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FORESTRY AND VEGETATION MANAGEMENT SPECIALISTS



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- Preliminary Tree Protection Plan-

TUMWATER BUSINESS PARK

83rd Avenue SW & Center Street SW
Tumwater, Washington

Prepared for: Brenda Fodge
Panattoni Development Company, Inc.

Prepared by: Washington Forestry Consultants, Inc.

Date: January 30, 2022

The project proponent is proposing to develop 29.2-acres on two parcels in Tumwater, WA. Washington Forestry Consultants, Inc. was retained to examine the trees in these proposed new project parcels.

Scope of Work

The purpose of the evaluation was to:

1. Complete an inventory of existing trees, and
2. Make recommendations for retention and/or replacement as per Chapter 16.08.070, the Tumwater Tree Protection Ordinance.
3. Prepare a new tree protection plan.

Methodology

WFCI has inventoried all trees 6-inches and larger diameter at breast height (DBH) in the proposed project area using standard forestry sampling methodology. Variable area and fixed radius plots were installed on a systematic grid across the forested portions of the site. The plot locations are marked in the field with pink flagging. Data from the counts of significant trees were entered into SuperAce[®], a forest inventory software program that projected the total number of significant trees in the buildable area of the project. This plot data will be used to determine the tree retention requirement. Sampling was designed to, and achieved a 95% confidence level for the projection of the population of significant trees.

The tree evaluation phase used methodology developed by Matheny and Clark (1998)¹ and the International Society of Arboriculture.

Soils and Site Description

The project includes parcels: 12710310100 (5.0 acres) and a portion of 12710100000 (137.0 acres) located in Sec. 10, T17N, R2W, W.M., City of Tumwater, Thurston County, Washington.

The topography of the project site is flat to gently rolling. It is bordered by industrial warehouses and vacant land on all sides of the project. The parcels have a wide variety of stocking and ages of trees. The ages of the trees are approximately 20 to 50 years old. Most of the site has been cleared and graded in the past. There are no buildings on the site.

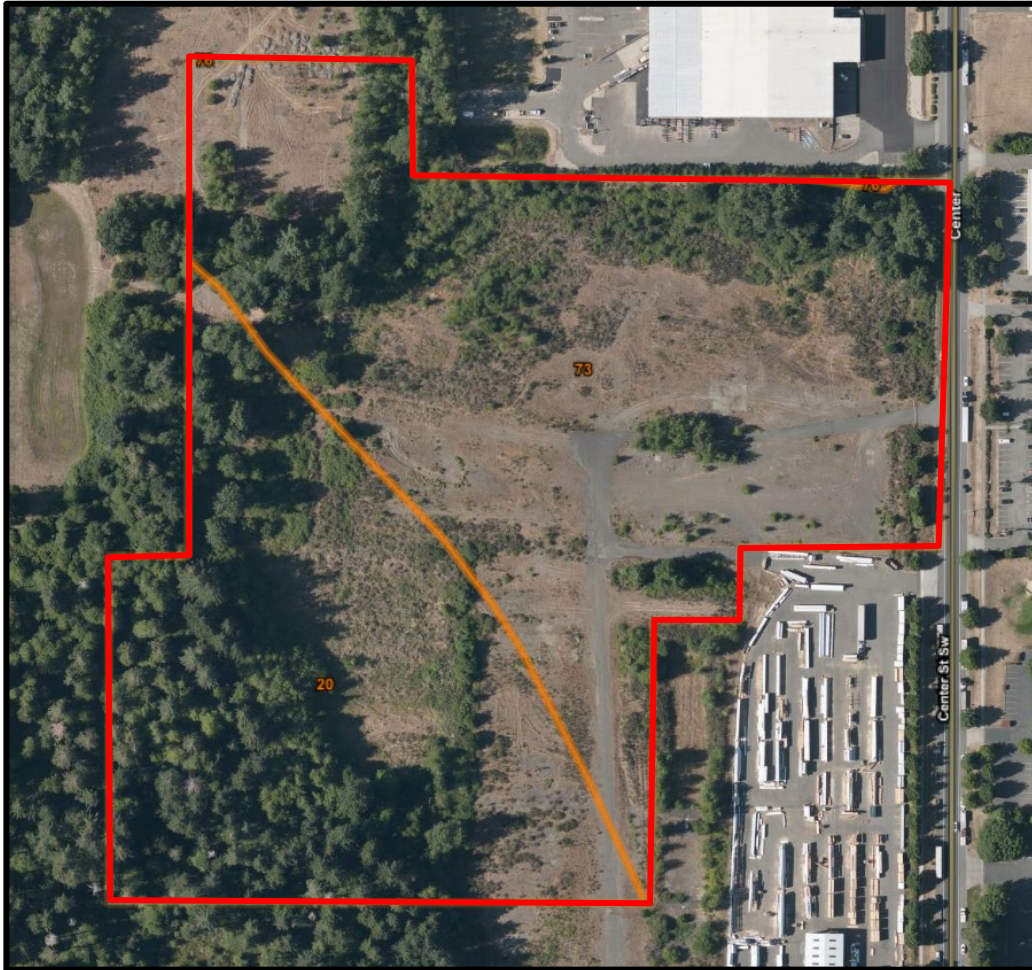
According to the Natural Resource Conservation Service there are two soil types on the project site; the Cagey loamy sand and the Nisqually loamy fine sand.

The first soil type is the Cagey loamy sand, a very deep, moderately well drained soil found on terraces. It formed in sandy glacial drift. Permeability is rapid. Available water capacity is moderate. The effective rooting depth for trees is 60 inches or more. A seasonal high-water table is at a depth on 18 to 30 inches from November to April. Runoff is slow and the hazard of erosion is slight. Windthrow hazard is slight under normal conditions. This is the dominant soil type on the site.

The second is the Nisqually loamy fine sand, a very deep, somewhat excessively drained soil found on terraces. It is formed in sandy glacial outwash. Permeability is moderately rapid in the surface layer and very rapid in the substratum. Available water capacity is moderate. The effective rooting depth for trees is 60 inches or more. The potential for windthrow of trees is slight under normal conditions. New trees require irrigation for establishment.

¹ Nelda Metheny and James R. Clark. Trees and Development: A Technical Guide to Preservation of Trees during Land Development. International Society of Arboriculture, Champaign, IL.

Figure 1: Tumwater Business Park Soil Map.



20 – Cagey loamy sand – 39%
73 – Nisqually loamy fine sand – 61%

Existing Trees

There are four distinct forest cover types on the site. An aerial photograph showing the cover types is located in Appendix I.

Type I – Type I (3.06 acres) is a moderately well stocked stand of black cottonwood (*Populus trichocarpa*) and red alder (*Alnus rubra*) trees. The type naturally reseeded after it was cleared. A summary of tree species, diameter range, trees per acre, number of trees and the percent composition of each species are provided in Table 1. The condition of the trees ranges from ‘Fair’ to ‘Poor’. No trees in this type would be suitable for retention.

Table 1.-- Inventory summary for forest cover Type I.

Species	DBH Range	Trees/Acre	# of Trees	% Composition
Cottonwood	6 – 24	100	306	80%
Red Alder	6 – 15	25	77	20%
Total	6 – 24	125	383	100%

The understory of the type includes trailing blackberry (*Rubus ursinus*), Himalayan blackberry (*Rubus armeniacus*), broadleaf weeds and grasses.



Photo 1: Typical appearance of trees in Cover Type I.

Type II. – Type II (20.13 acres) is an area that was previously harvested and cleared for building. There are very few scattered naturally seeded trees on the edges of the type. The tree species include Douglas-fir (*Pseudotsuga menziesii*), shore pine (*Pinus contorta*), and cottonwood. A summary of tree species, diameter range, trees per acre, number of trees and the percent composition of each species are provided in Table 2. The condition of the trees ranges from ‘Fair’ to ‘Poor’. The Douglas-fir and shore pine trees in this type would be suitable for retention.

Table 2. -- Inventory summary for forest cover Type II.

Species	DBH Range	Trees/Acre	# of Trees	% Composition
Douglas-fir	6 – 10	1	20	82.8%
Shore Pine	8 – 10	1	20	2.6%
Cottonwood	4 – 10	1	20	1.7%
Total	4 – 10	3	60	100%

The understory of this type includes scotch broom (*Cytisus scoparius*), trailing blackberry, Himalayan blackberry, other broadleaf weeds, and grasses.



Photo 2: Typical appearance of trees in Cover Type II.

Type III. – Type III (4.44-acres) is a moderately stocked bigleaf maple (*Acer macrophyllum*) stand ranging in size from 7 to 40 inches DBH. Minor species of Douglas-fir, western redcedar (*Thuja plicata*), and red alder also occur in the type. A summary of tree species, diameter range, trees per acre, number of trees and the percent composition of each species are provided in Table 3. The condition of the trees ranges from ‘Good’ to ‘Very Poor’. There are some quality trees in this type to retain.

Table 3. -- Inventory summary for forest cover Type III.

Species	DBH Range	Trees/Acre	# of Trees	% Composition
Bigleaf Maple	7 – 24	31	138	38%
Douglas-fir	16 – 34	29	129	36%
Red Alder	14 – 20	18	80	22%
Western Redcedar	30 – 40	3	1	4%
Total	7 – 40	81	348	100%

The understory of this type includes salal (*Gaultheria shallon*), western hazel (*Corylus cornuta*), Indian plum (*Oemleria cerasiformis*), other broadleaf weeds, and grasses.

Type IV. – Type IV (1.57-acres) is a well-stocked Douglas-fir stand ranging in size from 8 to 28 inches DBH. Minor species of western hemlock (*Tsuga heterophylla*) and shore pine also occur in the type. The stand was thinned in the early 2000’s. A summary of tree species, diameter range, trees per acre, number of trees and the percent composition of each

species are provided in Table 4. The condition of the trees ranges from ‘Good’ to ‘Poor’. There are many quality trees in this type to retain.

Table 4. -- Inventory summary for forest cover Type IV.

Species	DBH Range	Trees/Acre	# of Trees	% Composition
Douglas-fir	8 – 28	87	137	87%
Western Hemlock	10 – 16	10	16	10%
Shore Pine	17	3	5	3%
Total	8 – 28	100	158	100%

The understory of this type includes salal, western hazel, tall Oregon grape (*Mahonia aquifolium*), other broadleaf weeds, and grasses.



Photo 3: Typical appearance of trees in Cover Type IV.

Historic Trees. -- No Historic Trees occur on the site.

Specimen Trees. -- No trees were considered to be specimen trees.

Off-Site Trees. -- It is unlikely that tree removal on this parcel will adversely affect off-site trees.

Tree Protection Areas

The designated Tree Tract is located along the northern property line (see Appendix II). This tract is 1.46 acres, and is poorly stocked with cottonwood and red alder. None of these trees are suitable for retention. The entire tract should be cleared of existing trees and replanted with quality trees.

Minimum Stocking Calculation

The City of Tumwater Tree and Vegetation Protection Ordinance requires that 20% of the existing trees (or 12 trees per acre, whichever is larger) be saved on site.

The following is a summary of the proposed tree retention:

Total Project Acreage:	29.2 acres
Total # of trees on the Project	949 trees
Required Retention (12 Trees/acre) *	350 trees
Required Retention (20%): **	190 trees
Buildable Area	29.2 acres
Required Tree Tract Acreage (5% of buildable area)	1.46 acres
Proposed Tree Tract	1.46 acres
Planned Tree Retention in Tree Tract:	0 trees
Shortfall of Required Retention (350-0)	350 trees

* Used for required tree retention calculation.

** Ordinance requires 20% or 12 trees/acre, whichever is greater – Sample calculation.

A Tree Replacement Plan is necessary since planned retention is short of the minimum stocking requirement by 350 trees. The Tumwater tree ordinance requires that 3 replacement trees be planted for every tree short of the required tree retention. This means that **1,050** trees will need to be replanted on the site in addition to the required landscaping. The projected cost of this tree planting is \$131,250 at \$125/tree.

A total of 734 of the replacement trees can be planted in the tree tract on a 10 x 10 spacing. The remaining 316 trees should be planted in other areas of the site. Payment for the shortfall of planted trees can, with approval, be made to the Tumwater Tree Fund.

Tree Species for Inter-planting

We recommend that the following conifer tree species be used to interplant any gaps in the tree protection areas:

- Western redcedar
- Douglas-fir
- Incense-cedar
- Austrian pine

The trees should be at least 6-7 foot tall balled and burlap trees with well-developed central leaders.

The landscape plan (prepared by others) should incorporate some deciduous accent and shade trees to provide a mix of color, texture, and size across the site. The street tree selection should correspond to the Tumwater Comprehensive Street Tree Plan recommendations. All tree species should be planted and mulched according to industry standards.

Tree Protection during Construction

The tree protection fence should be orange mesh plastic, and be erected after logging and clearing, but prior to grading. No trenches, cuts, fills, drainage modification, irrigation lines, storing of materials, equipment operation, or other activity should occur within the critical root zone of protected trees. The tree protection and silt fences should be installed at least 5 feet beyond the driplines of trees to be saved.

If there are to be encroachments on any large diameter trees due to any change in the site plan, each tree should be evaluated to determine the impacts on tree survival and safety prior to the impact.

Pruning

All trees to be retained near structures, streets, or other targets should be crown cleaned to remove dead, dying, diseased, structurally defective, or extra branches. Crown raising or side trimming may be necessary to provide building and ground clearances for sidewalks and parking lots. All pruning should conform to the ANSI A300² standards for proper pruning, and be completed by or supervised by an ISA Certified Arborist®.

² American National Standard ANSI A300 (Part 1). 2008. Pruning for Tree Care Operations - Tree, Shrub, and Other Woody Plant Management - Standard Practices (Pruning). Tree Care Industry Association. Londonderry, NH. 13 pgs.

Landscape Installation

Grading, rototilling, and installation of irrigation lines should not impact the critical root zones (CRZ) of the protected trees. Noxious vegetation such as blackberry and Scotch broom should be selectively removed from tree tract areas by hand.

If additional fill is required to achieve desired grades, no more than 20% of the protected trees root zone should be covered with fill depths over 2 inches. If impacts must exceed 20% of the CRZ, the tree should be further evaluated by a Washington Forestry Consultants, Inc. (WFCI) to determine if removal and replacement is more appropriate.

Monitoring

Tree protection fences should be inspected by WFCI after installation to insure that they are properly located and maintained. The fences should be maintained until installation of the final landscaping.

Sequence of Events for Tree Protection Activity

1. Stake the clearing limits.
2. Complete logging and clearing.
3. Install tree protection fences prior to the start of grading as prescribed by WFCI.
4. Complete construction.
5. Plant replacement trees in Tree Tract and other areas of the site.

Summary

It is recommended that no trees be protected in the tree tract because of the low quality of trees. This is below the minimum requirement of 12 trees per acre (350) by 350 trees.

A total of 1,050 trees, in addition to the required landscaping, will need to be replanted to meet the city of Tumwater minimum stocking requirement. The projected cost of this tree planting is \$131,250. We suggest planting the tree tract with suitable tree species. Other options include open areas around storm water retention ponds. Payment for the shortfall of planted trees can, with approval, be made to the Tumwater Tree Fund.

Please give us a call if you have any questions.

Respectfully submitted,



Galen M. Wright, ACF, ASCA
ISA Bd. Certified Master Arborist PN-129BU
Certified Forester No. 44
ISA Tree Risk Assessor Qualified

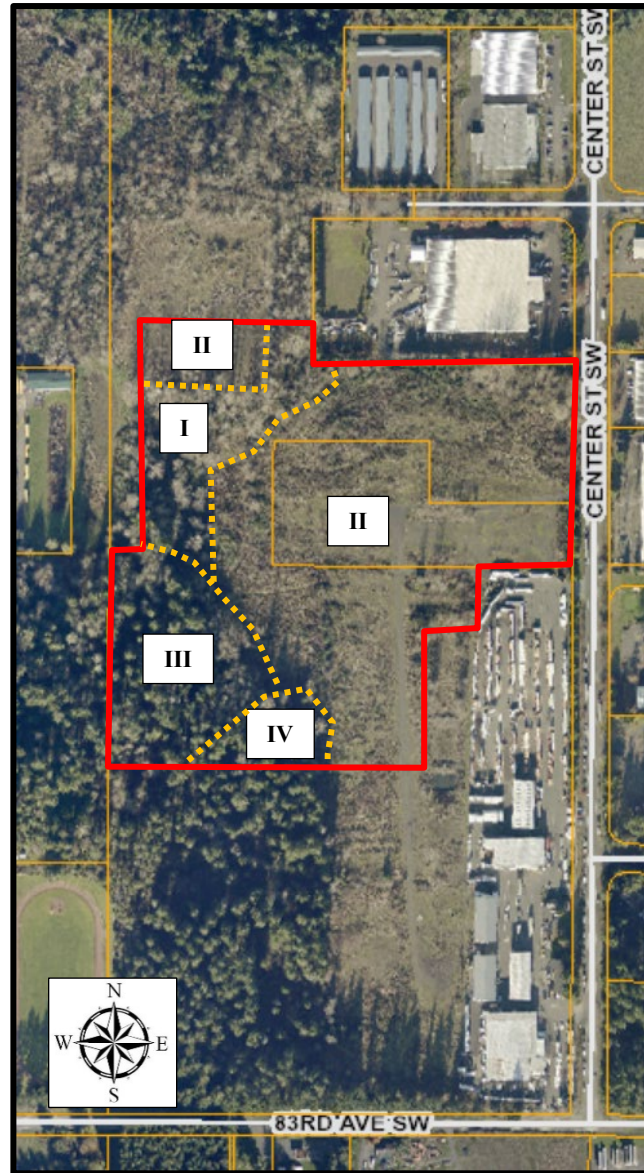


Joshua Sharpes
Professional Forester
ISA Certified Arborist
Municipal Specialist, PN-5939AM
ISA Tree Risk Assessor Qualified

APPENDIX I

Tumwater Business Park Aerial Photo with Forest Cover Types

(Thurston County Geodata 2020)

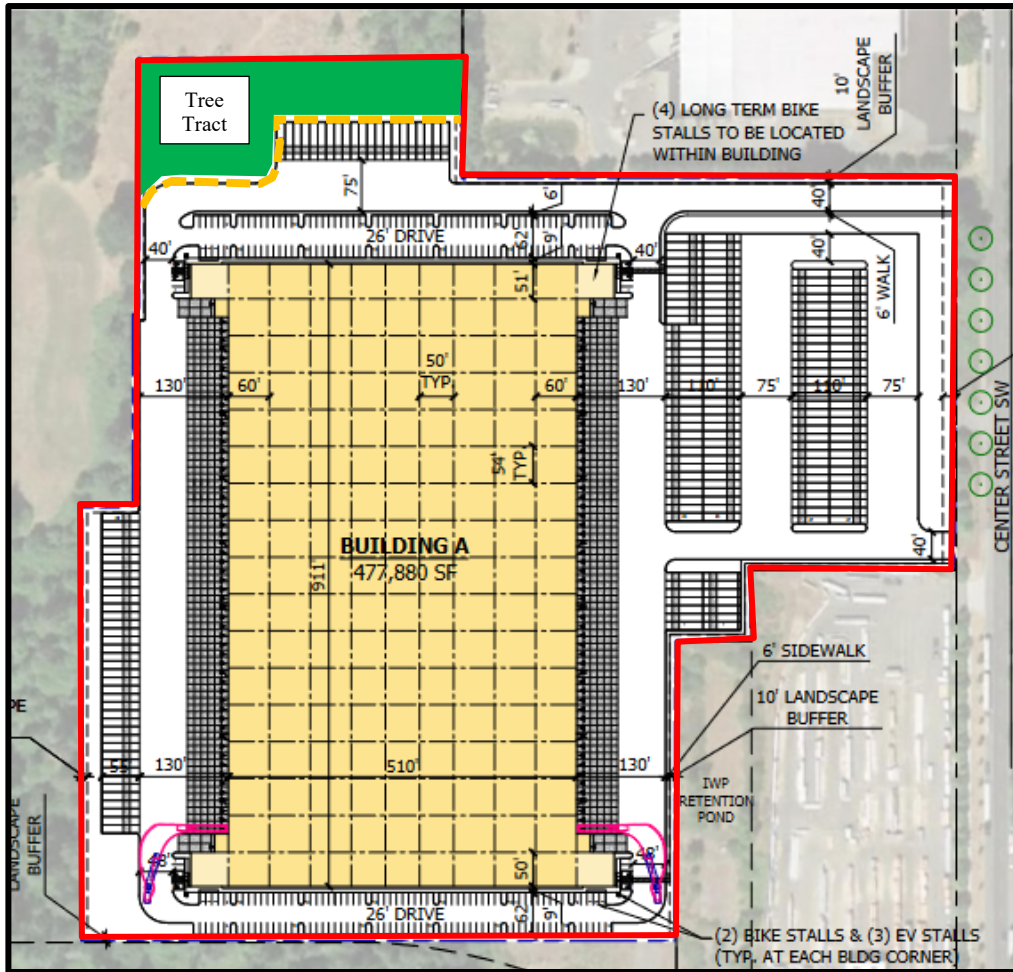


-  Project Boundaries
-  Forest Cover Type Lines

Type I: CW, ra – 6-24” DBH – 125 Trees/acre
Type II: DF, sp, cw – 4-10” DBH – 3 Trees/acre
Type III: BM, df, rc, ra – 6-40” DBH – 81 Trees/acre
Type IV: DF, wh, sp – 8-28” DBH – 100 Trees/acre

APPENDIX II

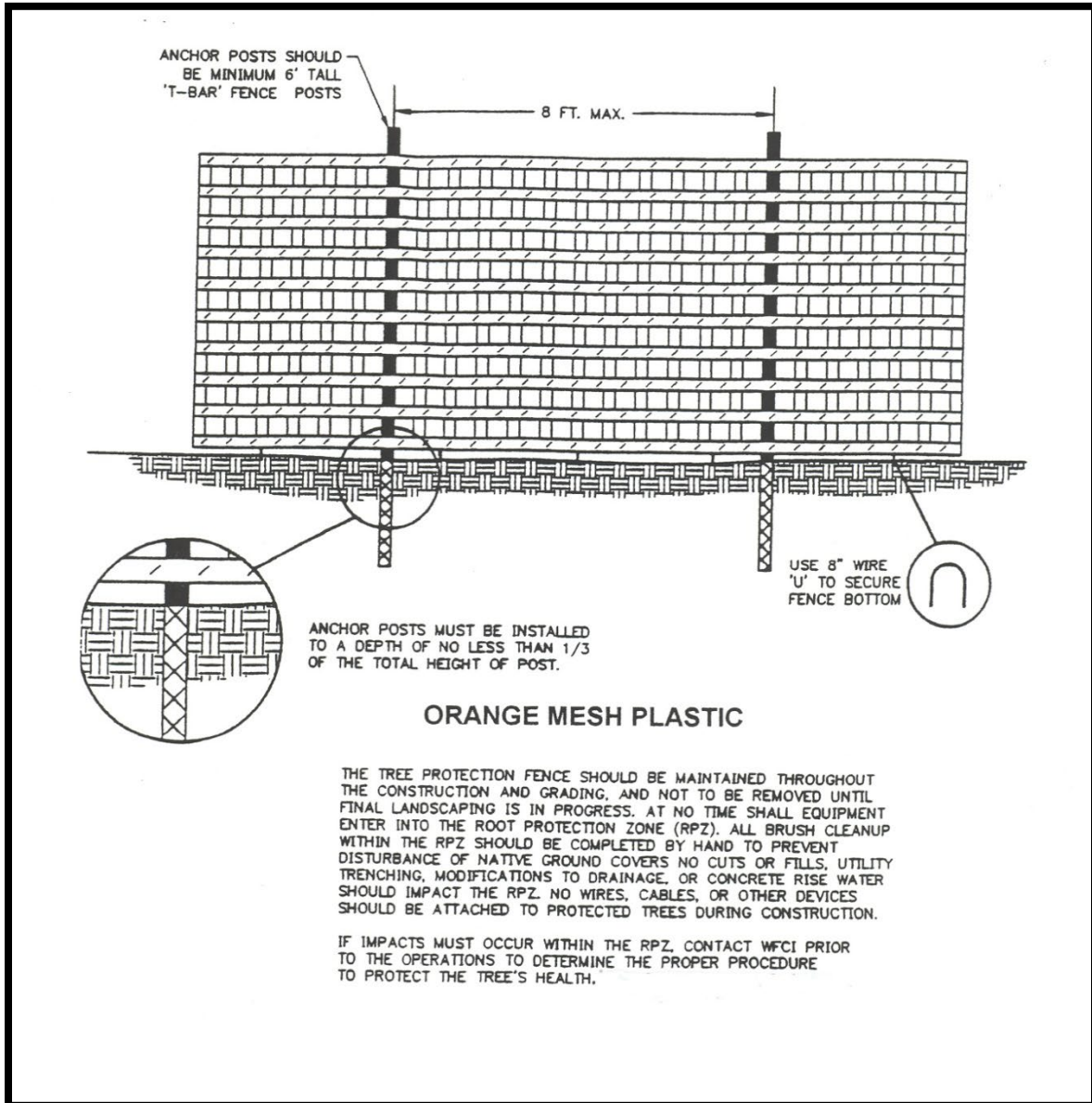
Tumwater Business Park Site Plan



- Tree Protection Fence Location - at perimeter of tree tract.
- Site Boundary

APPENDIX III

Tree Protection Fence Detail



APPENDIX IV

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.
- 6) Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of Washington Forestry Consultants, Inc.
- 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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- 9) Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.
- 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.