



May 24th, 2019

Attention: City of Vancouver

Subject: 2880 Venables (DP2018-00128) - Review of Lombardy Poplar on West Side of Property

Dear City of Vancouver Council Members,

As stated in our three arborist reports dated September 7th, May 1st, and May 29th regarding the row of Lombardy poplar along the west side of the Notre Dame Regional Secondary School, we remain very concerned if structural roots to the east side of these trees are to be pruned, damaged, or in any way removed. It is our professional opinion the likelihood of a failure of one or more trees in the row would be high.

In reference to the development permit application in 2007, we recommended the Lombardy poplars be removed and replaced due to a minimum of 2.88-meter-deep excavation proposed for the new elevation of the parking lot 3 meters away from the trunks. Roots were found to extend at least 30 meters away from the trunks.

Structural roots were found within the first 40 cm of soil 2 meters away from the trunks during a Hydro-Vac investigation in 2018. The investigation was limited to the extent of the existing retaining wall.

In the second development permit application submitted in 2018, a minimum of 1-meter-deep excavation was proposed for the new elevation of the parking lot 6 meters away from the trunks. We are still concerned this proposed elevation change for the parking lot will result in structural roots being pruned and damaged.

This species of tree for this location is inappropriate given the inevitable root pruning and damage imposed by the planned design and necessary excavation. These trees are at the end of their life cycle and already represent a threat. It should be noted that during the first field review a groundskeeper working onsite reported two previous failures of this species on the east side of the school. Our recommendation remains the same, these Lombardy poplars should be removed and replaced, regardless of planned upgrades to the property.

If you have any further questions or concerns regarding this report, please contact the under signed at 604-882-0024.

Sincerely,

Kelly Koome
Senior Project Arborist
ISA Certified Arborist PN 5962A
ISA Tree Risk Assessment Qualified

Austin Peterson
Senior Consulting Arborist
ISA Certified Arborist PN A1570
ISA Tree Risk Assessment Qualified



Date: September 7, 2018

VDZ Project File No.:	PR2016-18
Project Name:	Notre Dame Regional Secondary School
Site Address:	2880 Venables Street, Vancouver, BC
Project Arborist:	Kelly Koome – van der Zalm + associates inc.
Consulting Arborist	Kelly Koome (PN 5962A) Arminder Virk (PN 8443A)

Attention:	City of Vancouver Dave Jerke – van der Zalm + associates inc.
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Subject:	Supervision of Hydrovac Excavation at Notre Dame School
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1.0 BACKGROUND

Assignment

Supervise the creation of multiple trenches using a Hydrovac within the area of proposed excavation of the sport field's retaining wall and parking lot. The Hydrovac excavation was used as a tool to determine whether the proposed excavation for a retaining wall and parking lot in close proximity to a row of onsite Lombardy poplar trees will impact their root structure.

2.0 OBSERVATIONS

The purpose of the arborist supervision was to monitor the creation of four trenches (approximately 0.5 meters wide and 1 meter deep) during a Hydrovac excavation (Fig. 3). These trenches were excavated directly east of Tree 024, Tree 034, Tree 036, and Tree 039, respectively. The purpose of this project was to assess the roots present within the Critical Root Zones of the row of Lombardy poplar trees located along the west side of the development site. The area is close in proximity to the proposed excavation location for a sport field's retaining wall and parking lot, which is to be built alongside the row of 24 poplars, approximately 4.3 meters east of the edge of the trees' trunks (Fig. 1). The Hydrovac excavation of tree roots was also used to assess the level of risk that would be associated with excavating and development within the Critical Root Zone of the row of Lombardy poplars onsite.

The Consulting Arborists, Kelly Koome and Arminder Virk, arrived on site at 7:45 AM, August 30, 2018. During the site visit, the row of Lombardy poplars (Trees 024 – 047) assessed appeared to be in fair condition but did show some signs of stress. It was observed that many of the trees had roots which extended under the parking lot (up to 30.0 meters east) and resurfaced above ground within the parking lot (Fig. 4). This is characteristic of this species, as its roots are shallow and typically extend far in all directions. The roots of the onsite Lombardy poplars have likely extended as far as observed in an attempt to find nutrient and water sources.

Prior to the start of the Hydrovac excavation, a site meeting was held. During this meeting it was discussed the best way to mitigate damage to the roots of the trees. Safety protocols and hand signals were also discussed prior to excavation.

The Hydrovac excavation of trenches took place less than 1.0 meter east of Trees 024, 034, 036, 039. Excavation on the east side of Trees 036 and 039 uncovered multiple roots of various sizes close to the soil surface (Fig. 5). Observations found roots from Tree 036 extending underground and resurfacing in the parking lot approximately 6.0 meters east (Fig. 6). Excavation on the east side of Trees 024 and 034



uncovered structural roots, as well as a layer of asphalt approximately 0.5 meters below the soil surface, which was paved up to the trees' roots (Fig. 2). It is assumed during the construction of the parking lot, asphalt was poured up to these trees' roots and soil for the garden bed was added on top of the pavement at a later date. Tree 034 was also observed to have roots extending underground and resurfacing in the parking approximately 6.0 meters away, while Tree 024 had roots extending 30.0 meters away (Fig. 4).

3.0 RECOMMENDATIONS

Given that structural roots of the Lombardy poplars were observed during the Hydrovac excavation, and several roots were observed surfacing in the parking lot (up to 30 meters east of the trees themselves), it is recommended that the row of Lombardy poplars is removed prior to the development of the retaining wall and parking lot. The roots of these trees extend into the proposed development site, therefore development will cause damage to these roots, increasing the risk of failure. These recommendations support the information provided in the previous two Arborist Reports, which states that if trees are retained the risk of failure is high, as excavation would cause significant damage to the root structures, which have developed much further than the Critical Root Zone.

4.0 PHOTOGRAPHS



Fig. 1 – View of edge of proposed retaining wall, which is located 4.3 meters from the edge of poplars' trunks



Fig. 2 – Excavated trench east of Tree 034, which uncovered a layer of asphalt 0.5 meters from the surface



Fig. 3 – Hydrovac excavation of trenches



Fig. 4 – Roots of Tree 024 in parking lot



Fig. 5 – Exposed structural roots of Tree 036



Fig. 6 – Roots of Tree 036 in parking lot



FIELD REPORT

If you have any further questions or concerns regarding this report, please contact the under signed at 604-220-7841.

Sincerely,

Sincerely,

Kelly Koome
Project Arborist
ISA Certified Arborist PN 5962A
ISA Tree Risk Assessment Qualified



VDZ + A Consulting Inc.

ARBORIST REPORT

PROJECT:

NOTRE DAME REGIONAL SECONDARY SCHOOL

SITE ADDRESS:

**2880 Venables Street
Vancouver, BC**

CLIENT:

CITY OF VANCOUVER

PROJECT # PR2016-18

PREPARED BY:

VDZ + A Consulting Inc.

**Suite 1, 20177 97 Avenue
Langley, BC V1M 4B9**

PROJECT ARBORIST

KELLY KOOME

ISA Certified Arborist PN 5962A
ISA Tree Risk Assessment Qualified

CONSULTING ARBORIST

ARMINDER VIRK

ISA Certified Arborist PN-8443A
ISA Tree Risk Assessment Qualified

May 2, 2018



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VDZ + A Consulting Inc.

Background

VDZ + A Consulting Inc. was contacted by the client to prepare an ISA Certified Arborist Tree Report for the property at 2880 Venables St Vancouver, BC.

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Assignment

The Consulting Arborist, Arminder Virk performed a site review entailing identification and visual assessment of the tree(s) on site based on the tree survey provided by the client or representative(s).

The Project and Consulting Arborist will provide recommendations for the retention or removal of tree(s) on this site based on the existing site conditions and the proposed use of the site. Mitigation of development impact on the tree(s) has been considered as part of the tree assessment process.

Limits of the Assignment

Arminder Virk's observations were limited to one site visit on May 1, 2018. No tissue or soil samples were sent to a lab for identification or analysis. VDZ + A Consulting located the trees using the tree survey provided.

Testing and Analysis

Arminder Virk used visual tree assessment and mallet sounding to test the trees' health and condition.

Purpose and Use of Report

The purpose of this report is to assist the property owner in complying with the City of Vancouver Tree Bylaw 9958.

Site Review



City of Vancouver Public VanMap Image

Proposed Site Development

Construction of a new sports field and parking lot

Environmental Description

ISA Certified Arborist Arminder Virk conducted a site review and evaluation of the trees located at the above referenced property on May 1, 2018. The proposed development site is flat, and the west side is currently being used as a parking lot. The property has a secondary school situated on the north and east sides of the proposed development.

There is evidence of nesting birds on this site. Removal of any trees prior to August 15th (date subject to change depending on seasonal nesting behavior and therefore must be confirmed with City of Vancouver) will require a bird nesting survey.

Off-site Trees – There are no private off-site trees associated with this project.

Municipal Trees – There are City of Vancouver trees along Parker Street associated with this project.

Tree Preservation Summary

All of the trees identified on the Tree Retention/Removal Plan and within the Tree Assessment Data Table have been given their Retention/Removal recommendation on a preliminary basis. Final recommendations will be based upon design/construction and grading details.

Long-term tree preservation success is dependent on minimizing the impact caused during pre-construction clearing operations, construction and post construction activities. Best efforts must be made to ensure the Tree Protection Zone remains undisturbed.

Ongoing monitoring of retained trees through the development process and implementation of mitigating works (watering, mulching, etc.) is essential for success.

**Table 1 - Tree Assessment Data:**

Tree Assessment Data Table 1 Corresponds with Tree Risk Assessment-Row of Lombardy Poplar Report Dated May 27, 2018 for the Above Address.

The following trees are located onsite						
The root structure for trees 24 through 47 have significantly developed further than the dripline in turn leading to asphalt lifting and exposed roots that are damaged. It is highly likely that the root structure for these trees are interconnected and removal of any roots without the complete removal of the trees could potentially lead to catastrophic failure.						
Tree #	Common Name (Botanical Name)	DBH (m.)	Condition	Comments	Retain / Remove	Tree Replacement
24	Lombardy Poplar <i>Populus nigra</i>	.77	FAIR	IMAGE 2 TRUNK- Growing beside chain link fence DRIP LINE = 5.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
25	Lombardy Poplar <i>Populus nigra</i>	.58	FAIR	IMAGES 2 DRIP LINE = 4.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
26	Lombardy Poplar <i>Populus nigra</i>	.49	FAIR	IMAGE 2 DRIP LINE = 3.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
27	Lombardy Poplar <i>Populus nigra</i>	.64	FAIR	IMAGE 2 CROWN- Dead branches TRUNK- Codominant stems at 2.0 METERS DRIP LINE = 4.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
28	Lombardy Poplar <i>Populus nigra</i>	.41	FAIR	IMAGE 2 DRIP LINE = 2.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City



29	Lombardy Poplar <i>Populus nigra</i>	.62	FAIR	DRIP LINE = 4.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
30	Lombardy Poplar <i>Populus nigra</i>	.47	FAIR	IMAGE 2 DRIP LINE = 3.5 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
31	Lombardy Poplar <i>Populus nigra</i>	.62	FAIR	IMAGE 2 DRIP LINE = 4.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
32	Lombardy Poplar <i>Populus nigra</i>	.69	FAIR	IMAGE 2 DRIP LINE = 5.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
33	Lombardy Poplar <i>Populus nigra</i>	.83	FAIR	TRUNK- Codominant stems at 1.5 METERS DRIP LINE = 4.5 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
34	Lombardy Poplar <i>Populus nigra</i>	.87	FAIR	TRUNK-Multi-stemmed trunk at 2.0 METERS DRIP LINE = 5.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
35	Lombardy Poplar <i>Populus nigra</i>	.69	FAIR	IMAGE 6 TRUNK- Co-dominant stems at 1.5 METERS DRIP LINE = 5.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
36	Lombardy Poplar <i>Populus nigra</i>	.51	FAIR	IMAGE 6 DRIP LINE = 4.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
37	Lombardy Poplar <i>Populus nigra</i>	.41	FAIR	IMAGE 6 DRIP LINE = 3.0 METERS	REMOVE	To Be Finalized Pending



VDZ + A Consulting Inc.

				NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area		Discussions with City
38	Lombardy Poplar <i>Populus nigra</i>	.36	FAIR	IMAGE 6 DRIP LINE = 3.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
39	Lombardy Poplar <i>Populus nigra</i>	.61	FAIR	IMAGE 6 DRIP LINE = 4.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
40	Lombardy Poplar <i>Populus nigra</i>	.50	FAIR	IMAGE 6 DRIP LINE = 4.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
41	Lombardy Poplar <i>Populus nigra</i>	.49	FAIR	DRIP LINE = 4.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
42	Lombardy Poplar <i>Populus nigra</i>	.56	FAIR	DRIP LINE = 5.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
43	Lombardy Poplar <i>Populus nigra</i>	.59	FAIR	DRIP LINE = 4.5 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
44	Lombardy Poplar <i>Populus nigra</i>	.58	FAIR	DRIP LINE = 5.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
45	Lombardy Poplar <i>Populus nigra</i>	.67	FAIR	DRIP LINE = 5.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City
46	Lombardy Poplar <i>Populus nigra</i>	.70	FAIR	DRIP LINE = 5.0 METERS	REMOVE	To Be Finalized Pending



VDZ + A Consulting Inc.

				NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area		Discussions with City
47	Lombardy Poplar <i>Populus nigra</i>	.80 .73 .33	FAIR	TRUNK- Codominant stems at 1.5 METERS DRIP LINE = 5.0 METERS NOT SUITABLE FOR RETENTION –Significant root structure within proposed excavation area	REMOVE	To Be Finalized Pending Discussions with City

The following trees belong to City of Vancouver

Tree #	Common Name (Botanical Name)	DBH (m.)	Condition	Comments	Retain/ Remove	Tree Replacement
C4	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.20	GOOD	DRIP LINE = 2.5 METERS NOT SUITABLE FOR RETENTION -Within foot print of proposed driveway	REMOVE	To Be Finalized Pending Discussions with City
C5	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.17	GOOD	DRIP LINE = 2.5 METERS SUITABLE FOR RETENTION –With tree protection fence	RETAIN	N/A
C6	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.17	GOOD	DRIP LINE = 2.5 METERS SUITABLE FOR RETENTION –With tree protection fence	RETAIN	N/A
C7	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.13	GOOD	DRIP LINE = 2.5 METERS SUITABLE FOR RETENTION –With tree protection fence	RETAIN	N/A
C8	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.13 .12 .09	GOOD	DRIP LINE = 2.5 METERS SUITABLE FOR RETENTION –With tree protection fence	RETAIN	N/A
C9	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.04	GOOD	DRIP LINE = 2.5 METERS NOT SUITABLE FOR RETENTION –Within foot print of proposed driveway	REMOVE	To Be Finalized Pending Discussions with City
C10	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.11 .06	GOOD	DRIP LINE = 2.5 METERS	RETAIN	N/A



VDZ + A Consulting Inc.

				SUITABLE FOR RETENTION –With tree protection fence		
C11	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.10	GOOD	IMAGE 1 DRIP LINE = 2.5 METERS SUITABLE FOR RETENTION –With tree protection fence	RETAIN	N/A
C12	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.14	GOOD	IMAGE 1 DRIP LINE = 2.5 METERS SUITABLE FOR RETENTION –With tree protection fence	RETAIN	N/A
C13	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.12	GOOD	IMAGE 1 DRIP LINE = 2.5 METERS SUITABLE FOR RETENTION –With tree protection fence	RETAIN	N/A
C14	Lavalle Hawthorn <i>Crataegus x lavallei</i>	.12	GOOD	IMAGE 1 DRIP LINE = 2.5 METERS SUITABLE FOR RETENTION –With tree protection fence	RETAIN	N/A



Type and Number of Replacement Trees

For each tree removed from a site, the property owner must plant:

- One tree from Part 1 of Schedule D, or;
- Two trees from Part 2 of Schedule D, or;
- A tree(s) acceptable to the Director of Planning.

Size of Replacement Trees

Replacement trees must measure:

- 6 centimetres in caliper (trunk width measured at 15 centimetres above the ground) or *3.5 metres height at the time of planting.*



Appendix A: GLOSSARY OF KEY TERMS

Abutment: A structure built to support the lateral pressure of an arch or span, e.g., at the ends of a bridge.

Age: The relative age (young, intermediate, mature) within the particular stand of trees or forest.

Algae: Is a simple, nonflowering plant (includes seaweeds and many single-celled forms). They do contain chlorophyll (but lack true stems, roots, and vascular tissue)

ALR: The Agricultural Land Reserve in which agriculture is recognized as the priority.

Bole: The stem or trunk of a tree.

C: Refers to trees on City property.

Chlorotic: Yellowing of plant tissues caused by nutrient deficiency &/or pathogen.

Co-dominant Leaders: Forked dominant stems nearly the same size in diameter, arising from a common junction.

Co-dominant Within Stand: Individual tree whose height is generally equal to trees (regardless of species) within the same stand.

Compaction: Compression of the soil that breaks down soil aggregates and reduces soil volume and total pore space, especially macropore space.

Conk: A fungal fruiting structure typically found on trunks and indicating internal decay.

Dead Standing: A tree that has died but is still standing erect.

Decurrent Tree Form: Tree form which develops when the lateral branches grow as fast, or faster, than the terminal shot. This results in a tree with a broad, spreading form and multiple trunks.

DBH: The Diameter of the tree at 1.40 meters above the ground.

Dominant Within Stand: Individual tree whose height is significantly greater than adjacent trees (regardless of species) within the same stand.

Dwarf Mistletoe: A species of parasitic plants that infect numerous tree species in North America. Severe dwarf mistletoe infection can result in reduced growth, premature mortality.

Excurrent Tree Form: Tree form which develops when the leader outgrows the lateral branches. This results in a tree with a narrow, cone-shaped crown and clearly defined central trunk.

C-rad: The Drip Line of the tree as measured by the distance from the edge of trunk to the edge of the outermost branches.

CRZ: Critical Root Zone - The area between the trunk and to the end of the Drip Line.

DRIP LINE: Means a circle drawn on the ground around a tree directly under the tips of the outermost branches of the canopy of the tree.

Fair: Healthy but has some defects such as co-dominant trunk, dead branches.

Feeder Roots: The smaller roots responsible for water and nutrient absorption and gas exchange. These roots can extend far beyond the Drip Line (or outer canopy) of the tree.

Fungus (singular) / Fungi (plural): Unicellular, multicellular or syncytial spore-producing organisms that feed on organic matter (including molds, yeast, mushrooms and toadstools).

Gale - A very strong wind.

Girdling Root: Root that encircles all or part of the trunk of a tree or other roots and constricts the vascular tissue and inhibits secondary growth and the movement of water.

Good: Good form and structure, healthy with no defects.

Hazardous: Significant hazard exists with a high risk of immediate failure; which could result in serious damage to property or person(s).

Height: Height of tree is approximate.

LCR: Live Crown Ratio – The ratio of crown length to total tree length.

Level 1 Limited Visual Assessment: Limited visual assessment looking for obvious defects such as, but not limited to dead trees, large cavity openings, large dead or broken branches, fungal fruiting structures, large cracks, and severe leans.

Level 2 Basic Visual Assessment: Detailed visual inspection (aboveground roots, trunk, canopy) of tree(s) may include the use of simple tools to perform assessment (i.e. sounding mallet, trowel, measuring tape, binoculars). The assessment does not include advanced resistance drilling of trunk.

Level 3 Advanced Assessment: To provide detailed information about specific tree parts, defects, targets, or side conditions. May include arial inspection, resistance drilling of tree parts, laboratory diagnosis of fungal or plant tissue.

Mildew: Is a minute powdery or web-like fungi (of different colours) that is found on diseased or decaying substances.

Moss: A small, green, seedless plant that grows on stones, trees or ground.

No Disturbance Zone: Drip Line + Trunk Radius + (60 cm excavation zone). For example, a 50-cm diameter tree with a 4-meter Drip Line would have a No Disturbance Zone of 4.85 meters measured from the edge of



the trunk.

Nurse Log - a downed log from which another tree (s) grows off of.

Orthotropic Shoot: A shoot that is more or less vertical in orientation, upon which the leaves are usually arranged radially around the stem.

OS: Off-site trees and due to restricted access their DBH measurements are approximate. An assessment of off-site trees does not imply they are safe as the restricted access prevented a thorough review.

Plagiotropic Shoot: A shoot that is more or less horizontal in orientation, and upon which the leaves are often arranged in one plane.

Poor: multiple defects, disease, poor structure and or form, root and or canopy damage.

Phloem: Plant vascular tissue that transports sugar and growth regulators. Situated on the inside of the bark, just outside the cambium. Is bidirectional (transports up and down). Contrast with xylem.

Phototropic: Growth toward light source or stimulant.

Retain & Monitor: Monitor health and condition of tree every 12 months for signs of deterioration.

Root Crown: Also called the root collar, it includes the flare at the base of the trunk and the initial roots that develop below the trunk. These roots generally taper and subdivide rapidly to form the root system of the tree.

Root Plate - That part of the root system (excluding the small outermost roots) needed to keep a tree windfirm.

Root Plate Failure - The displacement of the root plate in a gale, resulting in the permanent lean or complete failure of the tree with the soil level pushed up on the windward side.

RULE - Remaining Useful Life Expectancy - The expected period of time that a particular tree will remain *relatively* free of defects or deficiencies, that would cause it to decline rapidly in either health or into an unreasonable level of risk.

Shoot: An extension of growth from the stem of a plant, young enough to be furnished with leaves, often associated with pruned trees.

SPEA: Streamside Protection and Enhancement Area

Spiral Decline: The health and condition of the tree is deteriorating.

Sub-dominant Within Stand: Individual tree whose height is significantly less than adjacent trees (regardless of species) within the same stand.

Suckers: Undesirable stem growth from the roots of the lower trunk of a tree, especially those from a rootstock of a grafted tree.

Suppressed: Individual tree whose growth, health and condition are negatively impacted by adjacent tree(s).

Thrifty: Strong and healthy trees, thriving physically and growing vigorously.

TPZ: Tree Protection Zone - The area between the trunk and the Tree Protection Barrier.

Wildlife Tree: A tree or a group of trees that are identified to be retained to provide future wildlife habitat.

Wildlife habitat can exist in tree risks (cavities, dead snags, broken tops). Often times the tree risk to potential targets (people & property) is reduced by removing that part of the tree posing the risk of failure, but the tree (or portion of) is retained to provide future habitat.

Windfirm - Having no elevated risk of windthrow.

Windfirm Boundary - The boundary of a stand of trees that is considered windfirm.

Windthrow - The fall of a tree in a high wind.

Witches Broom: A dense mass of shoots growing from a single point, with the resulting structure resembling a broom or a bird's nest.

Xylem: Thin overlapping cells that helps provide support and that conducts water and nutrients upward from the roots all the way to the leaves.

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Appendix B- PHOTOS

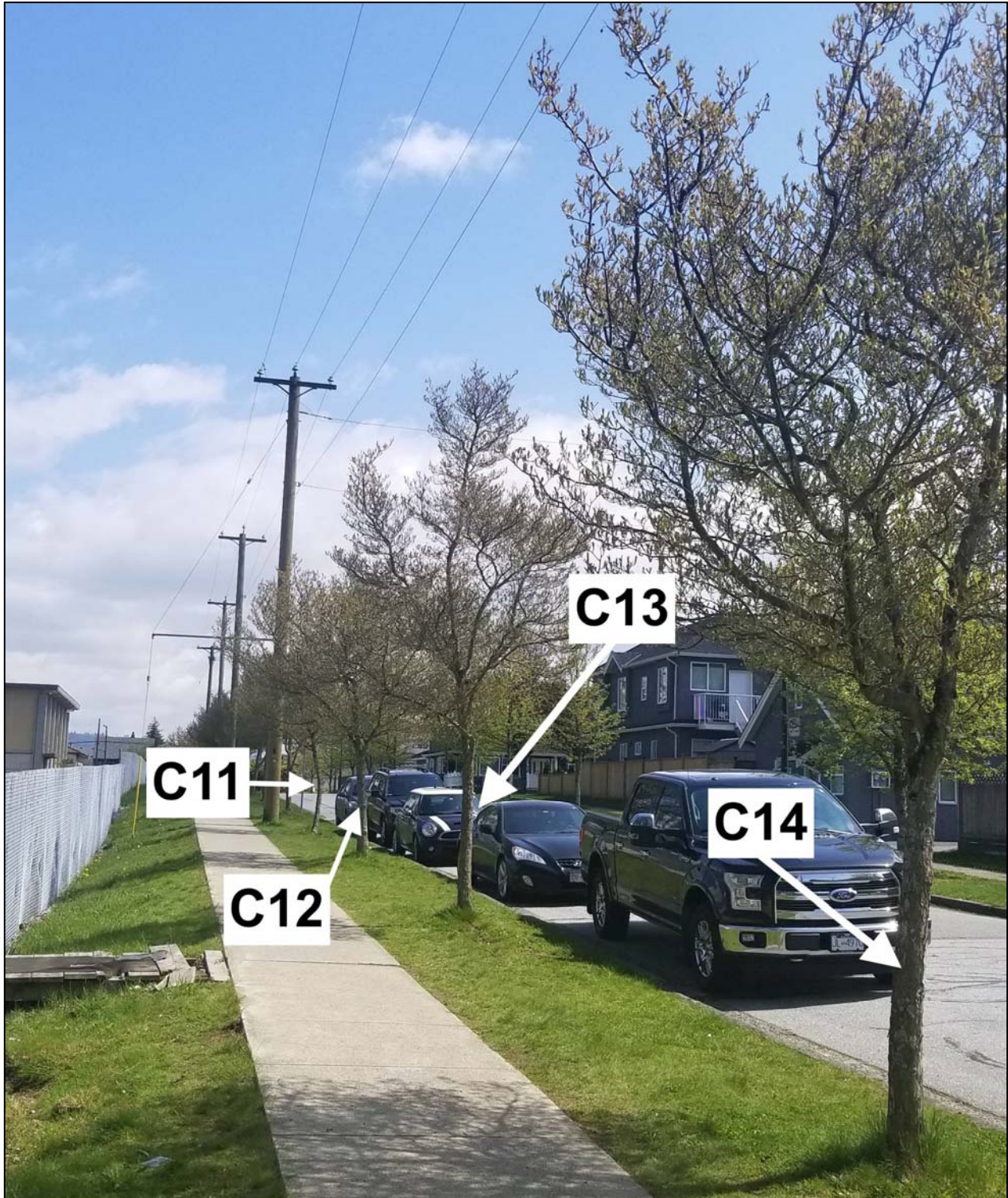


Image 1- City trees situated to the south of the proposed development area along Parker Street.

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Image 2 – Left to right: trees 24 to 34 on west side of proposed development area.



Image 3 – Left to right: trees 35 to 47 on west side of proposed development area.



Image 4 - Cracks and lifting of asphalt.



Image 5 - Structural roots extending through asphalt

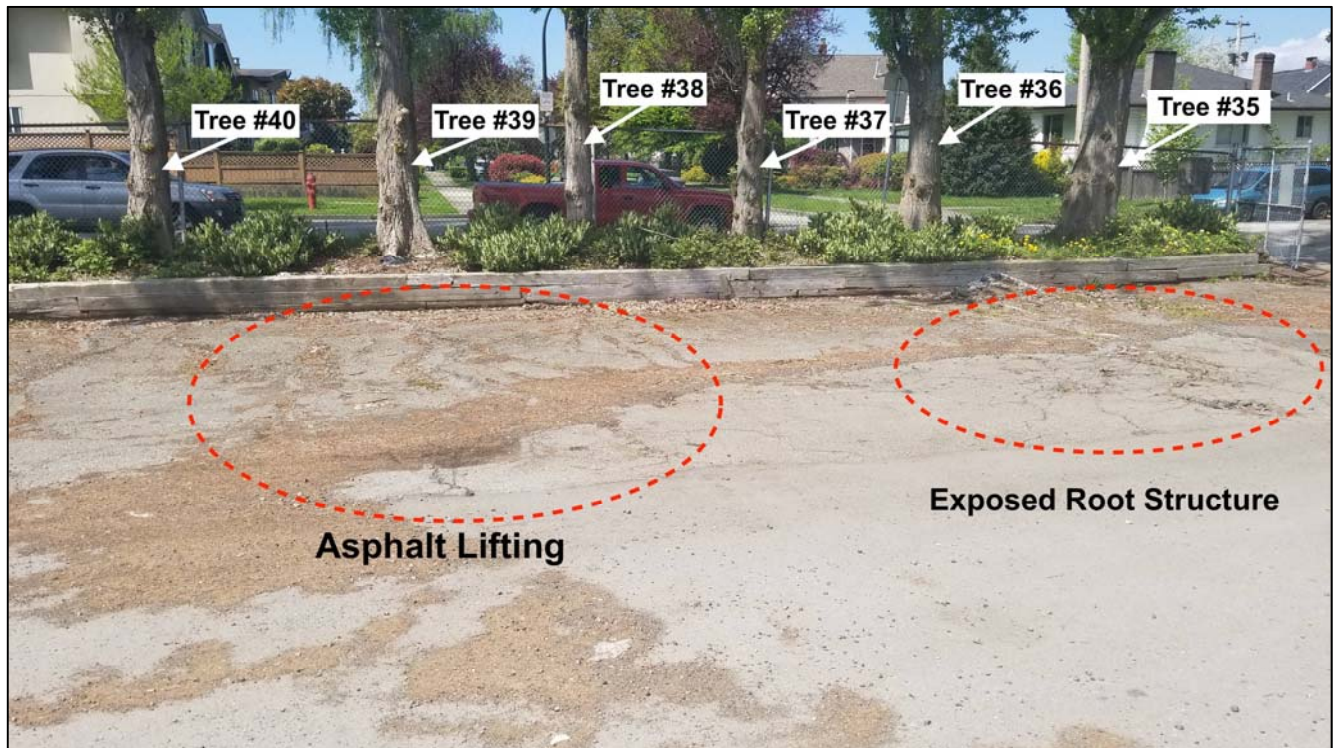


Image 6 - All the trees will have their root structure severely impacted by the proposed excavation.

I:\DZ-SERVER\PROJECTS\PARKS & RECREATION\ACTIVE\PR2015-18\NOTRE DAME REGIONAL SECONDARY SCHOOL\DWGS\SHEETS\1-01 TREE RETENTION PLAN.DWG





Appendix D - Construction Activity Around Tree Protection Zone

City of Vancouver Protection of Trees By-law Section 7

Protection of Trees During Construction

7.1 Submission of survey

With an application for issuance of a development permit or building permit, the owner or the applicant on behalf of the owner, must submit a survey, certified correct by a BC land surveyor who is a member of the Association of British Columbia Land Surveyors that shows:

- (a) each tree located on the site, on adjacent property within two metres of any boundary of the site, and on any street adjacent to the site;
- (b) the tree grade or tree elevation for each tree referred to in subsection (a);
- (c) the drip line for each such tree; and
- (d) the location, height, and diameter of each stump on the site.

7.2 Submission of arborist's report

With an application for issuance of a development permit or building permit, the owner or the applicant on behalf of the owner, must also submit a report, certified correct by an arborist, that sets out:

- (a) the condition, size, and species of trees on the site;
- (b) the impact of the proposed development on the health of trees on the site, and potential hazards to them during or after construction;
- (c) development limitations;
- (d) recommended construction practices to protect trees during and after construction; and
- (e) an undertaking from the arborist and the owner to the city that the arborist will perform or supervise performance of:
 - (i) pre-construction treatment of trees including root and branch pruning,
 - (ii) regular on-site inspections during construction, and will report any offence against this By-law on the site to the Director of Planning or on a street adjacent to the site to the City Engineer,
 - (iii) restorative landscape treatment including soil renovation,
 - (iv) selection and planting of any replacement trees required under this By-law, and
 - (v) a post construction inspection of the site, and will prepare a report, certified correct by the arborist, for submission, in a timely manner, to the Director of Planning.

7.3 Exception for interior alterations

If a development permit or building permit is for alterations only to the interior of a building, and, in the opinion of the Director of Planning, none of the work, or storage, transport, or removal of materials, will affect any tree located on the site, sections 7.1 and 7.2 do not apply.

7.4 Demolition, excavation, or construction

A person must not commence or carry on demolition, excavation, or construction on a site, except in accordance with the requirements of this By-law, and any applicable tree permit.

7.5 The owner shall:

- a) install a protection barrier for each retention tree located on the site, on adjacent property within two metres of any boundary of the site and on any street adjacent to the site, before demolition, excavation or construction begins on a site;
- b) ensure that the protection barrier meets the requirements for a protection barrier in this By-law, throughout the course of demolition, excavation and construction on the site; and
- c) maintain the protection barrier in good repair continuously throughout the course of demolition, excavation and construction on the site.

7.6 No construction without protection barrier



No person shall carry out demolition, excavation or construction on a site unless there are protection barriers in place as required by this By-law.

7.7 Location of protection barrier

Each protection barrier referred to in section 7.5 must, if the tree is on adjacent property within two metres of any boundary of the site, extend into the site from the nearest boundary of the adjacent site by the greater of two metres or such other distance determined by an arborist or the Director of Planning to be necessary to protect the tree and the adjacent property.

7.8 Requirements for trees on boulevards

In addition to the requirements of sections 7.5 and 7.6, before and during demolition, excavation, or construction on a site, the owner of the site must:

- (a) comply with the requirements of the City Engineer with respect to any tree on a boulevard in a street adjacent to the site;
- (b) not prune, move, or otherwise disturb such tree unless the Park Board has given its prior written permission;
- (c) ensure that each protection barrier:
 - (i) allows for free and clear passage of pedestrians on the surrounding portion of the boulevard and on the sidewalk adjacent to the boulevard,
 - (ii) allows for clear visibility of fire hydrants, driveway accesses, and crosswalks,
 - (iii) is 0.6 m or more from the curb to allow for the opening of car doors, and
 - (iv) is 0.3 m or more from the edge of any sidewalk located within a grass boulevard.

7.9 Issuance of building permit

Despite the Zoning and Development By-law and Building By-law, a person is not entitled to a permit for demolition, excavation, or construction on a site, except if:

- (a) the Chief Building Official has inspected and approved each protection barrier on the site or on adjacent property; and
- (b) the City Engineer has inspected and approved each protection barrier on a street.

7.10 Condition of protection barriers and retention trees

A person who installs a protection barrier under this Section 7 must:

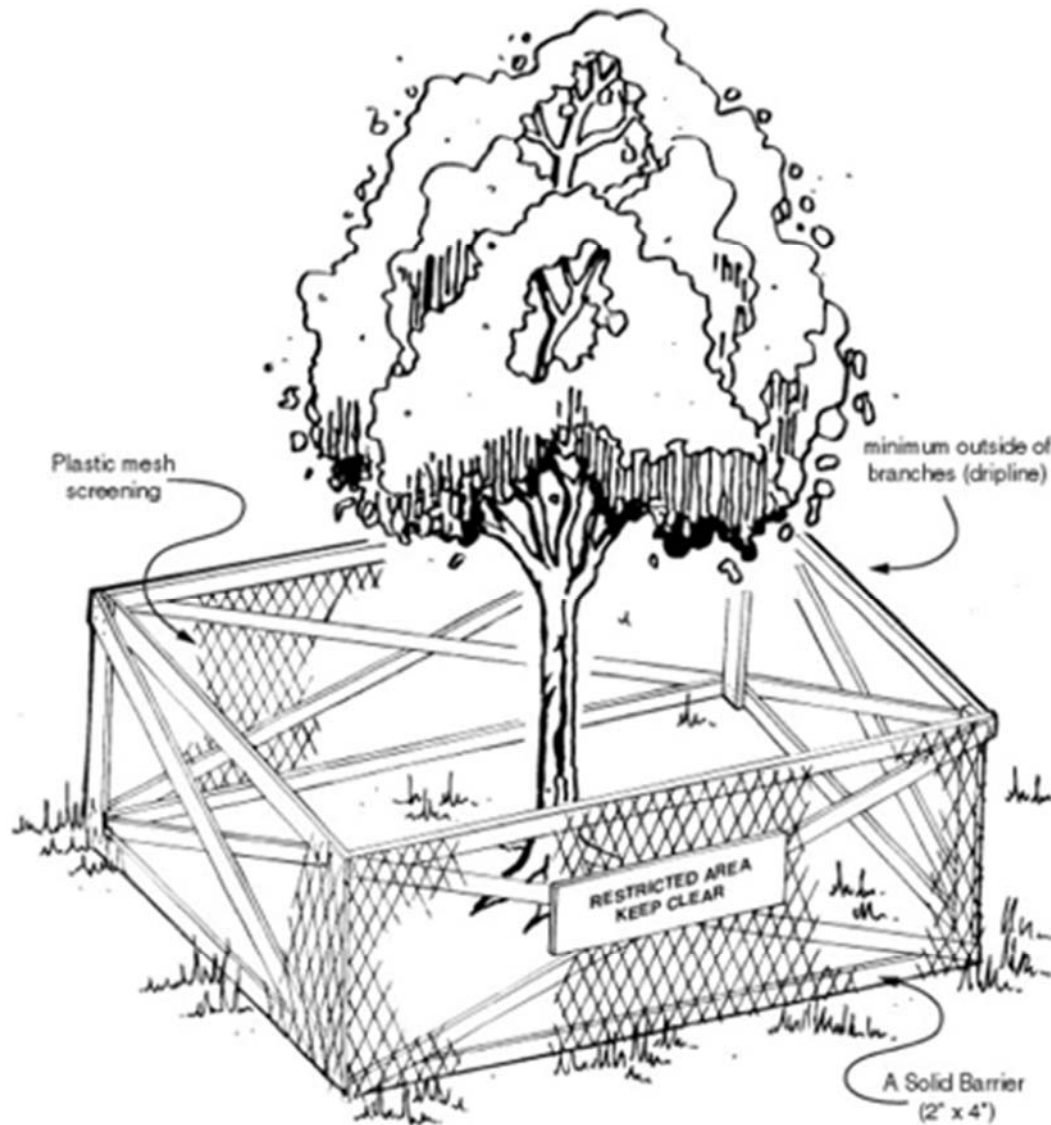
- (a) care for the retention tree within the tree protection area, during the construction process, including sufficient watering, particularly if excavation has disturbed the tree root system;
- (b) attend to proper root pruning and care for the remaining root system;
- (c) to minimize root damage, soil erosion and tree disturbance, wrap a temporary root curtain around the root zone to retain and protect the exposed area, which root curtain is to consist of heavy wire mesh or similar material lined with burlap and supported by posts;
- (d) use backfill to ensure that none of the roots remain exposed;
- (e) if required by the Director of Planning, tunnel rather than trench when installing underground utilities and drainage lines, which technique includes boring a hole under or through the root system with minimum disturbance, and carry out any excavation within the tree protection area to accommodate underground installations, including services and footings, by hand; and
- (f) maintain such protection barrier, repair any damage to it, and not alter or remove it until construction is complete.

7.11 No encroachment

A person must not encroach into a tree protection area, with or without vehicles, and must not store anything in such area until construction is complete.



Tree Protection Fencing for On-site Trees



Tree Protection Barrier

Note: no storage of building materials
within or against protection barrier



Schedule A
Protection Barrier Distance from Tree
Section 1.2

TRUNK DIAMETER		MINIMUM PROTECTION REQUIRED AROUND TREE
Trunk diameter		Distance from trunk
20 cm		1.2 m
25		1.5
30		1.8
35		2.1
40		2.4
45		2.7
50		3.0
55		3.3
60		3.6
75		4.5
90		5.0
100		6.0



Appendix E – LIMITATIONS

This report is valid for the day the trees were reviewed. This report is not to be re-printed, copied, published or distributed without prior approval by VDZ + A Consulting Inc.

Sketches, diagrams and photographs contained in this report being intended as visual aids, should not be construed as engineering reports or legal surveys.

Only the subject tree(s) was inspected and no others. This report does not imply or in any other way infer that other trees on this site or near this site are sound and healthy.

The tendency of trees or parts of trees to fall due to environmental conditions and internal problems are unpredictable. Defects are often hidden within the tree or underground. The project arborist has endeavored to use his skill, education and judgment to assess the potential for failure, with reasonable methods and detail. It is the owner's responsibility to maintain the trees and inspect the trees to reasonable standards and to carry out recommendations for mitigation suggested in this report.

TREE RISK ASSESSMENT – ROW OF LOMBARDY POPLAR

SITE ADDRESS:

2880 Venables Street

Vancouver, BC

CLIENT:

CITY OF VANCOUVER

PROJECT # PR2016-18



VDZ + A Consulting Inc.

Prepared by:

VDZ + A Consulting Inc.

Suite 1, 20177 97 Avenue

Langley, BC V1M 4B9

May 29, 2018

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Background

VDZ + A Consulting Inc. was contracted by City of Vancouver to prepare an ISA Certified Arborist Tree Risk Assessment Report for the property at 2880 Venables Street Vancouver, BC. This assessment corresponds with arborist report dated May 2, 2018 for the above address.

Assignment

Assess 24 Lombardy Poplar (*Populus nigra*) trees situated on the above address to determine a risk rating of the trees as they stand today. The assessment was followed by a subsequent risk rating that determines the risk based on the proposed development of the sports field and parking lot. In determining the tree risk rating, the ISA Certified consulting arborist followed the ISA TRAQ (Tree Risk Assessment Qualified) protocol.

Limits of the Assignment

The observations made by Arminder Virk (ISA Certified Arborist PN-8443A, ISA Tree Risk Assessment Qualified) were limited to two site visits on May 1st, 2018 and May 28th, 2018

Testing and Analysis

Arminder Virk used ground-based visual tree assessment and mallet sounding to test the trees' health, condition and risk level. No tissue or soil samples were sent to a lab for identification or analysis.

Conclusions and Recommendations

There are 24 trees in total that have been assessed (Tree Tag # 24 to 47). All of these trees are mature Lombardy Poplar (*Populus nigra*) and are located on the west side of the property. Lombardy Poplar (*Populus nigra*) are extremely narrow upright trees, where the root structure typically extends well beyond the dripline. These trees have a tendency to decay rapidly and are susceptible to wind throw, making the preservation of root structure a vital component in ensuring the trees health and longevity during construction.

If the decision is made to retain these trees during the proposed development, we recommend the following measures to ensure the trees best chances of survival due to the stresses of construction such as root removal, compaction, mechanical injury and grade changes.

1. **Maintain Tree Protection Zone:** Maintain the integrity of the tree protection zone during the duration of the development project
2. **Excavation:** Certified Arborist supervision required during excavation to evaluate root damage.
3. **Root Pruning:** Root pruning of any exposed roots during excavation should be cut cleanly by an ISA Certified Arborist.
4. **Tree Monitoring:** Ongoing monthly monitoring by the consulting Arborist or their delegate to evaluate construction injury/stress and make recommendations.
5. **Irrigation Plan:** Irrigation of the trees should be ongoing as per Project Arborist recommendations.



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The site consists of a secondary school and a parking lot that it paved on the west side of the property. The school is located on the north east side of the property and the subject trees are situated on the west side of the property. The assessed trees include 24 Lombardy Poplar (*Populus nigra*) which are arranged in a row. The upper root structures on these trees are limited on the east side to a wooden retaining wall that is .3-meters-high. There has been previous failure of at least 2 similar trees on the east side of the property, which is certainly of some concern.

This species relative tolerance to development impact is that they are 'tolerant of minor amounts of fill. Intolerant of changes in soil moisture. Decays rapidly. Susceptible to windthrow' (Matheny, P Nelda, 1998). The proposed design will mean the loss of all of the root system outside the existing drip line (or crown radius). This represents potentially a significant loss of roots as reflected in our High risk rating detailed in the following Table 1.

Table 1 Tree Data and Risk Rating

Tree #	Common Name (<i>Botanical name</i>)	DBH (m.)	Risk Rating	Comments
24	Lombardy Poplar <i>Populus nigra</i>	0.77	IMAGES 1,3,4	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians, Fire Hall and a house. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians, proposed sports field, Fire Hall and a house. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
25	Lombardy Poplar <i>Populus nigra</i>	0.58	IMAGES 1,4	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians, Fire Hall and a house. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians, proposed sports field, Fire Hall and a house. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
26	Lombardy Poplar <i>Populus nigra</i>	0.49	IMAGE 4	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians, Fire Hall and a house. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians, proposed sports field, Fire Hall and a house. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
27	Lombardy Poplar	0.64	IMAGE 4	



Tree #	Common Name (Botanical name)	DBH (m.)	Risk Rating	Comments
	<i>Populus nigra</i>			LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
28	Lombardy Poplar <i>Populus nigra</i>	0.41	IMAGE 4	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
29	Lombardy Poplar <i>Populus nigra</i>	0.62	IMAGE 4	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
30	Lombardy Poplar <i>Populus nigra</i>	0.47	IMAGE 4	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots.</p>				



Tree #	Common Name (<i>Botanical name</i>)	DBH (m.)	Risk Rating	Comments
The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH				
31	Lombardy Poplar <i>Populus nigra</i>	0.62	IMAGE 4 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
32	Lombardy Poplar <i>Populus nigra</i>	0.69	IMAGE 4 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
33	Lombardy Poplar <i>Populus nigra</i>	0.83	IMAGE 4 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
34	Lombardy Poplar <i>Populus nigra</i>	0.87	IMAGE 4 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots.</p>				



Tree #	Common Name (<i>Botanical name</i>)	DBH (m.)	Risk Rating	Comments
<p>The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
35	Lombardy Poplar <i>Populus nigra</i>	0.69	IMAGE 4,5	<p>LOCATION – West side of property</p> <p>TRUNK-Co-dominant stems at 1.5 METERS</p> <p>ROOTS- Restricted by retaining wall on east</p>
<p>CURRENT RATING</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
36	Lombardy Poplar <i>Populus nigra</i>	0.51	IMAGE 4,5	<p>LOCATION – West side of property</p> <p>TRUNK-Growing beside chain link fence</p> <p>ROOTS- Restricted by retaining wall on east</p>
<p>CURRENT RATING</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
37	Lombardy Poplar <i>Populus nigra</i>	0.41	IMAGE 4,5	<p>LOCATION – West side of property</p> <p>TRUNK – Growing beside chain link fence</p> <p>ROOTS- Restricted by retaining wall on east</p>
<p>CURRENT RATING</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 year, and the resulting target and consequences, the risk rating = HIGH</p>				
38	Lombardy Poplar <i>Populus nigra</i>	0.36	IMAGE 4,5	<p>LOCATION – West side of property</p>



Tree #	Common Name (<i>Botanical name</i>)	DBH (m.)	Risk Rating	Comments
				TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
39	Lombardy Poplar <i>Populus nigra</i>	0.61	IMAGE 4,5	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
40	Lombardy Poplar <i>Populus nigra</i>	0.50	IMAGE 4,5	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
41	Lombardy Poplar <i>Populus nigra</i>	0.49	IMAGE 4,5	LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots.</p>				



Tree #	Common Name (<i>Botanical name</i>)	DBH (m.)	Risk Rating	Comments
The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH				
42	Lombardy Poplar <i>Populus nigra</i>	0.56	IMAGE 4,5 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
43	Lombardy Poplar <i>Populus nigra</i>	0.59	IMAGE 4,5 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
44	Lombardy Poplar <i>Populus nigra</i>	0.58	IMAGE 4,5 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT Over the next 15-years, the tree part most likely to fail is the roots. The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
45	Lombardy Poplar <i>Populus nigra</i>	0.67	IMAGE 4,5 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING Over the next 15-years, the tree part most likely to fail is the roots.</p>				



Tree #	Common Name (<i>Botanical name</i>)	DBH (m.)	Risk Rating	Comments
<p>The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
46	Lombardy Poplar <i>Populus nigra</i>	0.70	IMAGE 4,5 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT</p> <p>Over the next 15-years, the tree part most likely to fail is the roots.</p> <p>The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				
47	Lombardy Poplar <i>Populus nigra</i>	0.80 0.73 0.33	IMAGE 2,4,5 LOCATION – West side of property TRUNK – Growing beside chain link fence ROOTS- Restricted by retaining wall on east	
<p>CURRENT RATING</p> <p>Over the next 15-years, the tree parts most likely to fail are roots and the union of the codominant stems.</p> <p>The targets include vehicles and pedestrians. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = MODERATE</p> <p>WITH PROPOSED DEVELOPMENT</p> <p>Over the next 15-years, the tree parts most likely to fail are roots and the union of the codominant stems.</p> <p>The targets include vehicles, pedestrians and proposed sports field. Given the likelihood of such a failure over the next 15 years, and the possible consequences and impact on the targets, the risk rating = HIGH</p>				

Table 2: TRAQ – Likelihood Matrix Example for Tree #24 With Proposed Development

Likelihood of failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Table 3 TRAQ – Risk Rating Matrix Example for Tree #24:

	Consequences of Failure
--	-------------------------



Likelihood of failure & Impact	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Photographs



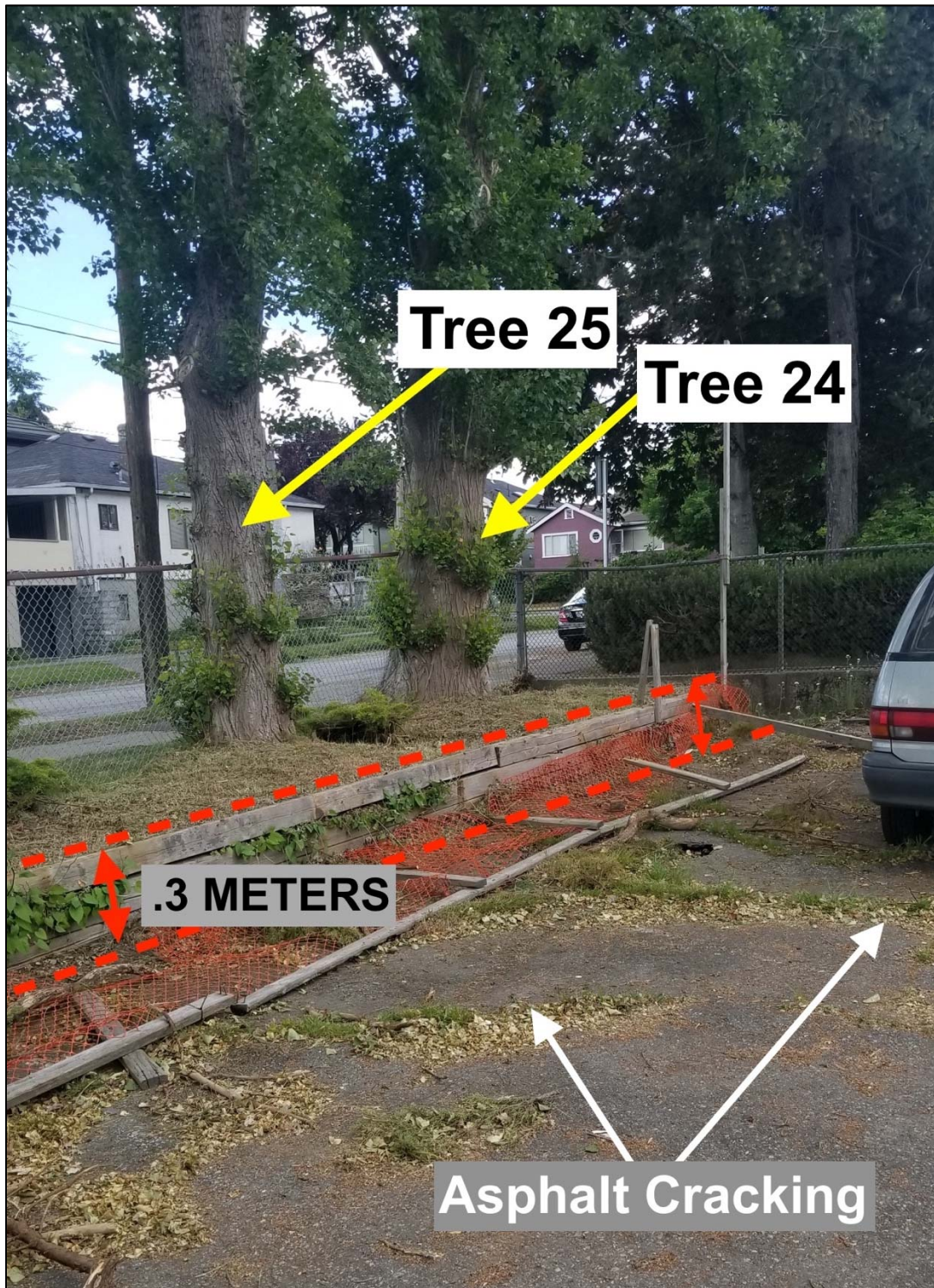


Image 1 –Tree 24 and 25 with retaining wall on east side





Image 2 –Tree 47 with co-dominant stems



Image 3 –Tree 24 growing beside fence



Image 4 – Row of assessed trees





Image 5 – View of trees 35-47 with retaining wall and parking lot



APPENDIX A - GLOSSARY OF TERMS

Abutment: A structure built to support the lateral pressure of an arch or span, e.g., at the ends of a bridge.

Adapted Trunk Diameter Method: As outlined in "Managing Trees During Construction" this method using the trees age and tolerance to construction damage to determine the factor that will be multiplied by the diameter to determine a sufficient tree protection zone given these factors.

Age: The relative age (young, intermediate, mature) within the particular stand of trees or forest.

Algae: Is a simple, nonflowering plant (includes seaweeds and many single-celled forms). They do contain chlorophyll (but lack true stems, roots, and vascular tissue)

ALR: The Agricultural Land Reserve in which agriculture is recognized as the priority.

Bole: The stem or trunk of a tree.

C: Refers to trees on City property.

Chlorotic: Yellowing of plant tissues caused by nutrient deficiency &/or pathogen.

Co-dominant Leaders: Forked dominant stems nearly the same size in diameter, arising from a common junction.

Co-dominant Within Stand: Individual tree whose height is generally equal to trees (regardless of species) within the same stand.

Compaction: Compression of the soil that breaks down soil aggregates and reduces soil volume and total pore space, especially macropore space.

Conk: A fungal fruiting structure typically found on trunks and indicating internal decay.

Creek: A flow of water often being a tributary of a river.

Culvert: A tunnel that carries a stream under a road.

C-Rad: Crown radius

Dead Standing: A tree that has died but is still standing erect.

Decurrent Tree Form: Tree form which develops when the lateral branches grow as fast, or faster, than the terminal shot. This results in a tree with a broad, spreading form and multiple trunks.

DBH: The Diameter of the tree at 1.40 meters above the ground.

Ditch: A narrow, drainage channel used along roads and fields.

Dominant Within Stand: Individual tree whose height is significantly greater than adjacent trees (regardless of species) within the same stand.

Dwarf Mistletoe: A species of parasitic plants that infect numerous tree species in North America. Severe dwarf mistletoe infection can result in reduced growth, premature mortality.

Excurrent Tree Form: Tree form which develops when the leader outgrows the lateral branches. This results in a tree with a narrow, cone-shaped crown and clearly defined central trunk.

CRZ: Critical Root Zone - The area between the trunk and to the end of the Drip Line.

DRIP LINE: Means a circle drawn on the ground around a tree directly under the tips of the outermost branches of the canopy of the tree.

Fair: Healthy but has some defects such as co-dominant trunk, dead branches.

Feeder Roots: The smaller roots responsible for water and nutrient absorption and gas exchange. These roots can extend far beyond the Drip Line (or outer canopy) of the tree.

Fungus (singular) / Fungi (plural): Unicellular, multicellular or syncytial spore-producing organisms that feed on organic matter (including molds, yeast, mushrooms and toadstools).

Gale - A very strong wind.

Girdling Root: Root that encircles all or part of the trunk of a tree or other roots and constricts the vascular tissue and inhibits secondary growth and the movement of water.

Good: Good form and structure, healthy with no defects.

Hazardous: Significant hazard exists with a high risk of immediate failure; which could result in serious damage to property or person(s).

Height: Height of tree is approximate.

LCR: Live Crown Ratio – The ratio of crown length to total tree length.



Level 1 Limited Visual Assessment: Limited visual assessment looking for obvious defects such as, but not limited to dead trees, large cavity openings, large dead or broken branches, fungal fruiting structures, large cracks, and severe leans.

Level 2 Basic Visual Assessment: Detailed visual inspection (aboveground roots, trunk, canopy) of tree(s) may include the use of simple tools to perform assessment (i.e. sounding mallet, trowel, measuring tape, binoculars). The assessment does not include advanced resistance drilling of trunk.

Level 3 Advanced Assessment: To provide detailed information about specific tree parts, defects, targets, or side conditions. May include arial inspection, resistance drilling of tree parts, laboratory diagnosis of fungal or plant tissue.

Mildew: Is a minute powdery or web-like fungi (of different colors) that is found on diseased or decaying substances.

Moss: A small, green, seedless plant that grows on stones, trees or ground.

No Disturbance Zone: The zone around a tree that must not be impacted by excavation, grade changes or proposed design plans. It is measured as the Drip Line (measured from the edge of trunk) + 0.60 meters (Minimum excavation over-dig required).

Nurse Log - a downed log from which another tree (s) grows off of.

Orthotropic Shoot: A shoot that is more or less vertical in orientation, upon which the leaves are usually arranged radially around the stem.

OS: Off-site trees and due to restricted access their DBH measurements are approximate. An assessment of off-site trees does not imply they are safe as the restricted access prevented a thorough review.

Plagiotropic Shoot: A shoot that is more or less horizontal in orientation, and upon which the leaves are often arranged in one plane.

Pollarding: A pruning system in which the upper branches of a tree are removed, promoting a dense head of foliage and branches.

Poor: multiple defects, disease, poor structure and or form, root and or canopy damage.

Phloem: Plant vascular tissue that transports sugar and growth regulators. Situated on the inside of the bark, just outside the cambium. Is bidirectional (transports up and down). Contrast with xylem.

Phototropic: Growth toward light source or stimulant.

Retain & Monitor: Monitor health and condition of tree every 12 months for signs of deterioration.

Root Crown: Also called the root collar, it includes the flare at the base of the trunk and the initial roots that develop below the trunk. These roots generally taper and subdivide rapidly to form the root system of the tree.

Root Plate - That part of the root system (excluding the small outermost roots) needed to keep a tree windfirm.

Root Plate Failure - The displacement of the root plate in a gale, resulting in the permanent lean or complete failure of the tree with the soil level pushed up on the windward side.

RULE - Remaining Useful Life Expectancy - The expected period of time that a particular tree will remain *relatively* free of defects or deficiencies, that would cause it to decline rapidly in either health or into an unreasonable level of risk.

Shoot: An extension of growth from the stem of a plant, young enough to be furnished with leaves, often associated with pruned trees.

Snag: In forest ecology, a **snag** refers to a standing, dead or dying tree, often missing a top or most of the smaller branches.

SPEA: Streamside Protection and Enhancement Area

Spiral Decline: The health and condition of the tree is deteriorating.

Stream: A small, narrow river.

Sub-dominant Within Stand: Individual tree whose height is significantly less than adjacent trees (regardless of species) within the same stand.

Suckers: Undesirable stem growth from the roots of the lower trunk of a tree, especially those from a rootstock of a grafted tree.

Suppressed: Individual tree whose growth, health and condition is negatively impacted by adjacent tree(s).

Thrifty: Strong and healthy trees, thriving physically and growing vigorously.

TPZ: Tree Protection Zone - The area between the trunk and the Tree Protection Barrier.



Wildlife Tree: A tree or a group of trees that are identified to be retained to provide future wildlife habitat. Wildlife habitat can exist in tree risks (cavities, dead snags, broken tops). Often times the tree risk to potential targets (people & property) is reduced by removing that part of the tree posing the risk of failure, but the tree (or portion of) is retained to provide future habitat.

Windfirm - Having no elevated risk of windthrow.

Windfirm Boundary - The boundary of a stand of trees that is considered windfirm.

Windthrow - The fall of a tree in a high wind.

Witches Broom: A dense mass of shoots growing from a single point, with the resulting structure resembling a broom or a bird's nest.

Xylem: Thin overlapping cells that helps provide support and that conducts water and nutrients upward from the roots all the way to the leaves.



APPENDIX B - REFERENCES

Bond, Jerry & Buchanan, Beth (2006) Best Management Practices: Tree Inventories, International Society of Arboriculture, Champaign, IL.

Dunster, Dr. Julian (2003) *Preliminary Species Profiles for Tree Failure Assessment*. ISA Pacific Northwest Chapter, Silverton, OR, USA

Dunster, Dr. Julian & Edmonds, Dr. R. (2014) Common Fungi Affecting Pacific Northwest Trees, ISA Pacific Northwest Chapter, Silverton, OR, USA

Fite, Kelby & Smiley, E. Thomas (2106) Best Management Practices: Managing Trees During Construction, International Society of Arboriculture, Champaign, IL.

Matheny, P Nelda. (1998) Trees and Development: Technical Guide to Preservation of Trees During Land Development, International Society of Arboriculture, Champaign, IL.

Sibley, David Allen (2009) *The Sibley Guide to Trees*. Alfred A. Knopf, New York, NY

Smiley, E.T., Matheny, N., Lilly, S. (2011) Best Management Practices: Tree Risk Assessment. International Society of Arboriculture, Champaign, IL.



APPENDIX C - ASSUMPTIONS AND LIMITING CONDITIONS OF THIS REPORT/ASSESSMENT

This report is valid for the day the trees were reviewed. This report is not to be re-printed, copied, published or distributed without prior approval by van der Zalm + associates.

Sketches, diagrams and photographs contained in this report being intended as visual aids, should not be construed as engineering reports or legal surveys.

Only the subject tree(s) was inspected and no others. This report does not imply or in any other way infer that other trees on this site or near this site are sound and healthy.

The tendency of trees or parts of trees to fall due to environmental conditions and internal problems are unpredictable. Defects are often hidden within the tree or underground. The project arborist has endeavored to use his skill, education and judgment to assess the potential for failure, with reasonable methods and detail. It is the owner's responsibility to maintain the trees and inspect the trees to reasonable standards and to carry out recommendations for mitigation suggested in this report.



APPENDIX D - Certificate of Performance

I, Arminster Virk, certify that:

1. I have personally inspected the trees and property referred to in this report and have stated my findings accurately.
2. I have no current or prospective interest in the trees or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.
3. The analysis, opinions and conclusions stated herein are my own and are based on current scientific procedures and facts.
4. My analysis, opinions and conclusions were developed, and this report has been prepared according to commonly accepted arboricultural practices.
5. No one provided significant professional assistance to me, except as indicated within the report.
6. My compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party nor upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am a member in good standing with the International Society of Arboriculture, and the Pacific Northwest Chapter of the ISA.

VDZ + A Consulting Inc.,



Arminster Virk, Consulting Arborist

ISA Certified Arborist PN-8443A

ISA Tree Risk Assessment Qualified



Michael J Mills Consulting
Urban Forestry & Arboriculture



Updated: Arboricultural Opinion
Notre Dame Regional Secondary School
2855 Parker Street, Vancouver

DE 410128

**ARBOURIST
REPORT**

Study completed for KMBR Architects.
MJM File #607 March 30, 2006
City of Vancouver DP Application #DE410128

Michael J Mills Consulting was retained by KMBR Architects to undertake an assessment of the existing tree resource on the Notre Dame Regional Secondary School property in East Vancouver. Our initial report was completed in January of 2006. We provide the following additional information to address specific prior to comments from the City of Vancouver (February 13, 2007) with respect to tree preservation issues. Our comments are based on the site plan information provided to us by the project Architect as of today's date.

- Item 1.11: Preservation of Trees along Kaslo Street:
The existing asphalt parking area in the south west corner of the site will remain as is. As such concern expressed by the city with respect to the trees in this area has been addressed. The retaining walls proposed for the west end of the playing field will be installed 5.5 metres east of the row of existing trees along Kaslo Street. We consider this set back distance to be well within the tolerance of the existing trees to survive subsequent to development.
- Item 1.14: Preservation of the Trees along Venables Street:
The new building fronting along Venables has been moved slightly south of the previous location. There is now a 5.5 metre area between the building foundation and the existing trees along Venables. It is recognized that this distance will be slightly reduced by over excavation, however, it is our opinion that there will be sufficient set back from the trees to ensure the long term success of the trees in this area.

As per the City request, we will agree to be on site at the time of excavation work along Venables to view the extent of any impact that might occur to the tree roots and to provide recommendation for any mitigation work that might become necessary.

The following information outlines the basic tree preservation requirements that must be observed at all times through the development process to ensure tree preservation success.

PROTECTION DURING CONSTRUCTION.

- .1 Prior to any work on site, install protection fencing in a continuous barrier along the lines of PROTECTED AREA LIMIT OF CONSTRUCTION shown on DMG Drawing L-1. Drive stakes vertically 450 mm minimum into ground spaced 3 M. on-centre. Ensure fencing detail meets or exceeds municipal requirements for fence construction.
- .2 Maintain the physical barrier until Substantial Performance is declared then remove from site.
- .3 No work of any kind shall occur within the fenced area without the permission of the project arborist.

1826 Sunshine Coast Highway, Roberts Creek BC V0N 2W5
Phone 604-886-2796 Fax 604-886-2718 email mills@dccnet.com

March 30, 2007

Arboricultural Assessment
Notre Dame Secondary School
MJM File #607

Page 2 of 2

- .4 Do not stockpile soil, construction materials, or excavated materials within tree protection areas.
- .5 Do not park, service or fuel vehicles within tree protection areas.
- .6 Do not cut branches or roots of retained trees without the approval of the project arborist.
- .7 After construction remove protection fencing. Remove any dead branches or dying limbs on trees at the direction of the project arborist.
- .8 At the time of soft landscape installation, scarify soil at edge of tree preservation areas and blend existing, undisturbed grade into newly graded areas smoothly and evenly.
- .9 Refer to landscape plans for final treatment in areas near the trees retained.

Please contact the undersigned if you have any questions or concerns regarding this matter.

Yours Truly,

Michael J Mills

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