



**TALBOT MACKENZIE & ASSOCIATES**

**CONSULTING ARBORISTS**

# **458 Cecelia Rd, Victoria, BC**

## **Construction Impact Assessment & Tree Management Plan**

**PREPARED FOR:** T-Square Design and Consulting Ltd  
2850 Lakehurst Dr.  
Victoria, BC  
V8W 1S6

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Tree Risk Assessment Qualified

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# 1. INTRODUCTION

Talbot Mackenzie & Associates was asked to complete a tree inventory, construction impact assessment and management plan for the trees at the following proposed project:

Site:	458 Cecelia Rd.
Municipality	City of Victoria
Client Name:	T-Square Design and Consulting
Dates of Site Visit:	May 13st, 2021, February 26th, 2022
Site Conditions:	1 urban lot. Proposed new building and amendments to landscape design
Weather During Site Visit:	Clear, Sunny

The purpose of this report is to address requirements of the City of Victoria arborist report terms of reference, and Tree Preservation Bylaw No. 05-106. The construction site survey (December 12, 2019) prepared by Powell and Associates, the site plan prepared by T-Square design, and Landscape plan (May 31, 2020) - Prepared by Koi Dragon Enterprises Ltd. At this time, we have not reviewed a civil servicing plan (showing proposed underground utility connection locations). It should be noted that we have not reviewed the servicing plan for this project.

# 2. TREE INVENTORY METHODOLOGY

Prior to our site visit, we were provided sketched landscape drawings including surveyed tree locations. For the purposes of this report, the size, health, and structural condition of trees was documented. For ease of identification in the field, numerated metal tags were attached to the lower trunks of onsite trees.

# 3. EXECUTIVE SUMMARY

The inventory indicates all 5 of the Douglas fir trees along the Cecelia frontage are protected under the City of Victoria Tree Preservation Bylaw. Based on the plans that have been provided, we believe the 5 firs are possible for retention provided tree protection fencing be installed in accordance with *Appendix A*, the project arborist be on site to supervise excavation within the CRZ and the paving through the CRZ be altered to reflect the details in *Appendix C*. The Landscape plan shows the area around the firs will consist of a more permeable and naturalized substrate than the existing gravel. This with the combination of the proposed irrigation system in the same area will help mitigate subsequent stress to the health of the trees due to disturbance within their critical root zones.

To mitigate mechanical damage to the crowns of these trees, some crown reduction pruning may be necessary. This pruning should be carries out by an ISA certified arborist according to City of Vitoria bylaw No. 21-035 and industry best practices.

Although there is not currently any city of Victoria owned trees within proximity of the proposed work, it is our understanding that the city will be assuming ownership of the 5 firs and corresponding boulevard upon the completion of this project. The City may choose to remove the firs and plant a more desirable species for this location.

## 4. TREE INVENTORY DEFINITIONS

**Tag:** Tree identification number on a metal tag attached to tree with nail or wire, generally at eye level. Trees on municipal or neighboring properties are not tagged.

**NT:** No tag due to inaccessibility or ownership by municipality or neighbour.

**DBH:** Diameter at breast height – diameter of trunk, measured in centimetres at 1.4m above ground level. For trees on a slope, it is taken at the average point between the high and low side of the slope.

\* Measured over ivy

~ Approximate due to inaccessibility or on neighbouring property

**Dripline:** Indicates the radius of the crown spread measured in metres to the dripline of the longest limbs.

**Relative Tolerance Rating:** Relative tolerance of the tree species to construction related impacts such as root pruning, crown pruning, soil compaction, hydrology changes, grade changes, and other soil disturbance. This rating does not take into account individual tree characteristics, such as health and vigour. Three ratings are assigned based on our knowledge and experience with the tree species: Poor (P), Moderate (M) or Good (G).

**Critical Root Zone:** A calculated radial measurement in metres from the trunk of the tree. It is the optimal size of tree protection zone and is calculated by multiplying the DBH of the tree by 10, 12 or 15 depending on the tree's Relative Tolerance Rating. This methodology is based on the methodology used by Nelda Matheny and James R. Clark in their book "Trees and Development:

A Technical Guide to Preservation of Trees During Land Development."

- 15 x DBH = Poor Tolerance of Construction
- 12 x DBH = Moderate
- 10 x DBH = Good

To calculate the critical root zone, the DBH of multiple stems is considered the sum of 100% of the diameter of the largest stem and 60% of the diameter of the next two largest stems. It should be noted that these measures are solely mathematical calculations that do not consider factors such as restricted root growth, limited soil volumes, age, crown spread, health, or structure (such as a lean).

### Health Condition:

- Poor - significant signs of visible stress and/or decline that threaten the long-term survival of the specimen
- Fair - signs of stress

- Good - no visible signs of significant stress and/or only minor aesthetic issues

**Structural Condition:**

- Poor - Structural defects that have been in place for a long period of time to the point that mitigation measures are limited
- Fair - Structural concerns that are possible to mitigate through pruning
- Good - No visible or only minor structural flaws that require no to very little pruning

Suitability ratings are described as follows:

**Rating: Suitable.**

- A tree with no visible or minor health or structural defects, is tolerant to changes to the growing environment and is a possible candidate for retention provided that the critical root zone can be adequately protected.

**Rating: Conditional.**

- A tree with good health but is a species with a poor tolerance to changes to its growing environment or has a structural defect(s) that would require that certain measures be implemented, in order to consider it suitable for retention (ie. retain with other codominant tree(s), structural pruning, mulching, supplementary watering, etc.)

**Rating: Unsuitable.**

- A tree with poor health, a major structural defect (that cannot be mitigated using ANSI A300 standards), or a species with a poor tolerance to construction impacts, and unlikely to survive long term (in the context of the proposed land use changes).

**Retention Status:**

- Remove - Not possible to retain given proposed construction plans
- Retain - It is possible to retain this tree in the long-term given the proposed plans and information available. This is assuming our recommended mitigation measures are followed
- Retain \* - See report for more information regarding potential impacts

Table 1. Tree Inventory

Tag or ID #	Surveyed ? (Yes/No)	Location (On, Off, Shared, City)	Bylaw protected ? (Yes/No)	Name		dbh (cm)	Critical root zone radius (m)	Dripline diameter (m)	Condition		Relative tolerance	General field observations/remarks	Retention/Location comments	Retention Status
				Common	Botanical				Health	Structural				
2505	Yes	On	Yes	Douglas fir	<i>Pseudotsuga menziesii</i>	64	9.3	10	Fair	Fair	Poor	Historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning	CRZ overlapping proposed new building and driveway. Possible for retention provided tree protection fencing be installed in accordance with <i>Appendix A</i> , project arborist to be on site to supervise excavation within CRZ, and paving of driveway through the CRZ shall follow details in <i>Appendix C</i>	Retain
2504	Yes	On	Yes	Douglas fir	<i>Pseudotsuga menziesii</i>	63	9.1	10	Fair	Fair	Poor	Historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning	CRZ overlapping proposed new building and driveway. Possible for retention provided tree protection fencing be installed in accordance with <i>Appendix A</i> , project arborist to be on site to supervise excavation within CRZ, and paving of driveway through the CRZ shall follow details in <i>Appendix C</i>	Retain
2503	Yes	On	Yes	Douglas fir	<i>Pseudotsuga menziesii</i>	31	4.5	5	Fair	Fair-Poor	Poor	previously topped, historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning	CRZ overlapping landscaped area, project arborist to supervise any excavation within CRZ and tree protection fencing to be installed according to <i>Appendix A</i>	Retain
2502	Yes	On	Yes	Douglas fir	<i>Pseudotsuga menziesii</i>	34	4.9	4	Fair	Fair-Poor	Poor	Previously topped, historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning, mechanical damage on lower stem, damage to root flare on North side	CRZ overlapping landscaped area, project arborist to supervise any excavation within CRZ and tree protection fencing to be installed according to <i>Appendix A</i>	Retain
2501	Yes	On	Yes	Douglas fir	<i>Pseudotsuga menziesii</i>	69	10.0	8	Fair	Fair-Poor	Poor	Historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning	CRZ overlapping proposed new building and driveway. Possible for retention provided tree protection fencing be installed in accordance with <i>Appendix A</i> and project arborist to be on site to supervise excavation within CRZ	Retain

\*CRZ calculated above and drawn as follows on Tree Management Plan (T1): **CRZ - 0.5 \* d.b.h.** (drawn from the center of the stem)



## 5. SITE INFORMATION & PROJECT UNDERSTANDING

The site consists of one commercial urban lot (458 Cecelia Rd.) in Victoria, B.C., which has existing commercial lots adjacent on all sides. It is our understanding that the proposal is to demolish the existing building and replace it with a new building on an altered footprint. The City is proposed to take ownership of the first 1.4m along the boulevard, including the ownership of the 5 firs. In addition to the proposed new building, there is a proposed landscaped area which is to include the 5 inventoried Douglas firs along the Cecelia Rd frontage, as well as a bicycle parking area directly beside. As part of the project,

## 6. FIELD OBSERVATIONS

The onsite tree resources consist of 5 Douglas firs (*Pseudotsuga menziesii*) clustered beside the driveway, in one row along the Cecelia Rd frontage, on the Southwestern margin of the property. Soil at the base of the 5 firs appears compacted, and vehicles are parked within the root zone on the North side of the trees inside the fence. All 5 of the firs appear to have undergone pruning in the past, likely for clearance from the hydro lines which run parallel to the Cecelia Rd.



Figure 1: Site context air photo: The boundary of the subject site is outlined in yellow.

## 7. CONSTRUCTION IMPACT ASSESSMENT

### 7.1. RETENTION AND REMOVAL OF MUNICIPAL TREES

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There are no municipal trees in proximity to the proposed work zone,

### 7.2. RETENTION AND REMOVAL OF PRIVATE OFFSITE TREES

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There are no offsite trees located on adjacent private property within proximity to the proposed work zone of this project.

### 7.3. RETENTION AND REMOVAL OF ONSITE TREES

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The following onsite trees (indicated by tag #) are located where they are possible for retention providing that their critical root zones are adequately protected during construction. The project arborist must be onsite to supervise any excavation or fill placement required within their critical root zones (shown on the tree management plan (T1) in Appendix A):

Retain:

- 2501, 2502, 2503, 2504, 2505

Quantity of Existing bylaw protected trees	# of Trees Retained	# of Trees Removed	Replacement Tree Ratio	Replacement Trees Required	Replacement Trees Proposed	Replacement Trees in Deficit
Onsite						
5	5	0	N/A	N/A	N/A	N/A
City owned Trees						
0	0	0	2:1	<u>N/A</u>	N/A	N/A
Private offsite Trees						
0	0	0	2:1	N/A		
			Total:	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

## 8. IMPACT MITIGATION

**Tree Protection Barrier:** The areas surrounding the trees to be retained should be isolated from the construction activity by erecting protective barrier fencing (see *Appendix A* for municipal barrier specifications). Where possible, the fencing should be erected at the perimeter of the critical root zone. The barrier fencing to be erected must be a minimum of 4 feet in height, of solid frame construction that is attached to wooden or metal posts. A solid board or rail must run between the posts at the top and the bottom of the fencing. This solid frame can then be covered with flexible snow fencing. The fencing must be erected prior to the start of any construction activity on site (i.e. demolition, excavation, construction), and remain in place through completion of the project. Signs should be posted around the protection zone to declare it off limits to all construction related activity. The project arborist must be consulted before this fencing is removed or moved for any purpose.



NOTE: This is required for bylaw protected trees and municipal trees and recommended for trees the client wishes to retain.

**Arborist Supervision:** All excavation occurring within the critical root zones of trees to be retained should be completed under supervision by the project arborist. Any severed or severely damaged roots must be pruned back to sound tissue to reduce wound surface area and encourage rapid compartmentalization of the wound. In particular, the following activities should be completed under the direction of the project arborist:

- excavation and landscape materials/hardscape installation around trees #2501-2505

**Methods to Avoid Soil Compaction:** In areas where construction traffic must encroach into the critical root zones of trees to be retained, efforts must be made to reduce soil compaction where possible by displacing the weight of machinery and foot traffic. This can be achieved by one of the following methods:

- Installing a layer of hog fuel or coarse wood chips at least 20 cm in depth and maintaining it in good condition until construction is complete.
- Placing medium weight geotextile cloth over the area to be used and installing a layer of crushed rock to a depth of 15 cm over top.
- Placing two layers of 19mm plywood.
- Placing steel plates.

#### **Paved Surfaces Above Tree Roots:**

If the new paved surfaces within the CRZ of tree to be retained require excavation down to bearing soil and roots are encountered in this area, this could impact their health and structural stability. If tree retention is desired, perimeter of proposed curbs of planter beds may need to be amended to limit encroachment of critical root zone of retained trees.

**Mulching:** Mulching can be an important proactive step in maintaining the health of trees and mitigating construction related impacts and overall stress. Mulch should be made from a natural material such as wood chips or bark pieces and be 5-8cm deep. No mulch should be touching the trunk of the tree. See “methods to avoid soil compaction” if the area is to have heavy traffic.

**Landscaping and Irrigation Systems:** The planting of new trees and shrubs should not damage the roots of retained trees. The installation of any in-ground irrigation system must account for the critical root zones of the trees to be retained. Prior to installation, we recommend the irrigation technician consult with the project arborist about the most suitable locations for the irrigation lines and how best to mitigate the impacts on the trees to be retained. This may require the project arborist supervise the excavations associated with installing the irrigation system. Excessive frequent irrigation and irrigation which wets the trunks of trees can have a detrimental impact on tree health and can lead to root and trunk decay.

**Arborist Role:** It is the responsibility of the client or his/her representative to contact the project arborist for the purpose of:

- Locating the barrier fencing

- Reviewing the report with the project foreman or site supervisor
- Locating work zones, where required
- Supervising any excavation within the critical root zones of trees to be retained
- Reviewing and advising of any pruning requirements for machine clearances

**Review and site meeting:** Once the project receives approval, it is important that the project arborist meet with the principals involved in the project to review the information contained herein. It is also important that the arborist meet with the site foreman or supervisor before any site clearing, tree removal, demolition, or other construction activity occurs and to confirm the locations of the tree protection barrier fencing.

## 9. DISCLOSURE STATEMENT

This arboricultural field review report was prepared by Talbot Mackenzie & Associates for the exclusive use of the Client and may not be reproduced, used or relied upon, in whole or in part, by a party other than the Client without the prior written consent of Talbot Mackenzie & Associates. Any unauthorized use of this report, or any part hereof, by a third party, or any reliance on or decisions to be made based on it, are at the sole risk of such third parties. Talbot Mackenzie & Associates accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, in whole or in part.

Arborists are professionals who examine trees and use their training, knowledge, and experience to recommend techniques and procedures that will improve a tree's health and structure or to mitigate associated risks. Trees are living organisms whose health and structure change and are influenced by age, continued growth, climate, weather conditions, and insect and disease pathogens. Indicators of structural weakness and disease are often hidden within the tree structure or beneath the ground. The arborist's review is limited to a visual examination of tree health and structural condition, without excavation, probing, resistance drilling, increment coring, or aerial examination. There are inherent limitations to this type of investigation, including, without limitation, that some tree conditions will inadvertently go undetected. The arborist's review followed the standard of care expected of arborists undertaking similar work in British Columbia under similar conditions. No warranties, either express or implied, are made as to the services provided and included in this report.

The findings and opinions expressed in this report are based on the conditions that were observed on the noted date of the field review only. The Client recognizes that passage of time, natural occurrences, and direct or indirect human intervention at or near the trees may substantially alter discovered conditions and that Talbot Mackenzie & Associates cannot report on, or accurately predict, events that may change the condition of trees after the described investigation was completed.

It is not possible for an Arborist to identify every flaw or condition that could result in failure nor can he/she guarantee that the tree will remain healthy and free of risk. The only way to eliminate tree risk entirely is to remove the entire tree. All trees retained should be monitored on a regular basis. Remedial care and mitigation measures recommended are based on the visible and detectable indicators present at the time of the examination and cannot be guaranteed to alleviate all symptoms or to mitigate all risk posed.

Immediately following land clearing, grade changes or severe weather events, all trees retained should be reviewed for any evidence of soil heaving, cracking, lifting or other indicators of root plate instability. If new information is discovered in the future during such events or other activities, Talbot Mackenzie & Associates

should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein.

## **10. IN CLOSING**

We trust that this report meets your needs. Should there be any questions regarding the information within this report, please do not hesitate to contact the undersigned.

Yours truly,

Talbot Mackenzie & Associates

Prepared by:

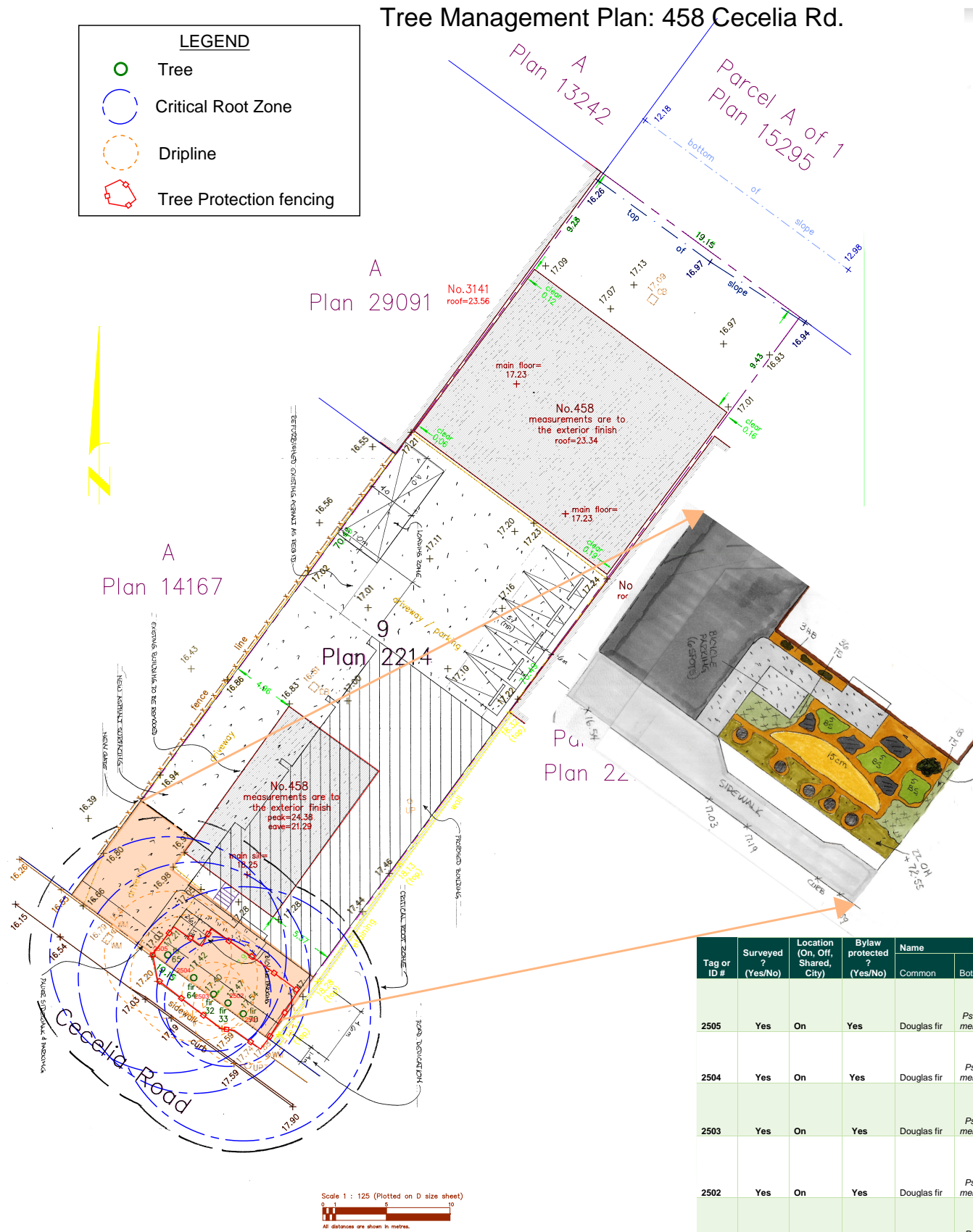
A handwritten signature in black ink, appearing to read 'Shannon Murray', with a large, stylized loop at the end.

Shannon Murray BSc  
ISA Certified Arborist PN – 9024A  
Tree Risk Assessment Qualification  
Email: tmtreehelp@gmail.com

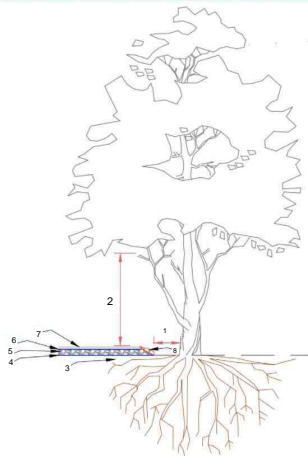
## **11. REFERENCES**

The City of Victoria Tree Preservation Bylaw No. 21-035

APPENDIX A - TREE MANAGEMENT PLAN



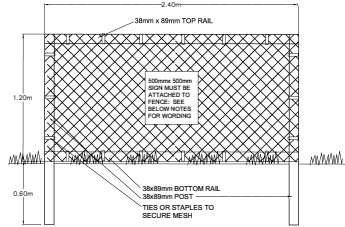
HARD SURFACE ABOVE TREE ROOTS DETAIL



1. Maintain as large a setback as possible between fill encroachment and the root cellar of the tree as possible.
2. Review any canopy clearance pruning requirements to accommodate vehicle or pedestrian clearances (pruning to be performed to ANSI A300 standards)
3. Excavate the new footprint of the driveway or sidewalk under the supervision of the project arborist. Excavation will be limited to the removal of the existing sod layers. Excavation around root structures must be performed by hand, airspace, or hydroexcavation.
4. Install a two-dimensional (such as combi-grid30/30) or three-dimensional geogrid reinforcement.
5. Install a 150mm depth layer of clear crushed gravel (no fines) using 20mm and/or 75mm diameter material or approved equivalent. \*Note: depth may be less than 150mm in some situations (dependant on grading constraints)
6. Install medium weight geotextile fabric (such as Nilex 4535or similar) over the clear gravel layer to prevent fine particles of sand infiltrating this layer.
7. The bedding or base layer and new driveway or sidewalk surface can be installed directly on top of the felted filter fabric.
8. Fill slopes – where possible, install loose-stacked boulders to reduce footprint of fill slopes that encroach within the critical root zone. Fill slope materials must be permeable to air and water. Do not pile fill material directly against tree trunk.



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 SHOWN FENCING MESH AND SECURE THE WOOD FRAME WITH ZIP TIES OR GALVANIZED STAPLES.
2. ATTACH A 500mm X 500mm SIGN WITH THE FOLLOWING WORDING: PROTECTED ROOT ZONE - NO ENTRY. 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

TREE PROTECTION NOTES

**Tree protection barrier:** The areas, surrounding the trees to be retained, should be isolated from the construction activity by erecting protective barrier fencing. Where possible, the fencing should be erected at the perimeter of the critical root zone. The barrier fencing to be erected must be a minimum of 1200mm in height, of solid frame construction that is attached to wooden or metal posts. A solid board or rail must run between the posts at the top and the bottom of the fencing. This solid frame can then be covered with flexible snow fencing. The fencing must be erected prior to the start of any construction activity on site (i.e. demolition, excavation, construction), and remain in place through completion of the project. Signs should be posted around the protection zone to declare it off limits to all construction related activity. The project arborist must be consulted before this fencing is removed or moved for any purpose.

**Arborist supervision:** All excavation occurring within the critical root zones of protected trees must be completed under the supervision of the project arborist. Any severed or severely damaged roots must be pruned back to sound tissue to reduce wound surface area and encourage rapid compartmentalization of the wound.

**Methods to avoid soil compaction:** In areas where construction traffic must encroach into the critical root zones of trees to be retained, efforts must be made to reduce soil compaction where possible by displacing the weight of machinery and foot traffic. This can be achieved by one of the following methods:

- Installing a layer of hog fuel or coarse wood chips at least 20cm in depth and maintaining it in good condition until construction is complete.
- Placing medium weight geotextile cloth over the area to be used and installing a layer of crushed rock to a depth of 15cm over top.
- Placing two layers of 19mm plywood.
- Placing steel plates.

**Mulching:** Mulching can be an important proactive step in maintaining the health of trees and mitigating construction related impacts and overall stress. Mulch should be made from a natural material such as wood chip or bark pieces and be 5-8cm deep. No mulch should be touching the trunk of the tree. See "methods to avoid soil compaction" if the area is to have heavy traffic.

**Pruning:** We recommend that any pruning of bylaw-protected trees be performed to ANSI A300 standards and Best Management Practices.

**Paved surfaces above tree roots:** Where paved areas cannot avoid encroachment within critical root zones of trees to be retained, construction techniques, such as floating permeable paving, may be required. The "paved surfaces above tree roots" detail above offers a compromise to full depth excavation (which could impact the health or structural stability of the tree). The objective is to avoid root loss and to instead raise the paved surface above the existing grade (the amount depending on how close roots are to the surface and the depth of the paving material and base layers). Final grading plans should take this potential change into account. This may also result in soils which are high in organic content being left intact below the paved area. To allow water to drain into the root systems below, we also recommend that the surface be made of a permeable material (instead of conventional asphalt or concrete) such as permeable asphalt, paving stones, or other porous paving materials and designs such as those utilized by Grasspave, Gravelpave, Grasscrete and open-grid systems.



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Tag or ID #	Surveyed ? (Yes/No)	Location (On, Off, Shared, City)	Bylaw protected ? (Yes/No)	Name	Common	Botanical	dbh (cm)	Critical root zone radius (m)	Dripline diameter (m)	Condition	Health	Structural	Relative tolerance	General field observations/remarks	Retention/Location comments	Retention Status
2505	Yes	On	Yes	Douglas fir		<i>Pseudotsuga menziesii</i>	64	9.3	10	Fair	Fair	Poor		Historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning	CRZ overlapping proposed new building and driveway. Possible for retention provided tree protection fencing be installed in accordance with Appendix A, project arborist to be on site to supervise excavation within CRZ, and paving of driveway through the CRZ shall follow details in Appendix C	Retain
2504	Yes	On	Yes	Douglas fir		<i>Pseudotsuga menziesii</i>	63	9.1	10	Fair	Fair	Poor		Historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning	CRZ overlapping proposed new building and driveway. Possible for retention provided tree protection fencing be installed in accordance with Appendix A, project arborist to be on site to supervise excavation within CRZ, and paving of driveway through the CRZ shall follow details in Appendix C	Retain
2503	Yes	On	Yes	Douglas fir		<i>Pseudotsuga menziesii</i>	31	4.5	5	Fair	Fair-Poor	Poor		previously topped, historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning	CRZ overlapping landscaped area, project arborist to supervise any excavation within CRZ and tree protection fencing to be installed according to Appendix A	Retain
2502	Yes	On	Yes	Douglas fir		<i>Pseudotsuga menziesii</i>	34	4.9	4	Fair	Fair-Poor	Poor		Previously topped, historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning, mechanical damage on lower stem, damage to root flare on North side	CRZ overlapping landscaped area, project arborist to supervise any excavation within CRZ and tree protection fencing to be installed according to Appendix A	Retain
2501	Yes	On	Yes	Douglas fir		<i>Pseudotsuga menziesii</i>	69	10.0	8	Fair	Fair-Poor	Poor		Historical pruning wounds with associated decay, asymmetrical crown due to hydro clearance pruning	CRZ overlapping proposed new building and driveway. Possible for retention provided tree protection fencing be installed in accordance with Appendix A and project arborist to be on site to supervise excavation within CRZ	Retain



## APPENDIX B - PHOTOGRAPHS



*Image 1- 5 Douglas firs I front of the subject site, all intended for retention. #2505 in the foreground to 2501 in the back.*



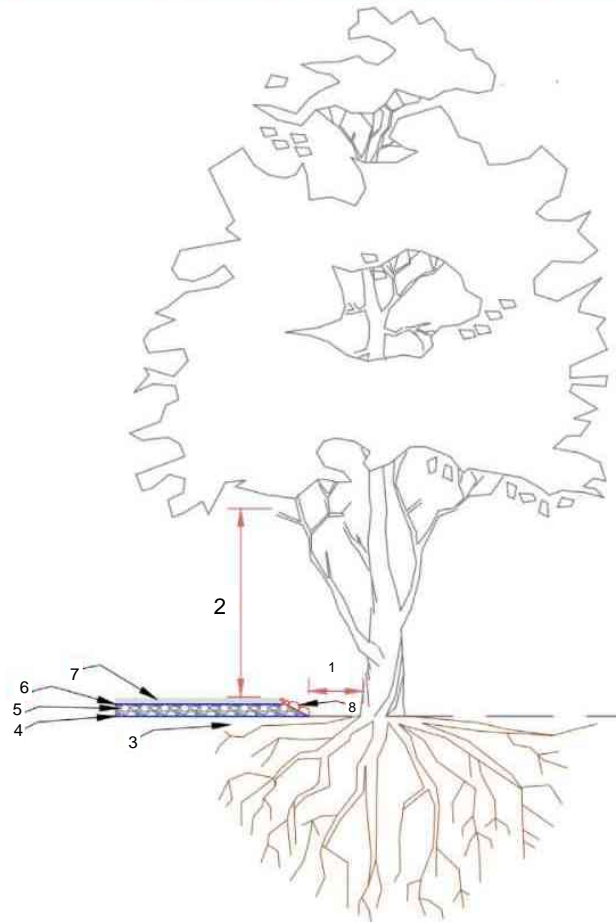


*Image 2 –Base of tree #2502, showing damage at base of root flare an level of soil compaction consistent with soil at base of other 4 firs.*



## APPENDIX C – PAVED SURFACES OVER ROOTS SPECIFICATIONS

### HARD SURFACE ABOVE TREE ROOTS DETAIL



1. Maintain as large a setback as possible between fill encroachment and the root cellar of the tree as possible.
2. Review any canopy clearance pruning requirements to accommodate vehicle or pedestrian clearances (pruning to be performed to ANSI A300 standards)
3. Excavate the new footprint of the driveway or sidewalk under the supervision of the project arborist. Excavation will be limited to the removal of the existing sod layers. Excavation around root structures must be performed by hand, airspace, or hydroexcavation.
4. Install a two-dimensional (such as combi-grid30/30) or three-dimensional geogrid reinforcement.
5. Install a 150mm depth layer of clear crushed gravel (no fines) using 20mm and/or 75mm diameter material or approved equivalent. \*Note: depth may be less than 150mm in some situations (dependant on grading constraints)
6. Install medium weight geotextile fabric (such as Nilex 4535 or similar) over the clear gravel layer to prevent fine particles of sand infiltrating this layer.
7. The bedding or base layer and new driveway or sidewalk surface can be installed directly on top of the felted filter fabric.
8. Fill slopes – where possible, install loose-stacked boulders to reduce footprint of fill slopes that encroach within the critical root zone. Fill slope materials must be permeable to air and water. Do not pile fill material directly against tree trunk.