Arboricultural Report and Inventory

For:
University of British Columbia Properties Trust

Site Location:
UBC Pacific Residences

To be submitted with DHC Tree Management Plan dated June 4th, 2019

Submitted to:
Sepehr Rad
Project Manager
UBC Properties Trust
University of British Columbia
2210 West Mall
Vancouver, BC, V6T 1Z4

Date: June 4th, 2019

Submitted by:
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SAFE CERTIFIED

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.

Supervisor:

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ISA Certified Arborist (PN-1920A)
ISA Tree Risk Assessment Qualified (TRAQ)
BC Parks Wildlife and Danger Tree Assessor

Project Arborist:

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ISA Certified Arborist (PN-8643A)
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Please contact us if there are any questions or concerns about the contents of this report.

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

Scope of Assignment:

Diamond Head Consulting Ltd. (DHC) was retained to complete an arboricultural report to supplement the proposed development application for the UBC Arts Student Center. 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 currently consists of hard and soft landscaping surrounding the UBC Gage residences and conference facilities (e.g. Photos 1 and 2). Vegetation on site is primarily large shrubs and small to medium stature trees planted within lawns, landscape buffers and contained beds. The site contains lanes and sidewalks and is adjacent to both Wesbrook Mall and Student Union Boulevard.

1.2 Proposed Land Use Changes

The proposed development will replace the current landscape with five ten-story tall residential towers, with accompanying servicing street upgrades and hard landscaping.

There a two development phases of development addressed in context of this report:

- **Phase 1:** Installation of site servicing in the south west of the subject site.
- **Phase 2:** Construction and development of the proposed buildings.

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.

2.0 Process and Methods

Ira Sutherland of DHC visited the site on July 12th, 2018 to collect the tree inventory information and Ian MacLaclan prepared the report in relation to the proposed plans. 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. 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.

2.2 Tree Risk Assessment

Tree risk assessments were completed following methods of the ISA Tree Risk Assessment Manual[1] 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 hazard 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

Minimum tree protection zone radii were calculated as six-times tree DBH for each tree with the potential to incur adverse development impacts. These TPZs 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 complete tree inventory is given in in Appendix 1.

One hundred and thirty (130) trees (including one palm tree) were identified in the inventory. Thirty-eight (38) species of trees were present on-site and most were non-native ornamentals. Twenty-three (23) were assessed to have a *good* health and structure rating; 73 trees (approximately half) of those inventoried had a *moderate* health and structure rating, while the remaining 34 trees had *poor* or *dead/dying* health and structure ratings. Those trees with *moderate* or *good* health and structure ratings have *medium* or *high* retention suitability respectively and could be feasibly retained in a developed landscape.

3.2 Tree Risk Assessment

One tree, number 9874, was assessed to pose a high-risk to targets present at the time of assessment (Photo 3). We recommend that this tree is removed as soon as possible, regardless of the proposed development process.

Table 1: Tree risk assessment summary.

Tree		Target	Likelihood			Consequences	Risk Rating	Action	Residual Risk
Number	Part to Fail		Failure	Impact	Failure & Impact				
9874	Half or whole tree	Parked vehicles	Probable	Medium	Somewhat likely	Significant	High	Remove tree. It is within building envelope and proposed for removal.	Nil

4.0 Tree Retention and Removal

One hundred and thirty (130) trees were identified in the inventory and evaluated in context of a large, fiver-tower development proposed at UBC.

4.1 Phase 1: Service Installation

Of the 130 trees captured in the inventory, 28 occur in context of site servicing proposed as a first phase of development in the south east of the site. Based on conflicts with the proposed services and access requirements of service installation, 11 of the 28 trees are proposed for removal in Phase 1. The remaining trees in context of the proposed Phase 1 servicing will require tree protection until the remaining development and site clearance commences. The locations of all trees to be removed and retained in Phase 1, as well as the dimensions of tree protection fences are given in the accompanying Tree Management Plan (Phase 1, page 1).

4.2 Phase 2: Development Construction

The landscape impacts of the proposed development are expected to be extensive. As a result, 91 of the 130 trees identified in the inventory are proposed for removal (including trees to be removed in Phase 1). These removals are proposed based on tree health, structure, suitability for retention and conflicts with the proposed design. Thirty-nine (39) tress are proposed for retention and they will require the installation of tree protection. Of these retained trees, trees 714 and 724 require further evaluation when more detailed landscape plans become available. The locations of all trees to be removed and retained, as well as the dimensions of tree protection fences are given in the accompanying tree management plan (Phase 2, pages 2 and 3).

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 dated July 4th, 2019. 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

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
008	On-Site	Pear (P. calleryana)	9	5	Moderate	Moderate vigour.	Medium	Remove	Within building envelope.	2
009	On-Site	Pine (P. monticola)	4	3	Moderate		Medium	Remove	Conflicts with hard landscape upgrades.	2
010	On-Site	Pine (P. sylvestris)	10	3	Moderate	Tightly clipped to form. Healthy.	Medium	Remove	In planter to be removed. Potential tree for relocation if suitable site is available.	2
501	On-Site	Zelkova (Z. serrata)	16	6	Good	Well established young tree. Symmetric crown. Good vigour.	High	Retain	Install tree protection fencing.	2
502	On-Site	Cherry (P. x yedoensis)	12	5	Moderate	Moderate vigour.	Medium	Retain	Install tree protection fencing.	2
701	On-Site	Cherry (P. x yedoensis)	25	5	Moderate	Dripline extends to building. Moderate vigour.	Medium	Remove	Conflicts with service excavation and installation.	2
702	On-Site	Pine (Pinus sp.)	20	5	Poor	Creeping multistem pine with one main upright stem.	Low	Remove	Within building envelope.	2
703	On-Site	Pine (P. nigra)	25	5	Poor	Creeping multistem pine somewhat upright.	Low	Remove	Excessive conflict with foundation excavation.	2
704	On-Site	Pine (Pinus sp.)	65	5	Poor	Creeping multistem pine with six upright stems ~ 10 cm DBH each.	Low	Remove	Within building envelope.	3.9
705	On-Site	Maple (A. pseudoplatanus)	21	7	Good	In landscape strip. Crown symmetric, dominant. Normal vigour.	Low	Remove	Conflicts with hard landscape upgrades.	2
706	On-Site	Maple (A. pseudoplatanus)	20	5	Poor	In landscape strip. Two stems 13 and 7 cm DBH. Wide basal union. Crown asymmetric, suppressed.	Low	Remove	Conflicts with hard landscape upgrades.	2
707	On-Site	Sorbus (S. aucuparia)	20	7	Poor	In landscape strip. Two stems from acute union above DBH.	Low	Remove	Conflicts with hard landscape upgrades.	2
708	On-Site	Maple (A. platanoides)	18	8	Moderate	In landscape strip. Asymmetric crown.	Medium	Remove	Conflicts with hard landscape upgrades.	2
709	On-Site	Birch (B. pendula)	35	14	Moderate	In landscape strip at hill crest. Dominant. Lower crown shaded and thin.	Medium	Remove	Conflicts with hard landscape upgrades.	2.1
710	On-Site	Maple (A. pseudoplatanus)	16	5	Poor	In landscape strip. Codominant stem pruned from base, little occlusion yet. Crown asymmetric.	Low	Remove	Conflicts with hard landscape upgrades.	2
711	On-Site	Pine (Pinus sp.)	38	6	Moderate	1 m south from curb. Two stems 19,19 cm DBH from wide union near base.	Medium	Remove	Conflicts with excavation for service installation.	2.3

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
712	On-Site	Hemlock (T. heterophylla)	16	7	Moderate	At edge of dense landscape strip. Crown asymmetric.	Medium	Remove	Conflicts with hard landscape upgrades.	2
713	On-Site	Pine (Pinus sp.)	70	5	Poor	0.5 m from curb. Seven stems ~10 cm DBH each from base; two lean towards road.	Low	Remove	Conflicts with hard landscape upgrades.	4.2
714	On-Site	Tulip tree (L. tulipifera)	63	20	Good	Grows in lawn. Sidewalk 3 m to west and south. Open grown. Codominant stems from wide union at 5 m. Symmetrical crown from 2 m. 5 m dripline. Dense foliage. Good vigour.	High	Remove	Within building envelope.	3.8
715	On-Site	Cedar (T. plicata)	41	10	Moderate	Grows with adjacent cedar. Single stem. Shared crown below 5 m; dense crown from trimming.	Medium	Remove	Within building envelope.	2.5
716	On-Site	Cedar (T. plicata)	63	10	Moderate	Grows with adjacent cedar. Shared crown below 5 m; dense from trimming. Codominant stems from acute basal union.	Medium	Remove	Within building envelope.	3.8
717	On-Site	Dogwood (Cornus sp.)	40	6	Moderate	4 stems ~10 cm DBH from acute basal unions. Asymmetric crown away from cedars.	Medium	Remove	Excessive conflict with foundation excavation.	2.4
718	On-Site	Cedar (T. plicata)	31	7	Dead/Dying	95% of crown dead.	Nil	Remove	Within building envelope.	2
719	On-Site	Maple (A. pseudoplatanus)	44	10	Moderate	2 m from sidewalk. Good vigour. Asymmetric crown south. Drip line radius 8 m.	Medium	Remove	Excessive conflict with foundation excavation.	2.6
720	On-Site	Cedar (T. plicata)	32	7	Poor	Upper crown dying back. Shared crown with adjacent cedar.	Low	Remove	Within building envelope.	2
721	On-Site	Cedar (T. plicata)	31	7	Moderate	Single stem. Shared crown with adjacent cedar. Normal vigour.	Medium	Remove	Within building envelope.	2
722	On-Site	Cherry (P. emarginata)	27	13	Dead/Dying	Recently dead tree. Appears still quite firm. Parking area a few meters north west.	Nil	Remove	Within building envelope.	2
723	On-Site	Maple (A. macrophyllum)	60	10	Moderate	In landscape strip. Three stems ~ 20 cm DBH growing together from old stump. Slightly asymmetric crown south.	Medium	Remove	Within building envelope.	3.6
724	On-Site	Maple (A. platanoides)	22	9	Poor	In landscape strip. Minor crown dieback due to shading. Asymmetric crown north.	Low	Remove	Within building envelope.	2
725	On-Site	Maple (A. macrophyllum)	54	17	Moderate	Codominant stems from acute union with minor included bark. Symmetric crown. Structural roots at surface up to 7 m east.	Medium	Remove	Within building envelope.	3.2
726	On-Site	Maple (A. macrophyllum)	70	17	Poor	Numerous stems from acute unions with extensive included bark. Some stems suppressed and dying.	Low	Remove	Conflicts with lane.	4.2

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
727	On-Site	Maple (A. macrophyllum)	64	17	Moderate	Open grown. Some acute unions, but appears sound. Moderate dead wood among inner crown.	Medium	Remove	Excessive conflict with foundation excavation.	3.8
728	On-Site	Maple (A. platanoides)	33	13	Poor	Phototropic lean. Grows in group. Asymmetric crown.	Low	Remove	Excessive conflict with foundation excavation.	2
729	On-Site	Maple (A. platanoides)	33	13	Poor	Phototropic lean. Grows in group. Asymmetric crown.	Low	Remove	Excessive conflict with foundation excavation.	2
730	On-Site	Maple (A. platanoides)	23	13	Poor	Phototropic lean. Grows in group. Asymmetric crown.	Low	Remove	Excessive conflict with foundation excavation.	2
731	On-Site	Maple (A. platanoides)	28	13	Poor	Phototropic lean. Grows in group. Asymmetric crown.	Low	Remove	Excessive conflict with foundation excavation.	2
732	On-Site	Maple (A. platanoides)	65	19	Moderate	Phototropic lean southeast. Dominant in group. Asymmetric crown. Many low sweeping branches.	Medium	Remove	Excessive conflict with foundation excavation.	3.9
733	On-Site	Cherry (P. x yedoensis)	14	5	Good	Good vigour and form.	High	Retain	Install tree protection fencing.	2
734	On-Site	Horsechestnut (A. hippocastanum)	36	10	Moderate	Asymmetric crown south. Wide unions. Moderate vigour.	Medium	Retain	Install tree protection fencing.	2.2
735	On-Site	Beech (F. sylvatica)	53	13	Good	Cut-leaf copper coloured variety. Grows in 12 m sq. planter. Straight central stem with well-spaced branches. Some inclusions but fusing over. Slightly asymmetric crown south due to competition. Good vigour.	High	Retain	Requires further detail of adjacent landscape plans. Install tree protection fencing assuming retention.	3.2
736	On-Site	Maple (A. circinatum)	45	4	Moderate	Grows in landscape strip. Healthy dense crown.	Medium	Remove	Conflicts with hard landscape upgrades.	2.7
737	On-Site	Palm (Trachycarpus sp.)	25	3	Moderate	Healthy palm. Planted immediately against building.	Medium	Retain	Install tree protection fencing.	2
1192	On-Site	Pine (Pinus sp.)	14	4	Good	Five needle pine with 1-inch long needles.	High	Remove	Conflicts with hard landscape upgrades.	2
1885	On-Site	Sorbus (S. aucuparia)	32	7	Moderate	Open grown. Two stems 15 and 17 cm DBH from acute union. Previous Codominant stem failed leaving large scar with extensive decay. One-sided crown left.	Medium	Remove	Within path alignment.	2
1886	On-Site	Maple (A. platanoides)	77	15	Poor	Parking lot 1.3 m west. Codominant stems from acute union with 1 m of included bark. Symmetric open grown crown. Good vigour.	Low	Remove	Excessive conflicts with foundation excavation, hard landscaping and lane.	4.6

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
1887	On-Site	Sorbus (S. aucuparia)	34	9	Moderate	Single stem. Laterals from mostly wide unions. Good form for species and size, except asymmetric crown to south.	Medium	Remove	Within building envelope.	2
1889	On-Site	Sorbus (S. aucuparia)	34	9	Good	Single stem. Laterals from mostly wide unions. Good form for species and size. Shipping container in dripline to north west.	High	Remove	Within building envelope.	2
1891	On-Site	Tulip tree (L. tulipifera)	32	10	Moderate	Partly shaded. Asymmetric crown west. Somewhat irregular stem and form.	Medium	Remove	Excessive conflict with foundation excavation and lane.	2
1894	On-Site	Sorbus (S. aucuparia)	35	7	Moderate	Open grown symmetric crown. Good branching structure. Somewhat low vigour. Minor deadwood.	Medium	Remove	Within building envelope.	2.1
1895	On-Site	Tulip tree (L. tulipifera)	29	10	Moderate	In lawn at crest of gentle slope. Symmetric crown. Somewhat irregular stem and form.	Medium	Remove	Within building envelope.	2
1896	On-Site	Davidia (D. involucrata)	29	6	Poor	Planted in lawn between building and parking lot. Wide unions. Asymmetric crown away from building. Several dead upper.	Low	Retain	Prune dead wood. Install tree protection fencing. Consider placing mulch around root zone to enhance the health of this tree.	2
1897	On-Site	Davidia (D. involucrata)	29	6	Moderate	Planted in lawn between building and parking lot. Wide unions. Asymmetric crown away from building. Moderate vigour.	Medium	Retain	Prune dead wood. Install tree protection fencing.	2
1898	On-Site	Davidia (D. involucrata)	26	6	Good	Planted in lawn. 5 m from retaining wall that drops to the west. Wide unions. Crown somewhat asymmetrical, with dripline extending 7 m toward building.	High	Retain	Install tree protection fencing.	2
1899	On-Site	Davidia (D. involucrata)	29	6	Good	Planted in lawn 1 m from retaining wall that drops to the east. Wide unions. Minor decay pockets at old pruning wound. Symmetric crown. Good vigour.	High	Remove	Excessive conflict with proposed hard landscaping.	2
1901	On-Site	Linden (Tilia sp.)	44	13	Moderate	Grows in open lawn. Symmetric crown. Main stem with wide ridges; sounds and looks solid. Main laterals attached at wide unions.	Medium	Remove	Will likely conflict with required foundation excavation.	2.6
1902	On-Site	Cypress (C. pisifera)	116	20	Moderate	Codominant stems (50 and 66 cm DBH) from acute basal union. Divides at further acute unions at 2 m. None to minor inclusions. Narrow columnar crown with <10% recent dieback.	Medium	Remove	Excessive conflicts with foundation excavation and path.	7

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
1903	On-Site	Holly (I. aquifolium)	50	10	Poor	Multiple stems from acute unions at 2 m. Extensive inclusion. Somewhat sparse crown.	Low	Remove	Within path alignment.	3
1904	On-Site	Holly (I. aquifolium)	50	10	Moderate	Two stems from wide below DBH union. crown shaded. Male individual - no invasive spreading fruit.	Low	Remove	Within building envelope.	3
1905	On-Site	Cherry (P. x yedoensis)	101	9	Moderate	Grows in group. Three main laterals from below DBH acute union: 39, 33, and 29 cm DBH. Vigorous asymmetrical crown spreads out past curb to east and nearly as far west.	Medium	Remove	Excessive conflict with foundation excavation and aboveground building envelope.	6.1
1906	On-Site	Cedar (T. plicata)	125	25	Moderate	Grows on minor slope 6 m from sidewalk, Codominant stems from acute union at 1.5 m. No inclusion. Minor bark seam below union. Open grown broad conical crown. Moderate vigour.	Medium	Remove	Excessive conflict with foundation excavation and aboveground building envelope.	7.5
1907	On-Site	Cypress (C. pisifera)	120	20	Moderate	Codominant stems (59 and 61 cm DBH) grow slightly away from each other from acute basal union. No inclusion. No further unions. Almost two separate columnar crown with Good vigour.	Medium	Remove	Within building envelope.	7.2
1936	On-Site	Hawthorn (Crataegus sp.)	42	6	Moderate	Three stems (13,14, and 15 cm DBH) from acute basal unions. Moderate Included bark. Minor lean and strong crown asymmetry south due to shading. Good vigour.	Medium	Remove	Conflicts with paved pedestrian building access.	2.5
1941	On-Site	Sorbus (S. aucuparia)	19	5	Poor	Open grown. One sided crown west. Moderate dead wood. Low vigour.	Low	Remove	Within building envelope.	2
1944	On-Site	Pine (P. nigra)	54	20	Moderate	10 degree lean and asymmetric crown to south. Partially corrected. Wide unions. Good vigour. Prominent landscape feature at building entrance. Drip line radius 6.5 m.	Medium	Remove	Unsuitable for long-term retention between buildings and cannot be retained in context of apparent upgrades to building access.	3.2
1945	On-Site	Pine (P. nigra)	53	20	Moderate	Asymmetric crown to south. Codominant stems from acute union at 9 m. Good vigour. Drip line radius 5 m.	Medium	Remove	Unsuitable for long-term retention between buildings and without tree 1944.	3.2
1946	On-Site	Plane (P. x acerifolia)	68	20	Good	in landscape strip. Hardscape 2 m west. 10 degrees phototropic lean away from building. Wide unions. No previous failures in very large crown. Dripline extends over building. Good vigour.	High	Retain	Install tree protection fencing. Update pans to maintain current alignment of sidewalk edge.	4.1

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
1953	On-Site	Horsechestnut (A. hippocastanum)	53	16	Moderate	Minor lean and asymmetric crown south. Wide unions. Moderate vigour.	Medium	Retain	Install tree protection fencing.	3.2
1955	On-Site	Horsechestnut (A. hippocastanum)	46	10	Moderate	Minor lean and asymmetric crown south. Wide unions. Moderate vigour.	Medium	Retain	Install tree protection fencing. Update pans to maintain current alignment of sidewalk edge.	2.8
1962	On-Site	Maple (A. pseudoplatanus)	50	6	Moderate	Grows 1 m from sidewalk. Shades bus stop booth. Minor crown dieback. Low vigour. Moderate deadwood in crown. Mostly Symmetric crown.	Medium	Remove	Conflicts with hard landscape upgrades.	3
1963	On-Site	Maple (A. pseudoplatanus)	46	7	Poor	in landscape strip in maple row. 5 m from sidewalk. 30% crown dieback. Moderate deadwood in crown. 2 m long seam along main stem sealed over. Symmetric crown.	Low	Remove	Conflicts with hard landscape upgrades.	2.8
1964	On-Site	Maple (A. pseudoplatanus)	35	7	Moderate	In lawn part of well-spaced maple row. 1.5 from sidewalk. Low vigour. Mostly Symmetric crown with 6 m dripline.	Medium	Remove	Excessive conflict with foundation excavation.	2.1
1966	On-Site	Maple (A. pseudoplatanus)	38	10	Good	In landscape strip in well-spaced maple row. 2 m from sidewalk on hill slope. Good vigour. Symmetric crown with 6 m dripline.	High	Remove	Excessive conflict with foundation excavation.	2.3
1967	On-Site	Maple (A. pseudoplatanus)	34	6	Moderate	In landscape strip in well-spaced maple row. 2 m from sidewalk and bus stop. Shades bus stop booth. Minor crown dieback. Low vigour. Moderate deadwood in crown. Symmetric crown.	Medium	Remove	Excessive conflict with foundation excavation.	2
1968	On-Site	Maple (A. pseudoplatanus)	34	6	Poor	In landscape strip in well-spaced maple row. 5 m from sidewalk. 25% crown dieback. Moderate deadwood in crown. 2 m long seam along main stem sealed over. Symmetric crown.	Low	Remove	Excessive conflict with foundation excavation.	2
2531	On-Site	Katsura (C. japonicum)	18	9	Moderate	Roots restricted. Grows in 30 cm wide soil strip in row of katsuras. Fairly symmetric crown. Moderate vigour.	Medium	Retain	Outside project scope. No fence required.	2
4191	On-Site	Locust (G. triacanthos)	16	6	Moderate	Well established young tree, minor mower damage.	Medium	Remove	Within building envelope.	2
4200	On-Site	Pine (Pinus sp.)	16	4	Good	Five needle pine with 1-inch long needles.	High	Remove	Conflicts with hard landscape upgrades.	2
4205	On-Site	Locust (G. triacanthos)	18	6	Moderate	20% crown dieback.	Medium	Remove	Within building envelope.	2

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
5184	On-Site	Cherry (P. serrulata)	6	4	Good	Staked loosely, good vigour.	High	Retain	Install tree protection fencing.	2
5187	On-Site	Ash (F. excelsior)	18	9	Moderate	Restricted rooting. In 1.0 m wide boulevard strip. Minor lean and Asymmetric crown south. Good vigour. Shades parking.	Medium	Retain	Install tree protection fence.	2
5188	On-Site	Ash (F. excelsior)	16	9	Moderate	Grows in 1.4 m wide boulevard strip. Large underground utility box 1 m west. Good form and vigour.	Medium	Retain	Install tree protection fence.	2
5192	On-Site	Pine (P. sylvestris)	10	3	Moderate	Tightly clipped to form. Healthy	Medium	Remove	In planter to be removed. Potential tree for relocation if suitable site is available.	2
5195	On-Site	Cherry (P. serrulata)	6	4	Moderate	Staked loosely, 20% of crown is dead.	Medium	Remove	Conflicts with service excavation and installation.	2
5197	On-Site	Pine (P. sylvestris)	27	5	Moderate	multi-stemmed. Good vigour.	Medium	Retain	Install tree protection fence at sidewalk edge.	2
5200	On-Site	Beech (F. sylvatica)	20	9	Good	Purple variety. Young tree establishing well. In traffic circle, prominent landscape feature with good growing space to mature. Recent dripline pruning.	High	Retain	Install tree protection fence. Arborist supervision required for excavation within 1.5 m of TPZ.	2
5202	On-Site	Cherry (P. serrulata)	6	4	Moderate	Staked loosely, 20% of crown is dead.	Medium	Remove	Conflicts with service excavation and installation.	2
5204	On-Site	Maple (A. platanoides)	32	10	Good	1 m north of sidewalk in landscape strip. Open grown. Appears to have excellent symmetry and vigour.	High	Retain	Install tree protection fence at sidewalk edge.	2
5207	On-Site	Cherry (P. serrulata)	6	4	Good	Staked loosely, good vigour.	High	Remove	Within building envelope.	2
5209	On-Site	Cherry (P. serrulata)	6	4	Good	Staked loosely, good vigour.	High	Retain	Install tree protection fencing.	2
5210	On-Site	Maple (A. platanoides)	14	10	Good	Fastigiate copper beech. Surrounded by concrete sidewalk and pavers. Open grown. Appears to have good symmetry and vigour.	High	Retain	Install tree protection fence at sidewalk edge.	2
5914	On-Site	Ash (F. excelsior)	18	9	Moderate	Restricted rooting. In 0.7 m wide boulevard. Minor lean and asymmetric crown south. Good vigour. Shades parking.	Medium	Retain	Install tree protection fence.	2
9675	On-Site	Redwood (S. giganteum)	15	5	Good	Conical form. Healthy.	High	Retain	Arborist supervision required for service excavation at edge of tree protection zone.	2

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
9676	On-Site	Cherry (P. x yedoensis)	30	4	Moderate	Shrubs at base. Unrestricted rooting. Dripline extends over adjacent roof. Low vigour.	Medium	Retain	Install tree protection fencing.	2
9678	On-Site	Cherry (P. x yedoensis)	27	6	Moderate	Shrubs at base. Unrestricted rooting. Dripline extends to existing building. Asymmetric crown away from building. Moderate vigour.	Medium	Remove	Conflicts with service excavation and installation.	2
9679	On-Site	Pine (P. nigra)	58	10	Good	In lawn area. Stout, mostly open grown tree with minor lower crown asymmetry. Good vigour.	High	Remove	Conflicts with service excavation and installation.	3.5
9680	On-Site	Pine (P. sylvestris)	41	10	Moderate	In pine group near street. Twisted form. Wide unions. Asymmetric crown away from group. Good vigour.	Medium	Remove	Conflicts with service excavation and installation.	2.5
9681	On-Site	Pine (P. sylvestris)	36	10	Moderate	In pine group near street. Twisted form. Good vigour. DBH measured at 1.1 m below swollen union	Medium	Remove	Conflicts with service excavation and installation.	2.2
9682	On-Site	Dogwood (C. nuttallii)	11	6	Moderate	Grows in landscape strip at crest of short steep hill. Full crown to ground. Minor anthracnose affecting foliage.	Medium	Retain	Install tree protection fencing.	2
9764	On-Site	Maple (A. circinatum)	32	4	Moderate	Grows in landscape strip. Three stems 13, 12, and 7 cm DBH. Healthy crown.	Medium	Retain	Retain if existing planting bed remains. More landscape plan detail required for complete assessment. Install tree protection fencing assuming retention.	2
9771	On-Site	Pine (P. monticola)	12	5	Moderate	Low vigour.	Medium	Remove	Conflicts with hard landscape upgrades.	2
9772	On-Site	Dogwood (Cornus sp.)	36	6	Good	Grows in wide planter. multi-stemmed from wide basal unions. Symmetric crown. Good vigour.	High	Remove	Conflicts with hard landscape upgrades.	2.2
9800	On-Site	Pear (P. calleryana)	9	5	Dead/Dying		Low	Remove	Within building envelope.	2
9817	On-Site	Ash (F. excelsior)	7	6	Moderate	Moderate vigour.	Medium	Remove	Within building envelope.	2
9820	On-Site	Ash (Fraxinus sp.)	9	5	Moderate	Grows in wide boulevard strip. 15 degrees lean and asymmetric crown east. Normal vigour.	Medium	Retain	Install tree protection fence. Arborist supervision required for excavation within 1.5 m of TPZ.	2
9823	On-Site	Ginkgo (G. biloba)	10	4	Good	Well-established.	High	Remove	Conflict with path alignment	2
9826	On-Site	Magnolia (Magnolia sp.)	8	4	Moderate	Grows in small parking lot peninsula. Normal form and vigour.	Medium	Retain	Install tree protection fence.	2

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
9829	On-Site	Magnolia (Magnolia sp.)	9	4	Moderate	Grows parking lot peninsula. Sparse crown, moderate-low vigour.	Medium	Retain	Install tree protection fence.	2
9830	On-Site	Ash (Fraxinus sp.)	16	7	Moderate	Grows in tapered boulevard strip. Minor lean and asymmetric crown. Good vigour.	Medium	Retain	Install tree protection fence.	2
9857	On-Site	Ironwood (P. persica)	5	5	Good	Moderate vigour.	High	Remove	Within building envelope.	2
9858	On-Site	Pear (P. calleryana)	11	5	Dead/Dying	85% of crown is dead.	Low	Remove	Within building envelope.	2
9859	On-Site	Smoke bush (Cotinus sp.)	30	3	Moderate	Multistem shrub. Purple foliage. Spreads away from building.	Medium	Remove	Conflicts with hard landscape upgrades.	2
9870	On-Site	Maple (A. macrophyllum)	60	10	Poor	Grows in thick landscape strip. Three stems ~ 20 DBH growing together from acute basal unions with inclusion. Slightly asymmetric crown south.	Low	Remove	Excessive conflict with foundation excavation. Unsuitable structure for retention.	3.6
9874	On-Site	Maple (A. macrophyllum)	63	16	Poor	In semi-natural area. Codominant stems from acute union with inclusion. Seam forming below. East stem probable to fail with high likelihood to hit parked cars.	Low	Remove	Within building envelope.	3.8
9876	On-Site	Maple (A. platanoides)	19	9	Poor	In landscape strip. Substantial crown dieback. Low vigour.	Low	Remove	Within building envelope.	2
9878	On-Site	Maple (A. platanoides)	19	9	Poor	In landscape strip. Substantial crown dieback. Low vigour.	Low	Remove	Within building envelope.	2
9880	On-Site	Maple (A. platanoides)	21	9	Poor	In landscape strip. Minor crown dieback. Low vigour.	Low	Remove	Within building envelope.	2
9881	On-Site	Maple (A. platanoides)	33	18	Moderate	In landscape strip. Minor crown dieback. Moderate vigour.	Medium	Remove	Within building envelope.	2
9884	On-Site	Maple (A. platanoides)	30	11	Poor	Grows in semi-natural area. Minor phototropic lean south east and one-sided crown. Moderate vigour.	Low	Remove	Within building envelope.	2
9885	On-Site	Maple (A. platanoides)	27	11	Poor	Grows in semi-natural area. Minor phototropic lean and asymmetric crown southeast. Moderate vigour. At hill crest 1.5 m from sidewalk.	Low	Remove	Within building envelope.	2
9886	On-Site	Maple (A. platanoides)	28	11	Poor	In landscape strip. Minor crown dieback due to shading. Asymmetric crown north.	Low	Remove	Within building envelope.	2
9889	On-Site	Maple (A. platanoides)	83	19	Poor	Dominant tree in group. Codominant stems (45, 38 cm DBH) from acute union with minor inclusion. Phototropic lean west.	Low	Remove	Excessive conflict with foundation excavation.	5

Tag #	Location	Species	DBH (cm)	Height (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ
9952	On-Site	Maple (A. platanoides)	58	20	Poor	Codominant crown. Phototropic lean away from landscape strip. 40% of root zone covered in crushed rock for parking. Strongly Asymmetric crown.	Low	Retain	Outside project scope. No fence required. Consider mulch placement in root zone to enhance the health of this tree.	3.5
9953	On-Site	Cedar (T. plicata)	64	23	Moderate	Dominant in maple stand. Good taper. Somewhat asymmetrical crown south. Good vigour.	Medium	Retain	Outside project scope. No fence required.	3.8
9954	On-Site	Maple (A. platanoides)	40	20	Moderate	Codominant in landscape strip between sidewalk and parking lot. Asymmetric crown.	Medium	Retain	Outside project scope. No fence required.	2.4
9956	On-Site	Maple (A. platanoides)	22	20	Moderate	In landscape strip between sidewalk and parking lot, Asymmetric crown. Birds nest in crown.	Medium	Retain	Outside project scope. No fence required.	2
9957	On-Site	Maple (A. platanoides)	15	10	Moderate	In landscape strip between sidewalk and parking lot. Asymmetric crown.	Medium	Retain	Outside project scope. No fence required.	2
9958	On-Site	Maple (A. platanoides)	16	10	Moderate	In landscape strip between sidewalk and parking lot. Asymmetric crown.	Medium	Retain	Outside project scope. No fence required.	2
9959	On-Site	Maple (A. platanoides)	16	10	Moderate	In landscape strip between sidewalk and parking lot, Asymmetric crown.	Medium	Retain	Outside project scope. No fence required.	2
9994	On-Site	Pine (P. sylvestris)	15	5	Moderate		Medium	Retain	Install tree protection fence at sidewalk edge.	2
9995	On-Site	Pine (P. sylvestris)	25	6	Moderate		Medium	Retain	Install tree protection fence at sidewalk edge.	2

Appendix 2 Site Photographs

Photo 1. The subject site viewed along Student Union Boulevard

Photo 2. The plaza currently fronting Gage Residencies and conference center.

Photo 3. Poor union at the base of tree 9874.

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 and 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 then 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 of 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 surveyed. 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.

2) The work undertaken in connection with this report and preparation of this report have been conducted by Diamond Head for the "Client" as stated in the report above. It is intended for the sole and exclusive use by the Client for the purpose(s) set out in this report. Any use of, reliance on or decisions made based on this report by any person other than the Client, or by the Client for any purpose other than the purpose(s) set out in this report, is the sole responsibility of, and at the sole risk of, such other person or the Client, as the case may be. Diamond Head accepts no liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm (including without limitation financial or consequential effects on transactions or property values, and economic loss) that may be suffered or incurred by any person as a result of the use of or reliance on this report or the work referred to herein. The copying, distribution or publication of this report (except for the internal use of the Client) without the express written permission of Diamond Head (which consent may be withheld in Diamond Head's sole discretion) is prohibited. Diamond Head retains ownership of this report and all documents related thereto both generally and as instruments of professional service.

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.

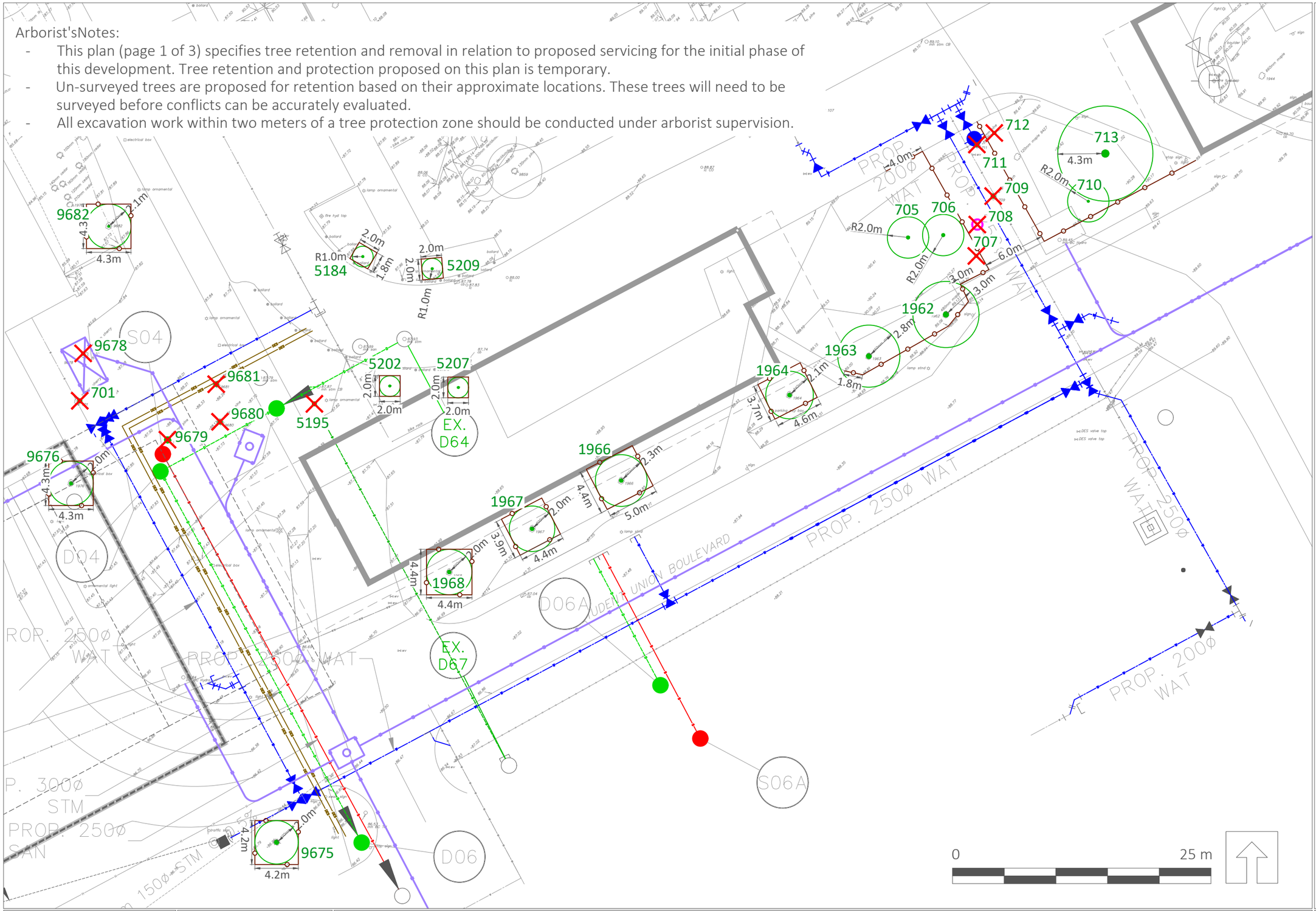
7) In preparing this report, Diamond Head has relied in good faith on information provided by certain persons, Government Bodies, government registries and agents and representatives of each of the foregoing, and Diamond Head assumes that such information is true, correct and accurate in all material 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.

Arborist'sNotes:

- This plan (page 1 of 3) specifies tree retention and removal in relation to proposed servicing for the initial phase of this development. Tree retention and protection proposed on this plan is temporary.
- Un-surveyed trees are proposed for retention based on their approximate locations. These trees will need to be surveyed before conflicts can be accurately evaluated.
- All excavation work within two meters of a tree protection zone should be conducted under arborist supervision.



LEGEND

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

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. (½ 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.

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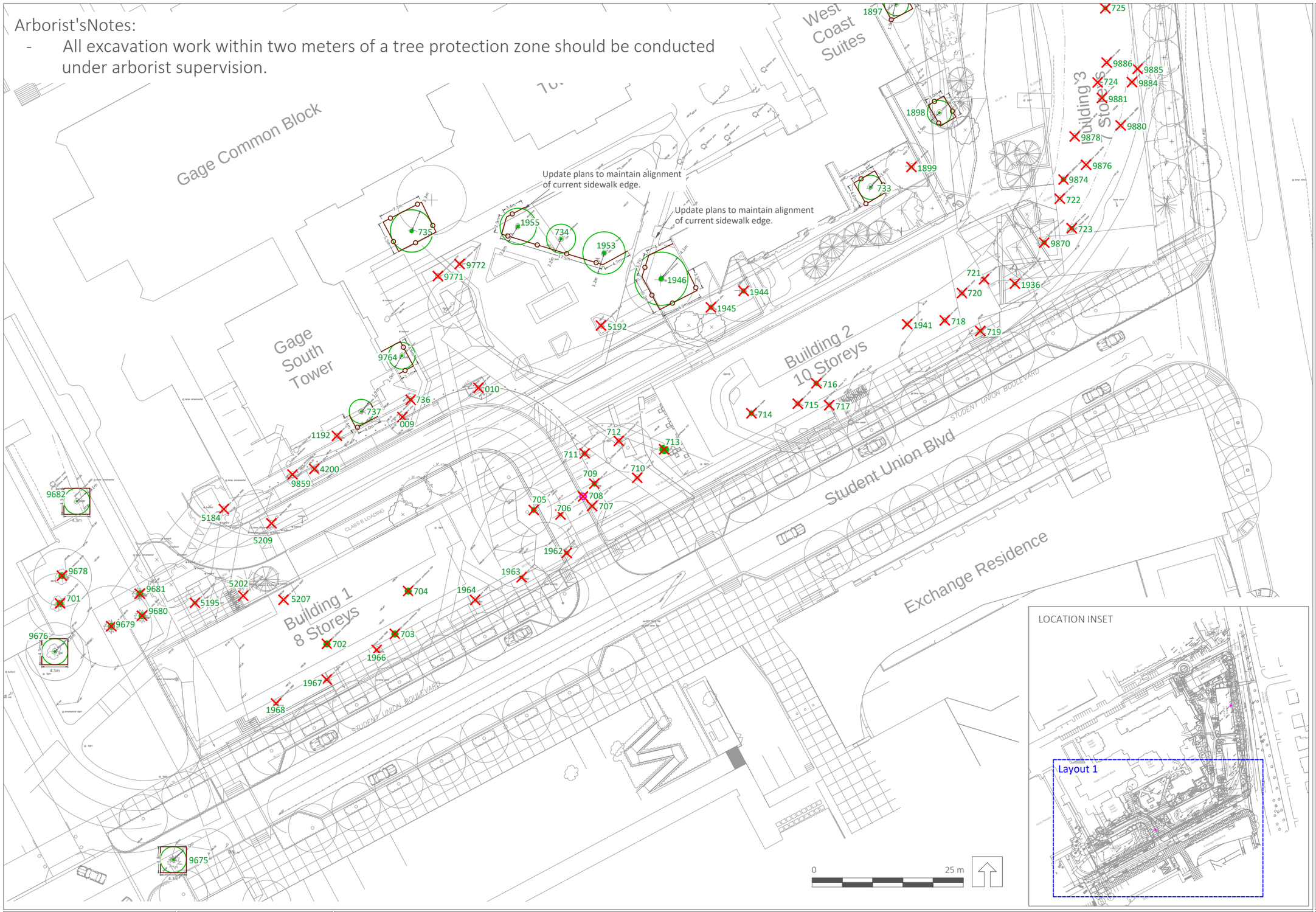
Project address: Pacific Residencies, UBC
Client: UBC Properties Trust

Drawing No: 001
Date: June 4th, 2019
Drawn by: IM
Page Size: TABLOID 11"x17"

Arborist'sNotes:

- All excavation work within two meters of a tree protection zone should be conducted under arborist supervision.



LOCATION INSET

LEGEND

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

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. (½ 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.

DIAMOND HEAD
3559 COMMERCIAL STREET
VANCOUVER BC | V5N 4E8
T 604.733.4886 | F 604.733.4879

Drawing title: Tree Management Plan - Phase 2 - Development (south)
Project address: Pacific Residencies, UBC
Client: UBC Properties Trust

Drawing No: 001
Date: June 4th, 2019
Drawn by: IM & KW
Page Size: TABLOID 11"x17"

Arborist'sNotes:

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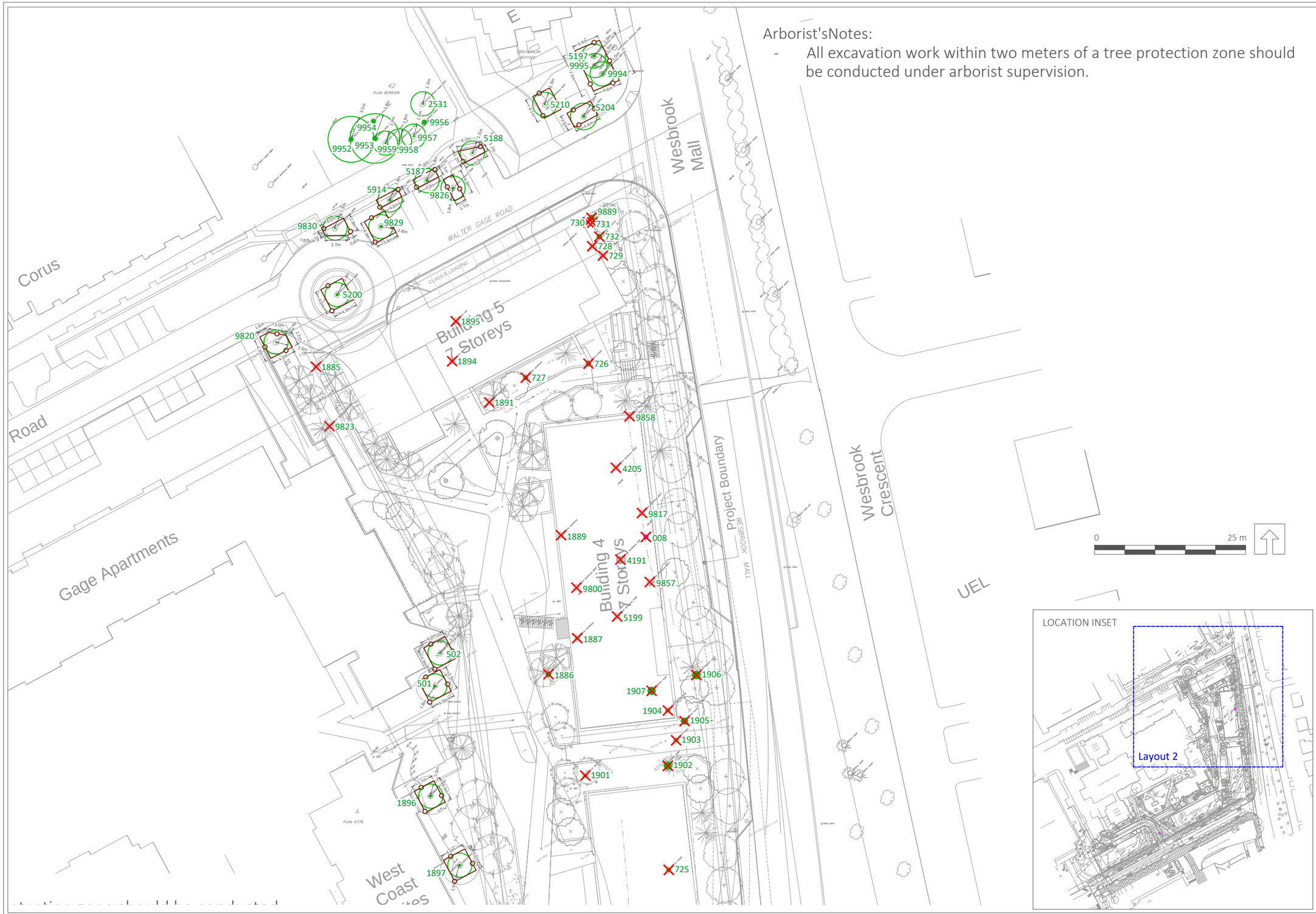

LOCATION INSET

LEGEND

- CRITICAL ROOT ZONE
- TREE PROTECTION ZONE AND FENCING
- SURVEYED TREE TO BE RETAINED
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Drawing title: Tree Management Plan: Phase 2 - Development (north)
Project address: Pacific Residencies, UBC
Client: UBC Properties Trust

Drawing No: 001
Date: June 4th, 2019
Drawn by: IM & KW
Page Size: TABLOID 11"x17"