

Arborist Report

Pre-Construction Report

Prepared for:
Ahmad Zazo
579 Speers Rd
Oakville, ON L6K 2G4

Site Address:
579 Speers Rd
Oakville, ON L6K 2G4

November 8th, 2019

Prepared by:
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Summary

The following Arborist Report is with respect to the proposed single-story addition onto the rear of an industrial building at 579 Speers Rd in Oakville. Following the assessment of the site and location of work by DRG, the following conclusions have been made:

- Construction of an asphalt parking lot and re-paving of existing asphalt surfaces will necessitate the removal of 10 trees, 5 of which are regulated by Town of Oakville by-laws and will require permits to remove.
- Parking lot construction is planned within the regulated TPZ of 2 large Willow trees and will require permits to encroach within their TPZ's. Extensive tree and root protection measures are recommended to preserve these trees throughout construction under supervision of a project arborist. Such details are provided within this report.
- Replacement planting of 10 medium to large sized trees with suitable planting space is recommended following completion of the work. Additional replacement planting requirements are recommended to be satisfied via payments of cash in lieu of replanting.
- Canopy Cover Plan calculations indicate that retained and proposed replacement trees will provide a total of 28.5% canopy coverage, which exceeds the minimum 20% requirement for industrial properties under development.

Additional recommendations for tree maintenance and protection are also included herein. It is imperative for all crew contracted to perform this construction to thoroughly understand this report.

Introduction

Davey Resource Group (DRG) was retained by the client, Ahmad Zazo, to develop an Arborist Report and Tree Protection Plan (TPP) for the planned construction of a substantial addition to the existing industrial building on his property. An inventory and assessment of all the trees potentially affected by the proposed construction was conducted. The Arborist was to document the current condition of the trees that may be impacted by the planned construction and prescribe recommendations for tree preservation based on City of Oakville by-laws.

Trees were assessed for the overall health, size and potential impacts that would be caused by the excavation and construction activity. Trees that are large enough to be subject to TPZ encroachment or removal permit requirements in the Town of Oakville were assigned appraisal values in accordance with the International Society of Arboriculture's Guide for Plant Appraisal. Tree protection fencing has been planned out and mapped as part of this report in accordance with Town of Oakville by-laws and industry best practices in order to provide the best-case scenario for protecting each tree to be retained during construction. In locations where excavation is to take place within the minimum Tree Protection Zone distances of trees, recommendations for minimizing damage to trees and tree roots during excavation will be prescribed.

This report and each site assessment must be accompanied by the following additional documents:

1. A full printing of the tree inventory performed by Davey Resource Group (DRG), otherwise known as the Tree Protection Action Key (TPAK).
2. The construction maps with the Arborist Comments, otherwise known as the Tree Protection Plan (TPP).

Limitations of the Assignment

It must be understood that DRG is the assessor of the trees in relation to tree preservation practices. The construction supervisors should incorporate the information and recommendations provided within this report into their construction methodology to complete their project in a reasonable manner.

This Arborist Report is based on the project scope and details for tree preservation as discussed. All proposed construction methods are limited to what was provided in the site plans and in discussions with the client. Estimates, measurements and comments regarding tree preservation were based on the proposed construction plans.

This Arborist Report was compiled from field data collected from the ground. A basic visual assessment of the tree was performed. No level of ISA Tree Risk Assessment was performed. More data may be obtained in regard to risk through an ISA Tree Risk Assessment.

Methods

- The site was inspected on November 5th, 2019 by ISA Certified Arborist Joseph Steinfeld (ISA #: OH-6403A).
- Weather was 5°C and partly cloudy
- Tools used to assess the trees included a Biltmore stick, metric DBH measuring tape, metric measuring tape, and camera.
- Multi-stem trees were measured by taking the square root of the sum of each stem's squared value (sum of squares). E.g. 2 stems measuring 10cm = $(\sqrt{(100 + 100)}) = 14.14$.
- Photographs taken of each tree are provided in this report and have been annotated and/or labeled.
- All trees on the property over 5cm in diameter at breast height (DBH) as well as any trees within 6m of proposed construction or excavation on neighbouring lots were assessed and included in the inventory.
- The site plan and in-field measurements of tree locations in relation to planned construction activity were studied in order to determine tree protection, root/canopy pruning, or removal needs.
- On private properties, tree diameters were measured to determine applicability of Oakville by-laws protecting private trees over 15cm in diameter at breast height (DBH)
- Under Oakville guidelines for Permit applications, appraisals were calculated for each tree subject to TPZ encroachment permit requirements.
- Replacement tree information for tree appraisals is standardized to factor in a 5cm DBH replacement tree at \$150 total installation cost.
- Appraisal values for permit requirements are found in Appendix 2.
- All inspection of trees was on a visual basis to determine current health, structure, and overall condition at the time of assessment.



Observations

Site Information

- The property is located on the north side of Speers Rd. The total area of the property covers approximately 10,000m². The property is bordered to the west by a narrow strip of city-owned Natural Area containing a shallow creek bed with several mature Willows and smaller understory trees. Along the rear of the property lies a shallow ditch abutting a Metrolinx rail corridor.
- The area proposed for development is within the rear half of the property where a gravel parking lot and vehicle storage area currently exists. The area behind the addition is to be converted into an expansive asphalt parking lot with space for a truck turn-around to allow access to the building.
- The front portion of the property contains open grassy landscaping and a small asphalt parking lot which is proposed to be re-paved.

Tree Information

- 34 trees were collected for this report and are numbered #1-35 in the inventory.
 - All trees were tagged in sequential order from #301-#335 in accordance with numbering in the inventory and TPP/CCP. Tag #316 was spoiled so it was not used and as such there is no Tree #16 in the inventory.
- 21 trees were located in the private property, mostly along the creek on the western boundary.
- 6 trees were located on the boundary of, or within the natural area surrounding the creek, and are under city ownership.
- 5 Flowering Crabapple trees were located along Speers Rd within the city-owned right-of-way.
- 2 Willow trees were located within the steep ditch at the rear of the property within the Metrolinx Rail right-of-way.
- Trees #10 and #13, two large Willows, and Trees #11 and #26, two Manitoba Maples, are within or on the edge of the proposed parking lot in the rear of the property and will require removal. These trees are regulated by the Town of Oakville and will require permits for removal.
- Trees #3, 4, 5, 7, and 9, all Green Ash trees, were found with extensive Emerald Ash Borer symptoms and are recommended for removal. None of these trees are regulated.
- Trees #17 and #20, two large Willows, are not within the proposed parking area and may be retained with extensive protection measures made to ensure preservation of their roots.
- Tree #25, a large Willow tree in the center of the rear gravel lot, will require removal to pave the proposed parking area. A permit from the Town will be required.

For further details and observations, refer to the Tree Protection Action Keys found in the supporting materials. Trees have been numbered and can be cross-referenced with the TPP.

Discussion

The following sections discuss specific areas regarding the preservation of trees during construction.

Regulatory Context

On private properties within the Town of Oakville, trees and individual hedgerow stems over 15cm in diameter at breast height (DBH) are protected from removal or injury, requiring a permit to be issued by the town to do so. Under the by-laws, Tree Protection Zones surrounding each tree are defined by the tree's diameter and must be kept free of all construction activity above and below ground. Were any work to be required within the TPZ of a tree protected by the by-law a permit to injure the tree is required by the Town of Oakville. Any tree protected by the by-law that must be removed to accommodate construction also requires permit approval to proceed. If work is proposed within 6 meters of a tree but not within its TPZ, it is in the best interest of the client to protect it using a Tree Protection Fence built to city standards (depicted in Appendix 4). This serves to prevent any incidental contact or harm to a protected tree that would constitute a contravention of the by-law and may result in fines or a stop-work order. Below is a table of TPZ distances as defined by Oakville By-laws.

Table 1: Tree Protection Zone Distances

Trunk Diameter (DBH)	<10cm	11-30cm	31-50cm	51-60cm	61-70cm	71-80cm	81-90cm	91-100+cm
Minimum Protection Distance Required	1.8m	2.4m	3.0m	3.6m	4.2m	4.8m	5.4m	6.0m

Source: City of Oakville By-law 2003-021 Schedule F § 3 "Tree Protection Zones"

Tree Removal and Replanting

Under Oakville by-laws, one replacement tree must be planted for every 10cm of diameter of protected tree that is removed. Each replacement tree must measure at least 60mm caliper size for hardwoods, or 150cm in height for conifers. For this project, 5 bylaw-sized trees are planned for removal, measuring 135cm, 86cm, 88cm, 64cm, and 16cm. This corresponds to up to 36 replacement trees that may need to be planted on-site following construction completion. There is suitable space on-site along the top of the creek banks and in the front yard to plant 10 medium and large-sized trees with full 10m-wide and 14m-wide canopies respectively. Native trees must be selected and be suitable for planting in partial sun conditions as their intended planting locations in the backyard of the property are within a lowland area surrounded by larger trees and other buildings. So long as the minimum size requirements are met, these trees may be planted on-site after construction to fulfill tree removal permit conditions. Additional replanting requirements can be satisfied via fee payments.

Recommended Replacement Trees for 579 Speers Rd (In accordance with the TPP and CCP)

Replacement Tree #	Species	Stature
#R1	Hackberry	Large
#R2	Hackberry	Medium
#R3	Hackberry	Medium
#R4	Red Maple	Medium
#R5	Pin Oak	Medium
#R6	Red Maple	Medium
#R7	Pin Oak	Medium
#R8	Red Maple	Medium
#R9	White Elm	Large
#R10	White Elm	Large

Tree Injury and work inside TPZ's.

Within the minimum TPZ radius of a tree, excavation work poses the risk of critical harm to tree roots. Careless removal or injury of roots within TPZ distances typically causes long-term health issues and may threaten the stability of the tree, raising fall-over risk. In addition, loss of over 30% of a tree's roots threatens the long-term survivability of a tree, as this amount of root loss cuts off a significant amount of water and nutrient resources to the tree. Surface work within a TPZ, even without any mechanical damage to the bark or foliage/twig loss from incidental contact by construction machinery, threatens soil compaction and root suffocation. For this reason, it is recommended that solid geotextiles above a woven fabric surface be laid down above the gravel base within the TPZ of Trees #17 and #20, where substantial asphalt paving is planned. Properly installed root protection material underlaying the asphalt will ensure that the roots maintain air and water mixture within the soil beneath the pavement. During removal of the existing gravel surface and establishment of the grade above which the asphalt will be paved, exploratory root excavation using an air-spade or low-pressure Hydro-Vac followed by root pruning by the site arborist will allow for construction to proceed without causing unplanned damage to either tree and leave properly pruned root ends that heal faster than broken or ripped root ends. As both trees are in fair condition with some amount of decay or dieback due to their advanced age, it is also recommended that these trees be re-inspected annually beginning in the first growing season after completion of construction to monitor any changes in health that may have been caused by the construction.

Tree Preservation

Tree preservation is a pro-active measure that starts at the planning stage. Understanding the importance of tree roots in overall tree health and survivability is of the highest importance in implementing effective tree preservation measures. In cases where construction will take place near an existing tree and risk compaction of soil within its root space or damage to above-ground tissue of the tree, a Tree Protection Zone (TPZ) is established to mitigate any possible harm. Boxes or fences surrounding existing trees on the TPP are based on the available space to establish at TPZ distances recorded in the field. Fencing is recommended to be installed at or beyond the minimum TPZ distance over permeable spaces and out to the edge of established hardscapes or the boundary of planters where grow spaces are restricted. If excavation for foundation construction or driveway repaving is to take place within the TPZ of any tree, fencing will be recommended out to the edge of the proposed excavation in order to maximize total root space. This provides a 'best case scenario' for tree protection needs. During work for this project, it is necessary for hoarding fences to be established around trees within 5m of any construction activity while equipment and crew are moving around.

Tree Protection Hoarding

Hoarding (Tree Protection Fencing (TPF) is used on construction sites to ensure that damage to the tree and its root zone is prevented. This distance is typically located by the MTPZ. However, it must be understood that sometimes this distance is not achievable due to infrastructure or necessary excavation being too close. It must be further understood the hoarding distance sometimes must accommodate a larger TPZ (than the typical MTPZ distance) due to a limited root growing area/volume (this area is typically defined by the project arborist.)

Hoarding locations should be field marked by the project arborist, and hoarding installation will be installed by the contractor. This hoarding must be anchored to the ground and must be installed to the lines defined by the project arborist. All staging areas are understood to be outside the TPZ. At no time are materials, vehicles, traffic or debris to be stacked, staged, or piled inside the hoarding (Tree Protection Fencing). Hoarding must be installed prior to the start of construction, must be inspected by a city inspector and remain in good condition.

Rigid hoarding should be installed on the construction side as detailed on the Tree Protection Map that reflects the current construction plans. Refer to the Appendices for materials and construction of this hoarding. This hoarding will create the tree protection zone (TPZ).

Problems will arise for tree preservation efforts when anyone removes the hoarding, even temporarily. It takes one instance of soil compaction from a heavy machine for roots to suffer from air and water deprivation and for the tree to become stressed. It is imperative to install and maintain the hoarding in good condition throughout the entire construction.

Root Pruning Protocol

Root pruning is a practice to minimize injuries to trees. Roots in comparison to upper canopy limbs store a great deal of energy and reserves for trees to survive and must be removed with the utmost care and consideration. Similar to pruning the upper canopy of the tree, roots are best removed (if needed) via target pruning practices and not by being torn off. Roots must be assessed by a qualified and experienced arborist who can correctly determine the extent to which roots are pruned back so that healthy future root growth is ensured.

Tree Protection Signs

It is required to display Oakville Standard Tree Protection Signs on hoarding. These signs could be made in bulk at a discounted rate and installed on the hoarding in various locations. Signage informs the public and reminds the contractors of the significance of the TPZs and the efforts put forward by the client in tree preservation.

Conclusion

Out of 34 included in the inventory and studied for this report, 5 trees above by-law threshold size will require removal for establishment of the asphalt parking lot and truck access pathway. 2 by-law sized trees will require at least some work within their Tree Protection Zones. Replacement tree requirements may be imposed by the Town of Oakville as condition of tree permit approval. Locations for 10 replacement trees planted at 10-14m intervals are noted on the TPP and CCP. The planned replacement plantings, along with existing coverage from trees on and overhanging the site, provide an adjusted Site Canopy Cover of 28.5% (see Appendix 4). Trees to be retained on-site are to be protected using Tree Protection Fencing built to town standards. Specifications for dimensions of tree protection hoarding is to be found on the Tree Protection Plan (Appendix 3). Should tree preservation methods and the Tree Protection Plan be followed, the preservation and long-term survival of trees near construction can be expected. Additional replacement tree requirements may be satisfied by cash in lieu fee payments to the Town. All remaining trees above the 15cm by-law size threshold are to be protected throughout planned construction using Tree Protection Fencing built to town standards. Specifications for dimensions of tree protection hoarding is to be found on the Tree Protection Plans and in the appendices of this report.

Should tree preservation methods and the Tree Protection Plan be followed, the preservation and long-term survival of trees to be retained near construction can be expected.



Recommendations

In accordance with the comments and specific instructions listed in the Tree Protection Action Key (TPAK, Appendix 1), we have provided the following recommendations to the client:

- Submit a Tree Removal Permit application to the Town of Oakville pertaining to the following trees:
 - Tree #10: a 135cm Willow in good condition
 - Tree #11, a 16cm Manitoba Maple in good condition
 - Tree #13: an 86cm Willow in good condition
 - Tree #25, an 88cm Willow in fair condition
 - Tree #26, a 64cm Manitoba Maple in fair condition
 - All trees to be removed are within the private property of the client.
- Submit a Tree Protection Zone Encroachment Permit application to the Town of Oakville pertaining to the following trees:
 - Tree #17: a 111cm Willow in fair condition
 - Tree #20: a 107cm Willow in fair condition
 - Tree #20 is on city property within the natural area surrounding the creek.
- We recommend the removal of Trees #1, 3, 4, 5, 7, 9, and 19 from the property prior to construction to allow for asphalt paving and construction access. These trees are not regulated by Oakville by-laws.
- We recommend the client provide replacement planting of 12 trees within the site property following completion of construction. Each tree is to be of no less than 60mm caliper for hardwoods. Any additional trees unable to be planted on the site property may be accounted for via fee payments to the Oakville Replacement Tree Planting Fund.
- We recommend the upper creekbanks and areas immediately surrounding the west and north edges of the parking lot be remediated with native topsoil and mulch prior to planting of replacement trees. Sod is not recommended in these areas to support a natural growth medium for the trees.
- We recommend any excavation or construction work required within the TPZ of Trees #17 and #20 to be monitored by a qualified arborist, who shall provide Air-Spade root excavation and pruning as necessary and write follow-up reports detailing the work.
- We recommend proposed asphalt paving be done above a permeable aggregate and solid geotextile root protection material installed beneath the surface and above existing roots to be retained within the TPZ's of Trees #17 and #20.

Appendix 1 – Tree Protection Action Key

Tree Number	Species	Botanical	DBH (cm) @ 1.4 m	Oakville Tree Protection Zone Distance (m)	Ownership	Overall Condition	Tree Height (m)	Crown Width (m)	Construction inside TPZ (Y/N)	Removal (Y/N)	Comments
1	Staghorn Sumac	<i>Rhus typhina</i>	12	2.4	Private	Good	5	7	Y	Y	Cluster of stems along edge of existing parking lot
2	Black Walnut	<i>Juglans nigra</i>	16	2.4	Private	Good	7	7	N	N	2.5m from parking lot
3	Green Ash	<i>Fraxinus pennsylvanica</i>	14	2.4	Private	Poor	8	5	Y	Y	EAB symptoms present
4	Green Ash	<i>Fraxinus pennsylvanica</i>	8	1.8	Private	Poor	4	2	Y	Y	EAB symptoms present
5	Green Ash	<i>Fraxinus pennsylvanica</i>	13	2.4	Private	Poor	6	5	N	Y	EAB symptoms present; multiple stems (10cm, 8cm)
6	Manitoba Maple	<i>Acer negundo</i>	7	1.8	Private	Fair	5	3	N	N	2.3m from existing/proposed driveway
7	Green Ash	<i>Fraxinus pennsylvanica</i>	13	2.4	Private	Poor	9	6	Y	Y	within creekbed, 3m from existing/proposed driveway
8	Norway Maple	<i>Acer platanoides</i>	23	2.4	Private	Good	9	8	N	N	At bottom of creek slope; multi-stem (20cm, 11cm)
9	Green Ash	<i>Fraxinus pennsylvanica</i>	11	2.4	Private	Poor	8	5	Y	Y	Cluster of stems along creek; EAB symptoms present
10	Willow	<i>Salix spp.</i>	135	8.1	Private	Good	20	22	Y	Y	DBH measured at base, estimated due to heavy brush piled against; branch union at 1.8m; remove
11	Manitoba Maple	<i>Acer negundo</i>	16	2.4	Private	Good	8	6	Y	Y	At bottom of creek slope; removal for construction access
12	Basswood	<i>Tilia americana</i>	14	2.4	Private	Fair	3	5	Y	N	multi-stem (10cm, 9cm, 8cm, 4cm); Brush piled against trunk
13	Willow	<i>Salix spp.</i>	86	5.4	Private	Good	21	17	Y	Y	Multi-stem (70cm, 50cm); on edge of existing gravel parking lot; removal recommended
14	Manitoba Maple	<i>Acer negundo</i>	7	1.8	Private	Fair	3	6	N	N	At bottom of bank
15	Green Ash	<i>Fraxinus pennsylvanica</i>	7	1.8	Private	Good	5	2	N	N	At bottom of bank
17	Willow	<i>Salix spp.</i>	111	6.7	Private	Fair	21	23	Y	N	Multi-stem (69cm, 64cm, 59cm, 43cm); Preservation requires substantial root protection, solid geotextile above woven fabric with digging to establish base conducted using Air-Spade/Hydro-Vac recommended;
18	White Ash	<i>Fraxinus americana</i>	13	2.4	Private	Fair	10	7	Y	N	brush piled against; clear out
19	Manitoba Maple	<i>Acer negundo</i>	12	2.4	Private	Fair	8	6	Y	Y	On edge of proposed parking lot; remove

Tree Number	Species	Botanical	DBH (cm) @ 1.4 m	Oakville Tree Protection Zone Distance (m)	Ownership	Overall Condition	Tree Height (m)	Crown Width (m)	Construction inside TPZ (Y/N)	Removal (Y/N)	Comments
20	Willow	<i>Salix spp.</i>	107	6.4	City (Natural Area)	Fair	21	24	Y	N	Multi-stem(69cm, 69cm, 43cm) on east bank; new paving in tpz, root protection measures recommended similar to #17
21	Manitoba Maple	<i>Acer negundo</i>	16	2.4	City (Natural Area)	Good	7	5	N	N	Multi-stem (12cm, 11cm); in creek bed
22	Green Ash	<i>Fraxinus pennsylvanica</i>	11	2.4	Private	Fair	7	5	N	N	
23	Manitoba Maple	<i>Acer negundo</i>	28	2.4	Boundary/ City	Good	9	8	N	N	
24	Willow	<i>Salix spp.</i>	109	6.6	City (Natural Area)	Good	20	18	N	N	Multi-stem (93cm, 56cm); opposite bank, canopy overhangs site property
25	Willow	<i>Salix spp.</i>	88	5.4	Private	Fair	20	17	Y	Y	Multi-stem (63cm, 62cm); in gravel lot; removal required
26	Manitoba Maple	<i>Acer negundo</i>	64	4.2	Private	Fair	10	14	Y	Y	Multi-stem (37cm, 33cm, 30cm, 26cm); Poor structure, low branches, on edge of proposed parking lot; Remove
27	Willow	<i>Salix spp.</i>	45	3.0	Neighbour	Fair	10	11	N	N	lost main leader; in ditch 1m below grade; 2m from gravel lot
28	Willow	<i>Salix spp.</i>	94	6.0	City (Natural Area)	Fair	17	22	N	N	Multi-stem (50cm, 48, 48, 42)
29	Willow	<i>Salix spp.</i>	108	6.5	City (Natural Area)	Fair	17	23	N	N	Multi-stem (62cm, 60, 47, 45)
30	Willow	<i>Salix spp.</i>	50	3.0	Neighbour	Poor	8	16	N	N	not tagged; in steep ditch; overgrown with vines
31	Flowering Crabapple	<i>Malus spp.</i>	25	2.4	City (Street)	Good	5	8	N	N	DBH measured at 1m above ground
32	Flowering Crabapple	<i>Malus spp.</i>	18	2.4	City (Street)	Fair	5	7	N	N	growing next to hydro pole
33	Flowering Crabapple	<i>Malus spp.</i>	32	3.0	City (Street)	Fair	6	10	N	N	numerous epicormic sprouts
34	Flowering Crabapple	<i>Malus spp.</i>	27	2.4	City (Street)	Good	6	10	N	N	
35	Flowering Crabapple	<i>Malus spp.</i>	23	2.4	City (Street)	Good	5	7	N	N	

Appendix 2: Appraisal Estimation

This appraisal is being completed to meet the Town of Oakville's requirements for assessing trees being impacted by a construction proposal. All city-owned trees that require protection, or may be removed, must be evaluated based on the most recent International Society of Arboriculture's Guide for Plant Appraisal.

Tree valuation was determined on a tree per basis using the Trunk Formula Method developed in the current standard practice "Guide for Plant Appraisal, 10th Ed." Developed by the Council of Tree & Landscape Appraisers and published by the International Society of Arboriculture.

Tree Appraisal Background

The tree valuation calculation, theory and assumptions have been extracted from the following multiple sources:

- Guide for Plant Appraisal, 10th Ed." Developed by the Council of Tree & Landscape Appraisers. This provides the theory and foundation to the Trunk Formula Method (TFM) used in the individual tree appraisal determination.
- Values were referenced from Humber Nurseries (Deciduous trees were sourced as approximately 5 cm dbh (60mm caliper). Conifers were sourced as approximately 200 cm tall (closest to approximately 5 cm dbh).

The Trunk Formula Method (TFM) calculation extracted from the two sources of theory and application literature is explained below:

$$\text{Value} = \text{Basic Tree Cost} * \text{Depreciation (Functional Limitations * External Limitations * Condition Rating)}$$

Where,

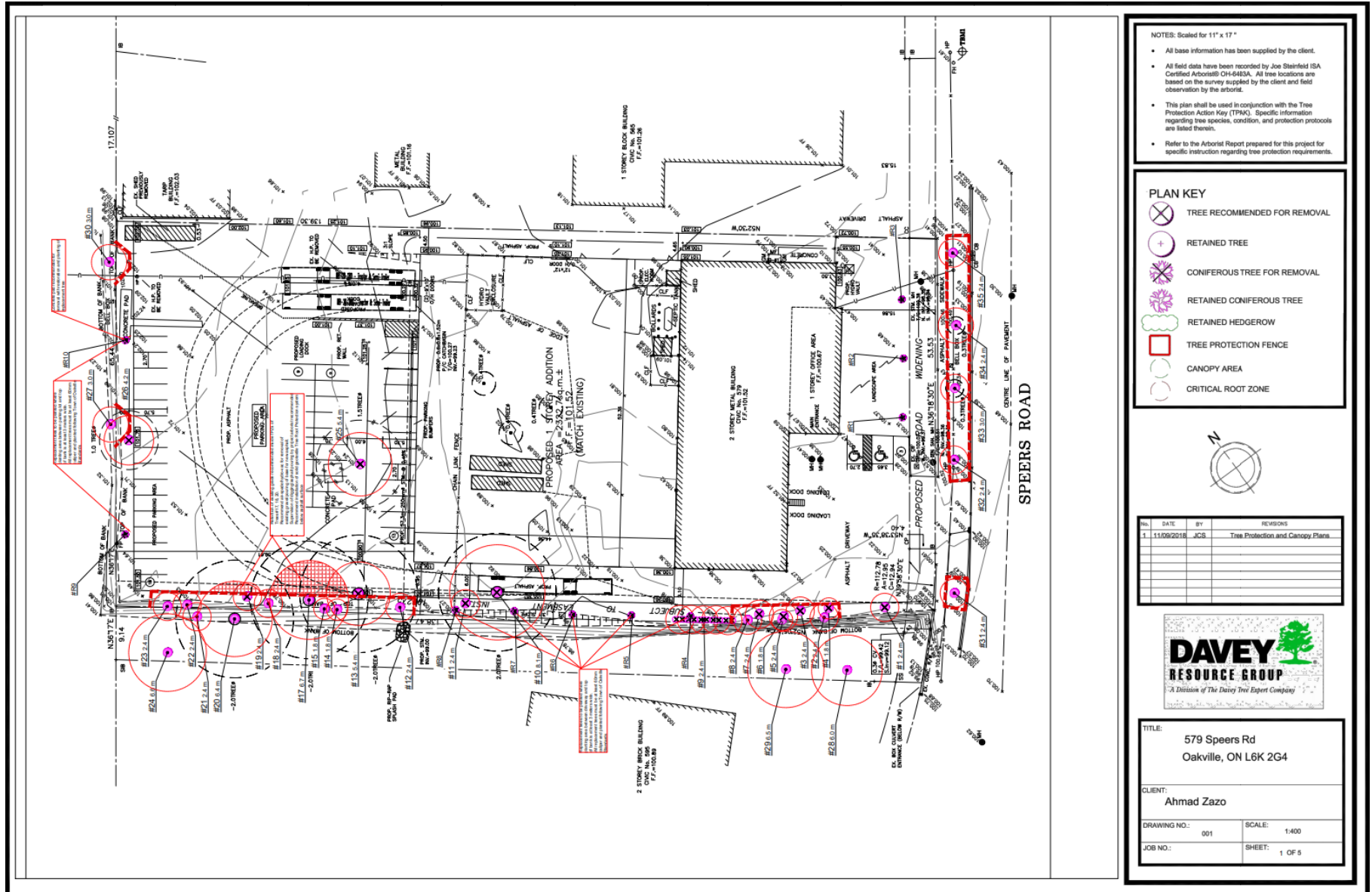
$$\text{Basic Tree Cost} = \text{Replacement Cost} + (\text{Base Price per Area} * (\text{Difference in Adjusted Trunk Area and Adjusted Trunk Replacement Area}))$$

Tree Appraisal Chart

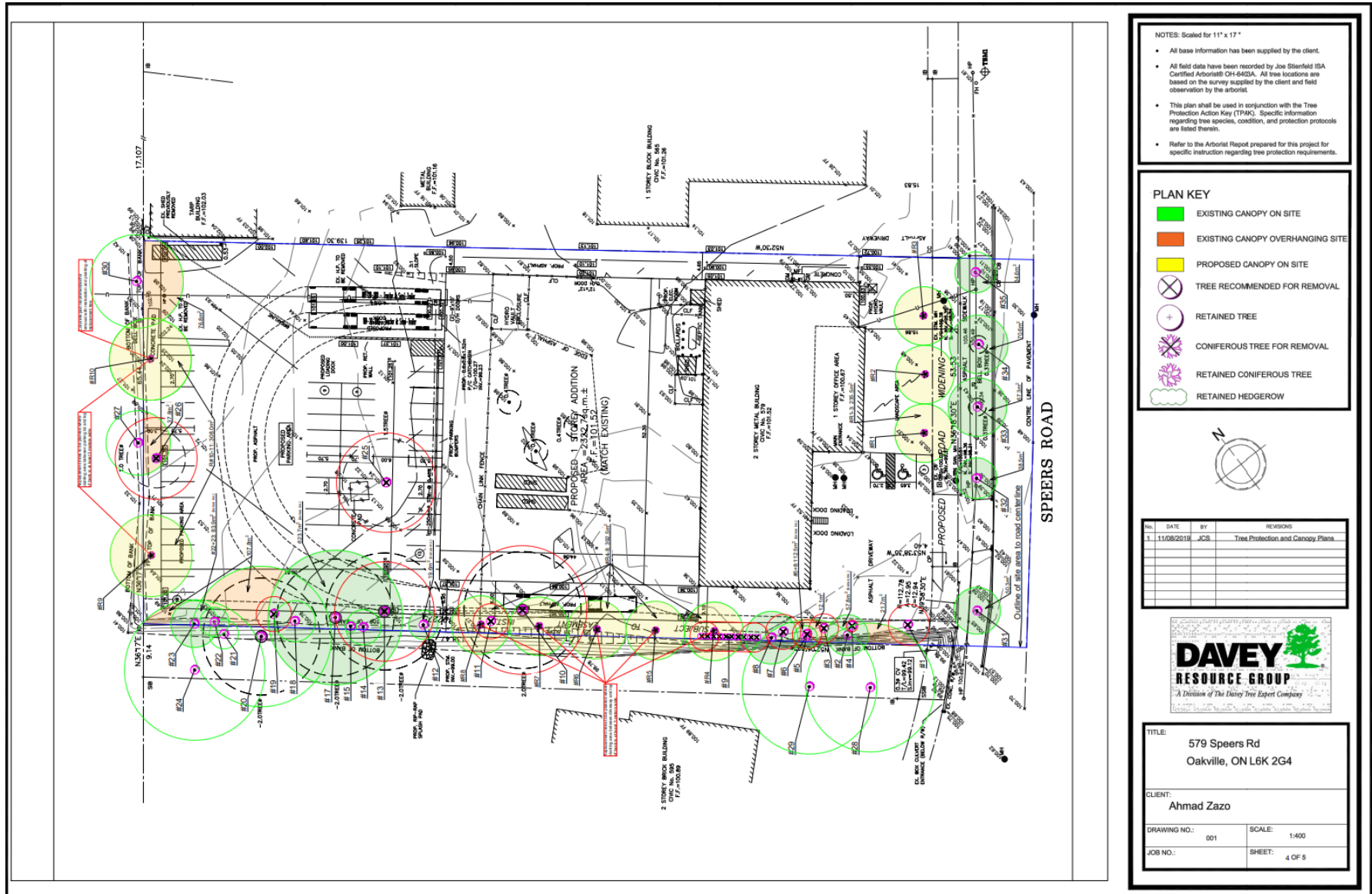
The following Chart outlines the figures determined for each tree.

Tree #	SPECIES	CONDITION	DBH	Functional Limitations	Condition Rating	External Limitations	Replacement Trunk (cm)	Replacement Cost	Install	Calculation
20	Willow	Fair	107	0.70	0.6	0.8	6	\$300	\$150	\$46,301.81
21	Manitoba Maple	Good	16	0.70	0.8	0.8	6	\$315	\$150	\$1,653.02
23	Manitoba Maple	Good	28	0.70	0.7	0.8	6	\$315	\$150	\$4,053.63
24	Willow	Good	109	0.70	0.8	0.8	6	\$300	\$150	\$64,057.59
28	Willow	Fair	94	0.70	0.6	0.8	6	\$300	\$150	\$35,768.88
29	Willow	Fair	108	0.70	0.6	0.8	6	\$300	\$150	\$47,168.47
31	Flowering Crabapple	Good	25	0.65	0.8	0.8	6	\$270	\$150	\$2,982.00
32	Flowering Crabapple	Fair	18	0.65	0.7	0.8	6	\$270	\$150	\$1,426.26
33	Flowering Crabapple	Fair	32	0.65	0.6	0.8	6	\$270	\$150	\$3,580.63
34	Flowering Crabapple	Good	27	0.65	0.8	0.8	6	\$270	\$150	\$3,449.14
35	Flowering Crabapple	Good	23	0.65	0.8	0.8	6	\$270	\$150	\$2,550.81

Appendix 3 – Tree Protection Plan (Preview – To be Printed to Scale)



Appendix 4 – Canopy Coverage Plan (CCP)



CANOPY CALCULATION CHART

FILE NUMBER

FILE NAME

579 Speers Rd

CANOPY COVER
TARGET

20% (Industrial)

Tree #	Species	Stature	Soil Volume per Tree (m ³)	Canopy Area (m ²)	Canopy Area Totals (m ²)
Proposed Canopy on Site					
R1	Hackberry	Medium	>30	78.5	
R2	Hackberry	Medium	>30	78.5	
R3	Hackberry	Medium	>30	78.5	
R4	Red Maple	Medium	>30	78.5	
R5	Pin Oak	Medium	>30	78.5	
R6	Red Maple	Medium	>30	78.5	
R7	Pin Oak	Medium	>30	78.5	
R8	Red Maple	Medium	>30	78.5	
R9	White Elm	Large	>30	154.0	
R10	White Elm	Large	>30	154.0	
Subtotal of proposed canopy					936.0

Existing Canopy on Site (to be Retained)

E2	Black Walnut	Large	N/A	38.5	
E6	Manitoba Maple	Medium	N/A	11.4	
E8	Norway Maple	Large	N/A	63.6	
E12	Basswood	Large	N/A	19.6	
E14	Manitoba Maple	Medium	N/A	0.0	
E15	Green Ash	Large	N/A	0.0	
E17	Willow	Large	N/A	415.5	
E18	White Ash	Large	N/A	0.0	
E22	Green Ash	Large	N/A	8.4	
E23	Manitoba Maple	Medium	N/A	50.3	
E31	Flowering Crabapple	Small	N/A	50.3	

E32	Flowering Crabapple	Small	N/A	38.5
E33	Flowering Crabapple	Small	N/A	78.5
E34	Flowering Crabapple	Small	N/A	78.5
E35	Flowering Crabapple	Small	N/A	34.6

Subtotal of existing canopy (x1.5 bonus) 1,333.6

Existing Canopy Overhanging Site

E20	Willow	Large	N/A	84.9
E24	Willow	Large	N/A	22.9
E27	Willow	Large	N/A	37.8
E28	Willow	Large	N/A	21.7
E29	Willow	Large	N/A	12.1
E30	Willow	Large	N/A	76.8

Subtotal of overhanging canopy 256.2

**Total # of
Trees 33**

Total Canopy Area 2,525.8

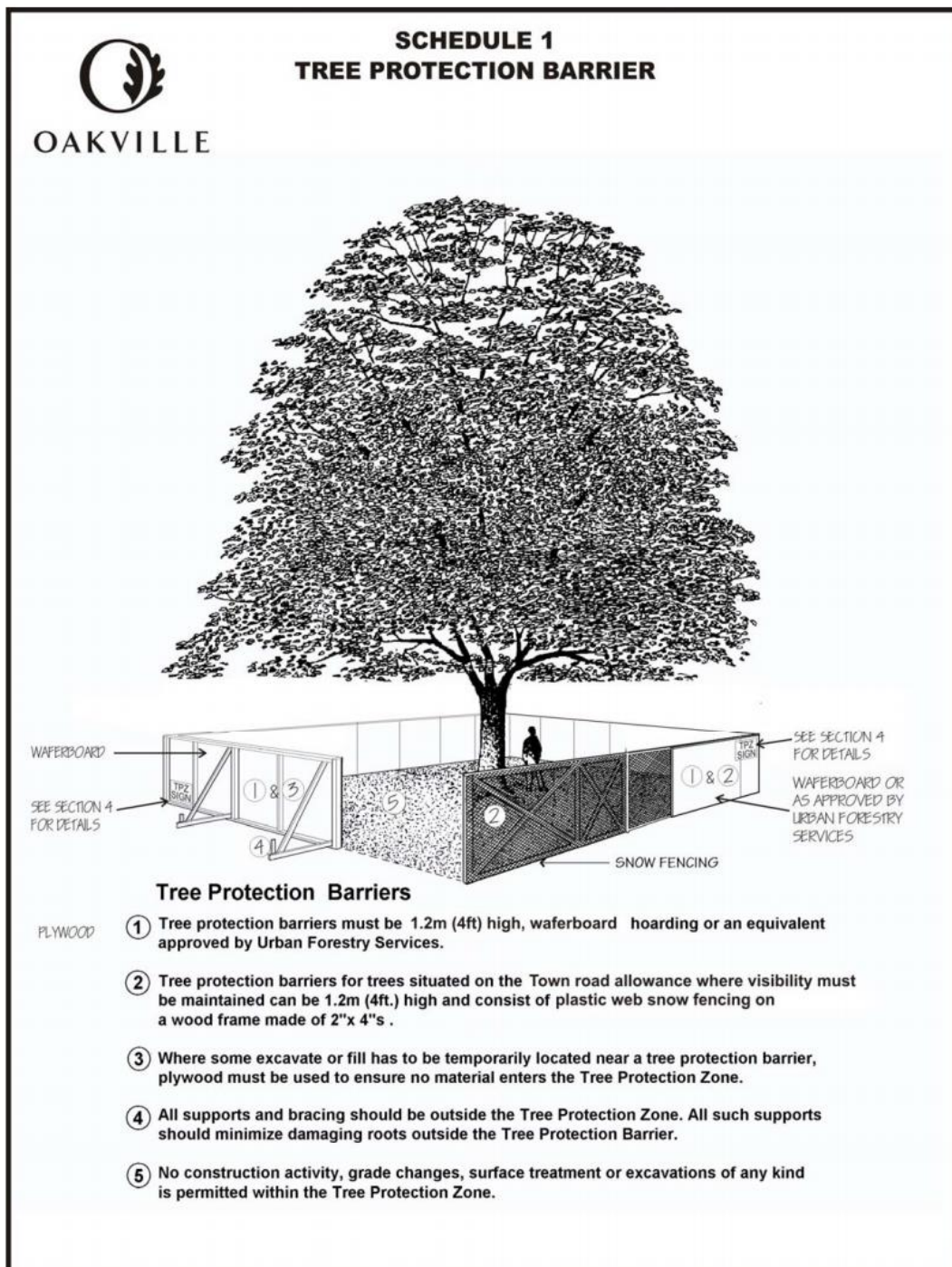
Canopy Summary

Total Site Area	<u>10,000m²</u>
Site Canopy Cover	<u>25.3%</u>
Canopy Cover Target by Land Use	<u>20%</u>

Parking Area Summary

Total Parking Spaces Proposed	<u>49</u>
Total # of Tree Plantings Proposed	<u>10</u>
Total # of Trees in or within 5m of Parking Area	<u>6</u>

Appendix 5 – Hoarding (TPF) Detail





Appendix 6 – Tree Protection Sign

A sign provided by the town that is similar to the illustration below will be paid for by the tree permit applications and mounted on one side of each tree protection barrier for the duration of the project.

Tree Protection Zone

No grade change, storage of materials or equipment is permitted within this area.
This tree protection barrier must not be removed without the written authorization of the Town of Oakville.
Report any contraventions to

Contact Name _____ **Tel No.** _____
Unauthorized removal of the tree protection barrier or other contraventions may result in prosecution.

Appendix 7 – References

1. ISA, 2001-2011. Best Management Practices, Books 1-9, Companion publications to ANSI A300 Standards for Tree Care
2. Dujesiefken, Dr. Dirk, 2012. Director of the Institute for Tree Care in Germany, The CODIT Principle, research presented on cambial regrowth on trees after injury at the Annual ISA Conference in Kingston Ontario
3. Sinclair and Lyon, 2005. Diseases of Trees and Shrubs, Second Edition
4. ISA, 2010. Glossary of Arboricultural Terms
5. Neely and Watson, ISA, 1994 and 1998. The Landscape Below Ground 1 and 2
6. Matheny and Clark, ISA, 1994. A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas, 2nd Edition
7. Matheny and Clark, ISA 1998. Trees and Development, A Technical Guide to Preservation of Tree During Land Development
8. PNW-ISA, 2011. Tree Risk Assessment in Rural Areas and Urban/Rural Interface, Version 1-5
9. Todd Hurt & Bob Westerfield, 2005. Tree Protection During Construction and Landscaping Activities
10. Council of Tree & Landscape Appraisers, Champaign, IL, 2000. Guide for Plant Appraisal, 9th Ed.,
11. Morton Arboretum, 2017. Determining the Age and Benefits of a Tree
<https://www.mortonarb.org/files/Find%20the%20Age%20of%20a%20Tree%20-%20high%20school.pdf>
12. Corporation of the Town of Oakville, 2017. By Law Number 2017-038

Appendix 8 – Glossary of Common Arboricultural Terms

Arborist	A professional who possesses the technical competence gained through experience and related training to provide for or supervise the management of trees and other woody plants in residential, commercial, and public landscapes.
ANSI A300	Acronym for American National Standards Institute. In the United States, industry-developed, national consensus standards of practice for tree care.
Bark Tracing	Cutting away torn or injured bark to leave a smooth edge.
Branch Bark Ridge	Raised strip of bark at the top of a branch union, where the growth and expansion of the trunk or parent stem and adjoining branch push the bark into a ridge.
Callus wood	Undifferentiated tissue formed by the cambium, usually as the result of wounding.
Clinometer	A device used to calculate the height of trees.
Consulting Arborist	An Arboricultural consultant is one of the following: <ul style="list-style-type: none"> American Society of Consulting Arborists, Registered Consulting Arborist (ASCA RCA#____) International Society of Arboriculture, Board Certified Master Arborist (ISA BCMA #____B) ISA Certified Arborist/Municipal Specialist in good standing for a minimum of 6 years with 6 years of proven experience in a management role related to arboriculture, and has attested and signed to a code of ethics related to arboriculture (ISA#____)
Compartmentalization	Natural defense process in trees by which chemical and physical boundaries are created that act to limit the spread of disease and decay organisms
Critical Root Zone – (CRZ)	Area of soil around a tree where the minimum amounts of roots considered critical to the structural stability or health of the tree are located. CRZ determination is sometimes based on the drip line or a multiple of dbh (12:1, 12cm of ground distance from the trunk for every cm of dbh) but because root growth is often asymmetric due to site conditions, on-site investigation is preferred.
Daylighting	Also known as Hydro-vac, this is the process by which soil is vacuumed up. In the context of tree care this allows workers to access the soil below the roots without mortal damage to significant roots.
DBH	Acronym for tree diameter at breast height. Measured at 1.4m above ground.
Decurrent	Rounded or spreading growth habit of the tree crown.
Directional Pruning	Providing clearance by pruning branches that could significantly affect the integrity of utility facilities or other structures, and leaving in place branches that could have little or no effect.
Dripline	Imaginary line defined by the branch spread of a single parent or group of plants

Excurrent	Tree growth habit characterized by a central leader and a pyramidal crown.
Included bark	Bark that becomes embedded in a crotch (union) between branch and trunk or between codominant stems. Causes a weak structure.
Lion's Tailing	Poor pruning practice in which an excessive number of branches are thinned from the inside and lower part of specific limbs or a tree crown, leaving mostly terminal foliage. Results in poor branch taper, poor wind load distribution, and higher risk of branch failure.
MTPZ	Acronym for Minimum Tree Protection Zone, also known as the Structural Root Zone (SRZ), which is the distance from the tree equal to 6 times the dbh, within which the likelihood of encountering roots that are structural supports for the tree.
Moment	Rotational force that is created by any line force on a body. The magnitude of a moment is defined as the product of the force magnitude and perpendicular distance from the line of action of the force to the axis of which the moment is being calculated.
Mortality Spiral	A sequence of stressful events or conditions causing the decline and eventual death of a tree.
Mulch	Material that is spread or sometimes sprayed on the soil surface to reduce weed growth, to retain soil moisture and moderate temperature extremes, to reduce compaction from pedestrian traffic or to prevent damage from lawn-maintenance equipment, to reduce erosion or soil spattering onto adjacent surfaces, to improve soil quality through its eventual decomposition, and/or to improve aesthetic appearance of the landscape. Mulch can be composed of chipped, ground, or shredded organic material such as bark, wood, or recycled paper; unmodified organic material such as seed hulls; organic fiber blankets or mats; or inorganic material such as plastic sheeting.
Organic Matter	Material derived from the growth (and death) of living organisms. The organic components of the soil.
CRZ	Acronym for Critical Root Zone, also known as the Critical Root Zone (see definition above), within which there is a high likelihood of encountering roots that are necessary for the survival for the tree.
Project Arborist	The consulting arborist retained to provide all tree preservation recommendations to the project manager or contractors on a given construction project.
Qualified Arborist	An arborist who has documented related training (i.e. ISA, MTCU, or equivalent) and on-the-job experience (minimum of 5 years)
Radial trenching	Technique for aerating the soil or alleviating compaction around a tree by removing and replacing soil (which may be amended) in trenches (typically 300mm deep and 150mm wide) made in a spoke like pattern (radially from the trunk) in the root zone to

	improve conditions for root growth.
Reaction Wood	Wood formed in leaning or crooked stems or on lower or upper sides of branches as a means of counteracting the effects of gravity.
Removal Cut	A cut that removes a branch at its point of origin. Collar cut.
Reduction Cut	A pruning cut that reduces the length of a branch or stem back to a lateral branch large enough to assume apical dominance.
Resistograph®	A brand name of a device consisting of a specialized micro-drill bit that drills into trees and graphs density differences that are used to detect decay.
Soft-Scaped	Landscaping practices that do not involved solid or deeply-dug foundations. Patios consisting of slab rocks laid on-top of the soil with minimal excavation and base (less than 10cm) and causing minimal damage to existing tree roots.
Static Support System	Cabling system that utilizes rigid materials such as rods and steel cables to limit movement and provide constant support of limbs.
Structural cells	Modular system consisting of units of soil and integrated support structures that serve both as a foundation for paved surfaces and a hospitable environment for tree root growth,
Structural pruning	Pruning to establish a strong arrangement or system of scaffold branches.
Structural Soil™	Pavement substrate that can be compacted to meet engineering specifications yet remains penetrable by tree roots in the urban environment. Composed of angular crushed stone, clay loam, and hydrogel mixed in a weight ratio of 100:20:0.03. Developed at the Urban Horticulture Institute, Cornell University, Ithaca, NY.
Supersonic Air Excavation Techniques (SSAT)	A methodology using a device that directs a jet of highly compressed air to excavate soil. Used within the root zone of trees to avoid or minimizing damage to the roots, or near underground structures such as pipes and wires to avoid or minimize damage to them.
Tree Protection Zone (TPZ)	Defined area within which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees, especially during construction. TPZ is sometimes based on a minimum multiple of dbh (e.g. 6:1, 6cm of ground distance from the trunk for 1cm of dbh)
Walls	Trees have 4 walls in a process known as compartmentalization. <ul style="list-style-type: none"> • Wall 1 prevents decay moving up and down in a tree • Wall 2 prevents decay moving inward in a tree • Wall 3 prevents decay moving laterally in a tree • Wall 4 is the new growth formed on the outside of the tree, callus growth.
Woundwood	Lignified, differentiated tissues produced on woody plants after wounding.



Appendix 8 – Arborist Qualifications



Joseph Steinfeld is a Consulting Arborist with Davey Resource Group. His formal education includes a Bachelor of Science in Ecology, Evolution, and Natural Resources with a focus in Forest and Landscape Ecology from Rutgers, the State University of New Jersey. Mr Steinfeld has almost ten years of varied work experience in the forestry, arboriculture, and ecological assessment fields. Mr. Steinfeld has worked with DRG for over four years as an Inventory Arborist, Asian Longhorned Beetle Damage Surveyor, Urban Forester, Site Manager, and Consulting Arborist.

Certifications

International Society of Arboriculture Certified Arborist (OH-6403A)
ISA Tree Risk Assessment Qualification

Appendix 9 – Photographs



Photo 1: View of Trees #1-8 along existing asphalt lot, with #28-29 in background



Photo 2: View looking southeast at Trees #9-13 (left to right)



Photo 3: View looking west along the creek bank at trees #13-22 (left to right). The foreground is to be paved with asphalt

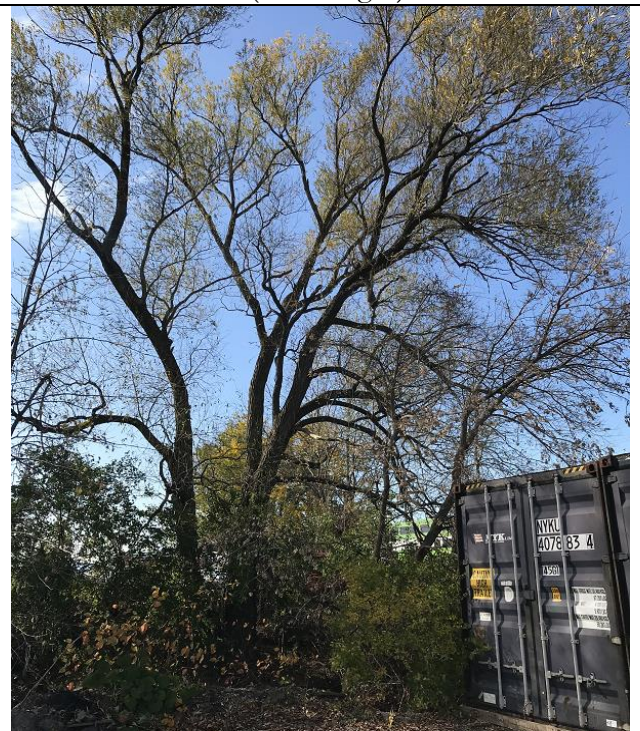


Photo 4: View looking west at Trees #23 (right) and #24 (left)



Photo 5: View of Tree #25 in the center of the back lot; to be removed.



Photo 6: Trees #26 (left) and #27 (right) at the rear of the property. Tree #27 may be fully protected, #26 is recommended for removal



Photo 6: Tree #30 at the northeast end of the property, within a steep ditch.



Photo 7: Trees #31-35, along Speers Rd. No work is proposed near these trees, they may be fully protected.

Conditions of Assessment Agreement

This Conditions of Assessment Agreement is made pursuant to and as a provision of Davey Resource Group, a division of The Davey Tree Expert Co. of Canada, Limited (“Davey”), providing tree assessment services as agreed to between the parties, the terms and substance of which are incorporated in and made a part of this Agreement (collectively the “Services”).

Trees are living organisms that are subject to stress and conditions and which inherently impose some degree or level of risk. Unless a tree is removed, the risk cannot be eliminated entirely. Tree conditions may also change over time even if there is no external evidence or manifestation. In that Davey provides the Services at a point in time utilizing applicable standard industry practices, any conclusions and recommendations provided are relevant only to the facts and conditions at the time the Services are performed. Given that Davey cannot predict or otherwise determine subsequent developments, Davey will not be liable for any such developments, acts, or conditions that occur including, but not limited to, decay, deterioration, or damage from any cause, insect infestation, acts of god or nature or otherwise.

Unless otherwise stated in writing, assessments are performed visually from the ground on the above-ground portions of the tree(s). However, the outward appearance of trees may conceal defects. **Therefore, to the extent permitted by law, Davey does not make and expressly disclaims any warranties or representations of any kind, express or implied, with respect to completeness or accuracy of the information contained in the reports or findings resulting from the Services beyond that expressly contracted for by Davey in writing, including, but not limited to, performing diagnosis or identifying hazards or conditions not within the scope of the Services or not readily discoverable using the methods applied pursuant to applicable standard industry practices.** Further, Davey’s liability for any claim, damage or loss caused by or related to the Services shall be limited to the work expressly contracted for.

In performing the Services, Davey may have reviewed publicly available or other third- party records or conducted interviews, and has assumed the genuineness of such documents and statements. Davey disclaims any liability for errors, omissions, or inaccuracies resulting from or contained in any information obtained from any third- party or publicly available source.

Except as agreed to between the parties prior to the Services being performed, the reports and recommendations resulting from the Services may not be used by any other party or for any other purpose. The undersigned also agrees, to the extent permitted by law, to protect, indemnify, defend and hold Davey harmless from and against any and all claims, demands, actions, rights and causes of action of every kind and nature, including actions for contribution or indemnity, that may hereafter at any time be asserted against Davey or another party, including, but not limited to, bodily injury or death or property damage arising in any manner from or in any way related to any disclaimers or limitations in this Agreement.

By accepting or using the Services, the customer will be deemed to have agreed to the terms of this Agreement, even if it is not signed.

Acknowledged by:

Name of Customer: _____

Authorized Signature: _____

Date: _____