Arboricultural Inventory and Report

For:
Crosstown Properties (Wharf Street) Ltd.

Site Location:
1314 & 1318 Wharf Street
Victoria, BC

To be submitted with the DHC Tree Management Plan dated October 17th, 2019.

Submitted to:
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Date: October 17th, 2019

Submitted by:
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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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Scope of Assignment:
Diamond Head Consulting Ltd. (DHC) was retained to complete an arboricultural assessment to supplement the proposed development application for 1314 & 1318 Wharf Street, Victoria, 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 is situated on the Victoria Waterfront 100 m south of the Johnson Street Bridge and immediately north of Reeson Park (Figure 1). It consists of two industrial lots occupied by two heritage buildings (Photo 1). The combined area of these lots is 0.138 ha. Their elevation decreases by 4.5 m from the Wharf Street connector sidewalk (east) to the top of the harbor bank (west). On-site vegetation is minimal and naturally regenerated. Semi-mature and mature ornamental trees are present in adjacent City of Victoria Parks.

1.2 Proposed Land Use Changes

The proposed development will incorporate the existing heritage buildings into a five-story (plus basement) mixed use commercial-residential development.

- Site topographic survey. File name 'ACAD-010030158-CNSI01-R02.dwg', by FOCUS, dated December 16th, 2010.
- Site architectural layout plan. File name 'NJ Site Plan.dwg'. Received from client October 3rd, 2019.
- Site landscape plan. File name '15030 20191016 REZONING SUBMISSION CAD ULTIMATE.dwg', received from client October 16th, 2019.

No civil engineering key plans have been reviewed by DHC at this time.

1.3 Report Objective

This report has been prepared to ensure the proposed development complies with the City of Victoria Tree Preservation Bylaw, Bylaw No. 05-106. Refer to Bylaw 05-106 for the complete definition of protected trees, which are summarized as:

- Trees with a stem diameter at breast height (DBH, measured at 1.4 m above grade) equal to or greater than 10 cm, calculated for 100% of the largest trunk and plus 60% of the diameter of all additional trunks.
- Trees with a height equal to or greater than 5 m.
- Replacement trees of any size planted as a condition of a tree permit;
- Trees on a parcel of land where the grade has an incline of 2:1 or greater.
- Any of the following trees:
  - (a) Garry Oak (*Quercus garryana*),
  - (b) Arbutus (*Arbutus menziesii*),
  - (c) Pacific Yew (*Taxus brevifolia*) over 50 cm in height,
  - (d) Pacific Dogwood (*Cornus nuttallii*),
  - (e) Douglas Fir (*Pseudotsuga menziesii*) over 60 cm in trunk diameter,
  - (f) Western Red Cedar (*Thuja plicata*) over 60 cm in trunk diameter,

- (g) Big Leaf Maple (*Acer macrophyllum*) over 60 cm in trunk diameter,
- (h) a significant tree,
- (i) any tree over 80 cm in trunk diameter,
- (j) a tree on a steep slope,
- (k) a tree that
- (i) is retained voluntarily by the owner as part of an application for a permit that would affect the tree, and
- (ii) tree that are protected by a restrictive covenant in favour of the City;

- Protected tree seedlings between 0.5 m and 5 m in height of the following tree species:
  - (a) Garry Oak (*Quercus garryana*)
  - (b) Pacific Dogwood (*Cornus nuttallii*)
  - (c) Arbutus (*Arbutus menziesii*);

Trees on adjacent properties with a tree protection zone that extends into the subject site have also been captured in the arborist report.

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

Figure 1. 1314 & 1318 Wharf Street in context of the surrounding landscape and infrastructure.

2.0 Process and Methods

Ian MacLachlan of DHC visited the site on October 10th, 2019. 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 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 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 have been calculated as diameter of each tree multiplied by 12, based on the 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 in Table 1 (below) and the complete inventory is given in Appendix 1.

Trees On-site

Only one on-site tree was identified in the inventory. It is a small multi-stemmed silver birch growing from a decayed stump among rocks at the harbor edge. We assessed this tree to have a *poor* health and rating and *low* retention value (Photo 2).

Trees on Adjacent Properties

One privately-owned off-site tree was present in context of the proposed development (Photo 3). It is a medium-sized silver birch growing among large boulders at the top of the harbor bank. We assessed its health and structure rating to be *poor* and its retention value to be *low*.

Twelve City-owned Park trees were identified in context of the proposed development. These trees are all medium sized ornamentally planted non-native species.

Eight of City Park trees (two Norway maples and six black pines) were growing at the north edge of Reeson Park in a single group with a continuous canopy (Photos 4 and 5). Root zones of these trees were covered by asphalt to the north and moderately compacted earth to the south. Trees 879, 880 and 881 had an increasing level of root zone constriction due to a retaining wall and trees 880 and 881 are likely to depend on this wall for their structural stability (Photo 6).

The eight trees in Reeson Park were free from obvious major defects, but their crowns had been raised and some broken branch stubs remain. Abundant small-diameter dead wood was present in the black pine crowns. All eight trees have asymmetrical crown development because of their growth in a group. Shoot extension growth of the black pines appears to be slowing and the larger trees have lost their apical dominance. It is likely that growth and vigor of these trees is becoming prematurely limited by the poor rooting environment.

In context of their current site, two of the black pines in Reeson Park were assessed to have *poor* health and structure and *low* retention value. The four remaining black pines had moderate *health* and structure and *medium* retention value. These ratings are assessed in the context of their group and would be lower for the same tree in an open-grown situation.

Four City-owned purple European beeches were growing in a row approximately 2.5 m the east of the Wharf Street Connection curb (Photos 1 and 7). No major root collar or trunk defects were observed, however the branching of this cultivar is dense and moderately upright from acute branch unions with included bark. These unions currently appear to be stable. The crowns have been raised to 2 m and are generally rounded and symmetrical. All four beech trees were assessed to have *moderate* health and structure ratings because of their abundant acute branch unions, but retention value was assessed to be *high* on account of their good overall health, form, and prominent position in the surrounding landscape.

3.2 Tree Risk Assessment

There were no trees identified in this report that pose a *high* or *extreme* risk in the context of targets present at the time of our on-site assessment.

Table 1: Summary of the tree inventory from 1314 & 1318 Wharf Street containing the number of trees categorized by retention value and the recommended number to be retained or removed. The complete tree inventory is given in Appendix 1.

Tree Species	Retention value			Recommendation		
	Low	Medium	High	Remove	Retain	Total
On-site and shared trees						
Silver Birch	1			1		1
On-site totals	**1**			**1**		**1**
Off-site trees						
Silver Birch	1			1		1
Off-site totals	**1**			**1**		**1**
City trees						
European Beech			4		4	4
Maple spp.		2		2		2
Black Pine	2	4		6		6
City totals	**2**	**6**	**4**	**8**	**4**	**12**
GRAND TOTAL				**10**	**4**	**12**

4.0 Tree Retention and Removal

Tree retention, removal and management recommendations are assessed based on conflicts with the propose on-site plans, the health and retention value of subject trees, and consideration of any future off-site works for development, servicing or landscaping.

The DHC Tree Management Plan dated October 17th, 2019, indicates the location of all trees including their recommended retention or removal, and the alignment of tree protection fencing where specified. Appendix 8 gives the City of Victoria tree protection fencing construction specifications.

4.1 Tree Retention

Four City-owned beech trees, numbers 882, 883, 884 and 885, are proposed for retention. Work within their critical root zones to repave the Wharf Street Connection is planned. We expect tree impacts from this repaving work to be negligible if the existing curb is retained and the existing road sub-base is re-used. Detailed plans for this repaving work should be reviewed by the project arborist and implemented only under arborist supervision.

4.2 Tree Removal

The one on-site birch tree (number 887, Photo 2) is proposed for removal on account of its poor health and structure and conflicts with a proposed deck. Similarly, the one privately-owned off-site birch tree (number 886, Photo 3) is also proposed for removal. This tree currently grows among boulders in a steep bank approximately 3 m from the on-site building. We expect than any excavation work around the on-site building foundation will conflict with and potentially destabilise this tree. In addition, there will be moderate crown conflicts with the proposed deck. Removal of this tree will require written permission from the off-site property owner.

Eight off-site trees in a group at the north edge of Reeson Park are proposed for removal based primarily on their conflicts with the proposed building envelope. The proposed conflicts are with excavation to the southern site property line within tree critical root zones and aerial conflicts between tree crowns and the proposed building. Pruning to retain these trees is not viable as it will compromise the crown structure and health of at least five trees. These trees cannot be retained in a way that maintains adequate future clearance from the proposed building envelope or allows functional clearance for construction access. It is also our understanding that substantial hard landscape upgrades are proposed immediately adjacent to these trees in Reeson Park. These upgrades would remove a retaining wall that the structural integrity of trees 880 and 881 is likely to depend on, and we also anticipate changes grade changes within critical root zones of this group.

The continuous crowns of trees 875 to 881 that have developed with heavy asymmetry in their group context. Individual trees cannot be retained in this context due to the excessive exposure and wind loading that they are would likely experience and are not acclimated to. Tree size, asymmetrical crown development and root zone constrictions mean that all eight trees in Reeson Park are unsuitable candidates for transplanting.

5.0 Discussion and Summary

The subject site is occupied by two heritage buildings. The proposed plans will incorporate the existing buildings into a mixed-use development that will require excavation and construction to the property lines. One on-site, one private off-site, and 12 City Park trees are present in context of the subject site. Proposed on-site plans will conflict with the on-site and off-site trees, and eight City trees in Reeson Park to the south. Considering the health, structure and retention value of all 14 trees, in context of conflicts with the proposed on-site plans, 10 trees will need to be removed to accommodate the proposed project.. Conflicts with four City Parks beech trees are possible, but we expect them to be negligible and propose retention of these trees with the installation of tree protection fencing and arborist supervision of any construction work beneath their drip lines.

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.

Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
874	City	Black Pine	Pinus nigra	11	4	40-59%	2	Poor	At top of 1 m high bank, partly compacted and eroded. Asphalt curb 1.2 m north. End of clump. Trunk has slight curve, pruning stubs from broken branches. Crown asymmetrical to west from phototropic growth away from now dead tree. Foliage density is good, and foliage is healthy.	Low	Remove	Tree conflicts excessively proposed on-site plans. See Section 4.2 of the DHC Arboricultural Report dated October 17th, 2019 for further details.	2
875	City	Black Pine	Pinus nigra	36	14	60-79%	4.7	Moderate	At end of clump. 1.3 m from asphalt curb to north. No obvious trunk defects. Two main scaffold branches from union at 3.5 m, appears u-shaped, minor included bark possible. 1 scaffold branch is upright, one leans 10 to 15 degrees north. Minor broken branches and dead wood in crown. Foliage density is good, and foliage is healthy. Drip line radius 4.7 m N, 2 m E, 2.8 m S, 3.9 m W. Retain only in group.	Medium	Remove	Tree conflicts excessively proposed on-site plans. See Section 4.2 of the DHC Arboricultural Report dated October 17th, 2019 for further details.	4.3
876	City	Black Pine	Pinus nigra	38	16	60-79%	3.7	Moderate	South side of clump. 2.8 m from asphalt curb to north. Root collar appears slightly buried. Minor basal sweep to single upright stem. Crown entirely asymmetrical to south except upper most branches. Minor broken branches and dead wood in crown. Foliage density is moderate to good, and foliage is healthy. Drip line 1.8 m N, 2.1 m E, 3.7 m S, 2.7 m W. Retain only in group.	Medium	Remove	Tree conflicts excessively proposed on-site plans. See Section 4.2 of the DHC Arboricultural Report dated October 17th, 2019 for further details.	4.6

Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
877	City	Norway Maple	Acer platanoides	32	16	60-79%	7.1	Moderate	1.45 m from asphalt curb to north. In clump. No obvious root or trunk defects. Four scaffold branches from acute unions at 3 m, two have minor to moderate included bark. Scaffold branch structure is upright with arching laterals to north. Unions appear good, minor branch failure possible under high load. Crown heavily asymmetrical to north. Foliage appears healthy and dense. Drip line 2.5 m from existing building envelope. Drip line 7.1 m N, 3.9 m E, 2.5 m S, 3.5 m W. Retain only in group.	Medium	Remove	Tree conflicts excessively proposed on-site plans. See Section 4.2 of the DHC Arboricultural Report dated October 17th, 2019 for further details.	3.8
878	City	Norway Maple	Acer platanoides	38	14	60-79%	4.9	Moderate	Unsurveyed tree. 4.0 m from asphalt curb to north. South edge of clump. Root collar appears a little buried. Trunk leans five degrees east, minor surface wounds occluding. Several nails/screws in trunk. Three scaffold branches from good u-shaped unions at 2 m. Scaffold branch structure is upright with arching laterals to south. Crown heavily asymmetrical to south. Foliage appears healthy and dense. Drip line 2.1 m N, 4.9 m E, 4.8 m S, 2.1 m W. Retain only in group.	Medium	Remove	Tree conflicts excessively proposed on-site plans. See Section 4.2 of the DHC Arboricultural Report dated October 17th, 2019 for further details.	4.6
879	City	Black Pine	Pinus nigra	26	12	60-79%	4.1	Poor	Suppressed in clump. 1.3 m from asphalt curb to north. 0.9 m to low retaining wall to south. Root collar appears slightly buried. Single upright stem, no obvious defects. Crown raised to 3 m. One broken branch stub and minor dead wood in crown. Branch structure is straggly and asymmetrical to south, one branch 4.1 m north. Foliage density is poor, but appears healthy. Drip line 4.1 m N, 2.4 m E, 3.6 m S, 1.2 m W. Retain only in group.	Low	Remove	Tree conflicts excessively proposed on-site plans. See Section 4.2 of the DHC Arboricultural Report dated October 17th, 2019 for further details.	3.1

Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
880	City	Black Pine	Pinus nigra	37	13	60-79%	5.7	Moderate	Codominant in clump. 0.65 m from asphalt curb to north. 1.05 m to low retaining wall to south. Root collar appears slightly buried. Single upright stem, no obvious defects, top third is sinuous. Crown raised to 2.5 m. Minor dead wood in crown. Branch structure is asymmetrical to north. Foliage density is moderate, appears healthy. Drip line 2.7 m from building envelope. Drip line 5.7 m N, 2.8 m E, 4.2 m S, 2.4 m W. Retain only in group.	Medium	Remove	Tree conflicts excessively proposed on-site plans. See Section 4.2 of the DHC Arboricultural Report dated October 17th, 2019 for further details.	4.4
881	City	Black Pine	Pinus nigra	59	16	60-79%	5.6	Moderate	Large dominant tree at end of clump. 0.4 m from asphalt curb to north. 0.6 m to 1.8 m high retaining wall to south. Root collar appears slightly buried. Two scaffold stems from good union at 1.75 m, one is upright, one leans 5 degrees east. Crown raised to 3.5 m, asymmetrical to east. Minor dead wood in crown. Foliage density is good, appears healthy. Drip line 2.6 m from building envelope. Drip line 5.3 m N, 5.6 m E, 5.6 m S, 2.4 m W. Retain only in group.	Medium	Remove	Tree conflicts excessively proposed on-site plans. See Section 4.2 of the DHC Arboricultural Report dated October 17th, 2019 for further details.	7.1
882	City	European Beech	Fagus sylvatica var. Rohanii	46	11	60-79%	6.4	Moderate	In grass at end of row of four similar trees. 2.6 m from curb to south and west. Minor surface wound on trunk occluding. Dense upright branching from 2 m. Appears to be fastigiate variety with wide form in maturity. Unions are all acute with moderate to high amounts of included bark. Crown has rounded form, but asymmetrical to south. Serrated leaf variety. Drip line 3.1 m N, 6.4 m E, 4.6 m S, 4.7 m W.	High	Retain	Install tree protection fencing specified in the DHC Tree Management Plan dated October 17th, 2019. Any work to adjacent asphalt will require arborist consultation and supervision.	5.6

Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
883	City	European Beech	Fagus sylvatica var. Rohanii	39	11	60-79%	6.3	Moderate	In row of four similar trees. 2.8 m from curb to west. Light pole in crown. Minor pruning wounds on trunk. Dense upright branching from 2 m. Appears to be fastigiate variety with wide form in maturity. Unions are all acute with moderate to high amounts of included bark. Crown has rounded form to east and west. Serrated leaf variety. Drip line 2.4 m N, 6.3 m E, 2.9 m S, 4.9 m W.	High	Retain	Install tree protection fencing specified in the DHC Tree Management Plan dated October 17th, 2019. Any work to adjacent asphalt will require arborist consultation and supervision.	4.7
884	City	European Beech	Fagus sylvatica var. Rohanii	59	11	60-79%	6.6	Moderate	In row of four similar trees. 2.6 m from curb to west. Minor pruning wounds on trunk. Dense upright branching from 2 m. Appears to be fastigiate variety with wide form in maturity. Unions are all acute with moderate to high amounts of included bark. Crown has rounded form to east and west. Serrated leaf variety. Drip line 2.8 m N, 6.6 m E, 5.8 m S, 5.5 m W.	High	Retain	Install tree protection fencing specified in the DHC Tree Management Plan dated October 17th, 2019. Any work to adjacent asphalt will require arborist consultation and supervision.	7.1
885	City	European Beech	Fagus sylvatica var. Rohanii	46	11	60-79%	7.1	Moderate	In grass at end of row of four similar trees. 2.9 m from concrete path north, 2.65 m to curb to west. Dense upright branching from 2 m. Appears to be fastigiate variety with wide form in maturity. Unions are all acute with moderate to high amounts of included bark. Crown has rounded form, but asymmetrical to north. Serrated leaf variety. Drip line 6.5 m N, 7.1 m E, 3.2 m S, 4.5 m W.	High	Retain	Install tree protection fencing specified in the DHC Tree Management Plan dated October 17th, 2019. Any work to adjacent asphalt will require arborist consultation and supervision.	5.5
886	Off-Site	Silver Birch	Betula pendula	42	12	60-79%	6.3	Poor	Growing at top of steep bank among large boulders. Likely naturally regenerated. 3 m from building corner. Multiple medium-sized pruning wounds in trunk with decay cavities developing. Structural unions are good. Over-extended branch to north. Crown full and healthy. Drip line 6.3 m N, 5.6 m E, 4.7 m S, 5 m W.	Low	Remove	Tree is likely to be destabilised by expected excavation around existing building envelope and crown will conflict with proposed deck. Owner's permission required for removal.	5
887	On-Site	Silver Birch	Betula pendula	30	5	60-79%	3	Poor	Unsurveyed tree. Growing at top of steep bank among large boulders. Naturally regenerated. Three 10 cm DBH stems from broken decayed stump.	Low	Remove	Tree health and structure is unsuitable for long-term retention and will conflict with proposed deck.	3.6

Appendix 2 Site Photographs

Photo 1. The subject site viewed from Wharf Street.

Photo 2. Tree 886 growing from boulders in the harbor wall.

Photo 3. Tree 886 growing from among boulders at the top of the harbor wall at the north west corner of an on-site building.

Photo 4. Trees 874 to 881 (left to right) in Reeson Park adjacent to the subject site property line.

Photo 5. Trees in Reeson Park adjacent to the subject site property line viewed from the subject site.

Photo 6. The restricted root zones of trees 879 (closest), 880 and 881 (furthest).

Photo 7. Trees 885 (left) to 882 (right) viewed from the north west.

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.

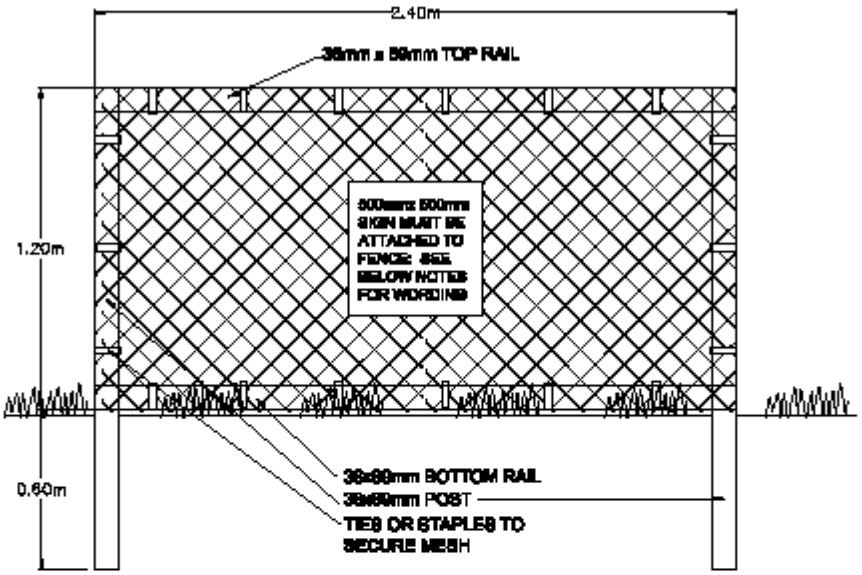
8) Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

9) Loss or alteration of any part of this report invalidates the entire report.

Appendix 8 City of Victoria Tree Protection Specifications

CITY OF VICTORIA

SUPPLEMENTARY STANDARD DETAIL DRAWINGS



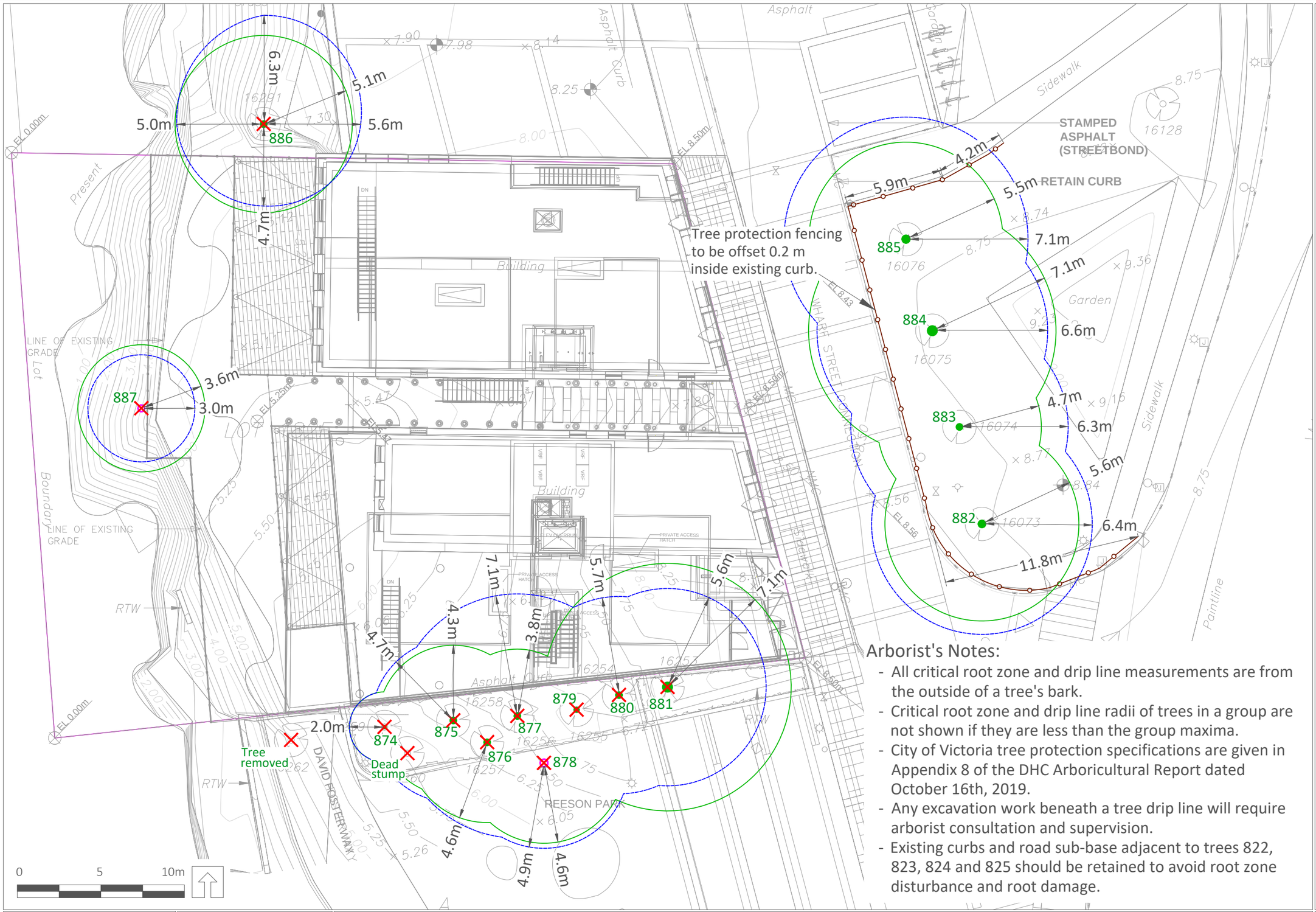
TREE PROTECTION FENCING

1. FENCE WILL BE CONSTRUCTED USING 38 mm X 89mm WOOD FRAME: TOP, BOTTOM AND POSTS * USE ORANGE SNOW-FENCING MESH AND SECURE THE WOOD FRAME WITH "ZIP" TIES OR GALVANIZED STAPLES.
2. ATTACH A 500mm X 500mm SIGN WITH THE FOLLOWING WORDING: WARNING- TREE PROTECTION AREA. THIS SIGN MUST BE AFFIXED ON EVERY FENCE OR AT LEAST EVERY 10 LINEAR METERS.

* IN ROCKY AREAS, METAL POSTS (T-BAR OR REBAR) DRILLED INTO ROCK WILL BE ACCEPTED

2011

TREE PROTECTION FENCING AND SIGNAGE DETAIL	REVISIONS	DRAWING NUMBER: SD P1



Arborist's Notes:

- All critical root zone and drip line measurements are from the outside of a tree's bark.
- Critical root zone and drip line radii of trees in a group are not shown if they are less than the group maxima.
- City of Victoria tree protection specifications are given in Appendix 8 of the DHC Arboricultural Report dated October 16th, 2019.
- Any excavation work beneath a tree drip line will require arborist consultation and supervision.
- Existing curbs and road sub-base adjacent to trees 822, 823, 824 and 825 should be retained to avoid root zone disturbance and root damage.

LEGEND

- CRITICAL ROOT ZONE
- MAXIMUM TREE DRIP LINE
- 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.

REFERENCE DRAWINGS

1. Base Survey by: FOCUS, dated December 16th, 2010

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Drawing title: Tree Management Plan
Project address: 1314 & 1318 Wharf Street, Victoria, BC
Client: Crosstown Properties (Wharf Street) Ltd.

Drawing No: 001
Date: October 17th, 2019
Drawn by: IM
Page Size: TABLOID 11"x17"