

Natural Stand Valuation Guidelines

OPEN SPACE OPERATIONS - Last Update: March 2020

Edmonton

Equitable compensation may be pursued by the City from the civic or private entity where there is damage or loss to City trees, as explained in the City of Edmonton Corporate Tree Management Policy. These guidelines outline how equitable compensation for Natural Stands is determined using the Natural Stand Valuation Methodology (equitable compensation for trees in boulevard and open spaces is outlined in the *City of Edmonton Guidelines for Evaluation of Boulevard and Open Space Trees* and is not part of these guidelines). An equitable compensation value is calculated based on the concept of canopy replacement.

These guidelines were developed and adapted from *The Tree Evaluation Method for Natural Stands in Our Urban Environment*, which was developed from Alberta Agriculture publication, *A Guide to Determining Replacement Value of Trees and Shrubs in Alberta*, Section 3 (AGDEX 275/33-3). The methodology relies on unit rate costs to be updated annually by the City of Edmonton. As industry best-management practices and corporate processes evolve, there may be a need to review the equitable compensation methodology. This document is intended to be a working document and may be updated by the City of Edmonton at any time. Recovery of administrative costs and tree maintenance costs associated with project work is also outlined, but is not the primary function of this document.

When will the Natural Stand Valuation Guidelines apply?

Equitable Compensation may be pursued by the City from the civic or private entity causing partial loss (damage) or total loss of City tree(s) within a Natural Stand, as per the Corporate Tree Management Policy. Examples of situations where Equitable Compensation is sought for Natural Stands (but not limited to) are:

- As a result of not complying with Tree Preservation Guidelines, City bylaws or policies.
- As a result of vehicle accidents.
- As a result of natural stand removal requests.

How are the Natural Stand Valuation Guidelines applied?

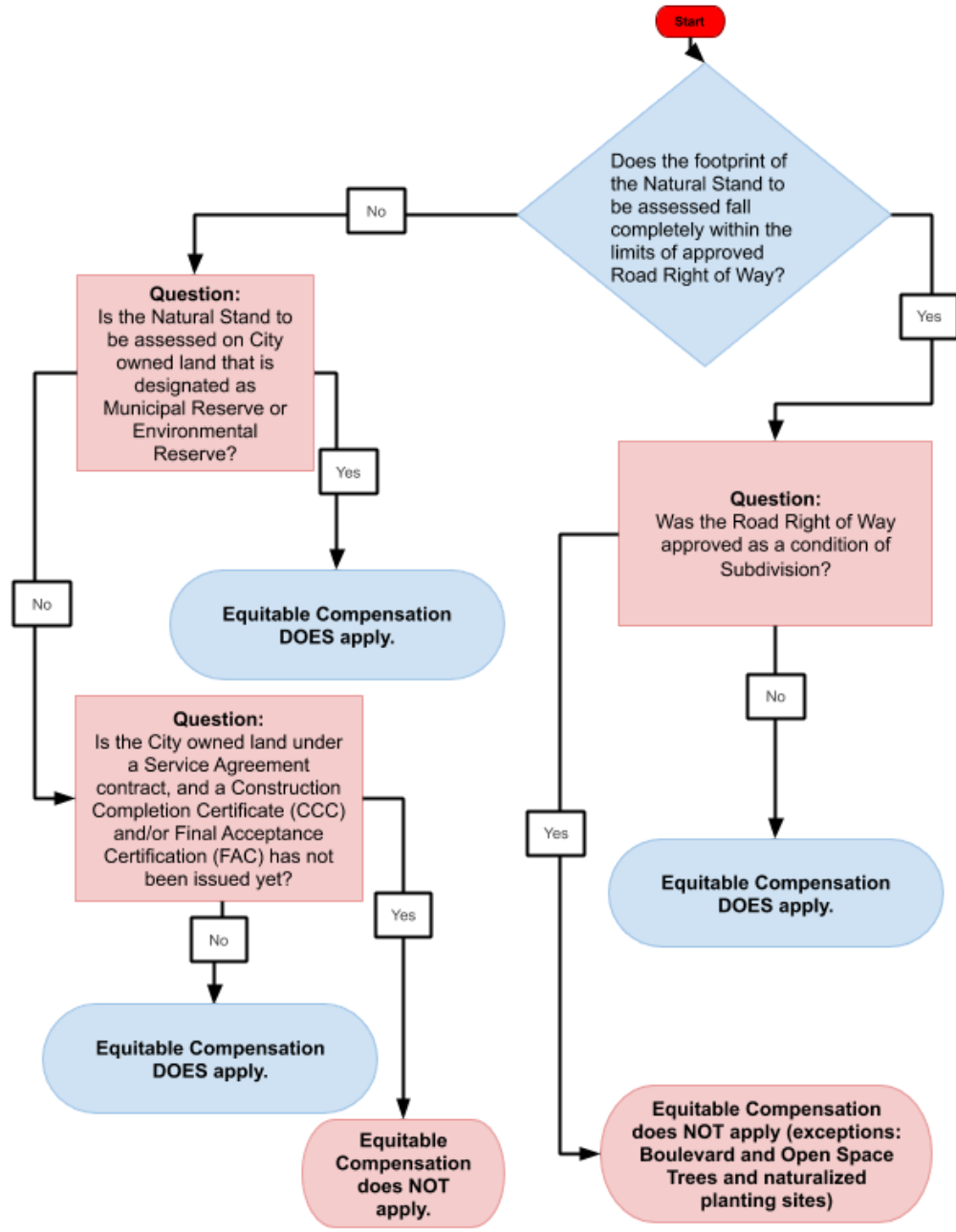
The City of Edmonton Natural Areas urban forester (CoE urban forester) will assess the Natural Stand for monetary value. If you are requesting tree removal within a Natural Stand or are responsible for the loss of City tree(s) in a Natural Stand, the CoE urban forester will work with you and explain how the value will be determined and billed.

The CoE urban forester will follow these steps to assess the Natural Stand value:

1. Determine if equitable compensation should apply (based on the scenario):



Application of Natural Stand Valuation Methodology



City Operations | Parks and Roads Services | Infrastructure Operations

Process to be followed by City of Edmonton urban forester. Unique situations may arise - final decision lies with the City of Edmonton urban forester.

Note: Unique situations may not meet the requirements of this decision tree. The City of Edmonton will make final decisions on when and how equitable compensation is sought.

2. Natural Stand valuation (CoE urban forester to complete assessment):
 Determine equitable compensation value: $V = (Pt + PtFv + Mc + Lr) * Sv_f$

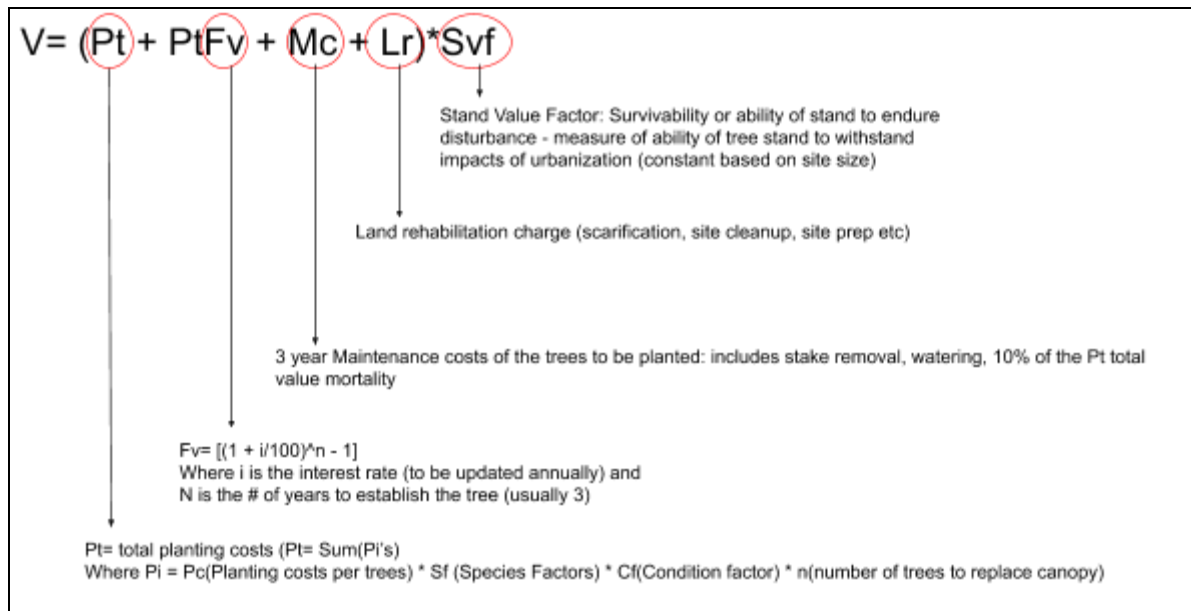


Figure 3: Formula for determining equitable compensation of Natural Stand.

A. Determine total planting costs (Pt)

a. $Pt = \sum(Pi's)$

Where $Pi = Pc(\text{Planting costs per trees}) * Sf(\text{Species Factors}) * Cf(\text{Condition factor}) * n(\text{number of trees to replace canopy})$

- b. Pi must be calculated for each species in the assessment.
- c. Pc is a unit rate based on the previous years' operational unit rates for planting costs per tree or shrub
- d. Sf is a constant percentage value used as a species rating for each species being assessed (Table 1, Appendix 1).
- e. Cf , the condition factor, assessment value determined by the Forester based on the matrix in Table 2, Appendix 1.
- f. n is the number of trees required to replace the canopy:
 Total area being assessed x % canopy cover of the species / canopy area of coverage for the given species
- Total area being assessed to be predetermined
 - Canopy cover (%) of stand: calculate all visible woody species from the bird's eye view perspective (total canopy cover to equal 100%, canopy cover(s) for individual species to be rounded to the nearest 5%).
 - Canopy area of coverage: each species has a theoretical canopy diameter and canopy area of coverage (Table 3, Appendix 1).

- Site should be staked out in the field by the entity responsible for the loss in tree canopy/damages prior to CoE urban forester's site visit.

B. Determine the future value (PtFv)

a. Pt determined in 2A.

b. Fv is the interest factor: $Fv = [(1 + i/100)^n - 1]$

i = interest rate (%) usually a rate of inflation.

n = number of years to establish the new trees (usually 3 years in an urban environment). For our purposes we use 3.

Current Fv rate in Item 1, Appendix 1.

C. Determine the 3 year establishment costs of the trees to be planted.

$Mc = (\text{establishment costs for 3 years} + 10\% \text{ mortality of the costs of planting a tree}) \times n$

Where: Establishment costs for 3 years = stake removal and watering costs for 3 years in addition to 10% of Pc value for mortality.

n = number of trees to be planted as outlined in 2Af.

D. Determine land rehabilitation Charge (Lr).

This would include costs associated with the clean-up, scarification and conditioning of the planting site if replanting to occur at site being assessed.

E. Determine the stand value factor (Svf).

a. Accounts for the survivability or the ability of the tree stand to endure disturbance caused by both external and internal factors. It is a measure of the ability of the tree stand to withstand the impacts of urbanization.

b. Value increases with the size of the site.

c. Constant values included in Table 4, Appendix 1.

F. Determine equitable compensation $V = (Pt + PtFv + Mc + Lr) \times Sv f$

3. CoE urban forester will recover costs (as per the Corporate Tree Management Policy) from the civic or private entity responsible for the tree loss:

A. The urban forester you are working with will provide additional details on information required to set up payments at time of project initiation (i.e. creation of Purchase Orders etc).

B. Administrative costs for CoE urban forestry personnel time will be recovered.

C. Costs associated with any required tree maintenance as a result of the Natural Stand tree loss will be recovered.

D. The equitable compensation value of Natural Stand tree(s) that were assessed for total loss will be recovered. The value recovered will be based on the

methodology described in Step 2 (Step 2F would determine total equitable compensation value).

Definitions:

All definitions in the [Corporate Tree Management and Tree Reserve Procedure](#) apply to this guideline.

References:

1. City of Edmonton. *Guidelines for Evaluation of Trees*.
https://www.edmonton.ca/residential_neighbourhoods/COE_Guidelines_for_Evaluation_of_Trees_20170424.pdf
2. Corns, I.G.W., Annas R.M. 1986. *Field guide to forest ecosystems of west-central Alberta*.
Canadian Forest Service, Northern Forestry Centre, Edmonton, Alberta.
3. Davies, M., *The Tree Evaluation Method for Natural Stands in Our Urban Environment*, 4th edition.
4. Grainger, G., *Determining Replacement Value of Trees and Shrubs in Alberta*. Alberta Tree Nursery and Horticultural Centre
5. Prairie Chapter International Society of Arboriculture. 2003. *Alberta Tree Species Rating Guide*.
<http://www.isaprairie.com/docs/Alberta-Tree-Species-Rating-Guide.pdf>

APPENDICES

Table 1: Tree Species Ratings Classes and Percentages for the City of Edmonton

BOTANICAL NAME	COMMON NAME
Class 1 – 110% (Special Class)	
Picea pungens ‘Koster’	Kosters Blue Spruce
Picea spp. (Specialties)	All grafted types of Spruce
Pinus spp. (Specialties)	All grafted types of Pines
Quercus spp.	Oak species
Class 2 – 100%	
Abies spp.	All Firs
Aesculus glabra	Ohio buckeye
Aesculus hippocastanum	Chestnut/Horse Chestnut
Elaeagnus angustifolia	Russian olive
Betula pendula gracilis	Weeping birch
Fraxinus selections	Patmore/Summit/Fallgold/Manchurian
Larix sibirica	Siberian Larch
Larix spp.	Larch Species
Picea spp.	All types of Spruce
Pinus spp.	All types of Pines
Populus tremula ‘Erecta’	Swedish Columnar Aspen
Pseudotsuga menziesii	Douglas fir
Syringa reticulata	Japanese lilac tree
Tilia americana	American basswood
Tilia cordata	Little Linden Leaf, Lime (Hybrids)

Ulmus americana 'Brandon'	American elm "Brandon"
Ulmus americana	American elm
Class 3 – 80%	
Acer ginnala	Amur maple
Acer saccharinum	Silver maple
Betula spp.	All other types of Birch
Crataegus spp.	Hawthorns
Fraxinus spp.	Common Green Ash & Black Ash
Juniperus scopulorum	Rocky Mountain Juniper & Cultivars
Malus baccata	Siberian flowering crab
Malus "Rosybloom Hybrids"	Rosybloom Crabs
Malus spp. Hybrids	Hybrid Apple/Crab
Populus x canescens 'Tower'	Tower Poplar
Populus x jackii 'Northwest'	Northwest poplar - cultivar
Prunus padus commutata	Mayday tree
Prunus spp.	Plums and Cherries
Prunus spp. Hybrids	Hybrid Cherries & plums
Pyrus ussuriensis	Ussurian Pear
Sorbus spp.	Mountain Ash Species
Class 4 – 60%	
Acer negundo (upright var. or form)	Manitoba maple (specialty upright forms)
Alnus spp.	Alder
Caragana arborescens	Standard Pea tree
Caragana arborescens vars.	Standard Pea tree – forms

Populus Hybrids	Hybrid Poplars
Salix acutifolia	Sharp leaf willow
Salix pentandra	Laurel leaved willow
Ulmus pumila	Siberian/Manchurian elm
Class 5 – 40%	
Acer negundo	Manitoba maple
Populus X 'Brooks #6'	Brooks #6 Poplar
Populus X 'Griffin'	Griffin Poplar (Non-fluff)
Populus spp.	Native poplars
Salix spp.	Native Willows

*Taken from the *Guidelines for Evaluation of Trees*.

**Values adapted from *The Tree Evaluation Method for Natural Stands in Our Urban Environment and Alberta Tree Species Rating Guide*.

Table 2: Tree Condition Rating

Percent	Description
100%	Perfect tree or specimen quality
90%	Excellent tree
80%	Very Good tree
70%	Above Average tree
60%	Good or Average tree
50%	Below Average tree
40%	Fair tree
30%	Poor tree
20%	Very poor tree

Table 3: Canopy Area per Tree for Tree Species Commonly Used in Edmonton

Tree Species	Canopy Area / Tree (m²)
Northwest Poplar	145
American Elm	145
Balsam Poplar	82
Manitoba Maple	89
Patmore Ash	65
Trembling Aspen	21
Willow / Birch	17
Black Ash	10
Common Caragana	9
Saskatoon / Cotoneaster / Alder	5
Dogwood	3
Scots Pine	22
White Spruce	18
Colorado Spruce	18
Larch	10
Lodgepole Pine	6
Jack Pine	10
Mugo Pine	3
Chokecherry / Honeysuckle	5
Mountain Ash	17
Currant / Gooseberry / Raspberry	3
Seabuckthorn	5

Roses	3
-------	---

* Adapted from Table I in *The Tree Evaluation Method for Natural Stands in Our Urban Environment*. Canopy Area per Tree recorded in this table as median value in range.

**Additional species have been added to this table that are frequently observed in Edmonton’s natural areas (canopy area adapted from original table using a value similar to listed species with a similar growing habit).

***Where additional species are observed in the natural area being assessed, use this table as a guide to determine the canopy area per tree based on a similar species and its growth habit and size characteristics.

****In the “calculation spreadsheet” a value of 7 is used for pine, as lodgepole pine most common in Edmonton (value 6) - increased value to 7 to account for some other pine species being planted.

Table 4: Stand Value Factors

Stand Value Factors	Area of the Site being Assessed
1.35	(> 5000m ²)
1.25	(3000m ² to 5000m ²)
1.2	(1500m ² to 3000m ²)
1.15	(500m ² to 1500m ²)
1.05	(< 500m ²)

Adapted from *The Tree Evaluation Method for Natural Stands in Our Urban Environment*.

Item 1: Interest Factor

<p>Formula: $Fv = [(1 + i/100)^n - 1]$ Current interest rate (i) = 2.7%* and n = 3 $Fv = [(1 + 1.6/100)^3 - 1]$ $Fv = 0.083206683$</p>
--

*Rate as of January 2020. Taken from [Consumer Price Index](#).