

Arboricultural Inventory and Report

For:

UBC

Anthropology and Sociology Building (ANSO)

6303 NW Marine Drive

Vancouver, BC



To be submitted with Tree Retention and
Removal Plan dated September 18, 2024

Submitted to:

Attn: Pamela Troyer

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Date: September 18, 2024

Submitted by:



The following Diamond Head Consulting staff conducted the on-site tree inventory and prepared or reviewed the report.

All general and professional liability insurance and staff accreditations are provided below for reference.

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Principal

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Please contact us if there are any questions or concerns about the contents of this report.

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WCB: # 657906 AQ (003)

General Liability: Northbridge General Insurance Corporation - Policy #CBC1935506, \$10,000,000

Errors and Omissions: Lloyds Underwriters – Policy #1010615D, \$1,000,000

Scope of Assignment:

Diamond Head Consulting Ltd. (DHC) was retained to complete an arboricultural assessment to supplement the proposed development application for Anthropology and Sociology Building (ANSO) 6303 NW Marine Drive Vancouver, BC. This report contains an inventory of protected on and off-site trees and summarizes management recommendations with respect to future development plans and construction activities. Off-site trees are included because pursuant to municipal bylaws, site owners must include the management of off-site trees that are within the scope of the development. This report is produced with the following primary limitations, detailed limitations specified in Appendix 7:

- 1) Our investigation is based solely on visual inspection of the trees during our last site visit. This inspection is conducted from ground level. We do not conduct aerial inspections, soil tests or below grade root examinations to assess the condition of tree root systems unless specifically contracted to do so.
- 2) Unless otherwise stated, tree risk assessments in this report are limited to trees with a *high* or *extreme* risk rating in their current condition, and in context of their surrounding land use at the time of assessment.
- 3) The scope of work is primarily determined by site boundaries and local tree-related bylaws. Only trees specified in the scope of work were assessed.
- 4) Beyond six months from the date of this report, the client must contact DHC to confirm its validity because site base plans and tree conditions may change beyond the original report's scope. Additional site visits and report revisions may be required after this point to ensure report accuracy for the municipality's development permit application process. Site visits and reporting required after the first submission are not included within the original proposal fee and will be charged to the client at an additional cost.

The client is responsible for:

- Reviewing this report to understand and implement all tree **risk**, removal and protection requirements related to the project.
- Understanding that we did not assess trees off the subject property and therefore cannot be held liable for actions you or your contractors may undertake in developing this property which may affect the trees on neighboring properties.
- Obtaining a tree removal permit from the relevant municipal authority prior to any tree cutting.
- Obtaining relevant permission from adjacent property owners before removing off-site trees and vegetation.
- Obtaining a timber mark if logs are being transported offsite.
- Ensuring the project is compliant with the tree permit conditions.
- Constructing and maintaining tree protection fencing.
- Ensuring an arborist is present onsite to supervise any works in or near tree protection zones.

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1.0 Introduction

1.1 Site Overview

The subject site includes the outside landscaping around the UBC Anthropology and Sociology Building. These grounds are seen with a diversity of ornamental shrubs and deciduous trees with a significant presence of planted western red cedar (*Thuja plicata*) throughout the surrounding landscape. The trees are planted within lawns, landscape buffers and contained beds and appear to be mature to semi-mature specimens.

1.2 Proposed Land Use Changes

The proposed development consists of an replacing the water proofing membrane around the existing building as well as new hardscapes. In preparing this report, we reviewed the following information:

- One site survey prepared by Aplin and Martin dated November 22, 2024.
- One landscape base plan prepared by Hapa titled “2406 - DWG - Landscape Base”.

1.3 Report Objective

The objective of this report is to ensure the proposed development complies with the development permit application rules for tree inventories at the University of British Columbia (UBC). Under these rules, trees greater than 15 cm in diameter at breast height are protected and included in the inventory.

This report outlines the existing condition of protected trees on and adjacent to the property, summarizes the proposed tree retention and removal, and suggests guidelines for protecting retained trees during the construction process.



Figure 1. Anthropology and Sociology Building (ANSO) in relation to existing landscape.

2.0 Process and Methods

Mitch Davis of DHC visited the site on October 11 2023. The following methods and standards are used throughout this report.

2.1 Tree Inventory

Trees on site and trees shared with adjacent properties were marked with a numbered tag and assessed for attributes including: species; height measured to the nearest meter; and, diameter at breast height (DBH) measured to the nearest centimeter at 1.4 m above grade. Off-site trees were inventoried, but not tagged. The general health and structural integrity of each tree was assessed visually and assigned to one of five categories: *excellent; good; moderate; poor; or dying/dead*. Descriptions of the health and structure rating criteria are given in Appendix 3.

Tree retention value, categorized as *high, medium, low, or nil*, was assigned to each tree or group of trees based on their health and structure rating, and potential longevity in a developed environment. Descriptions of the retention value ratings are given in Appendix 4. Recommendations for tree retention or removal were determined by taking in to account a tree's retention value rating, its location in relation to proposed building envelopes and development infrastructure.

2.2 Tree Risk Assessment

Tree risk assessments were completed following methods of the ISA Tree Risk Assessment Manual¹ published in 2013 by the International Society of Arboriculture, which is the current industry standard for assessing tree risk. This methodology assigns risk based on the likelihood of failure, the likelihood of impact and the severity of consequence if a failure occurs. Only on-site trees that had *high or extreme* risk ratings in their current condition and in context of their surrounding land use were identified and reported in section 3.2. Appendix 5 gives the likelihood and risk rating matrices used to categorize tree risk. DHC recommends that on-site trees be re-assessed for risk after the site conditions change (e.g. after damaging weather events, site disturbance from construction, creation of new targets during construction or in the final developed landscape).

2.3 Tree Protection

Tree protection zones were calculated for each tree according to the City of Vancouver Protection of Trees Bylaw 9958 requirements for minimum protection around a tree, but may be modified based on professional judgement of the project arborist to accommodate species specific tolerances and site specific growing conditions.

¹ Dunster, J.A., Smiley, E.T., Matheny, N. and Lilly, S. (2013). Tree Risk Assessment Manual. *International Society of Arboriculture*. Champaign, Illinois.

3.0 Findings: Tree Inventory and Risk Assessment

3.1 Tree Inventory

The tree inventory is summarized below and the complete tree inventory is given in Appendix 1.

Trees On-site

There were 94 protected trees within the assessment area. In total, 11 protected trees are recommended for removal and 83 are recommended for retention on the site as part of this development proposal (see Appendix 1 for individual tree inventory information).

3.2 Tree Risk Assessment

There were no trees on this site that posed a *high* or *extreme* risk at the time of assessment.

4.0 Tree Retention, Removal and Replacement

4.1 Tree Retention

The opportunities for tree retention on this assessment area are quite high due to the health and structure of existing trees and the moderate anticipated impact of the proposed landscape development. Trees that are in direct conflict with the proposed hardscape/landscape are shown for removal.

Minor encroachment of hardscape into tree protection zone of tree # 1608 to be done under project arborist supervision. Arborist will supervise relocating tree protection fence and may perform minor root pruning at the same time.

For trees to be retained adjacent to the construction area, the following specific protection measures will be required:

- 1) Tree fencing must be installed to dimensions around retained trees specified in the accompanying DHC Tree Management Plan. This fencing will be a minimum of six-times (6 x) the tree diameter at breast height and will surround the tree stems. No activity whatsoever is permitted inside tree protection zones without arborist consultation and direction.
- 2) Any unforeseen conflicts between trees and construction that arise at any stage of the development must be referred to and dealt with only by the project arborist. This includes any pruning measures that may be required.
- 3) The site must be accessed from paved surfaces surrounding site. Machinery operation and materials transfer or storage is not permitted inside tree protection zones.
- 4) Tree removals should occur after Tree protection barriers have been installed. This will ensure that equipment does not enter tree protection zones of retained trees.
- 5) Tree removals should be conducted only by ISA certified Arborists using ANSI A300 standards. This is to ensure damage does not occur to retained trees during the removal operations.

Appendix 1 Complete Tree Inventory Table

The complete tree inventory below contains information on tree attributes and recommendations for removal or retention. Tree ownership in this inventory table is not definitive, its determination here is based on information available from the legal site survey, GPS locations, and field assessment during site visits. Tree protection Zones are measured from the outer edge of a tree’s stem. If using these measurements for mapping the tree protection zone, ½ the tree’s diameter must be added to the distance to accommodate a survey point at the tree’s center. Where tree protection fencing is proposed to vary from the minimum municipal TPZ, comments will be included in the Retention/TPZ comments and shown on the Tree Retention and Removal Plan.

*TPZ is the tree protection zone size required by the relevant municipal bylaw or, if not defined, the project arborist.

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	6312	On Site	Japanese Cherry	Prunus serrulata	52	5	4	Moderate	Large exposed surface roots heaving sidewalk. From and health typical of mature fruit tree.	Medium	Retain	Protect as required	3.1
Surveyed	6313	On Site	Japanese Cherry	Prunus serrulata	64	5	4	Moderate	Large exposed surface roots heaving sidewalk. From and health typical of mature fruit tree.	Medium	Retain	Protect as required	3.8
Surveyed	6315	On Site	Norway Maple	Acer platanoides	49	12	6	Good	Well spaced from other trees. Full symmetrical crown.	High	Retain	Protect as required	2.9
Surveyed	5298	On Site	Sweet Chestnut	Castanea sativa	59	13	5	Moderate	Old wound at base of stem. Good reaction growth. Well spaced from other trees. Full crown.	Medium	Retain	Protect as required	3.5
Surveyed	5294	On Site	Field Maple	Acer campestre	51	14	4	Moderate	Part of cluster growing at corner of building. Asymmetrical crown. Staircase built within dripline.	Medium	Remove	In conflict with proposed hardscape.	3.1

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	5295	On Site	Norway Spruce	<i>Picea abies</i>	18	14	1	Poor	Part of cluster growing at corner of building. Historically topped at 1m. Asymmetrical crown. Staircase built within dripline.	Low	Remove	In conflict with proposed hardscape.	1.2
Surveyed	5296	On Site	Norway Spruce	<i>Picea abies</i>	18	14	1	Poor	Part of cluster growing at corner of building. Asymmetrical crown. Staircase built within dripline.	Low	Remove	In conflict with proposed hardscape.	1.2
Surveyed	5300	On Site	Japanese Cherry	<i>Prunus serrulata</i>	16	4	2	Moderate	Stem forked at base. Open grown.	Medium	Retain	Protect as required	1.2
Surveyed	5310	On Site	Japanese Cherry	<i>Prunus serrulata</i>	52	5	5	Poor	Multiple stem unions at 1m. Decay column visible.	Low	Remove	In conflict with proposed hardscape.	3.1
Surveyed	6111	On Site	Western Red Cedar	<i>Thuja plicata</i>	77	20	5	Moderate	Single straight stem. Growing at corner of building. Crown overhanging roof. Asymmetrical crown.	Medium	Remove	In conflict with proposed membrane replacement.	4.6
Surveyed	6110	On Site	Golden Chain Tree	<i>Laburnum x watereri</i>	49	9	4	Moderate	Growing in courtyard. Appears to have been historically topped at 2m. Good unions.	Medium	Retain	Protect as required	2.9
Surveyed	6108	On Site	Sweet Chestnut	<i>Castanea sativa</i>	82	22	6	Moderate	Growing in courtyard. Full crown. Some deadwood throughout crown.	Medium	Retain	Protect as required	4.9

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	5304	On Site	Sawara Cypress	<i>Chamaecyparis pisifera</i>	72	14	5	Poor	Part of group growing at corner of driveway. Historically topped.	Low	Retain	Protect as required	4.3
Surveyed	3997	On Site	Sawara Cypress	<i>Chamaecyparis pisifera</i>	38	15	2	Dead	Recently dead standing snag.	Nil	Remove	Due to pre- existing condition	2.3
Surveyed	6113	On Site	Lawson Cypress	<i>Chamaecyparis lawsoniana</i>	58	20	3	Moderate	Part of row. Single stem. Asymmetrical crown.	Medium	Retain	Protect as required	3.5
Unsurveyed	6114	On Site	Lawson Cypress	<i>Chamaecyparis lawsoniana</i>	62	20	3	Moderate	Part of row. Single stem. Asymmetrical crown.	Medium	Retain	Protect as required	3.7
Unsurveyed	6115	On Site	Lawson Cypress	<i>Chamaecyparis lawsoniana</i>	29	20	3	Moderate	Part of row. Single stem. Asymmetrical crown.	Medium	Retain	Protect as required	1.7
Unsurveyed	6116	On Site	Lawson Cypress	<i>Chamaecyparis lawsoniana</i>	73	20	3	Moderate	Part of row. Multiple stem unions at base Asymmetrical crown.	Medium	Retain	Protect as required	4.4
Unsurveyed	3998	On Site	Japanese Cherry	<i>Prunus serrulata</i>	28	6	2	Moderate	Form and health typical of mature fruit tree.	Medium	Retain	Protect as required	1.7
Unsurveyed	3999	On Site	Japanese Cherry	<i>Prunus serrulata</i>	15	5	1	Moderate	Form and health typical of young fruit tree.	Medium	Retain	Protect as required	1.2
Surveyed	6117	On Site	Western Red Cedar	<i>Thuja plicata</i>	78	22	5	Moderate	Part of group. Single straight stem. Asymmetrical crown. Crown extends over driveway. Curb 1m from stem.	Medium	Retain	Protect as required	4.7

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	6118	On Site	Western Red Cedar	Thuja plicata	73	22	5	Moderate	Part of group. Single straight stem. Asymmetrical crown. Crown extends over driveway. Curb 2m from stem.	Medium	Retain	Protect as required	4.4
Unsurveyed	6121	On Site	Western Red Cedar	Thuja plicata	104	22	5	Dying	Part of group. Single straight stem. Asymmetrical crown. Crown extends over driveway. Curb 0.7m from stem.	Nil	Retain	Protect as required	6.2
Unsurveyed	6122	On Site	Western Red Cedar	Thuja plicata	98	22	5	Moderate	Part of group. Single straight stem. Asymmetrical crown. Crown extends over driveway. Curb 0.7m from stem.	Medium	Retain	Protect as required	5.9
Unsurveyed	6125	On Site	Western Red Cedar	Thuja plicata	106	23	5	Moderate	Part of group. Stem forked at 1.5m. Boulders piled under dripline. Asymmetrical crown.	Medium	Retain	Protect as required	6.4
Unsurveyed	6124	On Site	Western Red Cedar	Thuja plicata	75	23	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	4.5
Unsurveyed	6123	On Site	Manna Ash	Fraxinus ornus	60	15	6	Poor	Crown suppressed by adjacent trees. Poor candidate for individual retention.	Low	Retain	Protect as required	3.6
Surveyed	6120	On Site	Western Red Cedar	Thuja plicata	85	23	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	5.1

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	6119	On Site	Western Red Cedar	Thuja plicata	99	23	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	5.9
Surveyed	6106	On Site	Sawara Cypress	Chamaecyparis pisifera	80	18	2	Moderate	Multiple leaders. Unions at 1m.	Medium	Remove	In conflict with proposed membrane replacement.	4.8
Surveyed	1707	On Site	Cypress (Unknown Species)	Cypress (Unknown species)	95	23	8	Moderate	Growing at corner of building. Stem swept. Corrected. Crown extends over roof.	Medium	Remove	In conflict with proposed membrane replacement.	5.7
Surveyed	6103	On Site	Western Red Cedar	Thuja plicata	70	20	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	4.2
Surveyed	6101	On Site	Western Red Cedar	Thuja plicata	80	20	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	4.8
Surveyed	6100	On Site	Apple spp.	Malus spp.	62	9	7	Moderate	Part of group. Multiple unions at 1.3m. Sprawling asymmetrical crown.	Medium	Retain	Protect as required	3.7
Surveyed	6102	On Site	Western Red Cedar	Thuja plicata	63	20	5	Moderate	Part of group. Single straight stem. Asymmetrical crown. Large exposed surface roots.	Medium	Retain	Protect as required	3.8
Surveyed	6104	On Site	Western Red Cedar	Thuja plicata	134	20	5	Moderate	Part of group. Multiple acute stem unions. Included bark. Asymmetrical crown.	Medium	Retain	Protect as required	8.0

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	1708	On Site	Rhododendron	Rhododendron spp.	74	6	5	Poor	Significant deadwood throughout crown. Leaves appear to be infected with a blight.	Low	Retain	Protect as required	4.4
Surveyed	1710	On Site	Rhododendron	Rhododendron spp.	63	6	5	Poor	Significant deadwood throughout crown. Leaves appear to be infected with a blight.	Low	Retain	Protect as required	3.8
Surveyed	5309	On Site	Pacific Crabapple	Malus fusca	64	12	6	Moderate	Growing in planted area. Crown extends over paved path. Cavity visible at 1.7m. Good reaction growth.	Medium	Retain	Protect as required	3.8
Surveyed	6095	On Site	Pacific Crabapple	Malus fusca	42	10	6	Moderate	Growing in planted area. Crown extends over paved path.	Medium	Retain	Protect as required	2.5
Surveyed	6094	On Site	Pacific Crabapple	Malus fusca	30	10	6	Moderate	Growing in planted area. Crown extends over paved path.	Medium	Retain	Protect as required	1.8
Surveyed	6093	On Site	Norway Maple	Acer platanoides	39	12	5	Moderate	Growing in raised planted area. Bounded by concrete retaining wall.	Medium	Retain	Protect as required	2.3
Surveyed	1712	On Site	Western Red Cedar	Thuja plicata	68	14	3	Moderate	Growing in planted area. Curb 1.5m from stem. Large pruning wounds at base. Stem forked at base.	Medium	Retain	Protect as required	4.1
Surveyed	1711	On Site	Hawthorn	Crataegus spp.	34	7	4	Moderate	Crown partially suppressed by adjacent tree.	Medium	Retain	Protect as required	2.0
Surveyed	6090	On Site	Western Red Cedar	Thuja plicata	81	15	5	Moderate	Growing on slight slope. Crown extends over sidewalk and road. Full crown.	Medium	Retain	Protect as required	4.9

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	6088	On Site	Western Red Cedar	Thuja plicata	78	22	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	4.7
Surveyed	6089	On Site	Western Red Cedar	Thuja plicata	77	22	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	4.6
Surveyed	6087	On Site	Western Red Cedar	Thuja plicata	81	22	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	4.9
Surveyed	6085	On Site	Western Red Cedar	Thuja plicata	67	22	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	4.0
Surveyed	6086	On Site	Western Red Cedar	Thuja plicata	55	22	5	Moderate	Part of group. Single straight stem. Asymmetrical crown.	Medium	Retain	Protect as required	3.3
Surveyed	1739	On Site	Western Red Cedar	Thuja plicata	21	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.3
Surveyed	1729	On Site	Western Red Cedar	Thuja plicata	21	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.3
Surveyed	1616	On Site	Western Red Cedar	Thuja plicata	29	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.7
Surveyed	1617	On Site	Western Red Cedar	Thuja plicata	30	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.8
Surveyed	1618	On Site	Western Red Cedar	Thuja plicata	34	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	2.0

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	1614	On Site	Western Red Cedar	Thuja plicata	32	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.9
Surveyed	1632	On Site	Western Red Cedar	Thuja plicata	25	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.5
Surveyed	1734	On Site	Western Red Cedar	Thuja plicata	37	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	2.2
Surveyed	1733	On Site	Western Red Cedar	Thuja plicata	31	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.9
Surveyed	1732	On Site	Western Red Cedar	Thuja plicata	31	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.9
Surveyed	4325	On Site	Western Red Cedar	Thuja plicata	33	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	2.0
Surveyed	4324	On Site	Western Red Cedar	Thuja plicata	33	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	2.0
Surveyed	4000	On Site	Western Red Cedar	Thuja plicata	22	8	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.3
Surveyed	6444	On Site	Cherry Plum	Prunus cerasifera	67	12	4	Moderate	Open grown. Some deadwood throughout crown. Decay cavity visible at 1m up stem.	Medium	Retain	Protect as required	4.0

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	6289	On Site	Norway Maple	Acer platanoides	45	13	4	Good	Open grown. No obvious defects.	High	Retain	Protect as required	2.7
Surveyed	6296	On Site	Lawson Cypress	Chamaecyparis lawsoniana	53	18	4	Good	Open grown. Full symmetrical crown. No obvious defects.	High	Retain	Protect as required	3.2
Surveyed	6294	On Site	Cherry Plum	Prunus cerasifera	34	12	4	Moderate	Open grown. Some deadwood throughout crown.	Medium	Retain	Protect as required	2.0
Surveyed	8101	On Site	Western Red Cedar	Thuja plicata	39	10	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	2.3
Surveyed	8102	On Site	Western Red Cedar	Thuja plicata	27	10	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.6
Surveyed	8103	On Site	Western Red Cedar	Thuja plicata	22	10	2	Moderate	Part of group. Single stem.	Medium	Retain	Protect as required	1.3
Surveyed	6302	On Site	Western Red Cedar	Thuja plicata	134	25	10	Good	Open grown. Full symmetrical crown. Good vigour.	High	Retain	Protect as required	8.0
Surveyed	6304	On Site	Apple spp.	Malus spp.	57	10	6	Moderate	Large pruning wounds up stem. Crown extends to face of building. Some deadwood throughout crown.	Medium	Remove	In conflict with proposed membrane replacement.	3.4
Surveyed	6305	On Site	Japanese Maple	Acer palmatum	28	6	3	Moderate	Stem forked at base. Concrete retaining wall within dripline.	Medium	Retain	Protect as required	1.7

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	5292	On Site	Sawara Cypress	<i>Chamaecyparis pisifera</i>	18	6	2	Moderate	Part of group. Asymmetrical crown.	Medium	Retain	Protect as required	1.2
Surveyed	636	On Site	Norway Maple	<i>Acer platanoides</i>	37	6	2	Moderate	Codominant stem at base. Asymmetrical crown.	Medium	Remove	In conflict with proposed membrane replacement.	2.2
Surveyed	4542	On Site	Sycamore Maple	<i>Acer pseudoplatanus</i>	22	13	2	Moderate	Part of group. Asymmetrical crown.	Medium	Retain	Protect as required	1.3
Surveyed	4543	On Site	Sycamore Maple	<i>Acer pseudoplatanus</i>	20	13	2	Moderate	Part of group. Asymmetrical crown.	Medium	Retain	Protect as required	1.2
Surveyed	6027	On Site	Sycamore Maple	<i>Acer pseudoplatanus</i>	30	13	2	Moderate	Part of group. Asymmetrical crown. Multiple unions at 1m and base.	Medium	Retain	Protect as required	1.8
Surveyed	6319	On Site	Western Red Cedar	<i>Thuja plicata</i>	109	23	8	Moderate	Single stem. Asymmetrical crown. Crown pruned for building clearance.	Medium	Remove	In conflict with proposed membrane replacement.	6.5
Surveyed	6320	On Site	Sawara Cypress	<i>Chamaecyparis pisifera</i>	112	23	6	Good	Full sprawling crown.	High	Retain	Protect as required	6.7
Surveyed	6299	On Site	Sycamore Maple	<i>Acer pseudoplatanus</i>	40	11	3	Moderate	Curb 2m from stem. Crown extends over parking lot.	Medium	Retain	Protect as required	2.4

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	6298	On Site	Sycamore Maple	Acer pseudoplatanus	60	12	4	Moderate	Multiple stem unions at base. Curb 2.5m from stem. Crown extends over parking lot.	Medium	Retain	Protect as required	3.6
Surveyed	4541	On Site	Sycamore Maple	Acer pseudoplatanus	44	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	2.6
Surveyed	4540	On Site	Sycamore Maple	Acer pseudoplatanus	32	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.9
Surveyed	4533	On Site	Sycamore Maple	Acer pseudoplatanus	28	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.7
Surveyed	3868	On Site	Sycamore Maple	Acer pseudoplatanus	23	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.4
Surveyed	5261	On Site	Sycamore Maple	Acer pseudoplatanus	20	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.2
Surveyed	1652	On Site	Sycamore Maple	Acer pseudoplatanus	18	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.1
Surveyed	1580	On Site	Paper Birch	Betula papyrifera	28	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.7
Surveyed	3084	On Site	Paper Birch	Betula papyrifera	25	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.5

Unsurveyed	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	Dripline	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Surveyed	5064	On Site	Sycamore Maple	Acer pseudoplatanus	16	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.2
Surveyed	2259	On Site	Sycamore Maple	Acer pseudoplatanus	16	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	1.2
Surveyed	1596	On Site	Sycamore Maple	Acer pseudoplatanus	40	13	2	Moderate	Part of dense group. Asymmetrical crown.	Medium	Retain	Protect as required	2.4
Surveyed	4035	On Site	Japanese Cherry	Prunus serrulata	35	12	2	Moderate	Large exposed surface roots heaving sidewalk. Form and health typical of mature fruit tree.	Medium	Retain	Protect as required	2.1

Appendix 2 Site Photographs



Photo 1. Trees #6018 and #6110, trees are within courtyard, viewing east.



Photo 2. Dead tree #3997, viewing west



Photo 3. Dying tree # 6121, viewing south..



Photo 4. Tree #1707, Tree planted right against existing building. Viewing northwest.



Photo 5. Trees # 6302, 8301-8303, viewing east.

Appendix 3 Tree Health and Structure Rating Criteria

The tree health and structure ratings used by Diamond Head Consulting summarize each tree based on both positive and negative attributes using five stratified categories. These ratings indicate health and structural conditions that influence a tree's ability to withstand local site disturbance during the construction process (assuming appropriate tree protection) and benefit a future urban landscape.

Excellent: Tree of possible specimen quality, unique species or size with no discernible defects.

Good: Tree has no significant structural defects or health concerns, considering its growing environment and species.

Moderate: Tree has noted health and/or minor to moderate structural defects. This tree can be retained, but may need mitigation (e.g., pruning or bracing) and monitoring post-development. A moderate tree may be suitable for retention within a stand or group, but not suitable on its own.

Poor: Tree is in serious decline from previous growth habit or stature, has multiple defined health or structural weaknesses. It is unlikely to acclimate to future site use change. This tree is not suitable for retention within striking distance of most targets.

Dying/Dead: Tree is in severe decline, has severe defects or was found to be dead.

Appendix 4 Tree Retention Value Rating Criteria

The tree retention value ratings used by Diamond Head Consulting provide guidance for tree retention planning. Each tree in an inventory is assigned to one of four stratified categories that reflect its value as a future amenity and environmental asset in a developed landscape. Tree retention value ratings take in to account the health and structure rating, species profile*, growing conditions and potential longevity assuming a tree's growing environment is not compromised from its current state.

High: Tree suitable for retention. Has a good or excellent health and structure rating. Tree is open grown, an anchor tree on the edge of a stand or dominant within a stand or group. Species of *Populus*, *Alnus* and *Betula* are excluded from this category.

Medium: Tree suitable for retention with some caveats or suitable within a group**. Tree has moderate health and structure rating, but is likely to require remedial work to mitigate minor health or structural defects. Includes trees that are recently exposed, but wind firm, and trees grown on sites with poor rooting environments that may be ameliorated.

Low: Tree has marginal suitability for retention. Health and structure rating is moderate or poor; remedial work is unlikely to be viable. Trees within striking distance of a future site developments should be removed.

Nil: Tree is unsuitable for retention. It has a dying/dead or poor health and structure rating. It is likely that the tree will not survive, or it poses an unacceptable hazard in the context of future site developments.

* The species profile is based upon mature age and height/spread of the species, adaptability to land use changes and tree species susceptibility to diseases, pathogen and insect infestation.

** Trees that are 'suitable as a group' have grown in groups or stands that have a single, closed canopy. They have not developed the necessary trunk taper, branch and root structure that would allow them to be retained individually. These trees should only be retained in groups.

Appendix 5 Risk Rating Matrices

Trees with a *probable* or *imminent* likelihood of failure, a *medium* or *high* likelihood of impacting a specified target, and a *significant* or *severe* consequence of failure have been assessed for risk and included in this report (Section 3.2). These two risk rating matrices showing the categories used to assign risk are taken without modification to their content from the International Society of Arboriculture Tree Risk Assessment Qualification Manual.

Matrix 1: Likelihood

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

Matrix 2: Risk Rating

Likelihood of Failure and Impact	Consequences of Failure			
	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

Appendix 6 Construction Guidelines

Tree management recommendations in this report are made under the expectation that the following guidelines for risk mitigation and proper tree protection will be adhered to during construction.

Respecting these guidelines will prevent changes to the soil and rooting conditions, contamination due to spills and waste, or physical wounding of the trees. Any plans for construction work and activities that deviate from or contradict these guidelines should be discussed with the project arborist so that mitigation measures can be implemented.

Tree Protection Zones

A Tree protection zone (TPZ) is determined using either dripline or a DBH multiplier to define a radius measured in all directions from the outside of a tree's trunk. It is typically determined according to local municipal bylaw specifications and may be modified based on professional judgement of the project arborist to accommodate species specific tolerances and site specific growing conditions. For retained trees, the TPZ and fencing indicated in this report are proposed as suitable in relation to the level of disturbance proposed on the site plan provided to the project arborist. Arborist consultation is required if any additional work beyond the scope of the plans provided is proposed near the tree. Work done in addition to the proposed impacts discussed in this report may cause the tree to decline and die.

Tree Protection Fencing: Tree protection zones (TPZs) will be protected by Tree Protection Fencing except where site features constrict roots (e.g., retaining walls or roads), where continual access is required (e.g., sidewalks), or when an acceptable encroachment into the TPZ is proposed, in which case the fencing will be modified. Tree Protection Fencing is shown on the Tree Protection Plan and, where it varies from the TPZ, the rationale is described in the inventory table in Section 3.1.

Within a TPZ, no construction activity, including materials storage, grading or landscaping, may occur without project arborist approval. Within the TPZ, the following are tree preservation guidelines based on industry standards for best practice and local municipal requirements:

- No soil disturbance or stripping.
- Maintain the natural grade.
- No storage, dumping of materials, parking, underground utilities or fires within TPZs or tree driplines.
- Any planned construction and landscaping activities affecting trees should be reviewed and approved by a consulting arborist.
- Install specially designed foundations and paving when these structures are required within TPZs.
- Route utilities around TPZs.
- Excavation within the TPZs should be supervised by a consultant arborist.
- Surface drainage should not be altered in such a way that water is directed in or out of the TPZ.

- Site drainage improvements should be designed to maintain the natural water table levels within the TPZ.

Prior to any construction activity, Tree Protection Fencing must be constructed as shown on the Tree Protection Plan. The protection barrier or temporary fencing must be at least 1.2 m in height and constructed of 2" by 4" lumber with orange plastic mesh screening. Tree Protection Fencing must be constructed prior to tree removal, excavation or construction and remain intact for the entire duration of construction.

Tree Crown Protection and Pruning

All heavy machinery (excavators, cranes, dump trucks, etc.) working within five meters of a tree's crown should be made aware of their proximity to the tree. If there is to be a sustained period of machinery working within five meters of a tree's crown, a line of colored flags should be suspended at eye-level of the machinery operator for the length of the protected tree area. Any concerns regarding the clearance required for machinery and workers within or immediately outside tree protection zones should be referred to the project arborist so that a zone surrounding the crowns can be established or pruning measures undertaken. Any wounds incurred to protected trees during construction should be reported to the project arborist immediately.

Unsurveyed Trees

Unsurveyed trees identified by DHC in the Tree Retention Plan have been hand plotted for approximate location only using GPS coordinates and field observations. The location and ownership of unsurveyed trees cannot be confirmed without a legal survey. The property owner or project developer must ensure that all relevant on- and off-site trees are surveyed by a legally registered surveyor, whether they are identified by DHC or not.

Removal of logs from sites

Private timber marks are required to transport logs from privately-owned land in BC. It is property owner's responsibility to apply for a timber mark prior to removing any merchantable timber from the site. Additional information can be found at: <http://www.for.gov.bc.ca/hth/private-timber-marks.htm>

Regulation of Soil Moisture and Drainage

Excavation and construction activities adjacent to TPZs can influence the availability of moisture to protected trees. This is due to a reduction in the total root mass, changes in local drainage conditions, and changes in exposure including reflected heat from adjacent hard surfaces. To mitigate these concerns the following guidelines should be followed:

- Soil moisture conditions within the tree root protection zones should be monitored during hot and dry weather. When soil moisture is inadequate, supplemental irrigation should be provided that penetrates soil to the depth of the root system or a minimum of 30 cm.
- Any planned changes to surface grades within the TPZs, including the placement of mulch, should be designed so that any water will flow away from tree trunks.

- Excavations adjacent to trees can alter local soil hydrology by draining water more rapidly from TPZs more rapidly than it would prior to site changes. It is recommended that when excavating within 6 m of any tree, the site be irrigated more frequently to account for this.

Root Zone Enhancements and Fertilization

Root zone enhancements such as mulch, and fertilizer treatments may be recommended by the project arborist during any phase of the project if they deem it necessary to maintain tree health and future survival.

Paving Within and Adjacent to TPZs

If development plans propose the construction of paved areas and/or retaining walls close to TPZs, measures should be taken to minimize impacts. Construction of these features would raise concerns for proper soil aeration, drainage, irrigation and the available soil volume for adequate root growth. The following design and construction guidelines for paving and retaining walls are recommended to minimize the long-term impacts of construction on protected trees:

- Any excavation activities near or within the TPZ should be monitored by a certified arborist. Structures should be designed, and excavation activities undertaken to remove and disturb as little of the rooting zone as possible. All roots greater than 2 cm in diameter should be hand pruned by a Certified Arborist.
- The natural grade of a TPZ should be maintained. Any retaining walls should be designed at heights that maintain the existing grade within 20 cm of its current level. If the grade is altered, it should be raised not reduced in height.
- Compaction of sub grade materials can cause trees to develop shallow rooting systems. This can contribute to long-term pavement damage as roots grow. Minimizing the compaction of subgrade materials by using structural soils or other engineered solutions and increasing the strength of the pavement reduces reliance on the sub-grade for strength.
- If it is not possible to minimize the compaction of sub-grade materials, subsurface barriers should be considered to help direct roots downward into the soil and prevent them from growing directly under the paved surfaces.

Plantings within TPZs

Any plans to landscape the ground within the TPZ should implement measures to minimize negative impacts on the above or below ground parts of a tree. Existing grass layer in TPZs should not be stripped because this will damage surface tree roots. Grass layer should be covered with mulch at the start of the project, which will gradually kill the grass while moderating soil moisture and temperatures. Topsoil should be mixed with the mulch prior to planting of shrubs, but new topsoil layer should not be greater than 20 cm deep on top of the original grade. Planting should take place within the newly placed topsoil mixture and should not disturb the original rooting zone of the trees. A two-meter radius around the

base of each tree should be left unplanted and covered in mulch; a tree's root collar should remain free from any amendments that raise the surface grade.

Monitoring during construction

Ongoing monitoring by a consultant arborist should occur for the duration of a development project. Site visits should be more frequent during activities that are higher risk, including the first stages of construction when excavation occurs adjacent to the trees. Site visits will ensure contractors are respecting the recommended tree protection measures and will allow the arborist to identify any new concerns that may arise.

During each site visit the following measures will be assessed and reported on by a consulting arborist:

- Health and condition of protected trees, including damage to branches, trunks and roots that may have resulted from construction activities, as will the health of. Recommendations for remediation will follow.
- Integrity of the TPZ and fencing.
- Changes to TPZ conditions including overall maintenance, parking on roots, and storing or dumping of materials within TPZ. If failures to maintain and respect the TPZ are observed, suggestions will be made to ensure tree protection measures are remediated and upheld.
- Review and confirmation of recommended tree maintenance including root pruning, irrigation, mulching and branch pruning.
- Changes to soil moisture levels and drainage patterns; and
- Factors that may be detrimentally impact the trees.

Appendix 7 Report Assumptions and Limiting Conditions

- 1) Unless expressly set out in this report or these Assumptions and Limiting Conditions, Diamond Head Consulting Ltd. (“Diamond Head”) makes no guarantee, representation or warranty (express or implied) regarding this report, its findings, conclusions or recommendations contained herein, or the work referred to herein.
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- 3) The findings, conclusions and recommendations made in this report reflect Diamond Head’s best professional judgment given the information available at the time of preparation. This report has been prepared in a manner consistent with the level of care and skill normally exercised by arborists currently practicing under similar conditions in a similar geographic area and for specific application to the trees subject to this report on the date of this report. Except as expressly stated in this report, the findings, conclusions and recommendations it sets out are valid for the day on which the assessment leading to such findings, conclusions and recommendations was conducted. If generally accepted assessment techniques or prevailing professional standards and best practices change at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary. Diamond Head expressly excludes any duty to provide any such modification if generally accepted assessment techniques and prevailing professional standards and best practices change.
- 4) Conditions affecting the trees subject to this report (the “Conditions”, include without limitation, structural defects, scars, decay, fungal fruiting bodies, evidence of insect attack, discolored foliage, condition of root structures, the degree and direction of lean, the general condition of the tree(s) and the surrounding site, and the proximity of property and people) other than those expressly addressed in this report may exist. Unless otherwise stated information contained in this report covers only those Conditions and trees at the time of inspection. The inspection is limited to visual examination of such Conditions and trees without dissection, excavation, probing or coring. While

every effort has been made to ensure that any trees recommended for retention are both healthy and safe, no guarantees, representations or warranties are made (express or implied) that those trees will not be subject to structural failure or decline. The Client acknowledges that it is both professionally and practically impossible to predict with absolute certainty the behavior of any single tree, or groups of trees, in all given circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential for failure and this risk can only be eliminated if the risk is removed. If Conditions change or if additional information becomes available at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary. Diamond Head expressly excludes any duty to provide any such modification of Conditions change or additional information becomes available.

- 5) Nothing in this report is intended to constitute or provide a legal opinion and Diamond Head expressly disclaims any responsibility for matters legal in nature (including, without limitation, matters relating to title and ownership of real or personal property and matters relating to cultural and heritage values). Diamond Head makes no guarantee, representation or warranty (express or implied) as to the requirements of or compliance with applicable laws, rules, regulations, or policies established by federal, provincial, local government or First Nations bodies (collectively, “Government Bodies”) or as to the availability of licenses, permits or authorizations of any Government Body. Revisions to any regulatory standards (including bylaws, policies, guidelines an any similar directions of a Government Bodies in effect from time to time) referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary. Diamond Head expressly excludes any duty to provide any such modification if any such regulatory standard is revised.
- 6) Diamond Head shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.
- 7) In preparing this report, Diamond Head has relied in good faith on information provided by certain persons, Government Bodies, government registries and agents and representatives of each of the foregoing, and Diamond Head assumes that such information is true, correct and accurate in all material respects. Diamond Head accepts no responsibility for any deficiency, misinterpretations or fraudulent acts of or information provided by such persons, bodies, registries, agents and representatives.
- 8) Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.
- 9) Loss or alteration of any part of this report invalidates the entire report.



- LEGEND**
- CRITICAL ROOT ZONE
 - TREE PROTECTION ZONE AND FENCING
 - SURVEYED TREE TO BE RETAINED
 - UN-SURVEYED TREE TO BE RETAINED (MUST BE SURVEYED)
 - ✘ SURVEYED TREE TO BE REMOVED
 - ✘ UN-SURVEYED TREE TO BE REMOVED (MUST BE SURVEYED)

- NOTES**
1. The location of un-surveyed trees on this plan is approximate. Their location and ownership cannot be confirmed without being surveyed by a Registered BC Land Surveyor.
 2. All tree protection fencing must be built to the relevant municipal bylaw specifications. The dimensions shown are from the outer edge of the stem of the tree.
 3. The tree protection zone shown is a graphical representation of the critical root zone, measured from the outer edge of the stem of the tree. ($\frac{1}{2}$ the trees diameter was added to the graphical tree protection circles to accommodate the survey point being in the center of the tree)
 4. Any construction activities or grade changes within the Root Protection Zone must be approved by the project arborist.
 5. This plan is based on a topographic and tree location survey provided by the owners' Registered British Columbia Land Surveyor (BCLS) and layout drawings provide by the owners' Engineer (P Eng).
 6. This plan is provided for context only, and is not certified as to the accuracy of the location of features or dimensions that are shown on this plan. Please refer to the original survey plan and engineering plans.

REFERENCE DRAWINGS

1. Base Survey by: Aplin and Martin dated November 22, 2023



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Drawing title: Tree Management Plan
Project address: Anthropology and Sociology Building - 6303 NW Marine Dr
Client: The University of British Columbia | Vancouver Campus

Drawing No: 001
Date: 2024/09/18
Drawn by: CL
Page Size: TABLOID 11"x17"

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