CITY OF VANCOUVER

CITY CLERK'S DEPARTMENT
Access to Information & Privacy Division

File No.: 04-1000-20-2021-451

November 16, 2021

s.22(1)

Dear s.22(1)

Re: **Request for Access to Records under the Freedom of Information and Protection of Privacy Act (the "Act")**

I am responding to your request dated August 24, 2021 under the ***Freedom of Information and Protection of Privacy Act, (the Act),*** for:

> **Arborist Report for Development Permit Application (DP-2021-00545) at 2120 West 10th Avenue. Date Range: June 1, 2021 to August 24, 2021.**

All responsive records are attached. Bastion Development Corp. has advised that the Arbortech Consulting report is subject to revision to reflect the recent Park Board decision to remove tree C02 based on their own tree management protocols.

Under section 52 of the Act, and within 30 business days of receipt of this letter, you may ask the Information & Privacy Commissioner to review any matter related to the City's response to your FOI request by writing to: Office of the Information & Privacy Commissioner, info@oipc.bc.ca or by phoning 250-387-5629.

If you request a review, please provide the Commissioner's office with: 1) the request number (#04-1000-20-2021-451); 2) a copy of this letter; 3) a copy of your original request; and 4) detailed reasons why you are seeking the review.

Yours truly,

[Signature on file]

Barbara J. Van Fraassen, BA
Director, Access to Information & Privacy
Barbara.vanfraassen@vancouver.ca
453 W. 12th Avenue Vancouver BC V5Y 1V4

*If you have any questions, please email us at foi@vancouver.ca and we will respond to you as soon as possible. Or you can call the FOI Case Manager at 604.871.6584.

Encl.

:kt

TREE MANAGEMENT REPORT:

FOR PROPSED DEVELOPMENT

Report Date: **July 4, 2018** **Rev 1: June 8, 2021** ACL File: **18186**

ACL Bus Lic: **16 742556** Inter-Municipal West

Prepared for: Attn.: **Reid Kaufman**
Bastion Development Corp.
500 – 1681 Chestnut Street,
Vancouver, BC, V6J 4M6

Prepared by: **Norman Hol**
Senior Consulting Arborist

Site Address: **2120 West 10th Avenue, Vancouver**

Project: **Application for Proposed Rezoning Development**

BACKGROUND

Arbortech Consulting is retained to provide professional consulting arborist services to undertake an assessment of the existing trees located at or within influencing distance of a proposed development at the above noted site. Our site investigation was performed on May 11, 2018.

Reference documents provided by the client include; ***Tree/Topographic Survey*** and current ***Architectural Site Plan***. The civil designs were not available for our review at the time of writing.

The subject site is comprised of commercial building. The proposed development consists of mixed use multi storey building.

Our ground based visual assessment of the existing trees includes; measuring the size (trunk diameter, height and spread), rating the health and structural condition, as well as identifying the species, age class, structural class, growing site constraints and other relevant tree or site factors. This report is not intended as a tree failure risk analysis; however, the structural form and presence and severity of defects were factors in our assessment. Tree health, structure and site factors were reviewed to rate the trees for viability of preservation in context to the proposed land use and expected construction related impacts to the site and the trees.

With consideration of municipal bylaws/policies we have reviewed the project design in context to our tree data and priority rankings to specify tree preservation within the development to the extent possible. Our process includes liaison with the client and design team to explore alternatives and design changes where applicable or appropriate. Our tree protection measures are developed in accordance with arboricultural best management practices and are the basis for our recommendations and specifications.

TREE RETENTION AND PROTECTION PLANNING

The specified ***Tree Protection Zone*** **(TPZ)** consists of 3 main components;

- ***Crown Protection Zone*** (**CPZ**): a minimum of 1.0 m outside the dripline (furthest extent of branches and foliage projected to the ground below) where any proposed aerial encroachment (i.e. for pedestrian or vehicle access, machinery or equipment operation, constructing building elements, operation of cranes or lifts etc) will require a detailed review by the project arborist to determine feasibility and to specify mitigation measures as necessary.
- ***Root Protection Zone*** (**RPZ**): a no-encroachment setback prescribed by the project arborist representing the closest proximities of soil and root disturbance toward a tree that are deemed manageable based on site and tree factors, and conditional to mitigation and compensatory treatment that may be specified.
- ***Working Space Setback*** (**WSS:** a setback outside of the RPZ of 1.5m or as specified by the project arborist where soil and root disturbance may occur (i.e. for excavation), conditional to supervision and direction by the project arborist and mitigation or treatment measures being implemented (i.e. root pruning).

UNIT 145 – 12051 HORSESHOE WAY RICHMOND, BC CANADA V7A 4V4 P 604 275 3484 F 604 275 9554

Tree retention planning and design consists of determining the preservation of priority 1 and 2 trees, in that preferential order. We first consider an optimal TPZ deemed to be a setback equal to the CPZ or a root and crown protection radius deemed by the project arborist to net negligible impact to the tree. If the optimal TPZ cannot be fully achieved, then we carry out a detailed design review process in consideration of the species tolerance, the size, health and structural class and form of the tree, the site and soil conditions, the general changes in environmental influences (i.e. wind exposure, sun exposure and soil hydrology), the presence or absence of known root obstructions, among other factors. Our comprehensive prescriptive tree protection setbacks and measures supersede the optimal TPZ recommendations as well as city guideline for tree protection setbacks.

DETAILED ANALYSIS

TRAQ Findings

Trees deemed to be of concern from the perspective of risk of failure have been assessed using Tree Risk Assessment Qualification (TRAQ) methods in context to existing and contemplated land uses. Details are as follows:

- 1 tree on this site is deemed to have significant structural defects that warranted assessment by TRAQ methods, considering a 3 year term related to decay within the main bole and the very likely circumstance that the buttress roots have also been structurally impaired by decay fungal disease.
- Tree C02 was assessed to Level 2 Basic Visual Assessment standards.
- Level 3 testing is deemed to not be required to determine severity of defects.
- The target includes Pedestrians, cyclists, cars, and buildings deemed to have frequent and constant occupancies in the current land use, and to have frequent and constant occupancies during the construction phase with high likelihood that tree failure(s) will impact people. The consequences for the failure will be severe.
- The severity of the defects, the expected mode of failure, and the likelihood of failure are described in Appendix B, but generally consists of the decay and strength loss related to disease infection in the roots system and the lower trunk.
- Following are our risk rating summary findings from our Level 2 basic visual assessment:

TRAQ Ratings:	Likelihood of Failure:	Likelihood of Impact:	Failure and Impact:	Consequences:	Risk Rating:
TREE C02	**Probable**	**High**	**Likely**	**Severe**	**High**

- We understand that, after our referral of these findings to them, Park Board staff undertook detailed testing to TRAQ Level 3 standards by investigating the scope of internal decay within the bole only, not within the structural root system. We also understand that the Park Board has deemed the tree is viable for retention. We find that the unassessed and thus unknown scope of root decay remains a significant wildcard in determination of the likelihood of failure.
- This tree is specified to be protected accordingly, however we are recommending further assessment in the future (see below for further details).

TREE RETENTION FINDINGS

There are no on-site trees at this development site. There are 6 off-site city owned street trees in the frontages adjacent to the site. Refer to the Tree Photos (Appendix A), Tree Inventory (Appendix B) and the Tree Management Drawing (Appendix C) for pertinent details.

With consideration of; our tree assessment findings, our retention priority rankings, the protection setbacks required to preserve the trees, and the current project design, existing trees are proposed to be treated follows:

ON-SITE TREES WITHIN THE SUBJECT PROPERTY:

- No tree was found growing within the subject property

OFF-SITE CITY ROAD FRONTAGE TREES:

REFER 1 City tree was referred to Park Board due to its current potential as a high risk to the public.

- Tree Tag/ID: C02
  See TRAQ details above.
  Since this is a pre-existing condition, the removal of this tree should be the sole responsibility of the Park Board. Considering the reported results of a Level 3 assessment by Park Board staff, and their requirement to retain and protect this tree, we recommend the following measures:
  - Re-assess the tree, particularly a Level 3 assessment of the roots that may be exposed within the subject development site at the time of demolition (of the existing building), as well as to assess structural roots closer toward the tree where possible, to determine the structural condition of its root system (to the extent possible while limiting the assessment to non-destructive methods for the city hardscape).
  - Undertake further coordination with the Park Board in updating the tree risk assessment.

PROTECT 5 Road Frontage trees:

- Tree Tag/ID's: C01, C02, C03, C04 and C05.
  These trees do not directly conflict with building construction on the site, however unknown impacts may require reassessment related to infrastructure work in the frontages such as but not limited to; trenching for underground services or utilities, sidewalk replacement, road curb replacement, etc. as well as site hoarding, temporary power and other temporary construction measures. As the project advances through the city review and approvals, more information will become known and re-assessment can be provided.
- Prune Tree Tag/ID's: C01and C02
  The crown of this tree overhangs slightly into the subject site. Mitigation of this condition appears feasible within tolerable scopes of pruning with adherence of ANSI A300 standards. The proposed pruning should be directed by the project arborist from this office. Note that all pruning to street trees will require approval from the city arborist at the Parks Board and it will be performed by the Park Board crews at the developer's cost.

Trees proposed to be retained will require protection measures in conformance with; the Tree Protection Prescription (see below), the Tree Management Drawing (see Appendix C), and Tree Protection Guidelines (see Appendix D).

REMOVE 1 City tree (subject to city approval) due to unresolvable conflict with demolition/construction:

- Tree Tag/ID: C02
  This tree will likely be made high-risk due to the demolition and removal of the existing building foundation directly adjacent to the trunk.
  Since this is a project related removal request, the removal and replacement costs are expected to be the responsibility of the developer.

OFF-SITE TREES ON NEIGHBOURING PRIVATE PROPERTY:

- No off-site, privately-owned tree was found.

TREE PROTECTION PRESCRIPTION

Refer to Tree Management Drawing (Appendix C), Tree Protection Specifications (Appendix D) and Letter of Undertaking (Appendix E) for further details. The owner is required to seek guidance and/or arrange on-site field services or supervision by the project arborist from this office, as specified on those documents.

TREE REPLACEMENT

Tree replacement requirements will be confirmed by the municipality in relation to their bylaw and policies. Design and specifications for the replacement trees will be provided by the project landscape architect.

Certified by;

Norman Hol, Company Principal and Senior Consultant

ISA Certified Arborist #PN-0730A
ISA Qualified Tree Risk Assessor (TRAQ)
PNWISA Certified Tree Risk Assessor #0076
BC Certified Wildlife and Danger Tree Assessor #P2529
ASCA Qualified Tree and Plant Appraiser (TPAQ)
Land Surveying Technologist

Enclosures;

Appendix A:	Tree Photos
Appendix B:	Tree Inventory
Appendix C:	Tree Management Drawing
Appendix D:	Tree Protection Specifications
Appendix E:	Letter of Undertaking

Assumptions and Limiting Conditions:

This report was prepared for and on the behalf of the client as addressed herein. Upon receipt of payment of our account in full, this report will become the property of the client. This report is intended for the exclusive use of our client, but in its entirety. Arbortech Consulting shall not accept any liability derived from partial, unintended, unauthorized or improper use of this report.

This report is restricted only to the subject trees as detailed herein, and no other trees were inspected or assessed.

The inner tissue of the trunk, limbs and roots, as well as the majority of the root systems of trees are hidden within the tree and below ground. Trees have adaptive growth strategies that can effectively mask defects. Our assessment is limited by relying on the outward signs and non-destructive testing to identify the severity of defects that may be indicators of structural deficiencies. We use our training, experience and judgement in this regard, however not all defects can be diagnosed through available methods. It may not be feasible to identify certain defects, or to measure the severity, without causing mortal injury to the tree. Further, we must acknowledge that extreme weather and environmental influences are unpredictable, and that any tree has risk of failure in such events. Arbortech Consulting does not guarantee or warrant that a tree is free of defect or that it will not fail.

The ownership of trees is determined based on the location of the trunk where it emerges from the ground relative to the property line. This determination may require the advice from a duly qualified professional surveyor.

Third party information provided to the consultant may have been relied upon in the formation of the opinion of the consultant in the preparation of this report, and that information is assumed to be true and correct. Arbortech has not verified that information, and does not warrant it as correct.

The use of maps, sketches, photographs and diagrams are intended only as a reference for the readers' use in understanding the contents and findings of this report, and are not intended as a representation of fact.

Approvals from a municipality and/or regulatory agency may be required prior to carrying out any treatments recommended in this report. The client is responsible to make application for, pay related fees and costs, and meet all requirements and conditions for the issuance of such permits, approvals or authorizations.

APPENDIX A

TREE PHOTOS

Tree #C01

Tree #C01

Tree #C02

Tree #C02 Ganoderma fruiting body

APPENDIX A

TREE PHOTOS

Tree #C02 Armillaria Fruiting bodies

Tree #c02 Newly replaced sidewalk

Tree #C03

Tree #C04

APPENDIX A

TREE PHOTOS

Tree #C05

Tree #C06

APPENDIX B: TREE INVENTORY

Tree Inventory Legend:

Tag/ID denotes the serial numbered aluminum tag affixed to the tree or a reference ID as referenced in report and on tree management drawing.
Loc denotes the ownership of trees based on the survey and project plans provided; **ON** = On-Site, **SHARED** = On-Site tree straddling PL, **OFF** = Neighbour Tree, or **CITY**
Dbh denotes dia of the trunk in cm at 1.4 m above grade or to arboricultural standards (i.e. below scaff union). Multiple stems above the root crown are used to calculate dbh based on trunk area method. Multiple stems attached into the root crown references the largest stem. DBH may be estimated or derived from survey data.
Ht denotes the height of the tree in metres as measured or estimated by the assessor.
Spr denotes the spread RADIUS of the branches and foliage (dripline) in metres as measured or estimated by the assessor.
LCR denotes the live crown ratio based on percent of live crown observed in relation to a tree of normal form and with a full crown.
Class denotes the structural class of a tree growing in Landscape **(OPEN, GROVE, or EDGE)** or Forest stand environment (see below);
Suitability for retention considers condition, age class, species, tolerance of disturbance, etc. ; **U** denotes Unsuitable, **C** denotes Conditional, **S** denotes Suitable
Contribution rating considers location, contribution and landscape function the tree may provide to the proposed land use; **L** denotes Low, **M** denotes Medium, **H** denotes High
Priority denotes a preservation ranking for consideration in tree retention planning, combining the suitability and contribution.
Assessment Findings summary description of overt defects and noteworthy growing condition factors, as well as preservation and protection considerations.
Action denotes proposed treatment in context to the current project design; **RETAIN**, **REMOVE or PROTECT**. Shared and Off-Site trees proposed as REMOVE **require owner consent**.
CPZ and **RPZ** are arborist assigned setbacks for Crown and Root protection. Along with the working space setback (**WSS**), they form the tree protection zone (**TPZ**).

Tag/ID	# of Trees	Loc	Common name, (*Botanical*)	Dbh	Ht	Spr	Suitability	Contribution	Priority	Assessment Findings	Action	Rationale	CPZ	RPZ
C01	1	City	Scotch elm (Ulmus glabra)	**107**	35	8.0	C	H	**N/A**	• Cavity observed on the westernmost scaffold actively used by squirrels • Safe retention of this tree includes end weight reduction of the westernmost scaffold branch, and proactive pruning to reduce the crown spread to 4-5m on the west side of the tree. The overall scope of pruning is ewell within tolerances and it will not impact the health, stability, nor aesthetics of the tree. • Protect rots to the edge of the existing building near PL.	**Protect**		9.0 N 5.0 S	see dwg

Tag/ID	# of Trees	Loc	Common name, (*Botanical*)	Dbh	Ht	Spr	Suitability	Contribution	Priority	Assessment Findings	Action	Rationale	CPZ	RPZ
C02	1	City	English elm (Ulmus procera)	**134**	35	10.0	U	H	**N/A**	• Sidewalk recently replaced adjacent to the tree so root impacts are expected to have been incurred. • Root and trunk rot diseases (i.e. Armillaria and Ganoderma) fruiting bodies observed at the base of trunk and on ground adjacent to the base of the tree. • Sounding revealed the presence of internal decay in the buttress roots and within thne lower bole. • Historical trunk injury observed on the north side of the trunk resulting in a large open wound. Internal trunk decay behind the injury was detected by sounding. • Failure of this tree is probable in any direction via either stem failure or root failure and target ratings are constant. • Due to the severity of the defects, pruning is not an applicable treatment for mitigation and removal is strongly recommended. • This tree is **HIGH-RISK** (see TRAQ findings in accompanying report). • Park Board will be notified by this office for their consideration and action.	**Protect - Refer to Parks**	Possible High Risk Tree	11.0	see dwg
C03	**1**	City	Star magnolia (Magnolia stellata)	**18**	8	4.0	S	H	**N/A**	• No significant defect observed.	**Protect**		5.0 E 2.5 W	2.5
C04	**1**	City	European beech (Fagus sylvatica)	**7**	4	1.0	S	H	**N/A**	• No significant defect observed.	**Protect**		2.0	1.5
C05	**1**	City	European beech (Fagus sylvatica)	**15**	9	1.5	S	H	**N/A**	• No significant defect observed.	**Protect**		2.5	2.5
C06	**1**	City	Japanese maple (Acer palmatum)	**20**	15	3.0	U	M	**N/A**	• The tree is growing within approximately 1m of the existing building at the subject site, and it appears to likely rely on the existing foundation for tree root anchoring and soil stability. Removal of the existing foundation, required to accommodate construction of new building, is expected to de-stabilize the tree and make it high risk for failure. This tree is recommended to be removed proactively prior to demolition commencing.	**REMOVE - Subject to Parks Approval**		4.0	2.0

TREE ASSESSMENT DETAIL

LEGEND-TREE ASSESSMENT:

- denotes **TAG NUMBER** or **ID REFERENCE**
- denotes **PRIORITY 1** tree **SUITABLE** for preservation (retainable if design can accommodate it)
- denotes **PRIORITY 2** tree **MARGINAL** for preservation. (possible candidate subject to design and other conditions)
- denotes **PRIORITY NIL** tree **UNSUITABLE** for preservation (not viable)
- denotes **UNDERSIZE TREE** that is exempt from permitting (based on municipal bylaw)
- denotes **OFF-SITE** tree within influencing distance (neighbour or city to be advised or consulted)
- denotes **OPTIMAL TREE PROTECTION SETBACK** (for planning and design consideration)
- denotes **6 TIMES DBH SETBACK** (for reference only – not a specification)

DRAWING USE AND COORDINATION:

- This drawing relies on information and drawings supplied by the client or their consultants. Refer to original drawings from the consultants (i.e. surveyor, engineer, architect or other design professionals) for accurate locations and dimension of site features.
- All tree protection measures specified herein should be included and coordinated with the designs for the project, including but not limited to; architectural, landscape, civil and geo-technical. It is the responsibility of each design professional to understand and review the tree protection measures and determine any conflicts. If conflicts are identified, the design professional and/or the client should bring those to the attention of the project arborist from this office to review and resolve.
- Tendering and contracts for site preparation, land clearing, civil works and/or construction should include specifications for tree protection measures to be implemented as per this drawing and any reference documents.
- It is the responsibility of the owner or their agent to obtain all necessary approvals for the tree retention and removal scheme presented herein. Any changes that the municipality requests should be brought to the attention of the project arborist from this office to review and resolve.
- Some existing trees may not be shown on this drawing (i.e. undersize or bylaw exempt trees, or grouped trees). It is the responsibility of the contractor(s) to confirm that all necessary municipal approvals are in place, and to determine the full scope of tree removal work. Only the trees shown to be retained and protected are to remain on site, unless otherwise directed by the owner.
- Trees and stumps to be removed from within the tree protection zone (including CPZ, RPZ and WSS) are to be removed as directed and with on-site supervision from an arborist from this office.
- Stump grinding may be required for the removal of trees within the tree protection zone, at the discretion of an arborist from this office.
- Certain tree removals in proximity of retained trees or power lines may require assistance from a suitably qualified professional, such as but not limited to;
  - ISA Certified Arborist (tree removal, rigging, pruning and other tree service work) working to ANSI A300 and ANSI Z133 Standards and Best Management Practices,
  - Certified Utility Arborist (tree removals, pruning and other tree service work) working to ANSI A300 and ANSI Z133 Standards and Best Management Practices and following BC Hydro policies and procedures.

TREE PROTECTION ZONE RESTRICTIONS:
Trees that are specified to be retained must be protected from damage during all phases of development related work on the site. Any access or construction related work within the TPZ (CPZ, RPZ and/or WSS) requires advance approval, guidance and on-site direction or supervision by the project arborist. General restrictions in the ***TPZ*** are as follows:

- No soil disturbance of any scope or to any depth for cuts or fills, including but not limited to; trenching, stripping of over-burden, bulk excavation, fill placement, site preparation, grade transitions, topsoil placement, etc.,
- No passage or operation of machinery, trucks, vehicles or equipment (including small track machines, skid steers, lifts, etc), except as approved and directed by the project arborist, and subject to special measures.
- No storage of soil, spoil, gravel, construction materials, waste materials, etc.,
- No waste or washing of concrete, stucco, drywall, paint, or other potentially harmful materials,
- No placement of temporary structures or services,
- No affixing lights, signs, cables or any other device to retained trees,
- No pruning or cutting of retained trees, except as approved and directed by the project arborist, and performed by a qualified tree service firm employing ISA Certified Arborists and working to ANSI A300 and ANSI Z133 Standards.
- No landscape finishing, such as but not limited to; installing retaining walls, digging planting holes, placing growing medium, installing irrigation or conduit, etc., except as approved and directed by the project arborist.

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Priority denotes a preservation ranking for consideration in tree retention planning, combining the suitability and contribution.
Assessment Findings summary description of overt defects and noteworthy growing condition factors, as well as preservation and protection considerations.
Action denotes proposed treatment in context to the current project design; **RETAIN, REMOVE or PROTECT.** Shared and Off-Site trees proposed as REMOVE **require owner consent.**
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Tag/ID	# of Trees	Loc	Common name, (*Botanical*)	Dbh	Ht	Spr	Suitability	Contribution	Priority	Assessment Findings	Action	Rationale	CPZ	RPZ
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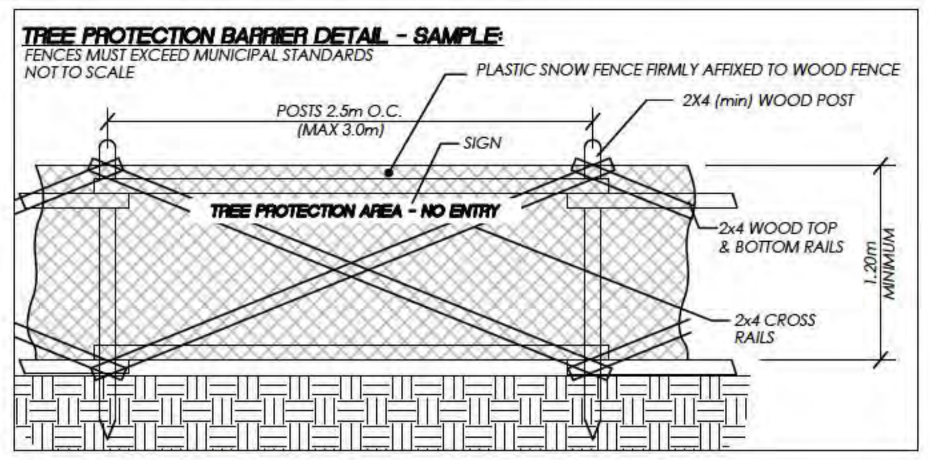
C02	1	City	English elm (Ulmus procera)	**134**	35	10.0	U	H	**N/A**	• Sidewalk recently replaced adjacent to the tree so root impacts are expected to have been incurred. • Root and trunk rot diseases (i.e. Armillaria and Ganoderma) fruiting bodies observed at the base of trunk and on ground adjacent to the base of the tree. • Sounding revealed the presence of internal decay in the buttress roots and within thne lower bole. • Historical trunk injury observed on the north side of the trunk resulting in a large open wound. Internal trunk decay behind the injury was detected by sounding. • Failure of this tree is probable in any direction via either stem failure or root failure and target ratings are constant. • Due to the severity of the defects, pruning is not an applicable treatment for mitigation and removal is strongly recommended. • This tree is **HIGH-RISK** (see TRAQ findings in accompanying report). • Park Board will be notified by this office for their consideration and action.	**Protect - Refer to Parks**	Possible High Risk Tree	11.0	see dwg
C03	1	City	Star magnolia (Magnolia stellata)	**18**	8	4.0	S	H	**N/A**	• No significant defect observed.	**Protect**		5.0 E 2.5 W	2.5
C04	1	City	European beech (Fagus sylvatica)	**7**	4	1.0	S	H	**N/A**	• No significant defect observed.	**Protect**		2.0	1.5
C05	1	City	European beech (Fagus sylvatica)	**15**	9	1.5	S	H	**N/A**	• No significant defect observed.	**Protect**		2.5	2.5
C06	1	City	Japanese maple (Acer palmatum)	**20**	15	3.0	U	M	**N/A**	• The tree is growing within 1m of the existing building and it appears to rely on the existing foundation for tree root anchoring and soil stability. Removal of the existing foundation, required to accommodate construction of new building, will de-stabilize the tree and make it high risk for failure. This tree should be removed proactively prtior to demolition commencing.	**REMOVE - Subject to Parks Approval**		4.0	2.0

TREE PROTECTION BARRIER DETAIL - SAMPLE:
FENCES MUST EXCEED MUNICIPAL STANDARDS
NOT TO SCALE



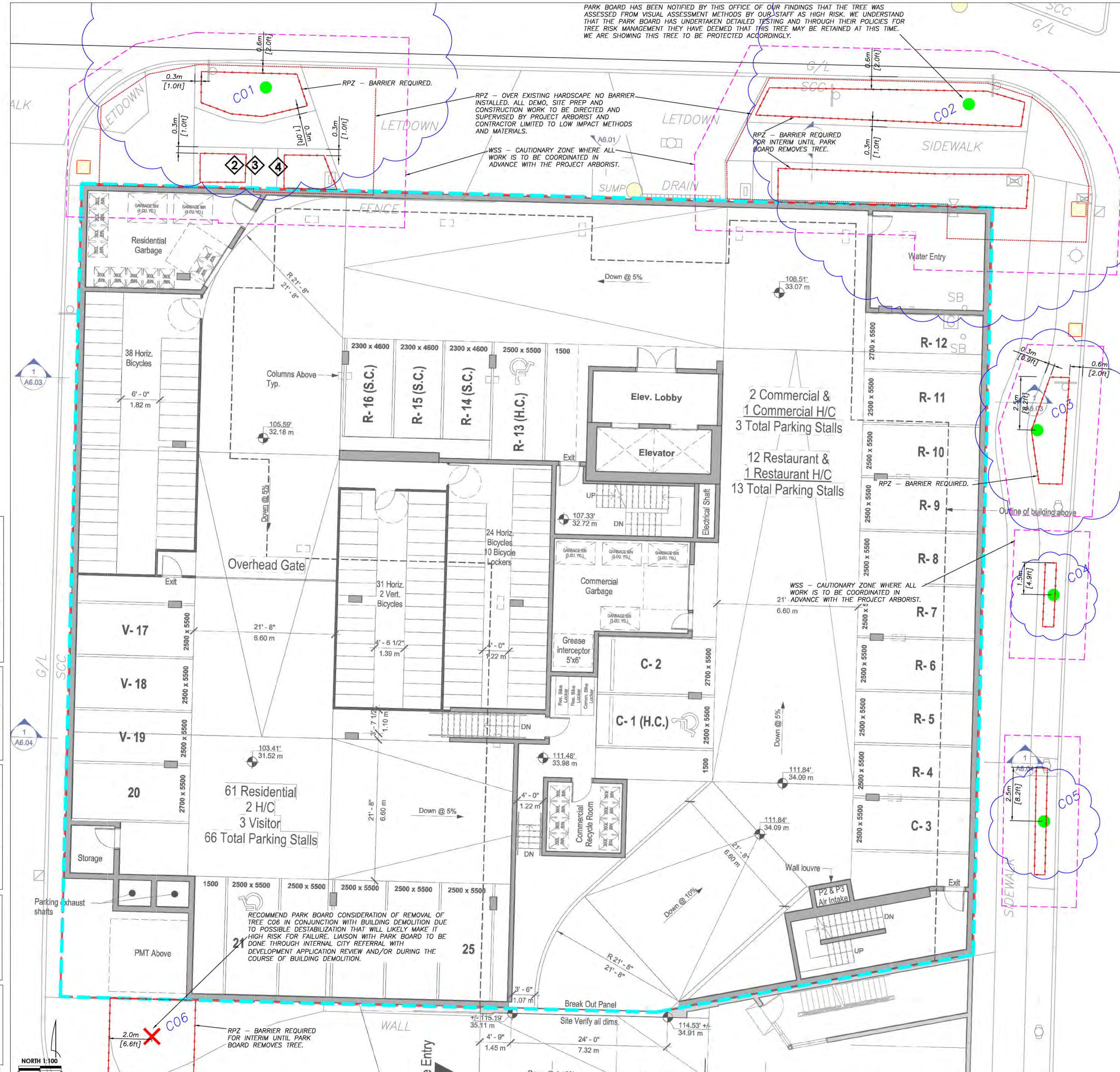
LEGEND-TREE PROTECTION:

- denotes **CROWN PROTECTION ZONE – CPZ** Exclusion zone – no aerial encroachment of buildings to within 1.0m min)
- denotes **ROOT PROTECTION ZONE - RPZ** This is the minimum alignment for **TREE PROTECTION BARRIERS**
- denotes **WORKING SPACE SETBACK – WSS** Offset from RPZ as specified by Project Arborist – Site works within WSS requires approval and on-site supervision by the Project Arborist
- denotes **SPECIAL MEASURES** required See report for further details. Project Arborist to direct or implement.

Note: All tree protection setbacks are measured from the centre of trunk

LEGEND-TREE MANAGEMENT IN DEVELOPMENT AREA:
See arborist report for further details.

- denotes **TAG NUMBER** or **ID REFERENCE** (see tree inventory and assessment list)
- denotes **RETENTION** tree (protection measures as specified)
- denotes **REMOVAL** tree (TAGGED TREE) (municipal permit or approvals may be required)
- denotes **HIGH RISK** tree to be **REMOVED** or **MODIFIED** (see tree inventory and report – permit or approvals required)



TREE RETENTION DETAIL

APPENDIX C: TREE MANAGEMENT DRAWING FOR DP

ARBORTECH CONSULTING
ACL GROUP
aclgroup.ca
SUITE 145 - 12051 HORSESHOE WAY, RICHMOND, BC V7A 4V4 604 275 3484

PROJECT:	PROPOSED REDEVELOPMENT
ADDRESS:	2120 W10TH AVE VANCOUVER BC
CLIENT:	BASTION DEVELOPMENT CORP
CITY REF:	
ACL FILE:	18186
PLOT SIZE:	22"X34"
REV #:	1
DATE:	JUN 8, 2021

APPENDIX D

TREE PROTECTION SPECIFICATIONS

1. **CONTACT INFORMATION:**

All tree protection questions, clarifications and coordination, should be directed to:

ARBORTECH CONSULTING *OFFICE:* ***604 275 3484*** *EMAIL:* ***trees@aclgroup.ca***

A project arborist will be assigned by our office to schedule a pre-construction meeting, and coordination of supervision protocols will be established.

2. **TREE PROTECTION ZONES (TPZ):**

Tree protection setbacks are defined on our drawings and documents relative to the centre of the tree trunk where it emerges from the ground and/or the actual extent and spread of the crown or roots of the tree. The ***TPZ*** is comprised of three main components:

CPZ – CROWN PROTECTION ZONE SETBACKS:

Specified by the project arborist to be at a minimum of the dripline extents of the crown (furthest reaching branches and foliage) plus 1.0 m. Restrictions on any aerial encroachment within a CPZ are required in order to protect from tree damage. This includes interim needs during site preparation or construction (machinery, cranes, trucks, vehicles, etc.), design elements (new structures, etc), and the working space required to build or maintain them. Pruning may be possible to accommodate certain encroachments but some encroachments may not be feasible within tolerances for impacts – consult with project arborist to confirm.

RPZ – ROOT PROTECTION ZONE SETBACKS:

A specified setback denoting the closest limits of soil/root disturbance determined by the project arborist based on; tree species, size, age class, condition, soil type and depth, drainage, topography, wind exposure and changes thereof, constrained root conditions, and acceptable thresholds specific to those factors. RPZ alignments that are smaller than the CPZ may be supported conditional to; the locations of the design features being sufficiently set back to allow for building space and grade transition, the aerial encroachment of that design feature within the CPZ being of tolerable impacts, and/or implementation of special remedial measures or enhancement treatments.

WSS – WORKING SPACE SETBACKS:

A setback zone to the specified offset from the ***RPZ*** (see tree management drawing) where all proposed site changes or construction work is to be supervised by the project arborist. Demolition of existing structures or hard landscape features will require low impact methods, and any excavations within this zone will require on-site direction and root pruning services of the project arborist.

The design professionals should consider the above, as well as the rest of this document in preparing the project designs.

3. **TREE PROTECTION ZONE RESTRICTIONS:**

Trees that are specified to be retained must be protected from damage during all phases of development related work on the site. Any access or construction related work within the TPZ (CPZ, RPZ and/or WSS) requires advance approval, guidance and on-site direction or supervision by the project arborist. General restrictions in the ***TPZ*** are as follows:

- No soil disturbance of any scope or to any depth for cuts or fills, including but not limited to; trenching, stripping of over-burden, bulk excavation, fill placement, site preparation, grade transitions, topsoil placement, etc.,
- No passage or operation of machinery, trucks, vehicles or equipment (including small track machines, skid steers, lifts, etc), except as approved and directed by the project arborist, and subject to special measures.
- No storage of soil, spoil, gravel, construction materials, waste materials, etc.,
- No waste or washing of concrete, stucco, drywall, paint, or other potentially harmful materials,
- No placement of temporary structures or services,
- No affixing lights, signs, cables or any other device to retained trees,
- No pruning or cutting of retained trees, except as approved and directed by the project arborist, and performed by a qualified tree service firm employing ISA Certified Arborists and working to ANSI A300 and ANSI Z133 Standards.
- No landscape finishing, such as but not limited to; installing retaining walls, digging planting holes, placing growing medium, installing irrigation or conduit, etc., except as approved and directed by the project arborist.

4. **TENDERING, IFC DRAWINGS AND CONSTRUCTION MANAGEMENT:**

Tendering of the project, issuance of the IFC drawings and documents (architectural, civil, landscape, mechanical, geo-technical, etc.) as well as planning of the construction (demolition, site clearing, excavation, shoring, access/egress, crane operations, etc.) should be coordinated with the tree protection specifications herein and the measures outlined as specified on the ***Tree Management Drawing*** prepared by this office. Any conflicts with the TPZ's identified by the project team or the contractor will require additional detailed review by the project arborist in advance of proceeding.

5. **BARRIERS – TREE PROTECTION FENCES:**

Barriers should be erected at the CPZ setback where possible, but must be installed no closer to the RPZ specified alignments as a minimum tree protection measure. Signs stating "TREE PROTECTION ZONE - NO ENTRY" must be placed on the tree protection fence at a suitable frequency at the direction of the project arborist. The contractor, sub-contractors and trades should be made aware of the restrictions therein (see above). The barriers must be maintained at those alignments in good condition, and may not be removed for any reason (including landscaping), unless prior approval from the project arborist is obtained.

6. **SURVEYING:**

Tree locations are derived from the project survey, and any discrepancies should be coordinated with their office directly and reported to the project arborist.

Tree barriers aligned with or within close proximity to a property line, a design feature, a restrictive covenant line, and/or an environmentally sensitive or protected area may require a survey in advance to enable accurate barrier installation.

APPENDIX D

TREE PROTECTION SPECIFICATIONS

7. TREE PRUNING, TREATMENTS, ENHANCEMENTS AND SPECIAL MEASURES:

The developer and their contractors are responsible to ensure completion of enhancement or remedial tree treatments, and proactive tree protection measures for retained trees as specified by the project arborist, including but not limited to;

- Pruning for risk mitigation, crown restoration, form, building or overhead clearance, and/or sight lines.
- Pre-treatments such as root mapping, vertical aeration, advance root pruning and other treatments.
- Installation of soil amender (i.e. mulch) within the ***RPZ*** to mitigate soil desiccation and to improve soil fertility.
- Supplemental watering to compensate for soil hydrology changes.
- Low impact removal for stumps located within a ***CPZ*** (i.e. stump grinding or cutting with project arborist supervision).
- Windfirming of new forest edges created by clearing of the development lands, including; re-assessment, tree removals, pruning, modification to wildlife tree, or other treatments as specified by the project arborist.

See the tree management drawing for further details.

8. DEMOLITION OR PRE-CONSTRUCTION OPERATIONS:

If tree removal permits are issued at this stage, please review next item also. Note that some municipalities will not approve tree removal at the demolition phase. Tree barriers may need to be installed prior to demolition and/or the municipality may require on-site direction and supervision by the project arborist during the process of demolishing existing structures and hardscapes. In some cases tree protection barriers must be realigned, and restoration of the zone undertaken, after demolition is complete. A letter of undertaking (***LOU***) confirming supervision may be required by, or may be on file with, the municipality. The demolition contractor will need to coordinate with the project arborist accordingly.

9. TREE REMOVAL/CLEARING OPERATIONS:

A copy of the tree permit must be provided to the project arborist to check for congruency with our tree management drawing. Note that neighbour approvals, additional municipal permits and/or authorizations from regulatory bodies may be required and are the responsibility of the developer or their assigned representative. Certain trees requiring removal may not be shown or referenced on the drawing or documents prepared by this office (i.e. undersize or non-bylaw trees or untagged trees assessed in groups). There are often removal trees (identified or unidentified on our drawings) that require felling, extraction and stump removal from TPZ's using low impact methods. Only the trees shown for retention within a tree protection zone as specified on our tree management drawing shall be retained (unless otherwise directed by the developer). The contractor and/or the land clearing subcontractor should verify the tree removal and clearing scope based on their own site investigation. The developer/owner and their contractor should also coordinate with the project arborist in advance to identify retained trees, identify low impact removal trees, review the work plan, and to ensure contractor compliance with the tree protection measures specified.

10. CONSTRUCTION OPERATIONS:

A letter of undertaking (***LOU***) for arborist supervision may be on file with the municipality. The contractor (project manager/site superintendent) and the developer are encouraged to proactively meet with the project arborist in advance of commencing work on the project to; establish communication and procedural protocols, review responsibilities for tree protection measures at specific milestones of the project, and identify and resolve any anticipated tree protection related challenges. Pursuant to the Tree Protection Zone Restrictions noted above, the trunks, branches, foliage and roots of retained trees, as well as the soil within the TPZ, must not be damaged by construction activities. Careful attention to excavation, access/egress, servicing, and machinery equipment and crane operation in proximity to the height and size of the TPZ's is recommended. Note that pruning to reduce the height of retained trees (topping or heading) CANNOT be accommodated. It is recognized that certain unpredictable construction conflicts with a TPZ may arise that could interfere with the protection of the selected trees, however any proposed encroachment into a TPZ and/or changes to the tree retention scheme are subject to approval in advance by the project arborist and the municipality. Special measures required for tree protection compliance related to construction work in the ***CPZ*** or within an ***RPZ*** may be feasible to accommodate managed encroachments into a ***TPZ***, such as but not limited to:

- Root mapping by the project arborist.
- Installing armour or suspended structures over the soil within the ***RPZ*** to accommodate temporary worker or equipment passage within a ***TPZ***. Several types of armouring may be available. Implementation is at the discretion of the project arborist and may be conditional to municipal approvals.
- Low impact trenching using air-vac or hydro-vac, with arborist supervision, to accommodate underground services or utilities. This option is restricted as to viability by; proximity, scope, depth, shoring needs, tree species, site/soil conditions and other factors.

11. LANDSCAPING OPERATIONS:

Removal of the tree barriers requires advance coordination and approval by the project arborist. The operation of equipment of any size or type, the placement of growing medium, all grading and sub-base preparation for hard landscape features. (i.e. sidewalks and patios), site preparation for retaining walls and footings, excavation for fences, signs and other landscape features, digging of planting holes for new plants and trees, the digging of trenches for irrigation, drainage and lighting infrastructure, and the placement of turf and other surface finishing, all have a high potential for causing damage to trees, roots or soil. Advance coordination between the landscape contractor and our office prior to landscape operations commencing is required to avoid tree protection non-compliance and bylaw issues.

APPENDIX E

LETTER OF UNDERTAKING – COMFORT LETTER

PROOF OF CONTRACT FOR FIELD SERVICES BY PROJECT ARBORIST

July 4, 2018 **Revision 1: June 8, 2021** ACL File: **18186**

For Municipal Review and Approval Purposes

Client and Project: **Bastion Development Corp – Park Place**

Site Address: **2120 w 10TH Avenue, Vancouver**

Ref Documents: **Arbortech Tree Management Report and Drawing**

Pursuant to city bylaws or policies, the **Project Arborist** is confirmed to be retained under contract to the developer or owner to assist with tree protection treatments and compliance during site preparation and construction phase as summarized below:

SCHEDULE:

- PRE-CONSTRUCTION SITE VISIT:
  The tree protection zone setbacks and restrictions will be reviewed by the project arborist with the general contractor, including the working space setback provisions noted below.
- SITE VISITS DURING CONSTRUCTION:
  The project arborist will attend proactively once per month or as scheduled with the contractor when construction is in progress in vicinity of the retained trees in order to check on compliance.
- POST CONSTRUCTION ASSESSMENT AND SIGN-OFF:
  At completion of the project, the project arborist is required by the city to undertake an inspection and sign-off to confirm that all tree protection measures have been successfully implemented.

SPECIAL MEASURES:

1. General:
   We must be called to attend and review, approve, direct and/or supervise certain works from time to time during the demolition, site preparation, construction and landscaping, at critical milestones or activities:
   - **a.** Prior to demolition, site preparation or construction commencing, to direct and inspect the installation of tree protection barriers in advance of or in lieu of municipal inspection.
   - **b.** Whenever access into the tree protection zone (TPZ) is contemplated or desired for any reason.
   - **c.** Whenever any grading, trenching, excavation or landscape work occurs within a TPZ, including the root protection zone (RPZ) and the working space setback (WSS) of 1.5m setback from a RPZ.
   - **d.** For any pruning of a retained tree.
   - **e.** For any tree removal or stump removal from within a RPZ or WSS.
   - **f.** During any landscape finishing within the TPZ.
   - **g.** At the completion of the project to review the condition of the trees and to sign off on the construction and landscape having met tree protection compliance measures to the satisfaction of the project arborist.
2. Pruning - Tree C01 and C02:
   This tree requires pruning as recommended by the project arborist to mitigate aerial building clearance. All tree work is to be carried out under the direction of the project arborist from this office and by the Vancouver Park Board crews. The scope of pruning is within ANSI standards (A300).
3. Demolition Supervision – Tree C01 and C02:
   The removal of the building and its foundation, as well as any hardscape features from within the TPZ (including the WSS) will require on-site supervision by the project arborist.
4. Root Pruning for Site Excavation – Tree C01 and C02:
   The project arborist must be on site concurrently with any excavation adjacent to the tree protection zone If required: to identify tree roots, provide root protection measures and/or undertake root pruning treatments as necessary.
5. Root Pruning for Services Adjacent to TPZ – All Retained Trees:
   If Required; The project arborist must approve the method of excavation (i.e. excavator, hydro-vac, air-vac, air spade etc) and also must be on site concurrent with trenching to identify tree roots, provide root protection measures and/or undertake root pruning treatments as necessary.
6. Low Impact Trenching for Services Through TPZ – All Retained Trees:
   The preference would be for all underground services and utilities to be aligned outside of the tree

protection zones. If required; The project arborist must be on site concurrently with the excavation to expose tree roots with hydro-vac and air-vac methods and to provide root protection measures and/or undertake root pruning treatments as necessary.

7. Landscape Finishing – All Retained Trees:
   Preparation works and installation of landscape finishing works including but not limited to; hardscape, retaining walls, fencing, irrigation, conduit, benches, patio pavers, soil placement, grass or turf installation, planting or other landscape features that are proposed within or directly adjacent to a TPZ must be reviewed by this office in advance and installed with on-site direction and guidance from the project arborist.

Site review reports will be issued to; the owner, the prime consultant and the general contractor through the construction phase, and the post construction assessment sign off report will be issued to the city after completion of the project.

By signing below, the owner agrees that they;

- Have read and understand Arbortech's standard ***Tree Protection Specifications***,
- Will provide Arbortech Consulting with all design drawings and report any design changes that may impact tree preservation,
- Will ensure that Arbortech Consulting is contacted with a minimum of **3 business days advance notice** to arrange attendance by the project arborist at required times,
- Will comply with project arborist directed and supervised work in conformance with arboricultural standards and best management practices, using low impact materials and methods as directed, and facilitate any remedial work or treatments that may be prescribed or required by the project arborist.

Certified by; Norman Hol For Scheduling: Phone: 604 275 3484 Email: trees@aclgroup.ca	Signature of Developer/Owner: _____ Printed Name: _____ Phone: Email:

	Signature of Contractor: _____ **Printed Name:** _____ Phone: Email:

Tree Risk Assessment

For:
Vancouver Board of Parks and Recreation

Site Location:
2120 West 10th Avenue Vancouver BC

Submitted to:

Joe McLeod – City Arborist, Supervisor Urban Forestry
BCSLA, ISA Certified Arborist, TRAQ, FIT, LEED-AP
Vancouver Board of Parks and Recreation | 2099 Beach Avenue | Vancouver, BC | V6G-1Z4
tel.: (604) 257-8474
email.: joe.mcleod@vancouver.ca

Date: August 18, 2021

Submitted by:

DIAMOND HEAD
3559 Commercial Street
Vancouver, BC 604.733.4886

The following Diamond Head Consulting staff either performed the site visit and/or reviewed the report. All general and professional liability insurance and individual accreditations have been provided below for reference.

Trevor Cox, MCIP RPP
Senior Arborist/Planner
ISA Certified Arborist
ISA Tree Risk Assessment Qualified (TRAQ)
BC Parks Wildlife and Danger Tree Assessor

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

Contact Information:

Phone: 604-733-4886
Fax: 604-733-4879
Email: Trevor@diamondheadconsulting.com
Website: www.diamondheadconsulting.com

Insurance Information:

WCB:	# 657906 AQ (003)
General Liability:	Northbridge General Insurance Corporation - Policy #CBC1935506, $10,000,000
Errors and Omissions:	Lloyds Underwriters – Policy #1010615D, $1,000,000

Table of Contents

1.0 Introduction

1.1 Scope of Assignment

Diamond Head Consulting Ltd. (DHC) was retained to complete a tree risk assessment for an individual elm tree growing at the southwest corner of 10th Avenue and Arbutus Street and outside 2120 West 10th Avenue, Vancouver. Trevor Cox of DHC visited the site on August 17, 2021.

This report is produced with the following primary limitations, detailed limitations specified in Appendix 1:

1) Our investigation is based solely on visual inspection of the tree during the site visit. This inspection was conducted from ground level. We did not conduct aerial inspections, soil tests or below grade root examinations to assess the condition of tree root systems
2) Risk assessments consider only known targets and visible tree conditions and represent the condition at the time of inspection only.
3) Only the subject tree specified in the scope of work was assessed and assessments were performed within the limitations specified.
4) Risk is assessed in the context of a 3-year timeframe. However, it is not a guarantee period for the risk assessment.
5) This report does not provide any estimates to implement the proposed recommendations provided in this report.
6) Tree Risk Assessments were completed following International Society of Arboriculture (ISA) Standards to the accepted industry standard of care. Trees that do not have signs of visible weakness can however fail under abnormal weather conditions and wind events, or in any case where the forces applied exceed the strength of the tree or its parts.

1.2 Site Overview

The subject tree is an English elm (*Ulmus procera*) and is growing on the southwest corner of 10th and Arbutus, Vancouver, in the sidewalk median. The targets in this area include, the buildings to the south and east, the hydro lines and bus electrified lines, people in vehicles and pedestrians below. This is a densely populated area and arbutus at this intersection has a lot of vehicle and bike traffic. tree is predominantly exposed to winds from the south and is partly sheltered from winds coming from other directions.

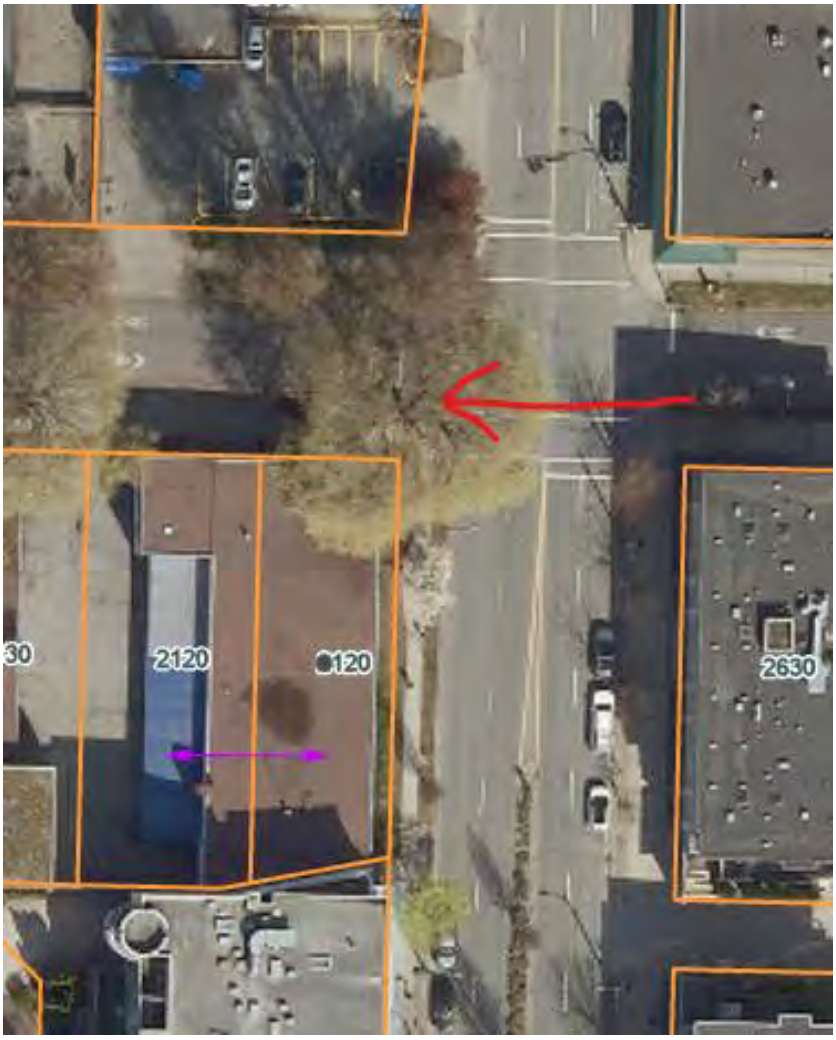


Figure 1. The subject tree in context of the surrounding landscape and infrastructure.

2.0 Process and Methods

To assess the risk associated with this elm tree, the ISA Tree Risk Assessment process[1] (TRAQ) has been used. The TRAQ methodology assigns risk based on the likelihood of failure, the likelihood of impact and the severity of consequence if a failure occurs. The likelihood and risk rating matrices used to categorize tree risk are provided below. These two risk rating matrices are taken from the ISA Tree Risk Assessment Qualification Manual.

We conducted a Level 2 assessment (basic) from ground level, using:

- Diameter tape
- True Pulse Range finder.

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

3.0 Findings: Tree Risk Assessment

3.1 Trees and Site Conditions

The subject tree is described in Table 1 and the risk assessment outcome is reported in Table 2:

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

Table 1. Description of tree assessed.

Tag #	Species	DBH (cm)	Ht (m)	Description
92	English elm (*Ulmus procera*)	~90	32	• This tree is growing in the sidewalk edge at the corner of Arbutus and 10th Avenue on the southwest corner. • The canopy is wide spreading and has no other aerial conflicts. • There has been ongoing pruning in the crown. Some of those on the south side have poor wound closure. • Fungal fruiting bodies (conks) of *Ganoderma applanatum* are found growing on the main trunk, on the west side. • There is a large scar on the north side near the base of the tree where it likely was struck by a car. There is decayed wood at this area and there is frass from pest activity in this wound. • There are two main trunks that emerge at about 10 meters and the dominant stem to the west then emerges into two other stems at about 15m. The unions are slightly included on the south side but on the north side there is dominant. The eastern stem has a large scar that starts at about 3m and goes up the stem to about 12m in height. • There appears to be relatively good vigour in the crown given the large wounds and heart-rot at its base. There is some dieback in its upper canopy.

3.2 Targets

The targets considered in this assessment are the buildings to the south, east, nearby parked cars, powerlines, poles and traffic lights. It is directly adjacent to the bike path which is commonly used and occupied due to the stop light being adjacent to the tree. The buildings being the constant target. The likelihood of striking a target if the tree were to fail would be high. "The failed tree or branch will most likely impact the target. This the case when a fixed target is fully exposed to the assessed tree or near a high-use road or walkway with an adjacent street tree"[2]

3.3 Consequence of Failure

The consequences of this tree failing would be considered severe. The size of part that would fail from this tree at distance will be considerable. There is little in the way to prevent parts of the tree from striking nearby targets. The significance of target values, whether monetary or otherwise in this case is subjective but the damage would be very significant resulting in death or long-term disruption in repairs. Please refer to the likelihood Matrix 1 and 2 to how the likelihood of impact and the consequences of failure work in relation to the likelihood of failure to determine the overall tree risk rating.

[2] Dunster, J.A., Smiley, E.T., Matheny, N. and Lilly, S. (2013). Tree Risk Assessment Manual. *International Society of Arboriculture*. Champaign, Illinois. Pg. 183.

3.4 Likelihood of Failure

The likelihood of this tree failing needs to be considered in relation to a time frame of the defect causing enough damage in the wood that it fails under some type of force, like gravity, wind or other force. The time frame also needs to be considered in relation to the main defect noted on the tree, a wood decay fungus. *Ganoderma applanatum* is the wood decay fungus that is affecting this tree. There is a fruiting body of this fungus growing at an opening in the bark on the west side of the tree (photo 2). These fungi generally require a wound site to enter a live tree. This likely came about from the damage on the stem of the tree from a car or other mechanical damage. The cambium was damaged enough to expose the xylem and allowed oxygen and airborne pathogens to penetrate the tree. This type of decay is typically referred to as a heart rot and generally leads to stem failure rather than windthrow. Under the other tree risk assessing standard used in British Columbia to assess trees for parks, all trees found with this type of fungus adjacent to buildings are automatically labelled dangerous and require immediate treatments to remove the hazardous condition from striking the target. The reason for the automatic mitigation measures is that the trees with large fungal, heart rot, conks indicates that it is in one of the last stages of decay. This standard, the BC Parks Wildlife Danger Tree Assessor's Course, describes the five stages of tree decay from the first stage where the tree is wounded, to the fifth stage where the tree is dead and in advanced stages of decay with the pathogen that originally killed the host tree may fade out with a secondary pathogen becoming established. The fourth stage of decay, described below, is where the subject elm is situated:

> "After several years, some triggering mechanism occurs and fungal hyphae, which may form felts, fans or strands within the wood of the tree, produce fruiting bodies or 'conks' which grow on the branch, branch stubs or on the bole of the tree."[3]

Although a secondary pathogen was not seen on the tree at the time of assessment, it is understood that an *Armillaria* spp. root rot was found on the tree by other professionals. This finding would corroborate with the description above of the tree being somewhat close to the last stage of decay where a secondary pathogen begins to establish.

When trying to assess the likelihood of failure, a timing of three years has been used to help quantify it for this risk assessment. The likelihood of failure, in this time frame, considering the size of the wounds on the tree and size of the conk, is probable. Given the consequences of such a large tree falling at a densely populated intersection, the need to conduct a detailed inspection of the tree becomes less important. This factor is compounded when trying to determine the wood strength of the roots below ground and how this is interacting with the stem of the tree where the heart rot is occurring. Using ground penetrating radar equipment, coupled with sonic wood assessment instruments still cannot account for an accurate determination of the likelihood of failure in a certain time frame. "Most of the calculations to assess strength loss due to decay in tree trunks are based on an idealized model of a single, vertical cylindrical trunk, with the decay centrally located and uniform. When the trunk is leaning, asymmetrical in shape and the decay is off center, the guidelines for shell wall thickness may not

[3] Wildlife Danger Tree Assessor's Course Workbook, WorkSafeBC, Ministry of Forests and Range, BC Parks, Ministry of Environment. February 2006. Pg. 100.

apply[4]". The subject elm has a decay cavity situated at the western edge and a fruiting body indicating a heart-rot decay on the southern side. This shows that the column of decay is not centrally located and therefore the strength loss calculation would make the determination of wood strength difficult to accurately determine. This puts the onus on the City to determine what the acceptable risk threshold is for a significant tree in the City.

3.5 Photos

Photo 1. Looking up into the crown of the tree from its south side.

Photo 2. Looking at the conk found on the west side of the tree.

[4] Dunster, J.A., Smiley, E.T., Matheny, N. and Lilly, S. (2013). Tree Risk Assessment Manual. *International Society of Arboriculture*. Champaign, Illinois. Pg. 29,30.

Photo 3. Looking at the wound on the north side where there is a cavity in behind the surface wood.

Photo 4. Looking east at the tree.

3.6 Tree Risk Assessment

Table 2: Tree Risk Summary Table.

Tree		Target	Likelihood			Consequences	Risk Rating	Action	Residual Risk
Species	Part to Fail	Type	Failure	Impact**	Failure & Impact				
Elm	Whole Tree	Building	Probable	High*	Likely	Severe, Significant	High	Remove	Low

*The likelihood of impact considers the occupancy of the site and the likelihood of the tree striking that target.

4.0 Summary and Conclusions

The subject tree is large Elm that is with striking of several targets should it fail. *Ganoderma applanatum* fruiting body is visible at the trees base, with additional large wounds near the lower stem which is the main factor when considering the likelihood of failure. *Ganoderma applanatum* fungus decays lignin, cellulose and hemicellulose resulting in severe loss of wood strength. The decay occurs in the sapwood and heartwood of the lower trunk and sometimes large roots that are close to the base.

As noted in Matrix 1 above, the 'likelihood of impacting a target' has four possible categories: very low, low, medium and high. These categories consider how often a target zone is occupied. A target zone's occupancy rate can be defined in the following four categories[5]:

- **Constant Occupancy** – a target is present at nearly all times, 24 hours a day, 7 days a week.
- **Frequent Occupancy** – the target zone is occupied for a large portion of a day or week.
- **Occasional Occupancy** – the target zone is occupied by people or targets infrequently or irregularly.
- **Rare Occupancy** – The target zone is not commonly used by people.

In this case, the likelihood of the subject tree failure impacting a building or electrical lines and or people in a car nearby at the site as 'high'[6].

- **High**: The failed tree or tree part is likely to impact the target, with no protection factors, and the direction of fall is toward the target.

With the likelihood of the failure being probable and the high likelihood of striking a significant target, the overall risk rating is high and in this rating criteria, the Tree Risk Assessment Manual recommends that the tree "should be mitigated as soon as practical, when the work schedule or pruning cycle allows. The timing might be within a few weeks or months and before the next stormy season arrives."[7]

Removal of this tree will ultimately be necessary to mitigate safety risk to this public area.
Planning to replace this tree could be undertaken now to ensure that when this tree is removed a viable successor is in place. If there is an opportunity to increase the soil volume in this area to ensure that

[5] Dunster, J.A., Smiley, E.T., Matheny, N. and Lilly, S. (2013). Tree Risk Assessment Manual. *International Society of Arboriculture*. Champaign, Illinois. Pg. 124.

[6] Dunster, J.A., Smiley, E.T., Matheny, N. and Lilly, S. (2013). Tree Risk Assessment Manual. *International Society of Arboriculture*. Champaign, Illinois. Pg. 124.

[7] Dunster, J.A., Smiley, E.T., Matheny, N. and Lilly, S. (2013). Tree Risk Assessment Manual. *International Society of Arboriculture*. Champaign, Illinois. Pg. 150.

another large canopy tree can grow to have a long life without stresses from inadequate soil volume. Consideration should be made to allow for changes at the site for adequate soil in both in the surrounding road and in the boulevard.

Appendix 1 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.

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