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- Final Tree Protection Plan -

CASCADE AT BOURNSTADT VILLAGE

38272 Hwy. 211
Sandy, Oregon

Prepared for: Vaughn Bay Construction, Inc.

Prepared by: Washington Forestry Consultants, Inc.

Date: December 22, 2022

Introduction

The project proponent is planning to subdivide 8.83 acres into multi-family residential (apartments) on 6.95 acres, while creating 1 lot for the existing home at 38272 Hwy 211 in Sandy, Oregon. The home to the west on this lot was demolished.

The proponent has retained WFCI to:

- Evaluate all trees on the site pursuant to the requirements of the Bournstadt Village Specific Area Plan.
- Make recommendations for retention of suitable trees in the buildable, open space or tree tract areas, along with required protection and cultural measures.
- Complete the required minimum stocking and tree replacement calculations.
- Prepare a Tree Protection Plan.

Observations

Methodology

WFCI has individually evaluated 100% of the trees 3+ inches diameter at breast height (DBH) and larger in the proposed project area, and assessed their potential to be incorporated into the new project. A small tree number was painted at the base of each tree and the number shown on the aerial photos in Attachment 1 and Attachment 4.

Trees ≥ 8 inches DBH (diameter at breast height or 4.5 ft. above the groundline) which is equivalent to 25 inches circumference, are considered to be **significant** trees¹, and all others non-significant. The health of the tree is not considered, just size – as per the code.

Multi-stemmed tree DBH's were calculated using our industry standard:

$$DBH = \sqrt{(\text{Stem } 1^2 + \text{Stem } 2^2 + \text{Stem } 3^2 + \dots \dots \text{Stem } X^2)}$$

The tree evaluation phase used methodology developed by Matheny and Clark (1998)³. While tree risk ratings are not provided, trees rated as being in 'Poor' or 'Very Poor' condition are in poor health, and often were structurally defective.

Site History

The site now consists of 2 parcels. An existing home sat on each parcel along Hwy. 211. These house parcels will be subdivided with new lot lines. The areas around the existing homes are treed with native and planted tree species. The remainder of the land on the parcels was used for pasture and has a few trees and invasive brush. The site is flat to gently rolling. No streams or wetlands occur. Recently the westerly home was demolished. The easterly home will remain.

Soil Depth and Productivity

There is 1 soil type as per the Natural Resource Conservation Service Web Soil Survey. It is the Cazadero well-drained, silty clay loam with slopes of 0 to 7%. This soil is formed from old mixed alluvium and is found on terraces. The top 21 inches is silty clay loam, then clay to 75 inches. There is no restrictive layer to tree roots down to at least 80 inches. There is moderate available water holding capacity for trees and plants. It is well-suited to the normal growth of trees and other vegetation.

Existing Tree Conditions – Includes the Entire Ownership

The forest cover was stratified into 1 forest cover type for the purpose of description. It includes planted and natural trees and pasture.

Type I – All Trees. – This type includes residual, naturally established native tree species, along with many planted ornamental and native tree species. The inventory found 82 trees ranging from 3 to 45 inches DBH (See Attachment #2 – the Master Tree List).

¹ Chapter 17.92.10 C. *Significant plant and tree specimens should be preserved to the greatest extent practicable and integrated into the design of a development. Trees of 25-inches or greater circumference measured at a height of 4-1/2 ft. above grade are considered significant.*

² *Directors Rule 16-2008 – City of Seattle, Page 3, 6 pages.*

³ Matheny, Nelda and James R. Clark. *Trees and Development: A Technical Guide to Preservation of Trees during Land Development.* International Society of Arboriculture, Champaign. IL 1998

The tree species included: Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), Pacific Yew (*Taxus brevifolia*), cherry (*Prunus* spp.), bigleaf maple (*Acer macrophyllum*), hawthorne (*Crataegus* spp.), Austrian pine (*Pinus nigra*), Photinia (*Photinia serratifolia*), blue atlas cedar (*Cedrus atlantica*), western white pine (*Pinus monticola*), flowering plum (*Prunus cerasifera*), western redcedar (*Thuja plicata*), Pt. Orford Cedar (*Chamaecyparis lawsoniana*), deodar cedar (*Cedrus deodara*), shore pine (*Pinus contorta* var. *contorta*), apple (*Malus* spp.), and Scotch pine (*Pinus sylvestris*). Tree condition ranged from ‘Good’ to ‘Very Poor’. A list of the trees is provided in Attachment 2.

Table 1. Tree summary by area of the **entire** project site.

Tree Significance?	Area				Sum
	Buildable Area*	West Lot	East Lot	Rights-of-Way	
# Significant Trees	12	23	5	34	74
# Non-Significant Trees	0	2	2	4	8
Sum	12	25	7	38	82

*Footprint of new construction excluding rights-of-ways.

In summary, of the 82 trees larger than 3 inches DBH, 74 are significant i.e. 8 inches DBH and larger, and 8 are non-significant i.e. smaller than 8 inches DBH.

A total of 36 (49%) of the 74 significant trees are in ‘Poor’ or ‘Very Poor’ condition due to poor health, and/or structural defects including decay in the stem, codominant stems, or multiple tops.

In short, only 38 healthy significant trees exist within the entire project area.

Rights-of-Way Trees

There are 38 significant trees and 4 non-significant trees that are growing on the existing and planned new rights-of-way. A list is provided in Attachment #2 as part of the ‘Master List’ and the separate ‘Rights-of-Way Tree List’.

Buildable Area of the Parcel

This includes the footprint of the new construction, excluding existing and new rights-of-way. It includes the newly created lot from what was the west and east house lots. This is where trees will be retained.

Table 2. Summary of planned tree retention by area.

Area	# Significant Trees	# Sign. Trees to be Saved	# Non-Significant Trees	# Non-Sign. Trees to be Saved
Buildable Area	12	0	0	0
East House Lot	5	3	2	2
West House Lot	23	17	2	2
Sum	40	20	4	4

The above Table 2 excludes rights-of-ways. The ‘Buildable Area’ includes the footprint of construction, excluding rights-of-ways. The East House Lot and the West House Lot are combined as 1 lot in the final project plan.

In summary, there are 40 significant trees within the footprint of the construction in this project, excluding existing and dedicated rights-of-ways. Twenty of these 40 trees will be saved, along with all (4) non-significant trees.

Off-Site Impacts

There are 8 off-site trees that will require protection during construction. Seven are all located on the house lot east of the project and 1 on the existing house to the south. Trees D and E are in ‘Poor’ condition and appear to be at or very near the property line. I recommend that applicant negotiate ‘removal’ with landowner. Tree G is rated as ‘Poor’ in quality due to the multiple stems and the risk they pose is to the landowner – this is their issue, not the Cascade applicant. Table 4 in Attachment 2 provides a list of the off-site trees that potentially could be impacted along with our recommendations.

Discussion and Recommendations

Potential for Tree Retention

None of the 12 trees within the footprint of the new construction have the potential to be saved.

All 24 trees to be saved are on the 1 new house lot. It will be up to the landowners to perform their own tree maintenance.

No R/W trees will be saved.

Minimum Tree Protection Calculations

The City of Sandy Bournstadt Village Specific Area Plan requires that 6 significant trees per acre be saved in the new project. They recommend that 2 of these 3 saved trees be conifers. The following is a summary of the proposed tree retention and replanting:

Total Buildable Area	6.95 acres
Required Tree Retention (6 trees/ac)	42 trees
Planned Sign. Tree Retention in Buildable Area and House Lots	20 trees
Shortfall on Sign. Tree Retention in Buildable Area	22 trees

In summary, 20 significant trees and 4 non-significant trees will be saved, causing a shortfall of 22 trees below the required 42 tree (6 trees/acre) minimum. Note: Tree stocking in the buildable area and new house lot today is only 32 significant trees, which is below the 42 tree retention requirement. **There is no requirement in the Sandy code for tree replacement for this**

shortfall. If the 2:1 replacement ratio were applied, then 44 replacement trees would be required for this shortfall.

Tree replacement will need to be done at a 2:1 ratio for each tree removed that is 11 inches DBH and larger within the buildable area and new house lot of the parcel. This will require **32 replacement trees** to be planted (See Attachment #2 – Onsite tree list table). Two-thirds of the new trees for replanting should be conifers. No replacement trees are required for non-significant trees or rights-of-way trees that are removed. See Attachment #2 – the Onsite Tree List for this calculation.

I recommend that western redcedar, incense cedar, and Douglas-fir species should be used for replanting. The trees should be 6-7 ft. tall balled and burlap stock that meet the ANSI Z60.1 standards for nursery stock. They should be planted according to industry standards to include mulching and staking.

Tree Protection Requirements

Trees and tree tracts to be saved must be protected during construction by temporary orange mesh fencing on driven posts, located at the edge of the root protection zone (See Attachment #3).

There should be no equipment activity (including rototilling) within the critical root zone. No irrigation lines, trenches, or other utilities should be installed within the root protection zone. If roots are encountered outside the root protection zone, they should be cut cleanly with a saw and covered immediately with moist soil. Noxious vegetation within the root protection zone should be removed by hand. If a proposed save tree must be impacted by grading or fills, then the tree should be re-evaluated by WFCI to determine if the tree can be saved and mitigating measures, or if the tree should be removed.

Street Trees

The street trees along the internal driveways will be specified in the landscape plan. Any other required street trees along street frontage improvements will be as per direction from the City of Sandy urban forestry department.

Sequence for Tree Protection Activity

The following is the sequence for tree protection activity:

1. Stake the new lot lines and clearing limits. Communicate with the neighbor's to the east and south about off-site edge trees. Offsite trees to be removed must have landowner agreement.
2. Install tree protection fence as described and roughly shown on Attachment #3. Contact WFCI to inspect the fence prior to the start of land clearing.
3. Complete land clearing in the buildable area.
4. Maintain tree protection fences throughout construction.

5. It is recommended that replacement trees be planted in the fall between October 15th and April 1st to give them a better chance of establishment, survival, and early growth.
6. Contact WFCI should any questions arise regarding tree retention or protection on the project.

Summary

There are 40 significant trees and 4 non-significant trees within the footprint-of construction and new house lot. Twenty of these significant trees will be saved along with all 4 non-significant trees. These 24 trees are all located on the newly created house lot.

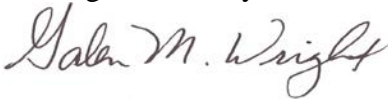
The Sandy tree code requires 6/trees per acre to be saved – however tree stocking is sparse within the footprint of the buildable area, so this plan falls 22 significant trees short of the requirement. The tree code calculates tree replacement based on the number of ≥ 11 inch DBH trees removed from the buildable area – this would require 32 new trees be planted.

The projected cost to purchase and install these 32 trees is \$5,600.

Please give us a call if you have any questions.

Respectfully submitted,

Washington Forestry Consultants, Inc.



Galen M. Wright, ACF, ASCA
ISA Board Certified Master Arborist No. PN-0129
Certified Forester No. 44
ISA Tree Risk Assessor Qualified (TRAQ)
ASCA Tree and Plant Appraisal Qualified (TPAQ)

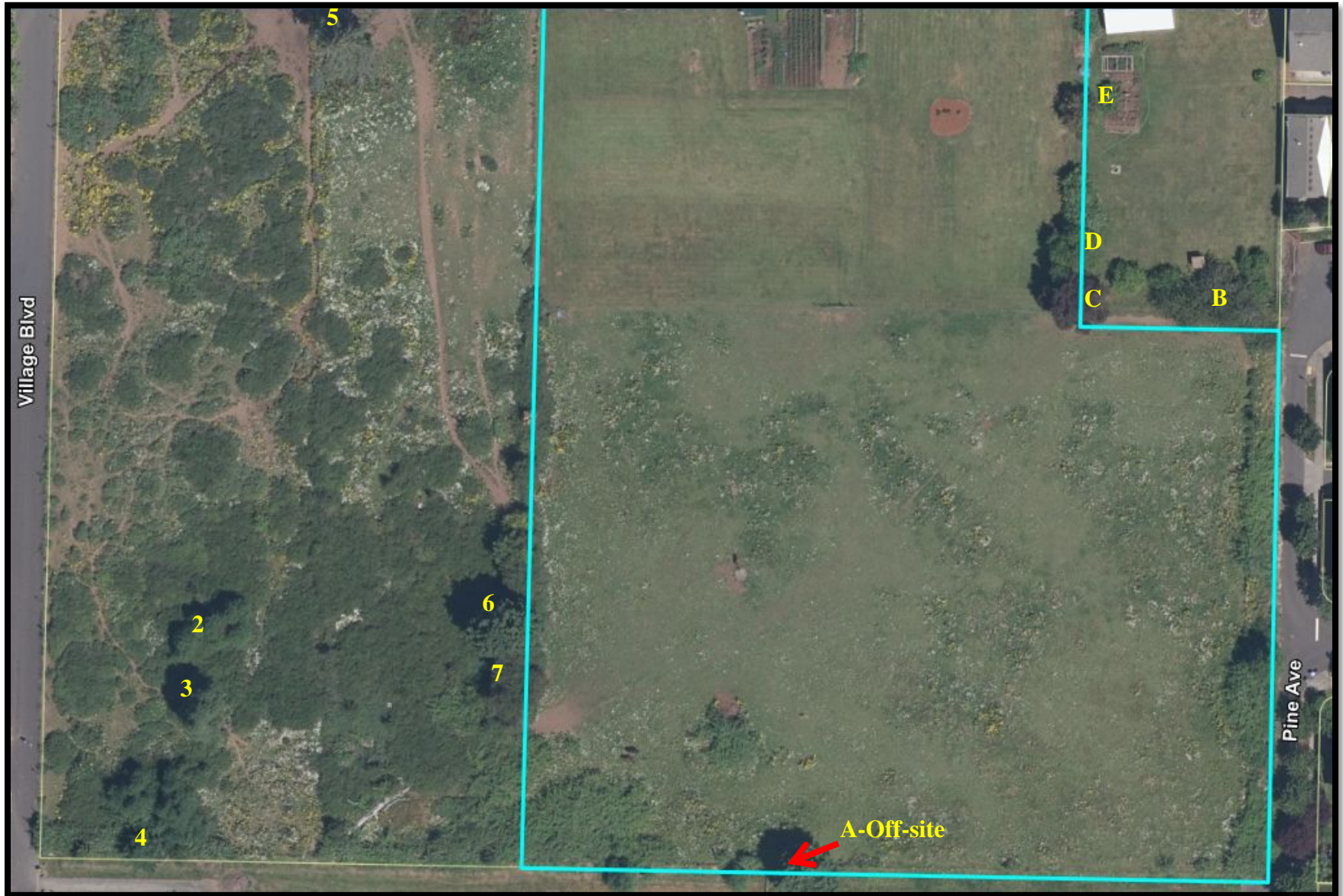
Attachment 1. Aerial photo showing relative tree locations and their painted numbers for the 1 new house lot, and new project buildable area.

(2 Pages Attached)

Figure 1. North area - relative locations of trees on the 2 house lots (approximate dashed lot line) and the northeasterly portion of the buildable area.



Figure 2. South area - relative locations of trees in Buildable Area of Project.



Attachment 2. Four Tree lists.

(8 Pages Attached)

- **Table 3 - Master Tree List – All Trees on Project**
- **Table 4 - Offsite Tree List – Trees Potentially Impacted by the Project**
- **Table 5 - On-Site Tree List – Trees in Buildable Area and New House Lot (Includes Tree Replacement Calculations)**
- **Table 6 - Rights-of-Way Tree List – trees to be removed for new streets and improvements.**

#	Species	DBH (in)	Calculated DBH for Multi-Stem Trees (in)*	Condition	Savable Based on Tree Condition Only? Yes or No	Project Plan Save or Remove	Minimum Root Protection Zone Radius if Saved (ft)	Location	Reason for Removal	Significant Tree ≥8" DBH? Yes or No
1	Douglas-fir	10,7,5	14.3	Very Poor; 3 stems;	Yes	Remove		On R/W	On R/W	Yes
2	Cherry	12		Fair; Never pruned;	Yes	Remove		Buildable Area	Footprint	Yes
3	Cherry	14		Fair; Never pruned;	Yes	Remove		Buildable Area	Footprint	Yes
4	Douglas-fir	11		Fair;	Yes	Remove	10 ft.	On R/W	Impacted by construction	Yes
5	Douglas-fir	45		Very Poor; Very severe decline;	No	Remove		Buildable Area	Footprint	Yes
6	Bigleaf maple	12,16,12,10	25.4	Very Poor; Decay in stems;	No	Remove		Buildable Area	Footprint	Yes
7	Hawthorne	4 to 8	19.9	11 stems; Very Poor;	No	Remove		Buildable Area	Footprint	Yes
8	Austrian pine	26		Poor;	No	Save		East House Lot		Yes
9	Photina	6,8	10	Fair;	Yes	Save		East House Lot		Yes
10	Blue atlas cedar	21		Good;	Yes	Remove		East House Lot	Wall impacts	Yes
11	Flowering Cherry	11.1		Good;	Yes	Remove		Buildable Area	Footprint	Yes
12	Flowering Cherry	15		Good;	Yes	Remove		On R/W	On R/W	Yes
13	Flowering Cherry	15		Good;	Yes	Remove		On R/W	On R/W	Yes
14	Douglas-fir	3		Good;	Yes	Remove		On R/W	On R/W	No
15	Ponderosa pine	10		Very Poor;	No	Remove		On R/W	On R/W	Yes
16	Ponderosa pine	13		Very Poor;	No	Remove		On R/W	On R/W	Yes
17	Ponderosa pine	15		Poor;	No	Remove		On R/W	On R/W	Yes
18	Ponderosa pine	14		Fair;	Yes	Remove		On R/W	On R/W	Yes
19	Ponderosa pine	9		Fair;	Yes	Remove		On R/W	On R/W	Yes
20	Ponderosa pine	11		Fair;	Yes	Remove		On R/W	On R/W	Yes
21	Ponderosa pine	21		Poor;	No	Remove		On R/W	On R/W	Yes
22	Ponderosa pine	16		Fair;	Yes	Remove		On R/W	On R/W	Yes
23	Ponderosa pine	11		Fair;	Yes	Remove		On R/W	On R/W	Yes
24	Ponderosa pine	10		Poor; Multiple tops;	No	Remove		On R/W	On R/W	Yes
25	Ponderosa pine	8		Very Poor;	No	Remove		On R/W	On R/W	Yes
26	Ponderosa pine	17		Fair;	Yes	Remove		On R/W	On R/W	Yes
27	Ponderosa pine	24		Fair;	Yes	Remove		On R/W	On R/W	Yes
28	Ponderosa pine	8,8,8	13.9	Very Poor;	No	Remove		On R/W	On R/W	Yes
29	Austrian pine	9,8	12	Very Poor;	No	Remove		On R/W	On R/W	Yes

#	Species	DBH (in)	Calculated DBH for Multi-Stem Trees (in)*	Condition	Savable Based on Tree Condition Only? Yes or No	Project Plan Save or Remove	Minimum Root Protection Zone Radius if Saved (ft)	Location	Reason for Removal	Significant Tree ≥8" DBH? Yes or No
30	Cherry	12,9	15	Very Poor; Decay in stem;	No	Remove		On R/W	On R/W	Yes
31	Austrian pine	9		Poor;	No	Remove		On R/W	On R/W	Yes
32	Douglas-fir	10		Good;	Yes	Remove		On R/W	On R/W	Yes
33	Douglas-fir	10		Good;	Yes	Remove		On R/W	On R/W	Yes
34	Douglas-fir	13		Good;	Yes	Remove		On R/W	On R/W	Yes
35	Douglas-fir	30		Good;	Yes	Save		East House Lot		Yes
36	Western white pine	25		Fair; Codom leader;	Yes	Remove		On R/W	On R/W	Yes
37	Douglas-fir	26		Fair; Pistil butt;	Yes	Remove		West House Lot	Grading	Yes
38	Pacific yew	6,6	8.5	Very Poor; Falling over;	No	Save		West House Lot		Yes
39	Ponderosa pine	13		Poor;	No	Remove		On R/W	On R/W	Yes
40	Ponderosa pine	16		Poor;	No	Save		West House Lot		Yes
41	Ponderosa pine	16		Poor; Codom stems;	No	Save		West House Lot		Yes
42	Ponderosa pine	12		Fair; Leaner;	Yes	Save		West House Lot		Yes
43	Ponderosa pine	10		Fair;	Yes	Save		West House Lot		Yes
44	Ponderosa pine	15		Poor; Codom stems;	No	Save		West House Lot		Yes
45	Ponderosa pine	17		Poor; Codom stems;	No	Save		West House Lot		Yes
46	Ponderosa pine	16		Poor; Codom stems;	No	Remove		West House Lot	Grading	Yes
47	Ponderosa pine	16		Poor; Codom stems;	No	Remove		West House Lot	Grading	Yes
48	Ponderosa pine	19		Very Poor; Codom stems;	No	Remove		West House Lot	Grading	Yes
49	Ponderosa pine	15		Poor; Codom stems;	No	Remove		Buildable Area	Footprint	Yes
50	Ponderosa pine	14		Poor;	No	Remove		Buildable Area	Footprint	Yes
51	Ponderosa pine	13		Very Poor; Top broken out;	No	Remove		Buildable Area	Footprint	Yes
52	Flowering plum	8.5		Very Poor;	No	Remove		East House Lot	Grading	Yes
53	Flowering plum	7.5		Very Poor;	No	Save		East House Lot		No
54	Flowering plum	7		Very Poor;	No	Save		East House Lot		No
55	Western redcedar	10		Good;	Yes	Remove		Buildable Area	Footprint	Yes
56	Deodar cedar	12		Fair;	Yes	Remove		Buildable Area	Footprint	Yes
57	Douglas-fir	12		Good;	Yes	Remove		Buildable Area	Footprint	Yes
58	Pt. Orford Cedar	17		Fair;	Yes	Save		West House Lot		Yes
59	Douglas-fir	8-9		Very Poor; Suppressed;	No	Save		West House Lot		Yes
60	Douglas-fir	21		Good;	Yes	Save		West House Lot		Yes

#	Species	DBH (in)	Calculated DBH for Multi-Stem Trees (in)*	Condition	Savable Based on Tree Condition Only? Yes or No	Project Plan Save or Remove	Minimum Root Protection Zone Radius if Saved (ft)	Location	Reason for Removal	Significant Tree ≥8" DBH? Yes or No
61	Blue atlas cedar	9		Fair;	Yes	Save		West House Lot		Yes
62	Blue atlas cedar	9		Fair;	Yes	Save		West House Lot		Yes
63	Blue atlas cedar	4,5	6.4	Very Poor;	No	Save		West House Lot		No
64	Flowering Cherry	8,7,8	13.3	Very Poor;	No	Save		West House Lot		Yes
65	Deodar cedar	8		Fair;	Yes	Save		West House Lot		Yes
66	Douglas-fir	11		Good;	Yes	Save		West House Lot		Yes
67	Douglas-fir	25		Good;	Yes	Remove		On R/W	On R/W	Yes
68	Douglas-fir	12		Good;	Yes	Save		West House Lot		Yes
69	Ponderosa pine	8.4	8.9	Fair;	Yes	Remove		West House Lot	Grading	Yes
70	Shore pine	6		Good;	Yes	Save		West House Lot		No
71	Douglas-fir	6		Good;	Yes	Remove		On R/W	On R/W	No
72	Flowering plum	6,6,4	9.4	Very Poor;	No	Remove		West House Lot	Grading	Yes
73	Douglas-fir	9		Fair;	Yes	Remove		On R/W	On R/W	Yes
74	Douglas-fir	9		Fair;	Yes	Save		West House Lot		Yes
75	Flowering Cherry	10,6	11.7	Very Poor;	No	Remove		On R/W	On R/W	Yes
76	Apple	12		Very Poor;	No	Remove		On R/W	On R/W	Yes
77	Apple	6		Very Poor;	No	Remove		On R/W	On R/W	No
78	Apple	9,6,6	12.4	Very Poor;	No	Remove		On R/W	On R/W	Yes
79	Ponderosa pine	17,16	23.3	Very Poor; Codom stems;	No	Remove		On R/W	On R/W	Yes
80	Scotch pine	9,6	10.8	Poor;	No	Remove		On R/W	On R/W	Yes
81	Scotch pine	17		Fair;	Yes	Remove		On R/W	On R/W	Yes
82	Ponderosa pine	7		Very Poor;	No	Remove		On R/W	On R/W	No

*Calculated DBH for multi-stem trees = Square Root of the sums of the individual stem diameters squared.

**Shaded trees are non-significant.

#	Species	DBH (in)	Condition	Project Plan Save or Remove	Minimum Root Protection Zone Radius if Saved (ft)	Comments
A	Leyland cypress	6 to 16	10 stems; Fair;	Save	10	2 ft from property line;
B	Flowering cherry	10	Fair;	Save	6	6 ft. from property line;
C	Flowering plum	12,10,8,4	Fair;	Save	6	6 ft. from property line;
D	Flowering cherry	6,8,8,6,6	Poor;	Save	6	1 ft. from property line;
E	Bigleaf maple	2 to 6	Poor; Sprouts;	Remove	0	0 ft. from property line;
F	Colorado blue spruce	15	Good;	Remove	12	6 ft. from property line;
G	Silver maple	16,11,6,18,10	Poor;	Remove	12	6 ft from property line;
H	Douglas-fir	32,30	Fair;	Remove	12	8 ft from property line;

#	Species	DBH (in)	Calculated DBH for Multi-Stem Trees (in)*	Condition	Savable Based on Tree Condition Only? Yes or No	Project Plan Save or Remove	Minimum Root Protection Zone Radius if Saved (ft)	Location	Comments	Significant Tree ≥8" DBH? Yes or No	≥11 Inches DBH Replacement Required at 2:1? # Trees**
2	Cherry	12		Fair; Never pruned;	Yes	Remove		Buildable Area	Footprint	Yes	2
3	Cherry	14		Fair; Never pruned;	Yes	Remove		Buildable Area	Footprint	Yes	2
5	Douglas-fir	45		Very Poor; Very severe decline;	No	Remove		Buildable Area	Footprint	Yes	2
6	Bigleaf maple	12,16,12,10	25.4	Very Poor; Decay in stems;	No	Remove		Buildable Area	Footprint	Yes	2
7	Hawthorne	4 to 8	19.9	11 stems; Very Poor;	No	Remove		Buildable Area	Footprint	Yes	2
11	Flowering Cherry	11.1		Good;	Yes	Remove		Buildable Area	Footprint	Yes	2
49	Ponderosa pine	15		Poor; Codom stems;	No	Remove		Buildable Area	Footprint	Yes	2
50	Ponderosa pine	14		Poor;	No	Remove		Buildable Area	Footprint	Yes	2
51	Ponderosa pine	13		Very Poor; Top broken out;	No	Remove		Buildable Area	Footprint	Yes	2
55	Western redcedar	10		Good;	Yes	Remove		Buildable Area	Footprint	Yes	0
56	Deodar cedar	12		Fair;	Yes	Remove		Buildable Area	Footprint	Yes	2
57	Douglas-fir	12		Good;	Yes	Remove		Buildable Area	Footprint	Yes	2
8	Austrian pine	26		Poor;	No	Save		East House Lot		Yes	0
9	Photinia	6,8	10	Fair;	Yes	Save		East House Lot		Yes	0
10	Blue atlas cedar	21		Good;	Yes	Remove		East House Lot		Yes	2
35	Douglas-fir	30		Good;	Yes	Save		East House Lot		Yes	0
52	Flowering plum	8.5		Very Poor;	No	Remove		East House Lot		Yes	0
53	Flowering plum	7.5		Very Poor;	No	Save		East House Lot		No	0
54	Flowering plum	7		Very Poor;	No	Save		East House Lot		No	0
37	Douglas-fir	26		Fair; Pistil butt;	Yes	Remove		West House Lot		Yes	2
38	Pacific yew	6,6	8.5	Very Poor; Falling over;	No	Save		West House Lot		Yes	0
40	Ponderosa pine	16		Poor;	No	Save		West House Lot		Yes	0
41	Ponderosa pine	16		Poor; Codom stems;	No	Save		West House Lot		Yes	0
42	Ponderosa pine	12		Fair; Leaner;	Yes	Save		West House Lot		Yes	0

#	Species	DBH (in)	Calculated DBH for Multi-Stem Trees (in)*	Condition	Savable Based on Tree Condition Only? Yes or No	Project Plan Save or Remove	Minimum Root Protection Zone Radius if Saved (ft)	Location	Comments	Significant Tree ≥8" DBH? Yes or No	≥11 Inches DBH Replacement Required at 2:1? # Trees**
43	Ponderosa pine	10		Fair;	Yes	Save		West House Lot		Yes	0
44	Ponderosa pine	15		Poor; Codom stems;	No	Save		West House Lot		Yes	0
45	Ponderosa pine	17		Poor; Codom stems;	No	Save		West House Lot		Yes	0
46	Ponderosa pine	16		Poor; Codom stems;	No	Remove		West House Lot		Yes	2
47	Ponderosa pine	16		Poor; Codom stems;	No	Remove		West House Lot		Yes	2
48	Ponderosa pine	19		Very Poor; Codom stems;	No	Remove		West House Lot		Yes	2
58	Pt. Orford Cedar	17		Fair;	Yes	Save		West House Lot		Yes	0
59	Douglas-fir	8.9		Very Poor; Suppressed;	No	Save		West House Lot		Yes	0
60	Douglas-fir	21		Good;	Yes	Save		West House Lot		Yes	0
61	Blue atlas cedar	9		Fair;	Yes	Save		West House Lot		Yes	0
62	Blue atlas cedar	9		Fair;	Yes	Save		West House Lot		Yes	0
63	Blue atlas cedar	4,5	6.4	Very Poor;	No	Save		West House Lot		No	0
64	Flowering Cherry	8,7,8	13.3	Very Poor;	No	Save		West House Lot		Yes	0
65	Deodar cedar	8		Fair;	Yes	Save		West House Lot		Yes	0
66	Douglas-fir	11		Good;	Yes	Save		West House Lot		Yes	0
68	Douglas-fir	12		Good;	Yes	Save		West House Lot		Yes	0
69	Ponderosa pine	8.4	8.9	Fair;	Yes	Remove		West House Lot		Yes	0
70	Shore pine	6		Good;	Yes	Save		West House Lot		No	0
72	Flowering plum	6,6,4	9.4	Very Poor;	No	Remove		West House Lot		Yes	0
74	Douglas-fir	9		Fair;	Yes	Save		West House Lot		Yes	0
	Sum										32
*Calculated DBH for multi-stem trees = Square Root of the sums of the individual stem diameters squared.											
**Replacement trees only needed for removals ≥11" DBH - Not needed for save trees and trees <11" DBH.											

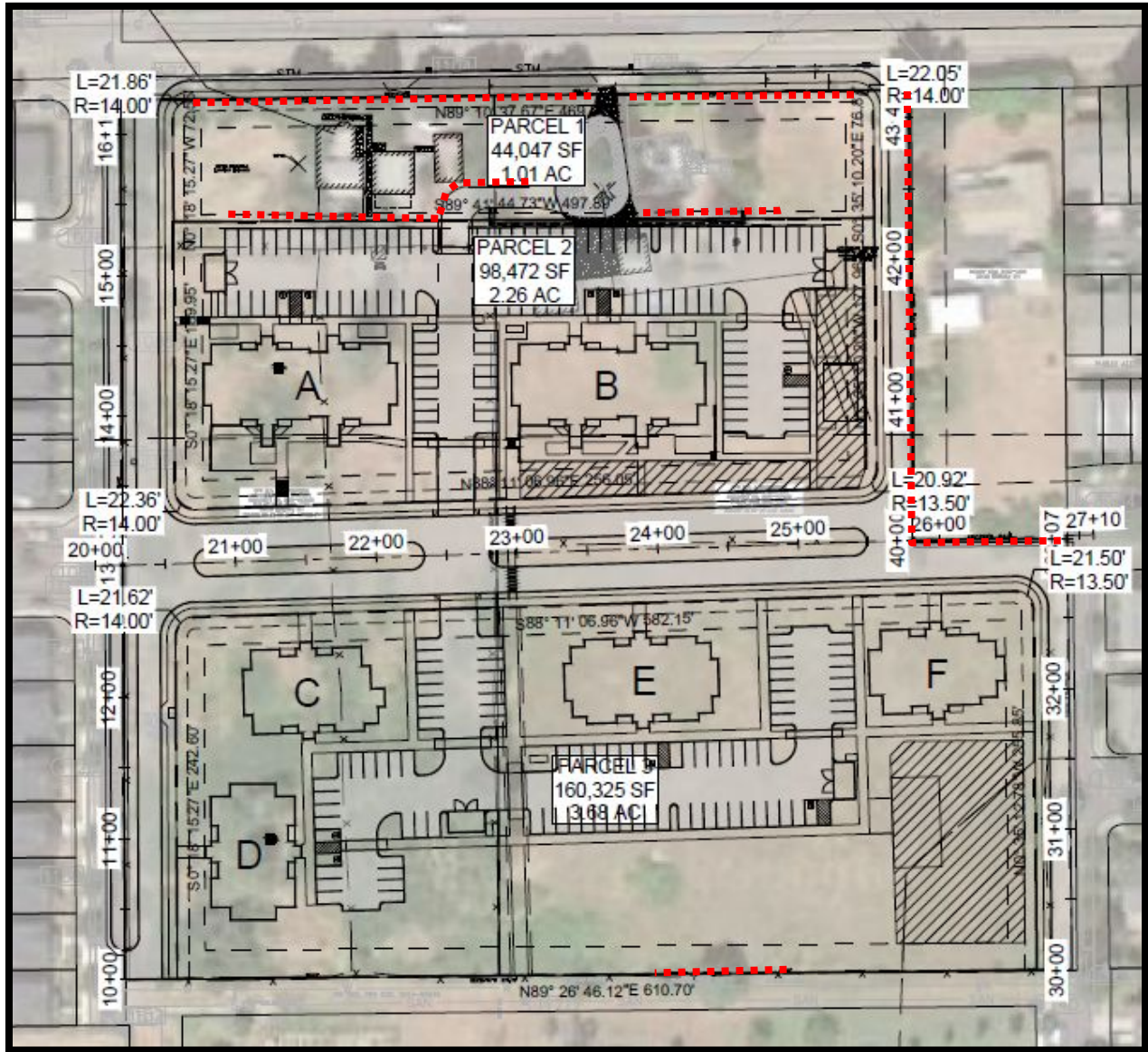
Table 6
Trees on Rights-of-Ways

#	Species	DBH (in)	Calculated DBH for Multi-Stem Trees (in)*	Condition	Savable Based on Tree Condition Only? Yes or No	Project Plan Save or Remove	Minimum Root Protection Zone Radius if Saved (ft)	Location	Reason for Removal	Significant Tree ≥8" DBH? Yes or No
1	Douglas-fir	10,7,5	13.2	Very Poor; 3 stems;	Yes	Remove		On R/W	On R/W	Yes
4	Douglas-fir	11		Fair;	Yes	Remove	10 ft.	On R/W	Impacted by construction	Yes
12	Flowering Cherry	15		Good;	Yes	Remove		On R/W	On R/W	Yes
13	Flowering Cherry	15		Good;	Yes	Remove		On R/W	On R/W	Yes
14	Douglas-fir	3		Good;	Yes	Remove		On R/W	On R/W	No
15	Ponderosa pine	10		Very Poor;	No	Remove		On R/W	On R/W	Yes
16	Ponderosa pine	13		Very Poor;	No	Remove		On R/W	On R/W	Yes
17	Ponderosa pine	15		Poor;	No	Remove		On R/W	On R/W	Yes
18	Ponderosa pine	14		Fair;	Yes	Remove		On R/W	On R/W	Yes
19	Ponderosa pine	9		Fair;	Yes	Remove		On R/W	On R/W	Yes
20	Ponderosa pine	11		Fair;	Yes	Remove		On R/W	On R/W	Yes
21	Ponderosa pine	21		Poor;	No	Remove		On R/W	On R/W	Yes
22	Ponderosa pine	16		Fair;	Yes	Remove		On R/W	On R/W	Yes
23	Ponderosa pine	11		Fair;	Yes	Remove		On R/W	On R/W	Yes
24	Ponderosa pine	10		Poor; Multiple tops;	No	Remove		On R/W	On R/W	Yes
25	Ponderosa pine	8		Very Poor;	No	Remove		On R/W	On R/W	Yes
26	Ponderosa pine	17		Fair;	Yes	Remove		On R/W	On R/W	Yes
27	Ponderosa pine	24		Fair;	Yes	Remove		On R/W	On R/W	Yes
28	Ponderosa pine	8,8,8	13.9	Very Poor;	No	Remove		On R/W	On R/W	Yes
29	Austrian pine	9,8	12	Very Poor;	No	Remove		On R/W	On R/W	Yes
30	Cherry	12,9	15	Very Poor; Decay in stem;	No	Remove		On R/W	On R/W	Yes
31	Austrian pine	9		Poor;	No	Remove		On R/W	On R/W	Yes
32	Douglas-fir	10		Good;	Yes	Remove		On R/W	On R/W	Yes
33	Douglas-fir	10		Good;	Yes	Remove		On R/W	On R/W	Yes

#	Species	DBH (in)	Calculated DBH for Multi-Stem Trees (in)*	Condition	Savable Based on Tree Condition Only? Yes or No	Project Plan Save or Remove	Minimum Root Protection Zone Radius if Saved (ft)	Location	Reason for Removal	Significant Tree ≥8" DBH? Yes or No
34	Douglas-fir	13		Good;	Yes	Remove		On R/W	On R/W	Yes
36	Western white pine	25		Fair; Codom leader;	Yes	Remove		On R/W	On R/W	Yes
39	Ponderosa pine	13		Poor;	No	Remove		On R/W	On R/W	Yes
67	Douglas-fir	25		Good;	Yes	Remove		On R/W	On R/W	Yes
71	Douglas-fir	6		Good;	Yes	Remove		On R/W	On R/W	No
73	Douglas-fir	9		Fair;	Yes	Remove		On R/W	On R/W	Yes
75	Flowering Cherry	10,6	11.7	Very Poor;	No	Remove		On R/W	On R/W	Yes
76	Apple	12		Very Poor;	No	Remove		On R/W	On R/W	Yes
77	Apple	6		Very Poor;	No	Remove		On R/W	On R/W	No
78	Apple	9,6,6	12.4	Very Poor;	No	Remove		On R/W	On R/W	Yes
79	Ponderosa pine	17,16	23.3	Very Poor; Codom stems;	No	Remove		On R/W	On R/W	Yes
80	Scotch pine	9,6	10.8	Poor;	No	Remove		On R/W	On R/W	Yes
81	Scotch pine	17		Fair;	Yes	Remove		On R/W	On R/W	Yes
82	Ponderosa pine	7		Very Poor;	No	Remove		On R/W	On R/W	No

*Calculated DBH for multi-stem trees = Square Root of the sums of the individual stem diameters squared.

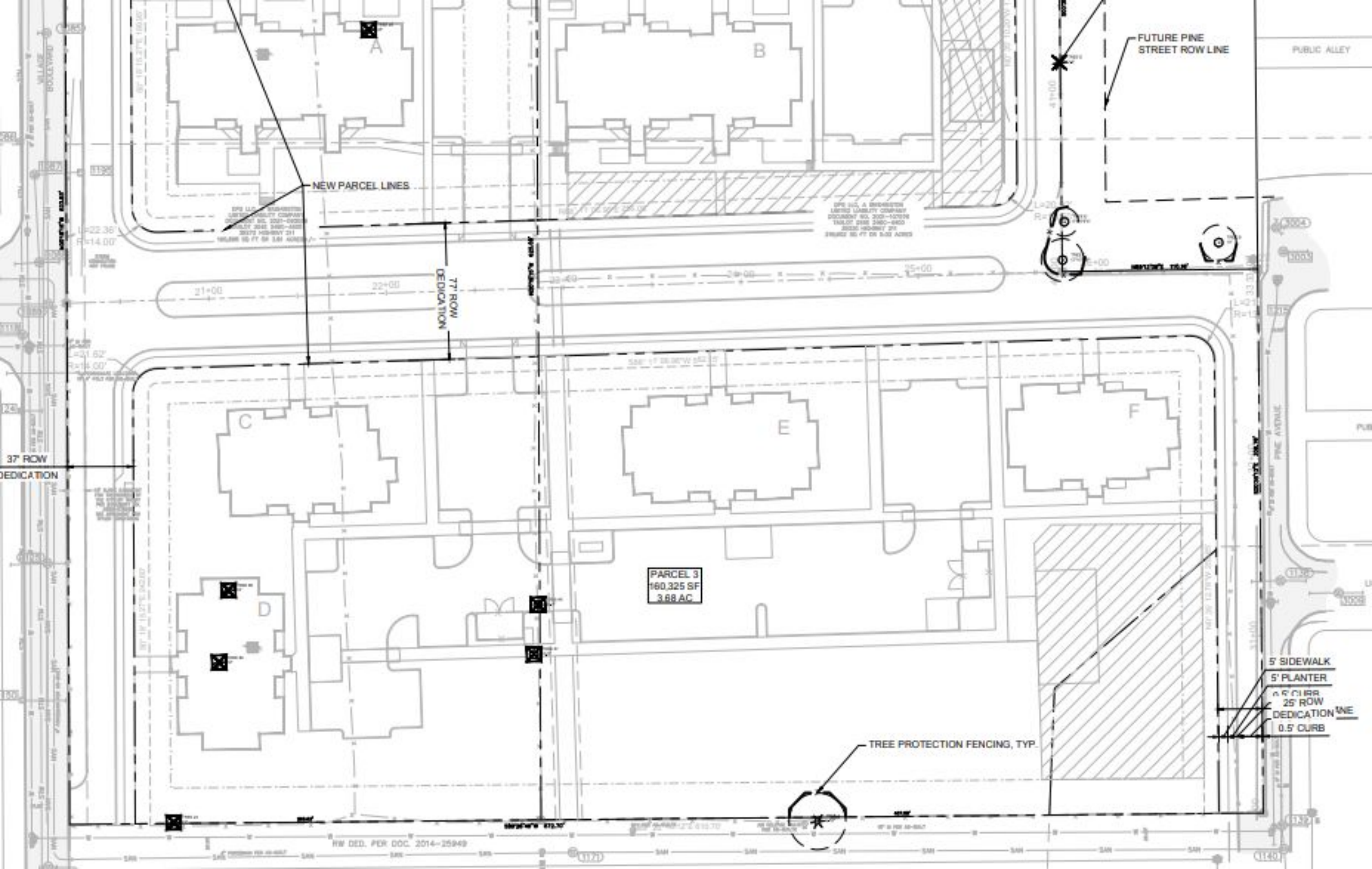
Attachment 3. Site Plan – Cascade at Bournstadt Village – Current site plan with approximate tree protection fence locations shown.



..... Approximate Tree Protection Fence Locations

Attachment 4. Tree Locations – Planned retention and removals. Ignore the tree protection fences shown – refer to Attachment 1 for Tree Protection Fence Locations.

(2 Pages Attached – North and South Project Areas)



NEW PARCEL LINES

77' ROW
DEDICATION

FUTURE PINE
STREET ROW LINE

PUBLIC ALLEY

37' ROW
DEDICATION

PARCEL 3
160,325 SF
3.68 AC

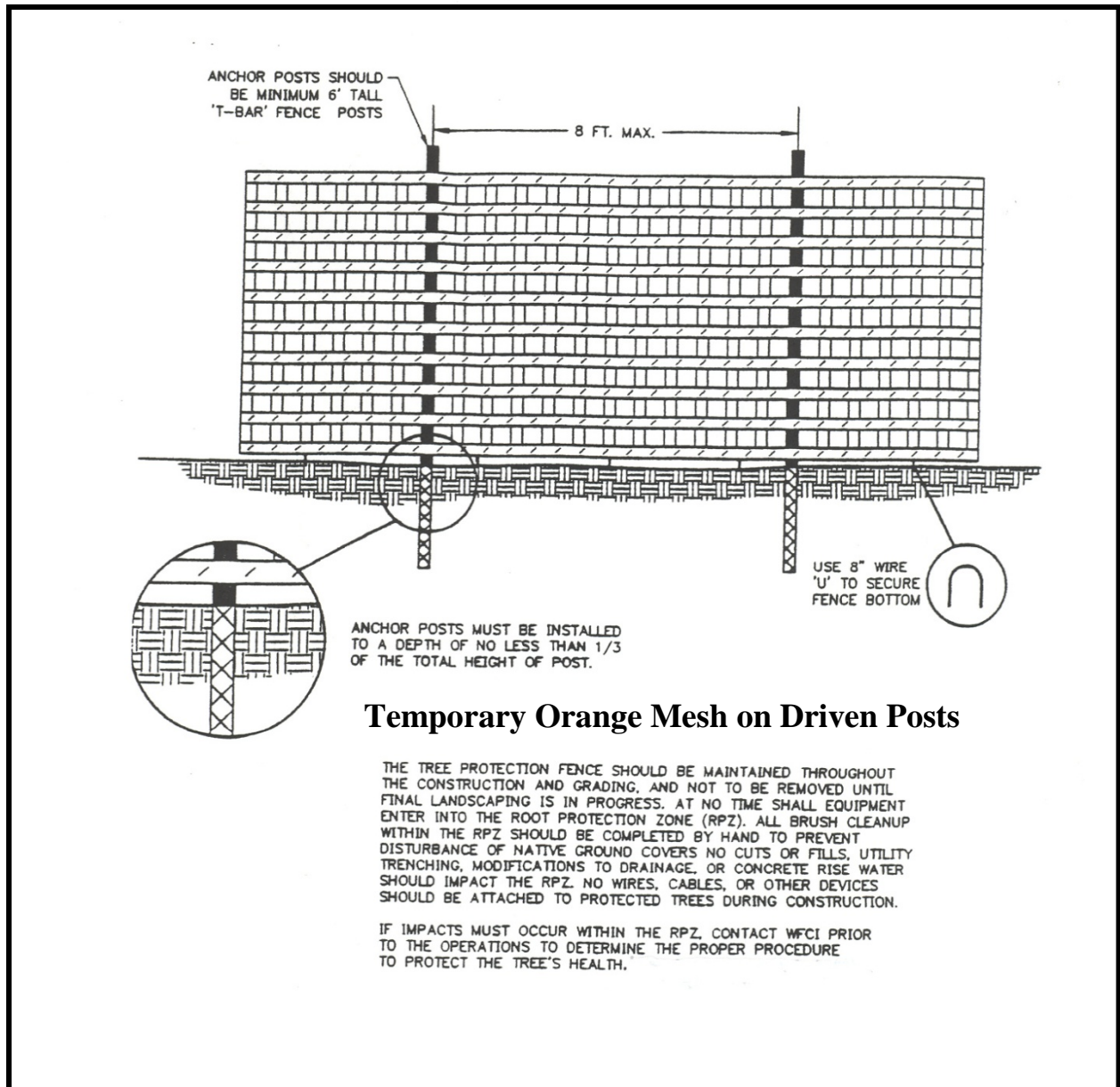
TREE PROTECTION FENCING, TYP.

5' SIDEWALK
5' PLANTER
6" CURB
25' ROW
DEDICATION LINE
0.5' CURB

RW DED. PER DOC. 2014-25949

1140

Attachment 5. Tree Protection Fence Detail.



Attachment 6. Individual Tree Rating Key for Tree Condition

RATING	SYMBOL	DEFINITION
Very Good	VG	<ul style="list-style-type: none"> • Balanced crown that is characteristic of the species • Normal lateral and terminal branch growth rates for the species and soil type • Stem sound, normal bark vigor • No root problems • No insect or disease problems • Long-term, attractive tree
Good	G	<ul style="list-style-type: none"> • Crown lacking symmetry but nearly balanced • Normal lateral and terminal branch growth rates for the species and soil type • Minor twig dieback O.K. • Stem sound, normal bark vigor • No root problems • No or minor insect or disease problems – insignificant • Long-term tree
Fair	F	<ul style="list-style-type: none"> • Crown lacking symmetry due to branch loss • Slow lateral and terminal branch growth rates for the species and soil type • Minor and major twig dieback – starting to decline • Stem partly unsound, slow diameter growth and low bark vigor • Minor root problems • Minor insect or disease problems • Short-term tree 10-30 years
Poor	P	<ul style="list-style-type: none"> • Major branch loss – unsymmetrical crown • Greatly reduced growth • Several structurally import dead or branch scaffold branches • Stem has bark loss and significant decay with poor bark vigor • Root damage • Insect or disease problems – remedy required • Short-term tree 1-10 years
Very Poor	VP	<ul style="list-style-type: none"> • Lacking adequate live crown for survival and growth • Severe decline • Minor and major twig dieback • Stem unsound, bark sloughing, previous stem or large branch failures, very poor bark vigor • Severe root problems or disease • No or minor insect or disease problems • Mortality expected within the next few years
Dead	DEAD	<ul style="list-style-type: none"> • Dead

Attachment 7. Tree Risk Assessment - A Description of the Process

The purpose of this document is to summarize the methodology of modern tree risk assessment for users of this type of information. This methodology has been put into place by the International Society of Arboriculture and has been in use in its present form since 2013. It updates the initial changes put into place in 2011.

Tree risk assessment is the systematic and qualitative process to identify, analyze, and evaluate tree risk. Tree risk evaluation is the process of comparing the assessed risk against given risk criteria to determine the significance of the risk. This methodology is based on the ANSI A300 standard⁴ for tree risk assessment. This standard is supported by a best management practices guide⁵.

Those qualified to do tree risk assessment have the qualification from the International Society of Arboriculture called ‘**Tree Risk Assessor Qualified.**’ The methodology for tree risk assessment is more recently detailed in the authoritative tree risk assessment manual⁶, which provides the state of the art for tree risk assessment.

Risk is the evaluation and categorizing of both the likelihood (probability) of occurrence of a tree or tree part failure, and the severity of consequences (value of and damage to the target that is impacted). The magnitude of risk can be categorized and compared to the client’s tolerances to determine if the risk is acceptable.

Tree risk management is the application of policies, procedures and practices used to identify, evaluate, mitigate, monitor, and communicate tree risk. It is up to the tree owner to determine what level of risk they are able to tolerate, and to conduct any mitigation required when that risk is unacceptable.

There are 3 levels of tree risk assessment:

Level 1 – assessment is limited to a visual assessment of the tree(s) near specified targets, such as along roadways or utility rights-of-ways to identify specified conditions or obvious defects. Assessment shall be from a specified perspective such as foot, vehicle, or aerial patrol.

Level 2 – assessment shall include a 360 degree, ground based visual inspection of the tree crown, trunk, trunk flare, above-ground roots, and site conditions around the tree in relation to targets. It may include sounding the stem to look for internal decay and/or the use of hand tools, or binoculars to view the crown better. Surrounding site conditions are also evaluated.

⁴ ANSI A300 (Part 9 – 2011) – *American National Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Management – Standard Practices (Tree Risk Assessment a. Tree Structure Assessment)*. American National Standards Institute, Inc. Washington D.C. 14 pgs.

⁵ Smiley, E. Thomas, Nelda Matheny, and Sharon Lilly. 2011. *Best Management Practices – Tree Risk Assessment*. International Society of Arboriculture. Champaign, IL.

⁶ Dunster, Dr. Julian et al. 2013. *Tree Risk Assessment Manual*. International Society of Arboriculture. Champaign, IL.

Level 3 – all of the level 2 techniques, plus advanced methodologies such as coring or drilling the tree stem or roots to look for decay, a climbing assessment, probing, pull testing, or radiation, sonic, or subsurface root assessments.

In tree risk assessment, **targets** are people who could be injured, property that may be damaged, or activities that could be disrupted by a tree failure. A tree must have a target for there to be a risk rating higher than ‘Low’. The target has a value and people are the highest value target, followed by structures, cars and other high value objects. Fences would be a low value target. As part of a target assessment, the assessor considers if the target can be moved out of reach of the tree or tree part that might fail, or if people could be excluded from the target area of the tree.

As part of the risk analysis, the assessor must conduct a site analysis. This may include looking for signs of recent tree removal that may expose a previously sheltered subject tree to winds, construction activity that severed roots of the tree, or other site or soils conditions/changes that affected drainage or tree health.

Defects often predispose a tree or part of a tree to failure. A key part of tree risk assessment is to categorize the likelihood of failure of the tree or a defective part. The tree or defect is examined, and the likelihood of failure is categorized in a matrix (below) as: **Improbable, Possible, Probable, or Imminent**. A tree with a lifting root plate would likely be categorized as ‘Imminent’ to fail. A tree with a broken and hanging branch that is still attached would likely be categorized as ‘Improbable’ or ‘Possible.’ Cracks in a trunk or branch would likely be categorized as ‘Probable’ or ‘Imminent’ to fail.

This rating of ‘**Likelihood of Failure**’ is then brought forward into the Likelihood of Failure and Impact matrix to assign a level of risk of the tree. The level of risk is then categorized as **Low, Moderate, High, or Extreme**.

The following 2 tables are used by Tree Risk Assessor Qualified professionals to rate the risk of the tree. Note: this system does not use a numerical rating system as old systems used.

Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Attachment 8. Description of Tree Evaluation Methodology

The evaluation of the tree condition on this site included the visual assessment of:

1. Live-crown ratio,
2. Lateral and terminal branch growth rates,
3. Presence of dieback in minor and major scaffold branches and twigs,
4. Foliage color,
5. Stem soundness and other structural defects,
6. Visual root collar examination,
7. Presence of insect or disease problems.
8. Windfirmness: if tree removal will expose this tree to failure.

In cases where signs of internal defect or disease were suspected, a core sample was taken to look for stain, decay, and diameter growth rates. Also, root collars were exposed to look for the presence of root disease.

In all cases, the overall appearance of the tree was considered relative to its ability to add value to either an individual lot or the entire subdivision. Also, the scale of the tree and its proximity to both proposed and existing houses was considered.

Lastly, the potential for incorporation into the project design is evaluated, as well as potential site plan modifications that may allow otherwise removed tree(s) to be both saved and protected in the development.

Trees that are preserved in a development must be carefully selected to make sure that they can survive construction impacts, adapt to a new environment, and perform well in the landscape. Healthy, vigorous trees are better able to tolerate impacts such as root injury, changes in soils moisture regimes, and soil compaction than are low vigor trees.

Structural characteristics are also important in assessing suitability. Trees with significant decay and other structural defects that cannot be treated are likely to fail. Such trees should not be preserved in areas where damage to people or property could occur.

Trees that have developed in a forest stand are adapted to the close, dense conditions found in such stands. When surrounding trees are removed during clearing and grading, the remaining trees are exposed to extremes in wind, temperature, solar radiation, which causes sunscald, and other influences. Young, vigorous trees with well-developed crowns are best able to adapt to these changing site conditions.

Attachment 9. Assumptions and Limiting Conditions

- 1) Any legal description provided to the Washington Forestry Consultants, Inc. is assumed to be correct. Any titles and ownership's to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as though free and clear, under responsible ownership and competent management.
- 2) It is assumed that any property is not in violation of any applicable codes, ordinances, statutes, or other governmental regulations, unless otherwise stated.
- 3) Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, Washington Forestry Consultants, Inc. can neither guarantee nor be responsible for the accuracy of information.
- 4) Washington Forestry Consultants, Inc. shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.
- 5) Loss or alteration of any part of this report invalidated the entire report.
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- 7) Neither all or any part of the contents of this report, nor copy thereof, shall be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales or other media, without the prior expressed written or verbal consent of Washington Forestry Consultants, Inc. -- particularly as to value conclusions, identity of Washington Forestry Consultants, Inc., or any reference to any professional society or to any initialed designation conferred upon Washington Forestry Consultants, Inc. as stated in its qualifications.
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- 10) Unless expressed otherwise: 1) information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection; and 2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the tree or other plant or property in question may not arise in the future.

Note: Even healthy trees can fail under normal or storm conditions. The only way to eliminate all risk is to remove all trees within reach of all targets. Annual monitoring by an ISA Certified Arborist or Certified Forester will reduce the potential of tree failures. It is impossible to predict with certainty that a tree will stand or fail, or the timing of the failure. It is considered an 'Act of God' when a tree fails, unless it is directly felled or pushed over by man's actions.