



A.B.C Consulting Arborists LLC

Accurate

Balanced

Certified

Yang Residence 7431 E Mercer Way Tree Protection Plan

March 1, 2019

PREPARED FOR:

Melissa Yang
C/O Steven M. Long, Studio 19 Architects
RE: 7435/7431 E Mercer Way
Mercer Island, WA

PREPARED BY:

A.B.C. Consulting Arborists LLC

Daniel Maple,

*Registered Consulting Arborist #627
ISA Municipal Specialist # PN-7970AM
ISA Tree Risk Assessment Qualified (TRAQ)
ISA Board Certified Master Arborist #PN-7970BM*

Accurate • Balance • Certified

TABLE OF CONTENTS

CONSULTING ARBORIST	2
ASSIGNMENT.....	3
LIMITATIONS OF ASSIGNMENT	3
METHODOLOGY	3
SITE	3
TREE LOCATION AND ID.....	3
TREES	4
TREE PROTECTION ZONES (TPZ).....	4
CRITICAL ROOT ZONES (CRZ)	5
FENCING	5
ROOT PROTECTION.....	6
CERTIFICATION.....	7
ATTACHMENTS	8

CONSULTING ARBORIST

Daniel J. Maple / A.B.C. Consulting Arborists, LLC
Email: Daniel@AbcArborist.Com Cell Phone: (509) 953-0293

Certifications

ASCA Registered Consulting Arborist (RCA)	# 627
ISA Board Certified Master Arborist (BCMA)	PN-7970BM
ISA Certified Arborist Municipal Specialist	PN-7970AM
ISA Tree Risk Assessment Qualified (TRAQ)	June 30, 2020
SAF Qualified Tree Farm Inspector	# 169449
Commercial Applicator	# 92432
Commercial UAV Airman Pilot (Drone)	# 4135495

ASSIGNMENT

Provide a tree inventory and protection plan for a new residence.

- Assess the trees for pre-& post construction viability.
- General health and condition of the trees.
- Provide Tree Protection Zones (TPZ)
- Provide Critical Root Zones (CRZ)
- Provide TPZ, CRZ fencing requirements and instructions.
- Provide observations, facts, findings and recommendations in a professionally written report.

LIMITATIONS OF ASSIGNMENT

This report is limited to a Visual Assessment (VA) of the site and the trees. It is not a comprehensive risk assessment, structural assessment or health assessment. The report is limited to the scope of the assignment.

METHODOLOGY

To evaluate the trees, as well as to prepare this report, I drew upon my 30+ years of experience in the field of arboriculture and my formal education. I followed the protocol of the International Society of Arboriculture (ISA) and I performed my assessment using and/or considering the following Best Management Practices:

ANSI A300 Part 2 – *Soil Management a.) Modification b.) Fertilization & c.) Drainage.*

ANSI A300 Part 5 – *Managing Trees During Site Planning, Site Development, and Construction.*

ANSI A300 Part 9 – *Tree Risk Assessment (Second Edition).*

ISA BMP's – *Tree Inventories (Second Edition 2013)*

Best Management Practices were developed to aid in the interpretation of professional standards and guide work practices based upon current science and technology. Using this process, I performed my assessment, which included looking at the overall health of the trees as well as the site conditions. This is a scientifically based process to look at the entire site, surrounding land and soil, as well as a general look at the trees themselves.

SITE

Parcel 257950-0162 is a 9,850 sq. ft. (.23-acre) site, **Zoned R-9.6**, proposed for a new residence. Access to the site will be via a driveway extension from parcel 2579500160. Potential erosion conditions were found using King County iMap. Soils are generally native, moderate in depth and well drained. No other relevant site conditions were noted.

TREE LOCATION AND ID

There are 45 trees included in this report, they were geo-tagged and are referenced as 1-45. Please refer to Attachment 1, Tree Plotter Image for an orientation to the site and the approximate location of the trees.

TREES

There was a total of 45 trees inventoried. 6 are in the ROW, 22 are on 2579500160, 4 are on 2579500151, 4 are on 2579500156, 3 are on 2579500170, and 6 were on the subject site parcel 2579500162. *See Attachment 1 Tree Plotter Image & Attachment 2 Tree Summary.*

Non-viable or Hazard Trees

There was 1 non-viable or hazard tree (18) on the site,
There were 6 offsite trees (17 and 22-26) that visual evidence suggests they may pose a hazard. They should have a thorough assessment by a qualified arborist.

Trees to be Removed for Improvements

There was 1 tree (14) that conflicts with the proposed site improvements and will be removed.
There were 4 trees (10-13), on parcel 2579500160, that need to be removed to provide access to the site.

Trees to be Retained

4 healthy viable trees in good to excellent condition will be retained on the site.

Offsite Trees

There are were 10 offsite trees with driplines near to or that extended over the property line, none of the driplines extended over proposed construction areas.

Impacts

With the installation of the tree protection fencing prior to development activity and by following the outlined tree protection instructions impacts to the on and offsite trees will be minimal.

Supplemental Trees/Replanting

Per city code 30% of the trees are to be retained. We are retaining 4 of the 6 trees (66%) more than the minimum 30% required by city code. **No supplemental trees or replanting is required.**

TREE PROTECTION ZONES (TPZ)

In order for trees to survive the stresses placed upon them in the construction process, tree protection must be planned in advance of equipment arrival on site. If tree protection is not planned integral with the design and layout of the project, the trees will suffer needlessly and possibly die. With proper preparation, often costing little or nothing extra to the project budget, trees can survive and thrive after construction. This is critical for tree survival because damage prevention is the single most effective treatment for trees on construction sites. Once trees are damaged, the treatment options available are limited.

General

The TPZ is the optimal protection zone set to preserve trees during construction. The TPZ radius generally is 8-Inches to 18-Inches of protection for every 1-Inch of DBH, based on the trees size, vigor and construction tolerances (*ANSI A300 Part 5 BMP, Matheny, Clark, 1998*).

The TPZ can usually safely be reduced by 20% as long as it does not impact the CRZ. Greater than 20% reductions may be possible, pending review, written permission, and direct over site of the work, by the Consulting Arborist.

The trees to be saved, must be protected during construction by temporary 6' tall chain-link, or like fencing, located 10' beyond the edge of the trees farthest extending limbs on all sides (dripline). The individual tree protection zones (TPZ) are 10' past the driplines of the tree(s), unless otherwise delineated by A.B.C. Consulting Arborist LLC. See **Attachment 2** for tree specific TPZ and CRZ.

No irrigation lines, trenches, or other utilities shall be installed within the TPZ, without detailed written instructions and the oversight of the Consulting Arborist, to reduce the impacts to the tree roots, and construction related stressors. Cuts or fills should impact no more than 20% of a tree's root system. If topsoil is added to the root zone of a protected tree, the depth should not exceed 2 inches of a sandy loam or loamy fine sand topsoil and should not cover more than 20% of the root system.

If roots are encountered outside the TPZ during construction, they shall be cut cleanly with a saw (not ripped or torn) and covered immediately with moist soil. Noxious vegetation within the critical root zone should be removed by hand. If a proposed save tree must be impacting by grading or fills, then the tree should be re-evaluated by A.B.C. Consulting Arborist LLC to determine if the tree can be saved with mitigating measures, or if the tree should be removed.

See **Attachment 3** for complete tree protection instructions.

CRITICAL ROOT ZONES (CRZ)

The CRZ is the area where the roots vital for the trees survival are located, the CRZ is generally ½ of the TPZ. At no time or for any reason shall the roots within the CRZ be impacted. See **Attachment 2** for tree specific TPZ and CRZ.

FENCING

6' tall chain link (or like fencing) shall be installed the TPZs prior to commencement of site clearing and shall remain in place for the duration of the project. When possible it is preferred that trees be fenced as a group, rather than individuals. At no time shall any vehicle or equipment be allowed inside TPZ/Fencing. No placing or stock-piling of any material of any kind shall be allowed inside the TPZ/Fencing.

Removal of any vegetation within the TPZ shall be done by hand. Should any disturbance be required inside the TPZ to install utilities or any other needs during the construction period, they will require project specific instructions by the Consulting Arborist and approval by the city prior to undertaking any said activity in the TPZ.

ROOT PROTECTION

Any roots encountered of 1” in diameter or greater, shall be cut with loppers, pruners, reciprocal saw or like device to provide a clean smooth cut. At no time, shall 1” or greater diameter roots be ripped or torn. Exposed roots shall be covered with wet burlap, or like item, to keep roots from drying out and shall be covered with soil as soon as reasonably possible.

Protect tree root systems from damage due to noxious materials caused by runoff or spillage while mixing, placing, or storing construction materials. Protect root systems from flooding, eroding, or excessive wetting caused by dewatering operations. Protect root systems from damage due to removal of adjacent trees.

SEE ATTACHMENT 3 For Complete Tree Protection Instructions.

CERTIFICATION

I, Daniel Maple, Certify to the best of my knowledge and belief:

1. That the statements of fact contained in this report are true and correct.
2. That the analysis, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and that they are my personal, unbiased professional analysis, opinions, and conclusions.
3. That I have no present or prospective interest in the property or plants that are the subject of this report, and that I had no personal interest or bias with respect to the parties involved.
4. That my compensation is not contingent upon a predetermined value or direction and that favors the cause of the client, the amount of the value estimate, the attainment of a stipulated results, or the occurrence of any subsequent event.
5. That my analysis, opinions, and conclusions were developed to reflect reasonable conformity with current ANSI A300 Best Management Practices and Industry Standards.
6. The report is based on the information known to me at the time of my assessment. If more information is disclosed, I may have further opinions.
7. The report is based on my analysis at the time of the assessment and covers that time frame only; any additional limitations are addressed in the body of the report and/or in the attachments.
8. That statements of fact in the report are correct to the best of my knowledge and belief, and that they are made in good faith.

Thank you for contacting A.B.C. Consulting Arborists LLC for your arboricultural needs.

Sincerely,



Daniel Maple, Consulting Arborist

*Registered Consulting Arborist #627
ISA Municipal Specialist #PN-7970AM
ISA Tree Risk Assessment Qualified (TRAQ)
ISA Board Certified Master Arborist #PN-7970BM*

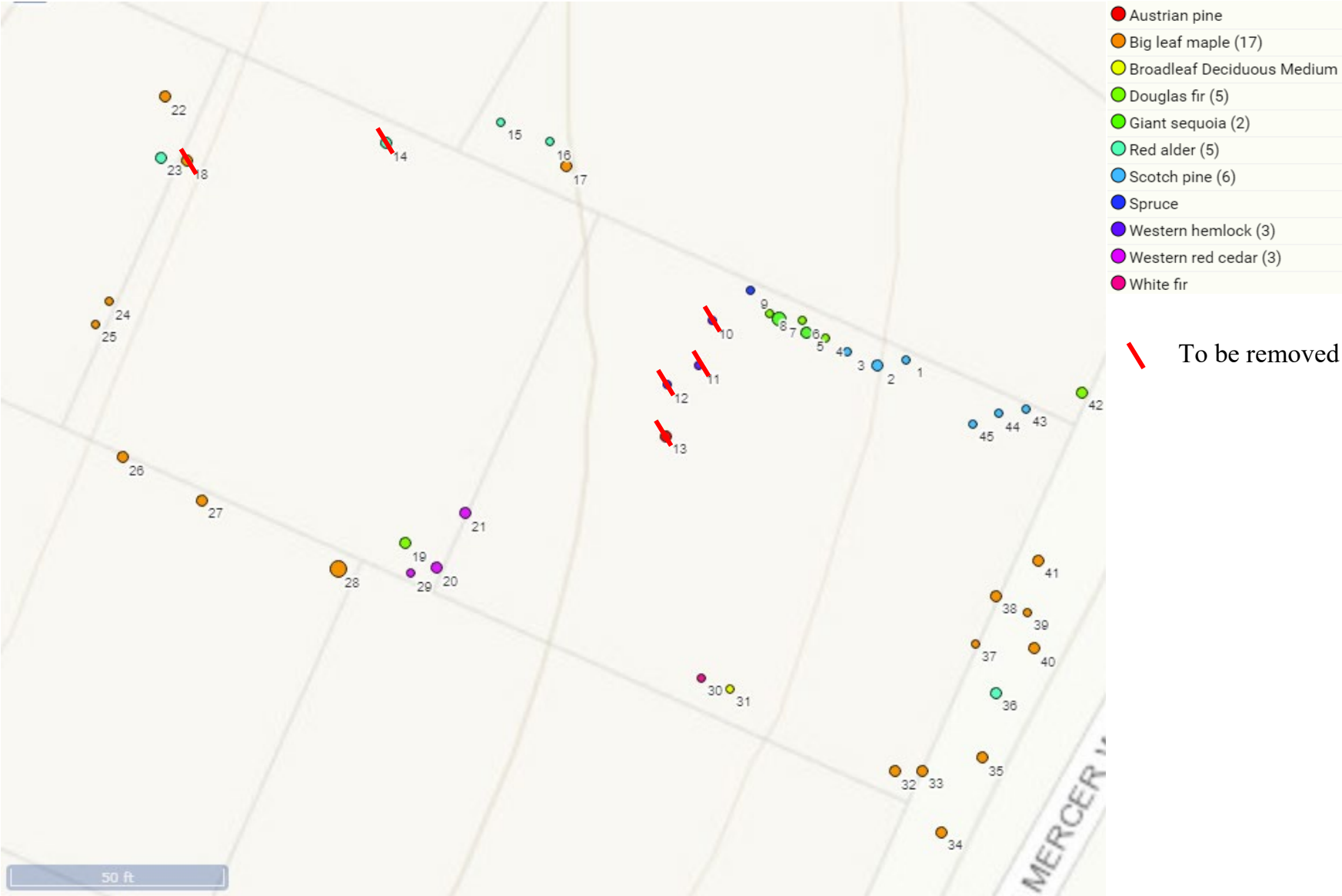


ATTACHMENTS

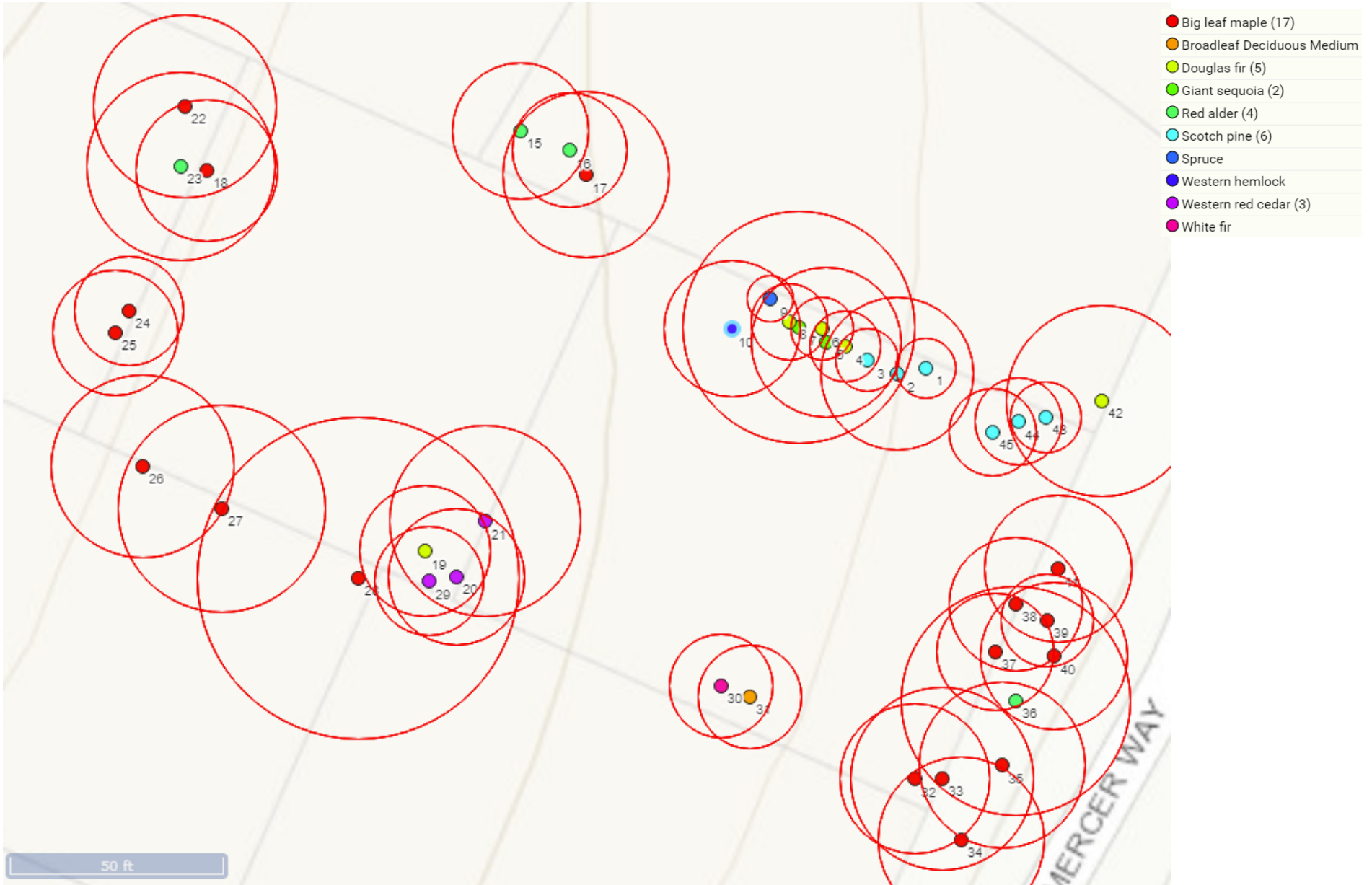
ATTACHMENT 1 - TREE PLOTTER IMAGE 9
ATTACHMENT 2 - TREE SUMMARY, TPZ, CRZ..... 12
ATTACHMENT 3 - TREE PROTECTION 14
ATTACHMENT 4 - ASSUMPTIONS & LIMITING CONDITIONS 17
ATTACHMENT 5 - GLOSSARY 18
ATTACHMENT 6 - REFERENCES 19

ATTACHMENT 1 - TREE PLOTTER IMAGE

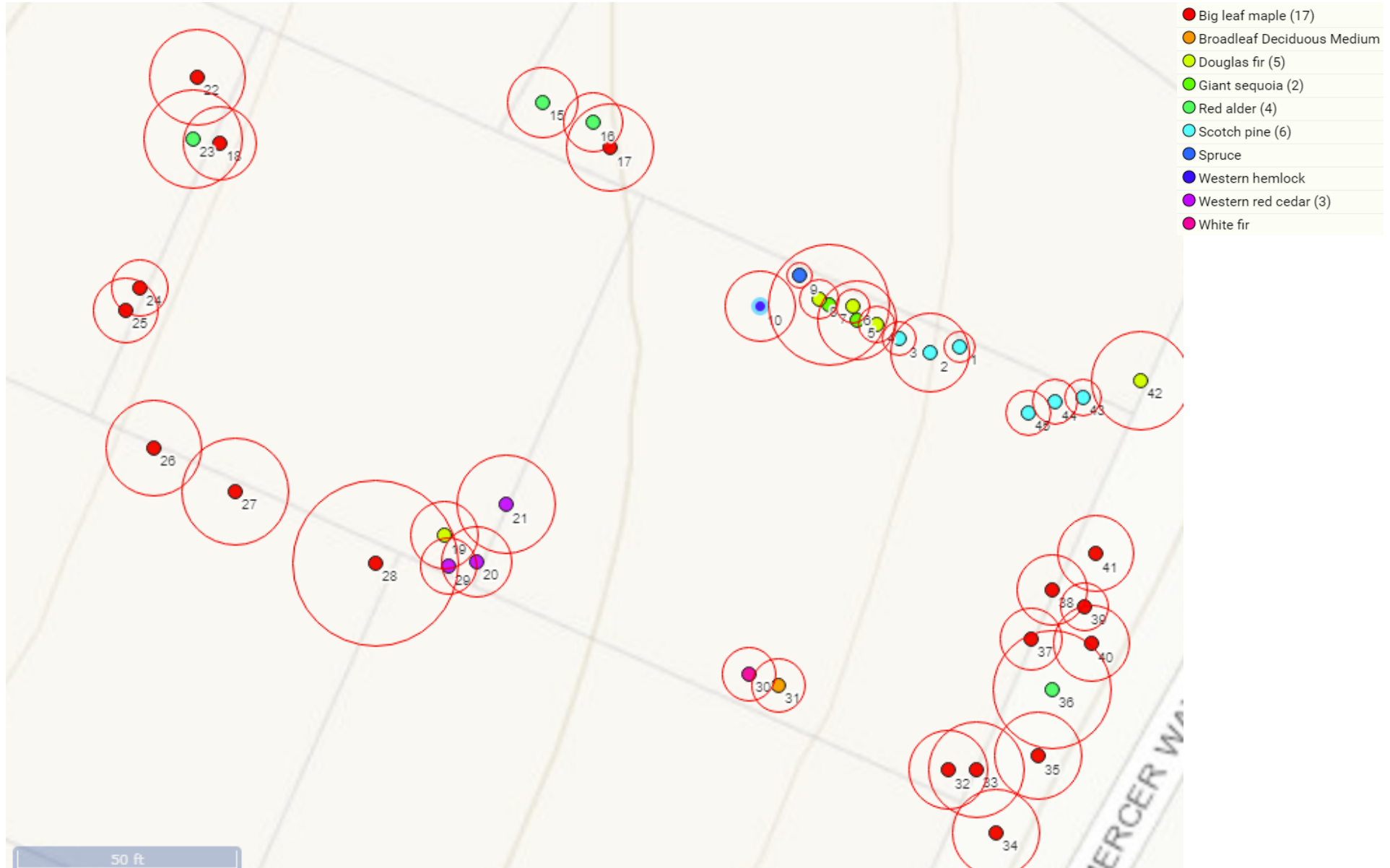
North



Trees to be Retained and TPZ



Trees to be Retained and CRZ



ATTACHMENT 2 - TREE SUMMARY, TPZ, CRZ

ID	Common Name	Latin Name	DBH	Height	Spread	Condition	Management	TPZ-Radius [ft]	CRZ-Radius [ft]
1	Scotch pine	<i>Pinus sylvestris</i>	7	20	9	Fair (70+)	Retain-Viable	Edge of Driveway	3.5
2	Scotch pine	<i>Pinus sylvestris</i>	18.5	50	22	Good (80+)	Retain-Viable	Edge of Driveway	9.25
3	Scotch pine	<i>Pinus sylvestris</i>	7.5	28	9	Fair (70+)	Retain-Viable	Edge of Driveway	3.75
4	Douglas fir	<i>Pseudotsuga menziesii</i>	8.5	36	21	Good (80+)	Retain-Viable	Edge of Driveway	4.25
5	Giant sequoia	<i>Sequoiadendron giganteum</i>	18	55	21	Good (80+)	Retain-Viable	Edge of Driveway	9
6	Douglas fir	<i>Pseudotsuga menziesii</i>	7.5	36	21	Good (80+)	Retain-Viable	Edge of Driveway	3.75
7	Giant sequoia	<i>Sequoiadendron giganteum</i>	28	77	29	Good (80+)	Retain-Viable	Edge of Driveway	14
8	Douglas fir	<i>Pseudotsuga menziesii</i>	9	36	21	Good (80+)	Retain-Viable	Edge of Driveway	4.5
9	Spruce	<i>Picea species</i>	5.5	25	14	Fair (70+)	Retain-Viable	Edge of Driveway	2.75
10	Western hemlock	<i>Tsuga heterophylla</i>	13	42	18	Fair (70+)	Remove for Construction	16.25	8.125
11	Western hemlock	<i>Tsuga heterophylla</i>	14.5	53	25	Good (80+)	Remove for Construction	18.125	9.0625
12	Western hemlock	<i>Tsuga heterophylla</i>	14.5	53	25	Good (80+)	Remove for Construction	18.125	9.0625
13	Austrian pine	<i>Pinus nigra</i>	22	57	33	Fair (70+)	Remove for Construction	22	11
14	Red alder	<i>Alnus rubra</i>	18.5	65	30	Fair (70+)	Remove for Construction	23.125	11.5625
15	Red alder	<i>Alnus rubra</i>	13	65	12	Fair (70+)	Offsite-Viable	16.25	8.125
16	Red alder	<i>Alnus rubra</i>	11	55	15	Poor (50+)	Offsite-Viable	13.75	6.875
17	Big leaf maple	<i>Acer macrophyllum</i>	20	65	40	Poor (50+)	Offsite-Needs Assessment	20	10
18	Big leaf maple	<i>Acer macrophyllum</i>	17	75	25	Fair (70+)	Remove not Viable	17	8.5
19	Douglas fir	<i>Pseudotsuga menziesii</i>	15.6	57	15	Fair (70+)	Retain-Viable	15.6	7.8
20	Western red cedar	<i>Thuja plicata</i>	16.5	30	23	Fair (70+)	Retain-Viable	16.5	8.25
21	Western red cedar	<i>Thuja plicata</i>	23	50	30	Good (80+)	Retain-Viable	23	11.5
22	Big leaf maple	<i>Acer macrophyllum</i>	22	67	25	Poor (50+)	Offsite-Needs Assessment	22	11
23	Red alder	<i>Alnus rubra</i>	18	67	25	Fair (70+)	Offsite-Needs Assessment	22.5	11.25
24	Big leaf maple	<i>Acer macrophyllum</i>	13	67	25	Poor (50+)	Offsite-Needs Assessment	13	6.5
25	Big leaf maple	<i>Acer macrophyllum</i>	15	67	25	Poor (50+)	Offsite-Needs Assessment	15	7.5
26	Big leaf maple	<i>Acer macrophyllum</i>	22	67	29	Poor (50+)	Offsite-Needs Assessment	22	11
27	Big leaf maple	<i>Acer macrophyllum</i>	25	67	37	Good (80+)	Offsite-Viable	25	12.5
28	Big leaf maple	<i>Acer macrophyllum</i>	38.74	67	37	Fair (70+)	Offsite-Viable	38.74	19.37
29	Western red cedar	<i>Thuja plicata</i>	13	37	24	Good (80+)	Offsite-Viable	13	6.5
30	White fir	<i>Abies concolor</i>	12.5	18	18	Fair (70+)	Retain-Viable	12.5	6.25
31	Deciduous Medium	<i>Deciduous Medium</i>	14	30	14	Good (80+)	Retain-Viable	12.5	6.25
32	Big leaf maple	<i>Acer macrophyllum</i>	18	65	23	Fair (70+)	Retain-Viable	18	9
33	Big leaf maple	<i>Acer macrophyllum</i>	22	65	23	Fair (70+)	Retain-Viable	22	11

34	Big leaf maple	<i>Acer macrophyllum</i>	20	65	23		Retain-Viable	20	10
35	Big leaf maple	<i>Acer macrophyllum</i>	20	38	25	Fair (70+)	Retain-Viable	20	10
36	Red alder	<i>Alnus rubra</i>	22	65	23	Fair (70+)	Retain-Viable	27.5	13.75
37	Big leaf maple	<i>Acer macrophyllum</i>	14	60	20	Good (80+)	Retain-Viable	14	7
38	Big leaf maple	<i>Acer macrophyllum</i>	16	60	20	Good (80+)	Retain-Viable	16	8
39	Big leaf maple	<i>Acer macrophyllum</i>	11	47	15	Fair (70+)	Retain-Viable	11	5.5
40	Big leaf maple	<i>Acer macrophyllum</i>	17.8	47	22	Fair (70+)	Retain-Viable	17.8	8.9
41	Big leaf maple	<i>Acer macrophyllum</i>	17.8	55	30	Fair (70+)	Retain-Viable	17.8	8.9
42	Douglas fir	<i>Pseudotsuga menziesii</i>	23	58	38	Excellent (90+)	Retain-Viable	Edge of Driveway	11.5
43	Scotch pine	<i>Pinus sylvestris</i>	8.5	30	19	Fair (70+)	Retain-Viable	Edge of Driveway	4.25
44	Scotch pine	<i>Pinus sylvestris</i>	10.5	30	23	Excellent (90+)	Retain-Viable	Edge of Driveway	5.25
45	Scotch pine	<i>Pinus sylvestris</i>	10.5	30	23	Excellent (90+)	Retain-Viable	Edge of Driveway	5.25

The Dripline TPZ is sometimes used as a default TPZ. The above listed TPZ's shall be the TPZ that is used. When possible fence trees as a group instead of individually.

The TPZ can be reduced to the CRZ, unless noted otherwise, as long as the TPZ is not reduced by more than 20%. This may be further reduced on a case by case basis, upon review, approval, and under the direct over site of A.B.C. Consulting Arborists LLC.

ATTACHMENT 3 - TREE PROTECTION

The following minimum Tree Protection Measures can be copied and introduced into all relevant documents such as site plans, permit applications and conditions of approval, and bid documents so that everyone involved is aware of the requirements.

1. Tree Protection Fencing:

- a. Tree Protection Fences will need to be placed around each tree or group of trees to be retained.
 - i. Tree Protection Fences are to be placed according to the attached drawing (bottom of attachment) at a distance of not less than 10' feet outside the dripline of the tree or group of trees to be saved, **or at the designated TPZ See Attachment 2 for TPZ/CRZ**
 - ii. Tree Protection Fences must be inspected prior to the beginning of any demolition or construction work activities.
 - iii. Nothing must be parked or stored within the Tree Protection Fences—no equipment, vehicles, soil, debris, or construction supplies of any sorts.
- b. Signs:
 - i. The Tree Protection Fences need to be clearly marked with the following or similar text in four inch or larger letters every 20'

TREE PROTECTION FENCE, DO NOT ENTER!
DO NOT PARK OR STORE MATERIALS WITHIN THE
PROTECTION AREA

Questions contact Daniel Maple of A.B.C. Consulting Arborists LLC.
Cell: (509) 953-0293 **Email:** Daniel@AbcArborist.Com

Signs along the TPZ may be waived at the discretion of the City and/or its officials.

2. Cement Trucks/Washout:

- a. Cement trucks must not be allowed to deposit waste or wash out materials from their trucks within the Tree Protection Fences.
- b. No waste, wash out, or contaminated water shall be allowed to flow into the Tree Protection Area.

3. Canopy Pruning:

- a. The canopies of some of the trees may need to be properly pruned to allow Sight lines (vehicular), access of equipment, materials, or building and construction clearance.
- b. If so, the pruning must be done by an International Society of Arboriculture, (ISA) Certified Arborist using current industry standard pruning techniques. (ANSI A300 Pruning Standards and ANSI Z131.1 Safety Standards as well as all OSHA, WISHA, and local standards must be followed.)
- c. Plant debris can be chipped and utilized on site for the mulch under the trees.

5. When excavation occurs near trees that are scheduled for retention, the following procedure must be followed to protect the long-term survivability of the tree:

- a. An International Society of Arboriculture, (ISA) Certified Arborist must be working with all equipment operators.
 - i. The Certified Arborist should be outfitted with an Airspade™, shovel, hand pruners, a pair of loppers, a handsaw, and a power saw (a “saws all” type reciprocating saw is recommended).
- b. The hoe must be placed to “comb” the material directly away from the trunk as opposed to cutting across the roots.
 - i. Combing is the gradual excavation of the ground cover plants and soil in depths that only extend as deep as the tines of the hoe.
- c. When any roots of one-inch diameter or greater, of the tree to be retained, is struck by the equipment, the Certified Arborist should stop the equipment operator.
- d. The Certified Arborist should then excavate around the tree root by Airspade™ (recommended) or by hand/shovel and cleanly cut the tree root.
 - i. The Certified Arborist should then instruct the equipment operator to continue.

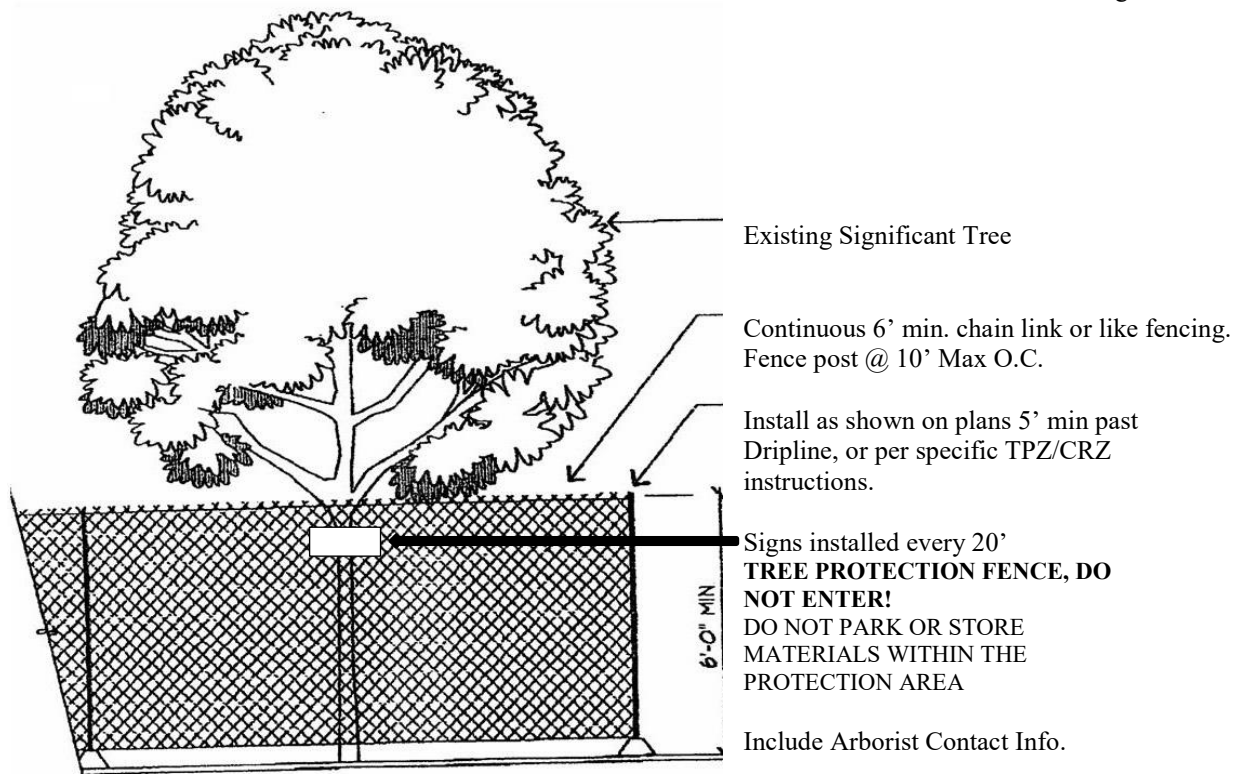
6. Putting Utilities Under the Root Zone:

- a. Boring under the root systems of trees (and other vegetation) shall be done under the supervision of an ISA Certified Arborist. This is to be accomplished by excavating a limited trench or pit on each side of the critical root zone of the tree and then hand digging or pushing the pipe through the soil under the tree. The closest pit walls shall be a minimum of 7 feet from the center of the tree and shall be sufficient depth to lay the pipe at the grade as shown on the plan and profile.
- b. Tunneling under the roots of trees shall be done under the supervision of an ISA Certified Arborist in an open trench by carefully excavating and hand digging around areas where large roots are exposed. No roots 1 inch in diameter or larger shall be cut.
- c. The contractor shall verify the vertical and horizontal location of existing utilities to avoid conflicts and maintain minimum clearances; adjustment shall be made to the grade of the new utility as required.

7. Watering:

The trees will require significant watering throughout the summer and early fall in order to survive long-term. An easy and economical watering can be done using soaker hoses placed three feet from the trunk of the tree and spiraled around the tree. One 75-foot soaker hose per tree is adequate. It is best to place the soakers using landscape staples, (available from HD Fowler in Bellevue for pennies apiece) then cover the area with three to six inches of mulch. The mulch will minimize evaporation and will also stimulate the microbial activity of the soil which is another benefit to the health of the tree.

- a. Water the tree to a depth of 18 to 20 inches. I recommended leaving the water on the soaker hoses for six to eight hours and then digging down to determine how deep your water is penetrating. Then adjust accordingly. It may take a good two days of watering to reach the proper depth.
- b. Once the water reaches the proper depth, turn off the hoses for four weeks and then water again. Water more often when temperatures increase— every three weeks when temperatures exceed 80 degrees and every two weeks when temperatures exceed 90 degrees. This drying out of the soil in between watering is important to prevent soil pathogens from attacking the trees.



Six-foot high temporary chain link (or like material) fencing shall be installed as shown on plans. Fencing shall be installed prior to construction activity and remain in place until construction is completed. Fencing panels are recommended. Fencing shall completely encircle the tree(s). Install fence posts using pier blocks. Avoid driving posts or stakes into major roots.

Make a clean straight cut, using loppers, reciprocal saw, or like tool, to remove damaged portion of root(s) over 1" inch diameter that are damaged during construction. **ALL** exposed roots shall be temporarily covered with damp burlap and covered with soil the same day, if possible, to prevent drying out. If not possible, the burlap must be kept moist at all times.

Work within the protection fencing shall be done manually. No stockpiling of materials, soil, debris, vehicular traffic, or storage of machinery or equipment shall be allowed within the limits of the fencing.

Cement trucks must not be allowed to deposit waste or wash out materials from their trucks within the tree protection fences, or in a manner that would allow the waste or wash out material to enter the TPZ.

The area within the tree protection fencing should be covered with wood chips, hog fuel, or similar materials, to a depth of 3 to 6 inches. The materials should be placed prior to beginning construction and remain until the tree protection fencing was taken down.

Should the tree protection fencing need to be installed inside the TPZ to allow for construction activity, then the following shall be done.

For construction equipment, cover the area from the tree protection fencing to the outer edge of the TPZ with 8 to 10 inches of wood chips, hog fuel, or similar materials, to reduce compaction cover area with steel plates.

For foot traffic, cover the area from the tree protection fencing to the outer edge of the TPZ with 6 inches of wood chips, hog fuel, or similar materials, to reduce compaction, cover with ¾ inch to 1-inch plywood.

The steel plates, plywood and wood chips are to remain in place until all construction activity is completed. The steel plates, plywood and woodchips shall then be removed and the tree protection fencing installed along the outer edge of the tree protection zone.

ATTACHMENT 4 - ASSUMPTIONS & LIMITING CONDITIONS

ASSUMPTIONS & LIMITING CONDITIONS

1. A field examination of the site was made for this report (date referenced in report). Reasonable care has been taken to obtain information from reliable sources, however, the certified/consulting arborist cannot guarantee the accuracy or validity of information provided by any outside sources.
2. Information provided in this report covers only tree's that were indicated for examination in the assignment and reflects the apparent condition of those tree(s) at the time of inspection. This inspection is limited to a visual method of the trees in question, excluding any core sampling, probing, dissection, aerial inspection, or excavation unless noted in writing and is contingent upon the appropriate fee for such services having been authorized in writing. There is no guarantee nor warranty, expressed or implied that any problems with any trees may not arise in the future.
3. All drawings, sketches, and photographs submitted with this report, are intended as visual aids only, and are not exact to scale. They should not be construed as engineering or architectural report or surveys unless noted and specified.
4. The certified/consulting arborist is not required to give any testimony or to attend meetings or dispute resolution proceedings relating this report unless subsequent contractual arrangements and fee agreements are made.
5. Any alterations made to this report automatically invalidates this report.
6. This document is protected by copy right laws©. Unless otherwise required by law, possession of this report or a copy of this report does not imply a right of publication or use for any purpose by anyone other than the person for whom it was created without prior expressed written permission and verbal consent of the certified/consulting arborist.
7. The report and values/opinions expressed, represent the work of the certified/consulting arborist, and the arborist's fees are in no way contingent upon the reporting of any specified values, stipulated results, or occurrence of a subsequent event.

ATTACHMENT 5 - GLOSSARY

Air excavation device, Air-Spade: Device that directs a jet of highly compressed air to excavate soil. Used within the root zone of trees to avoid or minimize damage to tree roots or near underground structures such as pipes and wires. May also reduce hazards associated with excavation near pipes or wires.

Alternate: Pertaining to bud or leaf arrangement, one leaf or bud at each node, situated at alternating positions along the stem. In this arrangement, the leaves are not directly across from each other

Drip line: Imaginary line defined by the branch spread (farthest extending limb in all directions) of a single plant or group of plants.

Defoliation: Loss of leaves from a tree or other plant by biological or mechanical means.

Foliage: The live leaves or needles of the tree; the plant part primarily responsible for photosynthesis.

Hypsometer: A device that measures vertical angles, and provides direct height measurements of objects by triangulation.

Included-bark: Bark that becomes embedded in a crotch (union) between branch and trunk or between codominant stems. Causes a weak structure.

Mulch: Any material such as wood chips, straw, sawdust, leaves, and stone that is spread on the surface of the soil to protect the soil and plant roots from the effects of raindrops, soil crusting, freezing, and evaporation.

Opposite: Pertaining to leaf or branch arrangement, leaves or branches situated two at each node, across from each other on the stem.

PH: Unit of measure that describes the alkalinity or acidity of a solution. Negative log of the hydrogen ion concentration. Measured on a scale from 0 to 14. Greater than 7 is alkaline, less than 7 is acid, and 7 is neutral (pure water).

Resistograph®: Brand name of a device consisting of a specialized micro drill bit that drills into trees and graphs density differences that are used to detect decay.

Soil compaction: Compression of the soil, often because of vehicle or heavy-equipment traffic, that breaks down soil aggregates and reduces soil volume and total pore space, especially macro-pore space.

Soil probe: Any one of many instruments used to take soil cores or samples. Usually some variation of a metal tube with a sharpened or serrated point and a T-shaped handle

Target: Any person or object within reach of a falling tree or part of a tree, that may be injured or damaged.

Tree protection zone (TPZ): Defined area within which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees, especially during construction or development.

Tree growth regulator (TGR): Chemical that can be applied to trees that slows terminal growth by reducing cell elongation.

Vigor: Overall health; the capacity to grow and resist physiological stress

Visual tree assessment (VTA): Method of assessing the structural integrity of trees using external symptoms of mechanical stress (such as bulges, reactive growth, etc) and defects (cracks, cavities, etc).

ATTACHMENT 6 - REFERENCES

1. Dirr, Michael A. *Manual of Woody Landscape Plants, Their Identification, Ornamental Characteristics, Culture, Propagation, and Uses*. Champaign: Stipes Publishing Company, 1990.
2. Dunster, Dr. Julian A., R.P.F., M.C.I.P. *Documenting Evidence, Practical Guidance for Arborists*, First Choice Books, Victoria, BC, Canada. 2014.
3. Harris, Richard W, James Clark, and Nelda Matheny. *Arboriculture, Integrated Management of Landscape Trees, Shrubs, and Vines*. 4th ed. Upper Saddle River: Prentice Hall, 2004.
4. Johnson, Warren T. and Lyon, Howard H. *Insects That Feed on Trees and Shrubs*. Ithaca: Comstock Publishing Associates, 1991.
5. Matheny, Nelda P. and Clark, James R. *Evaluation of Hazard Trees*. 2nd ed. Savoy: The International Society of Arboriculture Press, 1994.
6. Matheny, Nelda P. and Clark, James R. *Trees & Development, A Technical Guide to Preservation of Trees During Land Development*. Savoy: The International Society of Arboriculture Press, 1998.
7. Mattheck, Claus and Breloer, Helge. *The Body Language of Trees, A Handbook for Failure Analysis*. London: HMSO, 1994.
8. Pacific Northwest Chapter-ISA. *Tree Risk Assessment in Urban Areas and the Urban/Rural Interface*. Course Manual. Release 1.5. PNW-ISA: Silverton, Oregon, 2011.
9. Scharpf, Robert F. *Diseases of Pacific Coast Conifers*. Albany, California: USDA Forest Service, Agriculture Handbook 521, rev. June 1993.
10. Smiley, E. Thomas, Watson, Gary, and Larry Costello, *Root Management, ANSI A300 Part 8: Tree, Shrub, and Other Woody Plant Management—Standard Practices (Root Management)*. The International Society of Arboriculture Press. Champaign. IL. 2012.
11. Smiley, E. Thomas, Nelda Matheny, and Sharon Lilly, *Managing Trees During Construction, ANSI A300 Part 5: Tree, Shrub, and Other Woody Plant Management—Standard Practices (Management of Trees and Shrubs During Site Planning, Site Development, And Construction)*. The International Society of Arboriculture Press. Champaign. IL. 2012.
12. Watson, Gary W., and Neely, Dan, eds. *Trees & Building Sites*. Savoy: The International Society of Arboriculture Press, 1995.