



TALMACK
URBAN FORESTRY
— Consultants Limited —

Box 48153 RPO - Uptown Victoria, BC V8Z 7H6
Ph: (250) 479-8733
Fax: (250) 479-7050
Email: tmtrehelp@gmail.com



By jwalker at 9:35:35 AM, 2023/06/05

914 MCNAUGHTON AVENUE—
ESQUIMALT, BC
CONSTRUCTION IMPACT ASSESSMENT &
TREE MANAGEMENT PLAN

PREPARED FOR: Abstract Developments
#301 – 1106 Cook Street
Victoria, BC
V8V 3Z9

PREPARED BY: Talmack Urban Forestry Consultants Ltd.
Robert McRae – Consulting Arborist
ISA Certified # PN-7125A
Tree Risk Assessment Qualified
Tree Appraisal Qualified

DATE OF ISSUANCE: May 19, 2023

CONTENTS

1. INTRODUCTION	1
2. TREE INVENTORY METHODOLOGY	1
3. EXECUTIVE SUMMARY	1
4. TREE INVENTORY DEFINITIONS	2
5. SITE INFORMATION & PROJECT UNDERSTANDING	5
6. FIELD OBSERVATIONS	5
7. TREE RISK ASSESSMENT	6
8. CONSTRUCTION IMPACT ASSESSMENT	6
8.1. Retention and removal of municipal trees	6
8.1.1 Alternative mitigation measures for M1	6
8.2. Retention and removal of on-site trees	6
8.2.1 Additional mitigation measures for #698-700	7
8.3. Retention and removal of off-site trees	7
8.3.1 Notes Re. OS1	7
9. IMPACT MITIGATION	8
10. DISCLOSURE STATEMENT	10
11. IN CLOSING	11
12. REFERENCES	11
13. COMPANY INFORMATION	11

TABLES

Table 1. Tree Inventory	4
-------------------------	---

APPENDICES

Appendix A	Tree Management Plan
Appendix B	Site Photographs

REVISION RECORD

REVISION	DESCRIPTION	DATE (YYYY-MM-DD)	ISSUED BY
0	Construction Impact Assessment and Tree Management Plan	2023-05-19	RM

1. INTRODUCTION

Talmack Urban Forestry Consultants Ltd. was engaged to complete a tree inventory, construction impact assessment and management plan for the trees at the following proposed project:

Site:	914 McNaughton Avenue
Municipality:	Township of Esquimalt
Client Name:	Abstract Developments
Dates of Site Visit(s):	May 15, 2023
Site Conditions:	Flat residential lot with no ongoing construction.
Weather During Site Visit:	Mostly sunny

The purpose of this report is to address requirements of the Township of Esquimalt arborist report terms of reference, and Tree Protection Bylaw No. 2837. The construction impact assessment section of this report (section 8), is based on plans reviewed to date, including building plans from Zebra Designs (dated May 15th, 2023) and a site survey from Powell & Associates (dated March 31th, 2023).

2. TREE INVENTORY METHODOLOGY

For the purpose of this report, the size, health, and structural condition of trees were documented. For ease of identification in the field, numerated metal tags are attached to the lower trunks of on-site trees. Trees located on neighbouring properties, the municipal frontage, or in areas where access was restricted, were not tagged. Each tree was visually examined on a limited visual assessment basis (level 1), in accordance with Tree Risk Assessment Qualification (TRAQ) methods (Dunster *et al.* 2017) and ISA Best Management Practices.

3. EXECUTIVE SUMMARY

Based on review of the plans and our understanding of the project scope, one (1) on-site protected tree, one (1) off-site non-protected tree, and one (1) municipal tree are likely to require removal due to the proposed construction—*it should be noted that the municipal tree (M1) proposed for removal is young and healthy and may be an appropriate candidate for transplanting.* All other trees are located where their retention is possible, provided their CRZs can be adequately protected during construction.

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
- TBD – Final retention status “to be determined” at the time of construction or upon review of updated plans

Table 1. Tree Inventory

Tag or ID #	Surveyed? (Yes/No)	Location (On, Off, Shared, City)	Bylaw protected? (Yes/No)	Name		dbh (cm)	Dripline diameter (m)	Critical root zone radius (m)	Relative Tolerance	Condition		Retention Suitability (on-site trees)	General field observations/remarks	Tree retention / location comments	Retention status
				Common	Botanical					Health	Structural				
M1	No	Municipal	Municipal	Persian Ironwood	<i>Parrotia persica</i> 'Vanessa'	7 below unions	2	0.7	Good	Good	Fair-good	N/A	Included bark in unions.	Transplant?	X
698	Yes	On-site	Yes	Plum	<i>Prunus spp.</i>	19,9,7	7	3.4	Moderate	Good	Fair	Conditional	Epicormic growth. Rooted ~30cm west of retaining wall; canopy overhangs existing house.		X
699	Yes	On-site	Yes	Scots Pine	<i>Pinus sylvestris</i>	67 over ivy	11	6.7	Good	Fair-good	Fair	Suitable	Small deadwood, codominant at ~3m with active inclusion; minor pitch moth activity.	Brace?	Retain
700	Yes	On-site	Yes	Scots Pine	<i>Pinus sylvestris</i>	39	8	3.9	Good	Fair-good	Fair	Suitable	Codominant at ~5m (no visible inclusion), canopy weighted slightly north, branch failures historically (stubs present).		Retain
OS1	No	Off-site	No	European Birch	<i>Betula pendula</i>	~20	4	3	Poor	Good	Fair	N/A	Multiple leaders. Rooted ~30cm north of retaining wall; ~3m west of PL with 910 McNaughton.		X

5. SITE INFORMATION & PROJECT UNDERSTANDING

The development site consists of one residential lot (914 McNaughton Avenue), in Esquimalt, B.C. It is our understanding that the proposal is to relocate the existing house off site, followed by construction of a new duplex with associated driveways, patios, and fences. **At this time, we have not reviewed a site servicing plan**, though it is our understanding that underground utilities and overhead hydro will service the new duplexes from the McNaughton Avenue frontage, which should not result in impacts to protected trees. Underground service locations relative to potential transplanting or boulevard tree planting opportunities are discussed in **Section 8**. It is also our understanding that a 3m services easement (to service the adjacent development to the north) is proposed along the east property boundary.

Below is a general observation of the tree resource, as it appeared at the time of our site visit:

6. FIELD OBSERVATIONS

The on and off-site tree resource consists of a mixture of non-native tree species growing in ground in open landscape conditions (see **Figure 1**).



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

7. TREE RISK ASSESSMENT

During our May 15th (2023) site visit and in conjunction with the tree inventory updated same day, on-site trees were assessed for risk on a limited visual assessment basis (level 1) and in the context of the existing land uses. The time frame used for the purpose of our assessment is one year (from the date of the tree inventory). Unless otherwise noted herein, we did not conduct a detailed (level 2) or advanced (level 3) risk assessment, such as resistograph testing, increment core sampling, aerial examinations, or subsurface root/root collar examinations.

Existing Land Uses

We did not observe any trees that were deemed to be moderate, high, or extreme risk (in the context of the existing land uses) that would require hazard abatement to eliminate present and/or future risks (within a 1-year timeframe). Targets considered during this TRAQ assessment include: occupants of vehicles travelling or parked on McNaughton Avenue (frequent use), pedestrians travelling along existing sidewalks (frequent use), hydro lines (constant use), occupants of the existing house (constant use) or yard (occasional use) on neighbouring properties.

8. CONSTRUCTION IMPACT ASSESSMENT

8.1. RETENTION AND REMOVAL OF MUNICIPAL TREES

The following municipal trees (indicated by ID#) are located where they are likely to be severely impacted by proposed construction and are recommended for removal:

Remove 1 municipal tree

- M1

8.1.1 ALTERNATIVE MITIGATION MEASURES FOR M1

If desired by municipal authorities, this young and healthy tree could be transplanted into an alternate location on the boulevard fronting the subject property. This will depend on final locations of storm drain (SD), sanitary sewer (SS), water service, and gas service (if required). If possible, services should be routed below the proposed driveways, resulting in three (3) available planting locations (meeting CLS standards for small-large class trees) to the east and west of these crossings and/or between them.

8.2. RETENTION AND REMOVAL OF ON-SITE TREES

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

Retain and protect 2 bylaw-protected on-site trees

- #699 & 700

The following bylaw-protected on-site trees (indicated by tag#) are located where they are likely to be severely impacted by proposed construction and are recommended for removal:

Remove 1 bylaw-protected on-site tree

- #698

8.2.1 ADDITIONAL MITIGATION MEASURES FOR #698-700

- We recommend **Plum (*Prunus spp.*) #698** be removed prior to the demolition phase, as it is likely to be severely impacted by the removal of the existing retaining wall.

If #698 must be retained during the demolition phase, we recommend hard surfaces and retaining walls be left in place until the building permit stage—these will provide effective root armoring when house moving equipment is staged. In this scenario, protective barrier fencing shall also be installed to the edge of the existing retaining walls.

- The project arborist should be contacted to supervise the removal of the existing retaining wall within the CRZ of **Scots Pines (*Pinus sylvestris*) #699 & 700**, and be on-site during the installation of the proposed building foundation, patios, stairs, or deck footings (where these excavations encroach within the CRZs). Given that these installations encroach on a small percentage of the CRZs, we do not anticipate significant health impacts to ensue concerning either tree.

The project arborist should also supervise installation of footings for the proposed fence along the west property line—we recommend these be installed by hand tool excavation. If large roots are encountered, it may be necessary to slightly adjust the location of the footings to suit preservation of critical roots.

Codominant structure with active inclusion in the attachment was observed in #699. As a proactive measure, cable bracing should be considered to reduce the risk associated with large limb failure (considering the proposed introduction of new targets in the area). This work should be completed by an ISA Certified Arborist to ANSI standards.

8.3. RETENTION AND REMOVAL OF OFF-SITE TREES

The following non-protected off-site trees (indicated by tag#) are located where they are likely to be severely impacted by proposed construction and are recommended for removal:

Remove 1 non-protected off-site tree

- OS1

8.3.1 NOTES RE. OS1

- OS1 will likely require removal due to installation of underground services within the proposed 3m wide easement along the east property boundary of 914 McNaughton Avenue. Removal of any trees on neighbouring properties requires prior written authorization from the tree owners—it is our understanding that the adjacent property to the north is owned by the client (Abstract Developments).

9. 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.

Arborist Supervision: All excavation occurring within the critical root zones of protected trees 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:

- Any excavations and/or addition of fill within the CRZs of protected trees to be retained.

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.

Demolition of the Existing Buildings: The demolition of the existing houses, driveways, and any services that must be removed or abandoned, must take the critical root zone of the trees to be retained into account. If any excavation or machine access is required within the critical root zones of trees to be retained, it must be completed under the supervision and direction of the project arborist. If temporarily removed for demolition, barrier fencing must be erected immediately after the supervised demolition.

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, a raised and permeable paved surface should be constructed in the areas within the critical root zone of the trees. The “paved surfaces above root systems” diagram and specifications is attached.

The objective is to avoid root loss and to instead raise the paved surface and its base layer above the roots. This may result in the grade of the paved surface being raised 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.

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.

Blasting: Care must be taken to ensure that the area of blasting does not extend beyond the necessary footprints and into the critical root zones of surrounding trees. The use of small low-concussion charges and multiple small charges designed to pre-shear the rock face will reduce fracturing, ground vibration, and overall impact on the surrounding environment. Only explosives of low phytotoxicity and techniques that minimize tree damage should be used. Provisions must be made to ensure that blasted rock and debris are stored away from the critical root zones of trees.

Scaffolding: This assessment has not included impacts from potential scaffolding including canopy clearance pruning requirements. If scaffolding is necessary and this will require clearance pruning of retained trees, the project arborist should be consulted. Depending on the extent of pruning required, the project arborist may recommend that alternatives to full scaffolding be considered such as hydraulic lifts, ladders or platforms. Methods to avoid soil compaction may also be recommended (see “Minimizing Soil Compaction” section).

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 take into account 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.

10. DISCLOSURE STATEMENT

This arboricultural field review report was prepared by Talmack Urban Forestry Consultants Ltd. 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 Talmack Urban Forestry Consultants Ltd. 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. Talmack Urban Forestry Consultants Ltd 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 Talmack Urban Forestry Consultants Ltd. 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, Talmack Urban Forestry Consultants Ltd. 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.

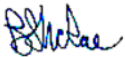
11. IN CLOSING

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,

Talmack Urban Forestry Consultants Ltd.

Prepared by:



Robert McRae
ISA Certified Arborist PN – 7125A
Tree Risk Assessment Qualification
Tree Appraisal Qualified
Robbie@Talmack.ca | 778-966-8733

12. REFERENCES

Dunster, J.A., E.T. Smiley, N. Matheny, and S. Lily. 2017. Tree Risk Assessment Manual, International Society of Arboriculture (ISA).








The Township of Esquimalt Tree Protection Bylaw No. 2837

13. COMPANY INFORMATION

General Liability: Intact Insurance, Policy No. 5V2147122 : \$5,000,000

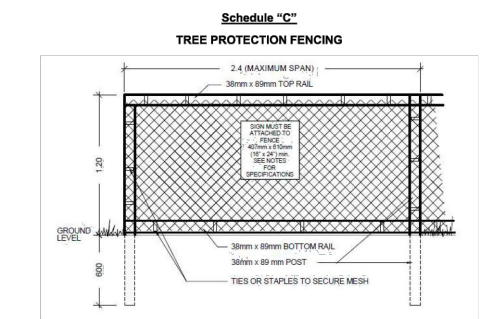
APPENDIX A – TREE MANAGEMENT PLAN

LEGEND

-  Existing tree with tag or ID #
-  Tree protection fencing
-  Dripline radius (m)
-  Critical root zone radius (m)
-  Tree proposed for removal
-  Unsurveyed tree
-  Site boundary



TREE PROTECTION FENCING



- Tree Protection Fencing Specifications:**
- The fence will be constructed using 38 x 89 mm (2" x 4") wood frame:
 - Top, Bottom and Posts.
 - Use orange snow fencing mesh and secure to the wood frame with "zip" ties or galvanized staples.
 - Attach a sign with minimum size of 407 mm x 610 mm (16" X 24") with the following wording:
 - DO NOT ENTER**- Tree Protection Zone (For retained trees);
 - DO NOT ENTER**- Future Tree Planting Zone (For tree planting sites)
- This sign must be affixed on every fence face or at least every 10 linear metres.
- *In rocky areas, metal posts (I-bar or rebar) drilled into rock will be accepted.
- DATE: November 2023
SCALE: N.T.S.

Tree Management Plan - T1

914 McNaughton Avenue
Esquimalt, BC

DATE: May 18, 2023
 PREPARED FOR: Abstract Developments
 SCALE: 1 : 200 @ 11" X 17"
 DRAWN BY: RM
 REVISION: 0
 REFERENCE DWG: Site Plan - Zebra Designs



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.

Demolition: The demolition of the existing houses, driveways, and any services that must be removed or abandoned must take the critical root zone of the trees to be retained into account. If any excavation or machine access is required within the critical root zones of trees to be retained, it must be completed under the supervision of the project arborist. If temporarily removed for demolition, barrier fencing must be erected immediately after the supervised demolition.

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 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.

Pruning: We recommend that any pruning of by-law-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.

Blasting and rock removal: Care must be taken to ensure that the area of blasting does not extend beyond the necessary footprints and into the critical root zones of surrounding trees. The use of small low-concussion charges and multiple small charges designed to pre-shear the rock face will reduce fracturing, ground vibrations and overall impact to the surrounding environment. Only explosives of low phytotoxicity and techniques that minimize tree damage should be used. Provisions must be made to ensure that blasted rock and debris are stored away from the critical root zones of trees.

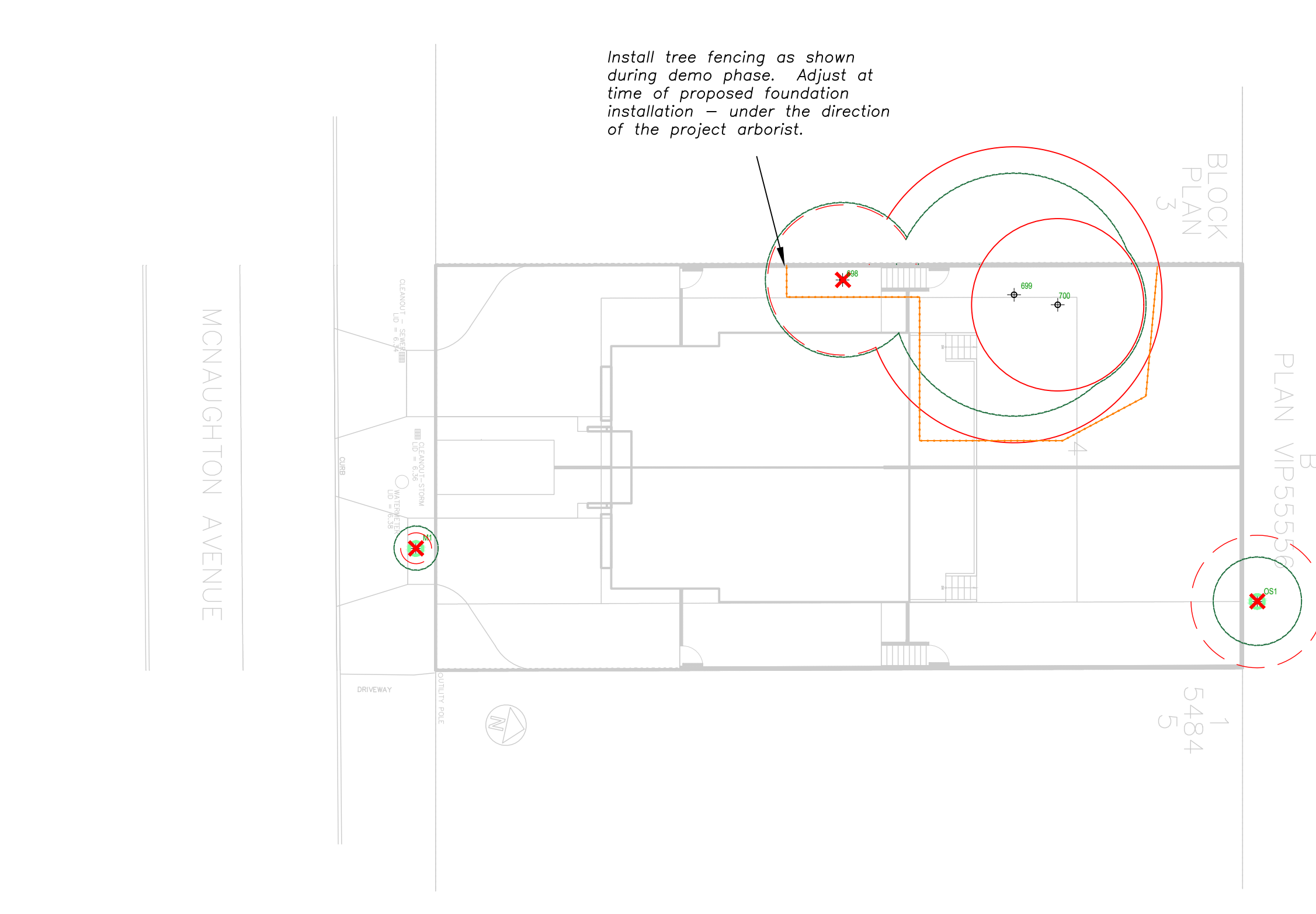
Scaffolding: This assessment has not included impacts from potential scaffolding including canopy clearance pruning requirements. If scaffolding is necessary and this will require clearance pruning of retained trees, the project arborist should be consulted. Depending on the extent of pruning required, the project arborist may recommend that alternatives to full scaffolding be considered such as hydraulic lifts, ladders or

platforms. Methods to avoid soil compaction may also be recommended (see "Minimizing Soil Compaction" section).

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 take into account the critical root zones of the trees to be retained. Prior to installation, we recommend the irrigation technical 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 the tree health and can lead to root and trunk decay.

Arborists 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 and machine access corridors where required.
- Supervising excavation for any areas within the critical root zones of trees to be retained including any proposed retaining wall footings and review any proposed fill areas near trees to be retained.



Install tree fencing as shown during demo phase. Adjust at time of proposed foundation installation – under the direction of the project arborist.



APPENDIX B - SITE PHOTOGRAPHS



Photograph 1: *Municipal Persian Ironwood within footprint of proposed driveway. Potential candidate for transplanting.*



Photographs 2-4: Canopy of Plum #698 overhanging existing house (above); rooted next to existing retaining wall (lower left).



Photographs 5-7: Scots Pines #699 & 700—to be retained (upper left). Codominant structure of #699 (upper right) with active inclusion (lower left); tree recommended for cable bracing.



Photograph 6: *European Birch OS1 (recommended for removal).*