



- Tree Protection Plan -

BETROZOFF SITE

11818, 11845 Woodinville-Redmond Road
Redmond, WA

Prepared for: Todd Sherman
Betrozoff Jones, LLC

Prepared by: Washington Forestry Consultants, Inc.

Date: September 19, 2013

Introduction and Scope of Services

The project proponent is planning to convert two single family parcels (8.04 acres) into new high density single family homes. The proponent has retained WFCI to:

- Evaluate all trees on the site pursuant to the requirements of Chapter 20D.80 of the Redmond Tree Protection Ordinance.
- Make recommendations for retention of significant trees in open space or tree tract areas, along with required protection and cultural measures.
- Complete the minimum stocking requirement calculations and the required tree replacement calculations.

Observations

Methodology

WFCI has individually evaluated the open space trees over 6 inches diameter at breast height (DBH) in the proposed project area, and assessed their potential to be incorporated into the new project. Trees within the project area were generally assessed for stand health. The tree evaluation phase used methodology developed by Matheny and Clark (1998)¹.

¹ 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.

In all cases, the overall appearance of the tree was considered relative to its ability to add value to a lot or the entire complex. The scale of the tree and its proximity to other developments is considered. The potential for incorporation into the project design is evaluated, as well as potential site plan modifications that may allow the tree(s) to be 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 that causes sunscald, and other influences. Young, vigorous trees with well-developed crowns are best able to adapt to these changing site conditions.

Site History

The site is currently occupied by two residences and multiple out buildings. The site is forested with a variety of native and planted tree species. The parcels are bordered by similar single-family homes to the north and south, Woodinville-Redmond Road to the east and 154th Place NE to the west.

Soil Depth and Productivity

According to the King County Soil Survey there are two soil types on the site. They are both variants of the Kitsap silt loam, a moderately deep, moderately well drained soil found on remnant terraces along Puget Sound. It is formed in glacial lake sediments. Permeability is very slow. Available water capacity is high. The effective rooting depth for trees is 32 inches. A seasonal high water table occurs from November to March. The soil is subject to hillside slippage. The potential for windthrow of trees is **high** under normal conditions.

Existing Tree Conditions

For the purposes of description, there are two forest cover types on the site (Appendix I).

Type I. -- This type includes the areas around the house that contains both native and planted trees in the landscape. The trees range in diameter from 6 to 34 inches diameter at breast height (DBH).

The tree species include Scotch pine (*Pinus sylvestris*), western white pine (*Pinus monticola*), ash (*Fraxinus spp.*), Ponderosa pine (*Pinus ponderosa*), silver maple (*Acer saccharinum*), red oak (*Quercus rubra*), Japanese maple (*Acer palmatum*), blue Atlas cedar (*Cedrus atlantica*), western hemlock (*Tsuga heterophylla*), Pacific yew (*Taxus brevifolia*), beech (*Fagus spp.*), laurel (*Prunus laurocerasus*), Norway spruce (*Picea abies*), coast redwood (*Sequoiadendron giganteum*) and Colorado blue spruce (*Picea pungens*).

The condition of the trees range from good to dead. There is no true understory in the type besides ornamental shrubs and a variety of grasses.

Type II. -- This type includes the remaining native vegetation on the site. The trees range in diameter from 6 to 49 inches diameter at breast height (DBH).

The tree species include Douglas-fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), Scouler's willow (*Salix scouleriana*), Pacific dogwood (*Cornus nuttallii*), Pacific madrone (*Arbutus menziesii*), western red cedar (*Thuja plicata*), Pacific willow (*Salix lasiandra*), ficus (*Ficus spp.*) bitter cherry (*Prunus emarginata*), black cottonwood (*Populus trichocarpa*), and laurel.

The condition of the trees range from very good to dead. The understory of the type includes Himalayan blackberry (*Rubus discolor*), salal (*Gaultheria shallon*) and Indian plum (*Oemleria cerasiformis*).

Significant Trees

An inventory of the significant trees was completed. These are trees 6 inches DBH and greater. A total of 294 significant trees were found. Two hundred and sixty-two (262) of these trees were healthy and have the potential to be retained on the site. Thirty-two of the trees are in poor or worse condition and should be removed. Most of the significant trees are located under the footprint of the improvements and will be removed for the construction of the project.

Landmark Trees

There are thirty-one Landmark trees in the project. A Landmark tree is one with a DBH 30 inches and greater. The site plan shows the retention of 10 Landmark trees. Therefore ten of the 31 Landmark trees (32%) will be saved in the tree tracts. An additional 3

landmark trees are located in the rights-of-way of Woodinville-Redmond Road. One of the trees in Tract D is in poor condition and should be removed. City of Redmond municipal code required that three trees be planted for every Landmark tree removed. Twenty-one Landmark trees will be removed on the site so 63 replacement trees will need to be planted on site as replacement trees.

Off-Site Impacts

Tree removal on this parcel could impact trees on the properties to the north and south of the project.

Discussion and Recommendations

Potential for Tree Retention

Forty-four healthy significant trees were identified to be retained on the site in four tracts. A list is provided in Appendix III with all species, size, and condition ratings. Six trees in these tracts are in poor condition and are not long term trees. These trees should be removed during the clearing phase of the project. Ten of the 44 trees being retained on the site are Landmark trees.

Tree Protection Measures

Trees to be saved must be protected during construction by temporary chain-link or plastic fencing on driven posts, located at the edge of the critical root zone. The individual critical root zones are a radius of 1' for each 1" of DBH (6' minimum), unless otherwise delineated by WFCI.

If there is asphalt in the CRZ that needs to be removed, a Certified Arborist shall be present to supervise removal to ensure the roots are not damaged. Other than asphalt removal, 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 critical root zone. If roots are encountered outside the critical root zone, they should be cut cleanly with a saw 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 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.

Pruning and Thinning

Trees retained are recommended to be pruned to provide ground clearance and visibility for security purposes. This pruning is recommended to raise the crowns to at least 8 feet in open spaces and 15 feet over streets and sidewalks. If branches encroach in buildings, then at least 10 feet of building clearance should be achieved. All pruning should be done, or be supervised by an International Society of Arboriculture Certified Arborist® and be done to the ANSI A300 standards for proper pruning.

Tree Transplanting

There are a no trees of a transplantable size and quality on this parcel.

Minimum Density Calculations

The City of Redmond's *Tree Protection Ordinance* requires that 35 percent of significant trees be retained on the site. The following is a summary of the estimated tree density planned for retention:

Number of Significant Trees on Site:	294 Trees
Number of Unhealthy Significant Trees on Site:	<u>32 Trees</u>
Number of Healthy Significant Trees on Site:	262 Trees

Minimum Density Required: (35% of trees)	92 Trees
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Planned Tree Retention:

Total Trees to be Saved	<u>50 Healthy Trees</u>
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Shortfall of Tree Retention	42 Healthy Trees
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Number of Healthy Landmark Trees on Site:	31 Trees
Number of Landmark Trees Required to be Saved:	31 Trees

Planned Landmark Tree Retention:

Total Landmark Tree to be Saved:	12 Trees
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Shortfall of Landmark Trees Retention	19 Trees
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Planned tree retention falls short of the minimum density requirement by 42 trees. At least 42 trees (6 ft. tall conifers or 2.5 inch caliper deciduous trees) need to be planted to meet the minimum 1:1 requirement.

At least 57 trees (3:1) need to be planted to replace the 19 Landmark trees being removed.

Tree Planting

In addition to street trees and other required landscaping, 99 trees need to be planted to meet the minimum stocking requirement of the tree protection ordinance and to replace Landmark trees.

It is recommended that the replacement trees be native conifer and be planted in gaps in the tree tracts. The following is a summary of the recommended tree replacement planting:

Table 1. Recommended trees for replacement.

Species	Size	# Trees	Projected Installed Cost
Western Red Cedar	6-7'	50	\$6,250
Douglas-fir	6-7'	49	\$6,125
		99	\$ 12,375

This tree planting plan should be illustrated on the landscape plan. All trees should be planted according to the City of Redmond and industry standards.

The projected installed cost of the 99 replacement trees is \$12,375..

Conclusions - Timeline for Activity

1. Consider the retention of 42 trees in four tree tracts. These 42 trees include 12 Landmark trees.
2. Heavily flag and stake the tree tract areas.
3. Contact WFCI to attend the pre-construction conference to discuss tree protection issues. WFCI can then inspect the planned locations of the tree protection fences and adjust the location if necessary. We will clearly mark all poor quality trees and edge trees that need to be removed from the tree tract areas at this time.
4. Complete all necessary pruning of save trees prior to installation of the tree protection fences. Contact WFCI to meet with the pruning contractor if necessary.
5. Complete logging of buildable area and selective tree removal of poor quality trees from the tree tract.
6. Install the tree protection fences around the tree tract as shown on the final tree protection plan.
7. Complete clearing, and grading.
8. Maintain all tree protection fences throughout construction.
9. If any unplanned construction activity will impact a 'save' tree, contact WFCI prior to the impact. WFCI can assess the proposed impact and recommend cultural care, mitigation, or removal.
10. Conduct an annual tree evaluation to determine short-and long-term effects of site changes on protected trees. Provide additional cultural care as needed.

Summary

There are a total of 294 trees within the project site. Two hundred and sixty-two trees are healthy and could be long-term trees if protected. Due to extensive grading required for the project, 50 trees are proposed to be saved in four tree tracts. No trees are proposed to be saved on lots due to the small lot size and grading.


The tree protection ordinance requires that a minimum of 35% of healthy significant trees be retained or planted on site. This proposed plan retains 50 trees in four tracts. This falls short of the minimum density requirement by 42 trees.

The ordinance also requires that 100% of Landmark trees be retained on the site. Twelve of the 31 healthy Landmark trees can be saved in the four tree tracts. The remaining Landmark trees are within the buildable area, under proposed improvements, or in areas to be graded. Landmark tree retention falls short by 19 trees, requiring 57 trees be planted to replace the Landmark trees being removed.

A total of 99 trees are proposed to be planted as replacement trees for the significant and Landmark trees that are to be removed. They should be planted into gaps in the tree tract areas to meet the minimum density requirements of the ordinance. The projected cost of this tree replacement plan is \$12,375.

Respectfully submitted,

Washington Forestry Consultants, Inc.



Galen M. Wright, ACF, ASCA
ISA Board Certified Master Arborist No. PN-0129
Certified Forester No. 44

attachment: appendices

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.

APPENDIX I

Forest Cover Types Aerial Photo of Betrozoff Jones Site (King County 2009 iMap)



— Approximate Site Boundary

- - - Type Boundary

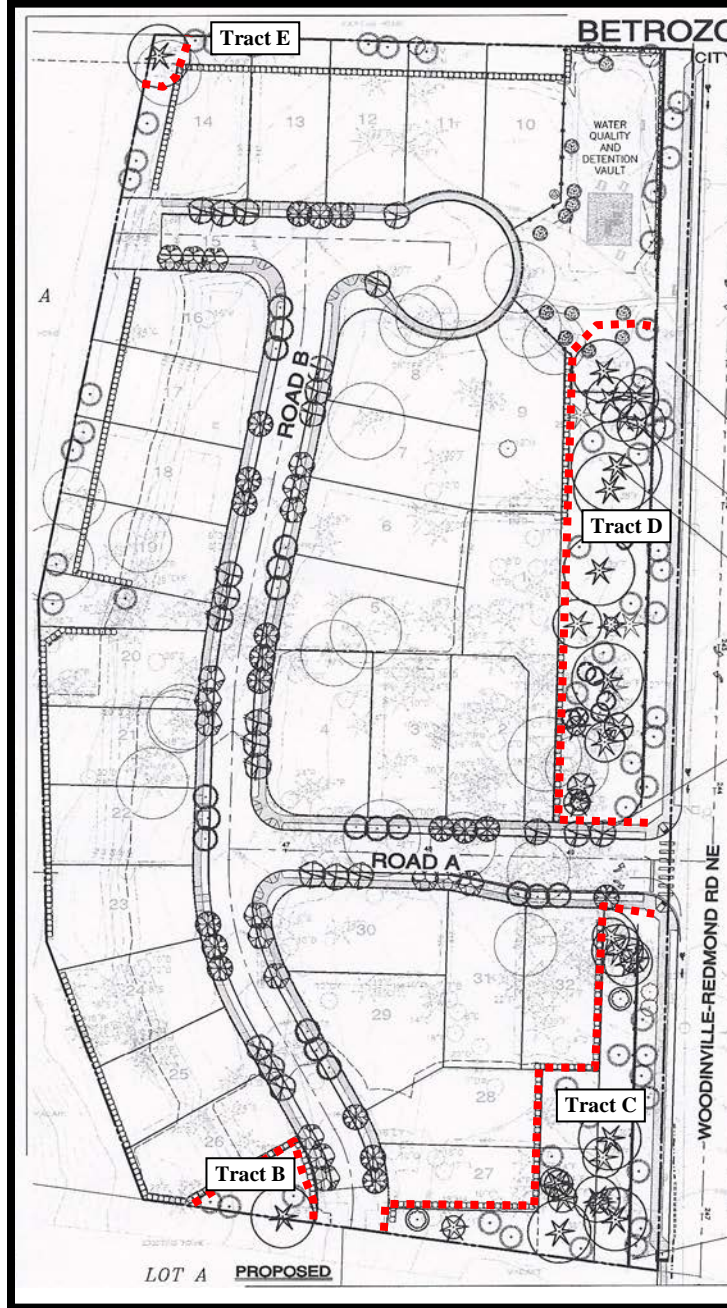
APPENDIX II

Site Plan of Betrozoff Jones, LLC Project - Tree Protection Plan Map

Illustrates Tree Protection Fence Locations

All Trees within Buildable Area are Proposed for Removal

(Refer to PP-08 and PP-09 Maps for Individual Tree Retention Mapping)



Tree Protection Fence Locations

APPENDIX III

List of Significant Trees in Tree Tract

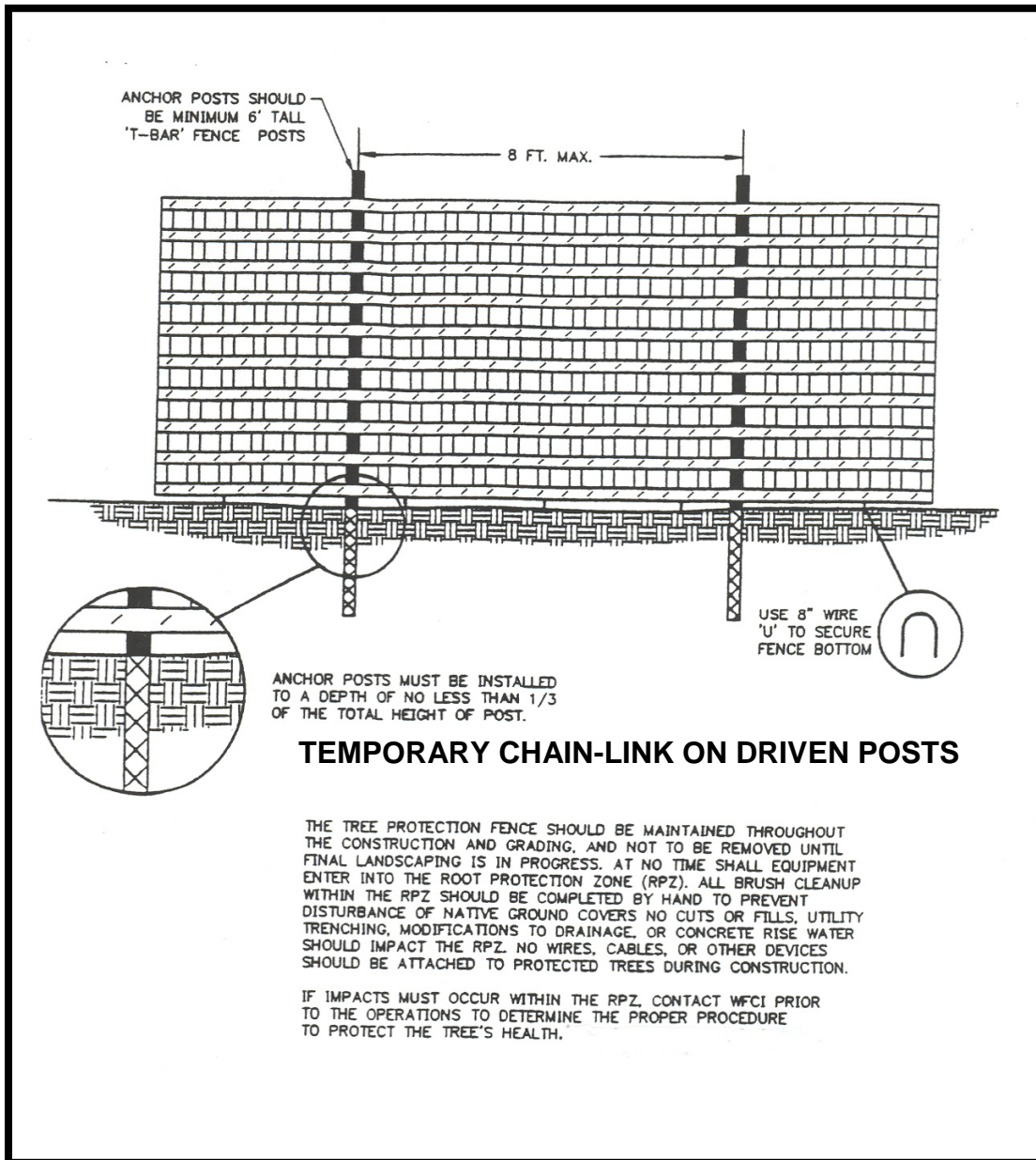
Tree #	Species	DBH (in.)	Condition	Tree Tract	Tree Potential to Save*	Recommended Project Plan: Save/Remove	Minimum Root Protection Zone (ft.)	Notes
5350	Douglas-fir	28	Good	D	Yes	Save	18	
5351	Douglas-fir	27	Fair	D	Yes	Save	18	
5352	Douglas-fir	30	Fair	D	Yes	Save	20	
5353	Douglas-fir	30	Fair	D	Yes	Save	20	
5354	Douglas-fir	26	Fair	D	Yes	Save	17	
5355	Douglas-fir	25	Good	D	Yes	Save	16	
5356	Douglas-fir	24	Fair	D	Yes	Save	16	
5357	Douglas-fir	27	Good	D	Yes	Save	18	
5358	Douglas-fir	34	Very Good	D	Yes	Save	22	
5359	Douglas-fir	29	Fair	D	Yes	Save	19	
5360	Douglas-fir	49	Good	D	Yes	Save	32	
5361	Douglas-fir	38	Good	D	Yes	Save	25	
5362	Japanese Maple	8	Good	D	Yes	Save	5	
5363	Douglas-fir	39	Good	D	Yes	Save	25	
5365	Colorado Blue Spruce	7	Fair	D	Yes	Save	5	
5366	Douglas-fir	39	Poor	D	No	Remove		Schweinitzii butt rot
5367	Douglas-fir	42	Fair	D	Yes	Save	27	
5368	Pacific Willow	27	Poor	D	No	Remove		decay in stem, lots of large pruning cuts
5412	Douglas-fir	31	Good	C	Yes	Save	20	
5413	Douglas-fir	20	Good	C	Yes	Save	13	
5414	Ficus spp.	9,10	Poor	C	No	Remove		decay in stem
5415	Deciduous	12	Fair	C	Yes	Save	8	
5416	Douglas-fir	26	Good	C	Yes	Save	17	
5417	Douglas-fir	16	Good	C	Yes	Save	10	
5418	Douglas-fir	28	Fair	C	Yes	Save	18	
5419	Douglas-fir	20	Fair	C	Yes	Save	13	
5434	Douglas-fir	34	Fair	C	Yes	Save	22	
5438	Douglas-fir	36	Fair	C	Yes	Save	23	
5439	Douglas-fir	34	Fair	C	Yes	Save	22	
5440	Douglas-fir	11	Fair	C	Yes	Save	7	
5441	Douglas-fir	24	Fair	C	Yes	Save	16	

Tree #	Species	DBH (in.)	Condition	Tree Tract	Tree Potential to Save*	Recommended Project Plan: Save/Remove	Minimum Root Protection Zone (ft.)	Notes
5450	Douglas-fir	22	Good	C	Yes	Save	14	
5461	Douglas-fir	34	Good	C	Yes	Save	22	
5462	Ponderosa Pine	25	Fair	C	Yes	Save	16	multi tops, ok for now
5464	Ponderosa Pine	23	Fair	C	Yes	Save	15	
5465	Douglas-fir	33	Good	C	Yes	Save	21	
5466	Ficus spp.	10	Poor	C	No	Remove		failed co-dom stem, large wound
5539	Douglas-fir	26	Very Poor	D	No	Remove		hollow butt
5540	Ponderosa Pine	21	Fair	D	Yes	Save	14	
5541	Ponderosa Pine	16	Fair	D	Yes	Save	10	
5542	Bigleaf Maple	8	Good	D	Yes	Save	5	
5543	Laurel	7,10	Fair	D	Yes	Save	6	
5544	Douglas-fir	14	Fair	D	Yes	Save	9	
5791	Laurel	8	Fair	D	Yes	Save	5	
5792	Laurel	7	Fair	D	Yes	Save	5	
6022	Douglas-fir	24	Very Good	D	Yes	Save	16	
6023	Bigleaf Maple	16-26	Very Poor	D	No	Remove		decay throughout tree, 5 stems
6055	Douglas-fir	20	Fair	D	Yes	Save	13	snowbreak top, ok for now

*Based on tree condition only – not the project design.

APPENDIX IV

Tree Protection Fence Detail



APPENDIX V

Glossary of Forestry and Arboricultural Terminology

DBH: Diameter at Breast Height (measured 4.5 ft. above the ground line on the high side of the tree).

Live Crown Ratio: Ratio of live foliage on the stem of the tree. Example: A 100' tall tree with 40 feet of live crown would have a 40% live crown ratio. Conifers with less than 30% live crown ratio are generally not considered to be long-term trees in forestry.

Crown: Portion of a trees stem covered by live foliage.

Crown Position: Position of the crown with respect to other trees in the stand.

Dominant Crown Position: Receives light from above and from the sides.

Codominant Crown Position: Receives light from above and some from the sides.

Intermediate Crown Position: Receives little light from above and none from the sides.
Trees tend to be slender with poor live crown ratios.

Suppressed Crown Position: Receives no light from above and none from the sides.
Trees tend to be slender with poor live crown ratios.