Tree Preservation & Protection Standards

The Urban Tree Management Group

2017-05-15

Revised 2019-07-15

STANDARD STATEMENT

This Standard provides the guidance and procedures for Tree Preservation and Protection for development/utility applications on Public lands.

PURPOSE

The guidance given by this Standard was created for, and is to be used by all, those concerned with Tree Protection and Preservation. This includes but is not limited to, architects, landscape architects, engineers, builders, contractors, arborists, applicants, property owners and all others involved with the protection and preservation of trees within the proximity of proposed work during such applications. This Standard also gives clarity and consistency for all involved with the proposed development application of what is to be expected and what work is to be performed throughout the development by the applicant.

SCOPE

This Standard provides guidance on the principles for protecting trees on land subject to development or construction. It follows, in sequence, the stages of development from planning to implementation.

Where development or construction is to occur, the Standard provides guidance on how to decide which trees are appropriate for retention, and on the means of protecting those trees during construction work. It does not argue for or against development, or for the removal or retention of trees; nor does it consider the monetary value of trees.

APPLICATION PROCESS

This Standard provides guidance to the Public on what steps are required during and leading up to a successful Tree Preservation and Protection with the City of Mississauga. Understanding that most, if not all, development applications have many variables; the following steps are **required** for all projects.

- The following documents must accompany all applications or provide documented proof that it's not applicable. Examples of each of these requirements are provided in the Documentation Standards and Requirements that follow.

    1. **Completed application form for Tree Preservation and Protection**
    2. **Arborist Tree Preservation and Protection Report**
    3. **Tree Inventory**
    4. **Tree Preservation and Protection Plan on a current property survey**

DOCUMENTATION STANDARDS AND REQUIREMENTS

Arborist Tree Preservation and Protection Report

The Arborist Tree Preservation and Protection Report must contain the following components and must be created with a computer program such as Word or similar and formatted as a PDF.

- Title page including
    - Property Address
    - Applicant's Name
    - Author's Name, Title and Company Name
    - Date

- Scope of Project including
    - Project type such as renovation, rebuild or addition
    - Number of trees on property and number of trees affected by project

- Comments including
    - Site condition and tree condition in general
    - Mitigation and preservation procedures such as compaction alleviation techniques or root exploration and pruning methods
    - Proposed tree work requirements
    - Any flora or fauna species at risk observed, such as Butternut or Redheaded Woodpecker, or lack thereof

- Summary and Conclusion including
    - Number of trees removed and/or affected by project
    - Signed letter of consent by both owners for any shared trees to be removed
- Pictures including
    - Overall site pictures
    - Inventoried trees whether to be removed or to remain
    - Validation of dbh (diameter at breast height 1.4m above ground) of all inventoried trees
    - Any hazardous trees or conditions on site along with pre-existing damage or previously removed trees

Tree Inventory Document

Tree Inventory for each tree must contain the following components and must be created with a computer program such as Excel or similar and formatted as a PDF.

- Species Variety/Cultivar Name in both common and botanical forms
- Size (dbh 1.4m above ground)
- Size of TPZ (Tree Protection Zone in meters)
- Ownership (example private, neighbor, city, shared)
- Health , Structure, and Overall Condition (ratings to be used Good, Fair, Poor, and Dead)
- Preserve or Remove
- Tree Appraisal Value using the Trunk Formula Method for city trees
- Site Comments (example Cavity, Hanger, or Dead Limb)
- Preservation Comments (example root exploration and pruning using Air Spade or hydro vac, etc.)

Tree Preservation and Protection Plan

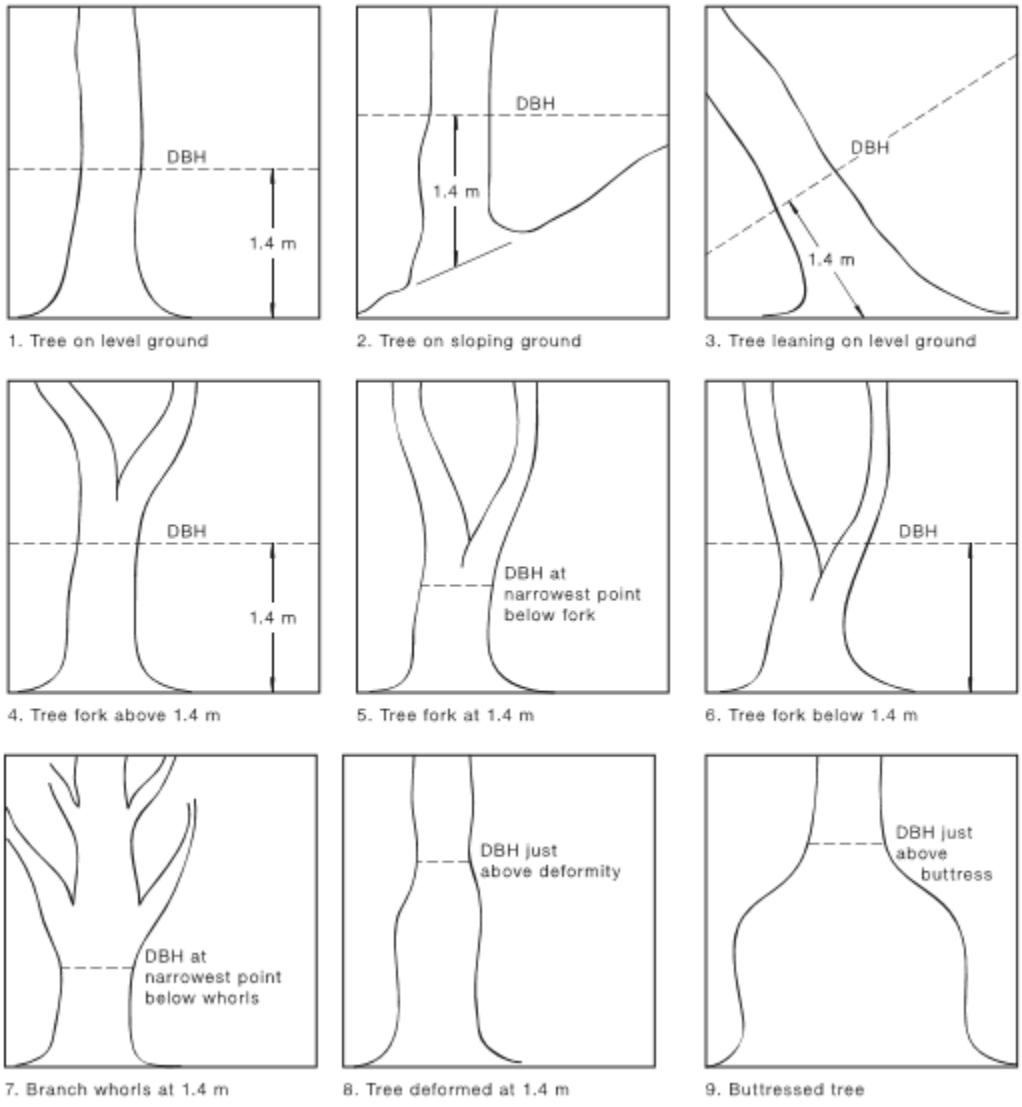
Tree Preservation and Protection Plan must contain the following components and must be created with a computer design program such as CAD or similar and formatted as a PDF.

- All inventoried trees noted and numbered on plan with a unique identifier that must correspond with the tree inventory.
- All TPZ noted along with minimum distances measured from the outside edge of trunk
- All removals to be marked with a X on the plan
- All preservation methods such as protection fencing or root exploration trenches shown on plan
- Construction access and stockpiling areas
- Legend
- Entire plan must be overlaid on a current survey with proposed project shown for reference

DETERMINING TREE PRESERVATION MINIMUM DISTANCES

MEASURING DIAMETER AT 1.4m ABOVE GROUND

Diameter at breast height must be measured at 1.4m from the ground using a calibrated tool such as a caliper, diameter tape or a tool designed to measure diameter.



Once the diameter is determined the following formulations must be used to determine the Tree Protection Zone.

DETERMINING TREE PRESERVATION MINIMUM DISTANCE FOR A SINGLE STEM TREE

The Tree Protection Zone (TPZ) is determined for each tree by multiplying its diameter at breast height at 1.4m from the ground (dbh) by a factor of 6 for street trees & 12 for open spaces and woodlands.

Example

Street Trees	Open Spaces & Woodlands
TPZ = dbh × 6 / 100	TPZ = dbh × 12 / 100
1.8m = 30cm x 6 / 100	3.6m = 30cm x 12 / 100

DETERMINING TREE PRESERVATION MINIMUM DISTANCE FOR A MULTI STEM TREE

1. Multiply each stem measurement by itself.
2. Add up the amounts of all stems.
3. Calculate the square root of the total to find the number to record as the DBH of the tree.

Example:

1. A three stemmed tree with diameters of 32cm, 64cm and 66cm.

32X32=1024
64X64=4096
66X66=4356

2. Add the amounts = 9476

3. Square Root (√) 9476 = 97.3

The DBH of the multi-stemmed tree = 97.3cm

TPZ = dbh × 6 / 100

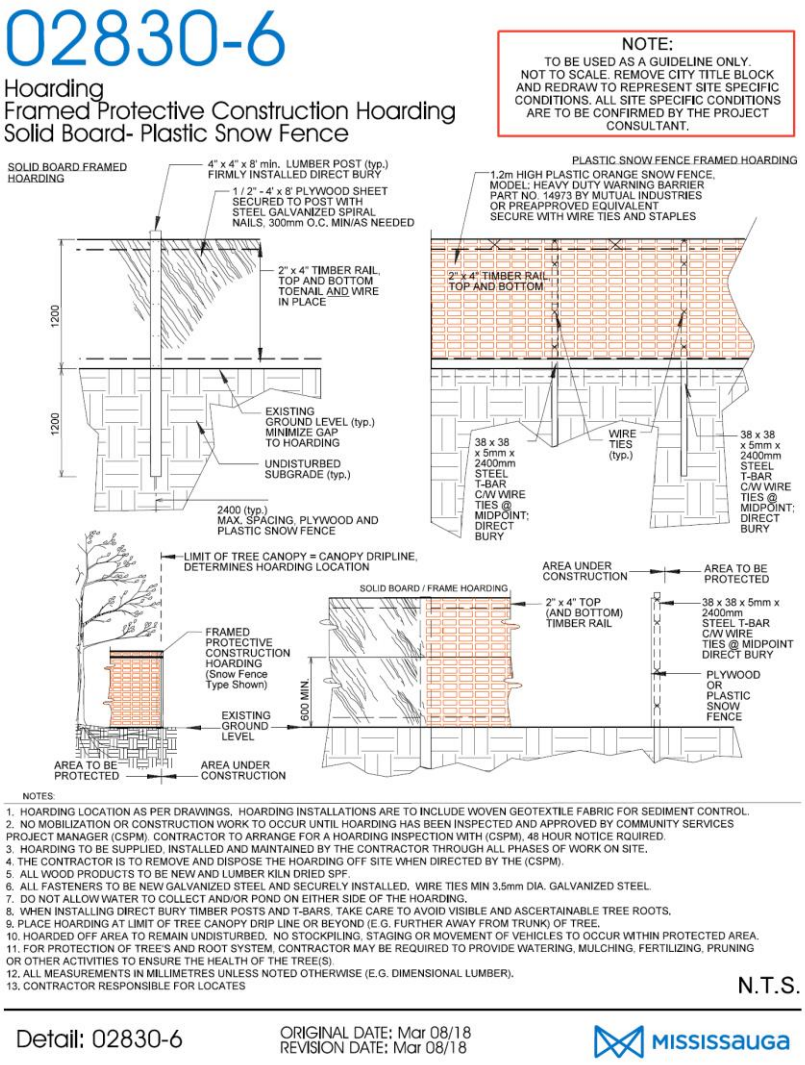
5.83m = 97.3cm x 6 / 100

You may also reference the TPZ table on page 13.

These minimum distances provide the minimum protection for anchor and traverse roots; however there can still be significant damage to lateral roots which are important for the trees biological function. For this reason, The City of Mississauga Forestry Department may require or reserves the right for larger tree protection zones than the minimum.

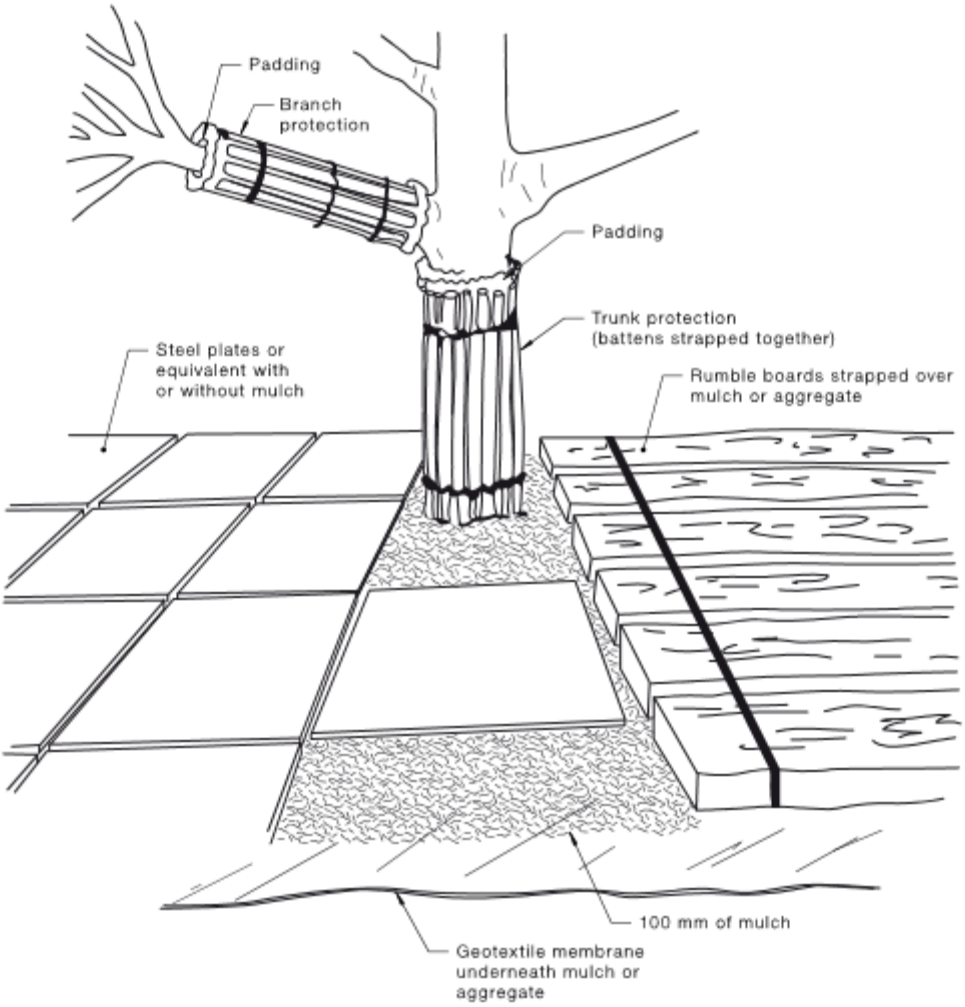
TREE PRESERVATION FENCING, CONSTRUCTION, SIGNAGE, AND TREE PROTECTION MEASURES

Below are the City of Mississauga's Approved Tree Preservation Fencing Specifications. All other fencing construction methods and material must be pre-approved by The City of Mississauga in advance of construction. All details are available in PDF format from Mississauga Forestry.



Approved Tree Protection Methods

Below are examples of approved tree protection methods that would be accepted. All other tree protection methods and material must be pre-approved by Mississauga Forestry in advance of construction.



Approved Tree Protection Zone (TPZ) Sign

Below is the approved tree protection zone sign. Tree protections zone signs are available for purchase at the City of Mississauga. Installation of the TPZ signs is mandatory; no other signage is permitted to be fixed onto any tree protection hoarding.

PROHIBITED ACTIVITIES WITHIN TREE PROTECTION ZONES

Except where authorized by Mississauga Forestry the following activities, including, but not limited to, are prohibited within the TPZ:

- Construction activities
- Storage of materials
- Storage of equipment
- Excavation
- Grade changes
- Cutting, tearing, breaking tree's roots, branches and trunk
- Dumping
- Parking
- Stringing Cables/Wires

ACTIVITY ALLOWED WITHIN TREE PROTECTION ZONES

It is to be understood that any type of activity within a Tree Protection Zone has an inherent risk of causing damage to the subject tree. Mississauga Forestry advises that any form of activity be avoided at all costs but fully understands that there may be a need to do so. Any activity within the Tree Protection Zone must be pre-approved by Mississauga Forestry. Below are some of the activities that Mississauga Forestry recognizes as acceptable practices of working within Tree Protection Zones if done appropriately. All other activities are to be avoided unless pre-approved by Mississauga Forestry.

Approved Types of Activities

- Excavation
    - Root Exploration/Root Pruning
    - Foundation/Basement Construction
    - Utility Relocation/Repair
    - Directional Boring – minimum 1.2m Depth

- Site Accessibility
    - Temporary Road/Entrance
    - Construction Worker Access
    - Material Delivery

Excavation

When excavation is necessary within Tree Protection Zone proper care must be taken when performing such activities. Excavation methods must be pre-approved and documented with the City of Mississauga Forestry. The following methods are acceptable and must be either conducted or supervised by a Certified Arborist during the activity.

- Hand Digging
    - No Mechanical advantage such as excavator, backhoe, or skid steers

- Air Assist Machinery
    - Air Spade/Air Knife using 185 cfm portable air compressor
    - Air vacuum unit

- Hydro Vac
    - Maximum water psi of 500 or less
    - Oscillating nozzle

- Root Pruning
    - Any exposed roots which are frayed or damaged shall be pruned in accordance with good arboriculture practices
    - Prolonged exposed roots shall be kept moist and covered with mulch or moistened burlap
- Directional Boring / Micro Tunnelling
    - All efforts should be made to route all underground utilities around the TPZ; if this cannot be achieved, utilities should be bored or tunnelled with a minimum depth of 1.2m under the TPZ. Boring/tunnels should not go directly beneath the trunk; instead the boring/tunnels should be offset based on the tree diameter

Site Accessibility

When site accessibility is necessary within or through Tree Protection Zone proper care must be taken when performing such activities. Site accessibility methods must be pre-approved and documented with Mississauga Forestry. The following methods are acceptable but must be recommended by a Certified Arborist and documented within the Tree Preservation Report and Plan. Mitigating measures such as horizontal hoarding/compaction alleviation measures must be under taken when such activities occur within the Tree Protection Zone. Below are some approved mitigating options for working within Tree Protection Zone.

- Multiple Layered Approach
    - Bottom Layer must consist of a pre-approved synthetic geotextile material
    - Middle Layer must consist of 8 – 12 inches of course wood chips
    - Top Layer must consist of ¾ inch hard wood plywood

- Two Layer Approach
    - Bottom Layer must consist of ¾ inch hard wood plywood laid in one direction of orientation
    - Top Layer must consist of ¾ inch hard wood plywood laid in opposite direction of orientation
    - Both layers must then be screwed together at 12 inch spacing
- Steel Plate
    - ¼ inch steel plate smooth finish on ground side no checker plate on ground side

Onsite Arborist Requirements

Whenever work is required within the Tree Protection Zone an arborist must be present and either performing or supervising the work at hand. Below are the qualifications required to be recognized as a competent arborist by Mississauga Forestry.

- Have a current certification in good standing from the International Society of Arboriculture, Certified Arborist or Board Certified Master Arborist; or,

- Have completed an apprenticeship in Arboriculture and completed the required hours/written exam to be a Qualified Arborist in the eyes of the Ontario Provincial Government; or,
- Have completed the qualifications and are a Registered Professional Forester (RPF); or,
- Have the verifiable skills and experience to perform or supervise said work within the Tree Protection Zone.

Hoarding Removal

The City of Mississauga must inspect all tree preservation hoarding prior to removal from the site.

Public Tree Replacement

PUBLIC TREE REPLACEMENT CHART Min. 60mm Diameter Deciduous/1.8m Height Coniferous	
Diameter at Breast Height (DBH) in cm	Number of Replacement Trees
6-15	1
16-30	2
31-45	3
46-60	4
61-75	5
76-90	6
91-105	7
106-120	8
>120	9

Tree Protection Zone Table

Trunk Diameter (cm)	Minimum Tree Protection Zone (TPZ) Distance from Trunk (m)	Minimum Tree Protection Zone (TPZ) Distance from Trunk (m) for trees in Open Spaces and Woodlands
<10 cm	1.2	2.4
10-20	1.5	2.4
21-30	1.8	3.6
31-40	2.4	4.8
41-50	3.0	6.0
51-60	3.6	7.2
61-70	4.2	8.4
71-80	4.8	9.6
81-90	5.4	10.8
91-100	6.0	12.0
>100	6 cm per 1 cm DBH	12 cm per 1 cm DBH

DEFINITIONS

- **AIR SPADE / AIR KNIFE** - is a specialist excavation tool that uses compressed air to remove and break up soil with minimal damage to roots and underground utilities. It can be used for a variety of reasons including the alleviation of compaction, soil improvement, root inspection and root location.
- **ARBORIST** - ISA Certified Arborist / ISA Board Certified Master Arborist / Ontario Qualified Arborist / Registered Professional Forester / verifiable skills and experience in arboriculture.
- **BILTMORE STICK** - is a tool used to measure various tree dimensions, such as diameter at breast height and height. It looks much like an everyday yardstick.
- **CAD (computer-aided design)** - software is used by architects, engineers, drafters, artists, and others to create precision drawings or technical illustrations.
- **COMPACTION** - process by which the porosity of a given form of sediment is decreased as a result of its mineral grains being squeezed together by the weight of overlying sediment or by mechanical means.
- **DBH** – diameter at breast height a measurement taken at 1.4 meters from the ground.
- **DEVELOPMENT APPLICATION** - is a formal request for consent to carry out proposed development, such as change of use of land, subdivide land, and carry out building, landscaping and other work.
- **DIRECTIONAL BORING** - commonly called horizontal directional drilling or HDD, is a steerable trenchless method of installing underground pipe, conduit, or cable in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area.
- **DRY VAC / HYDRO VAC** - is a type of tank truck that has a pump and a tank, designed to pneumatically suck liquids, sludge (such as fecal sludge), slurries or sand/water mixtures without the contact of any mechanical equipment.
- **MITIGATION** - Includes the prevention, modification or alleviation of impacts on the natural environment. Also includes any action with the intent to enhance beneficial effects.
- **PDF** - an abbreviation for the Netware Printer Definition File. PDF (Portable Document Format) is a file format that has captured all the elements of a printed document as an electronic image that you can view, navigate, print, or forward to someone else.
- **THE TRUNK FORMULA METHOD** - is used to appraise the monetary value of trees that are considered too large to be replaced with nursery or field-grown stock. The value of the tree is based on the cost of the largest commonly available transplantable tree and the cost to install it, plus the increase in value due to the larger size of the tree being appraised. As with the Replacement Cost Method, the Basic Tree Cost is adjusted according to species of the tree, its physical condition, and its landscape location (site, contribution, and placement).
- **TREE PROTECTION ZONE (TPZ)** - is the minimum setback required to maintain the structural integrity of the tree's anchor roots, based on generally accepted arboricultural principles.