



- Tree Inventory and Risk Assessment -

CENTRALIA PARKS AND STREET TREES

118 West Maple St.
Centralia WA 98531

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Date of Report: February 28, 2020

Introduction and Scope of Services

We were contacted by the City of Centralia to conduct an inventory and risk assessment for the trees in Fort Borst Park, Riverside Park, Washington Park, and a small area of street trees in the downtown core of Centralia. The purpose was to evaluate the stocking, composition and condition of the trees in these areas, conduct a tree risk assessment, and make recommendations for cultural care or removal. Field inventories, evaluations, and Level II Tree Risk assessment were conducted in February of 2020. The following is a summary of our findings by area.

Downtown Core – Street Trees

The Centralia downtown area includes both sides of Pearl Street and Tower Street between Center Street to the north and Cherry Street to the south, including the railroad depot and its parking lots.

We found 122 street and parking lot trees in this area. Tree size ranges from 4 to 36 inches in diameter at breast height (DBH), and the condition of the inventoried trees ranges from 'Poor' to 'Good,' with most trees described as being in 'Fair' condition or better.

Tree species include Norway maple (*Acer platanoides*), flowering cherry (*Prunus serrulata*), flowering plum (*Prunus cerasifera*), northern red oak (*Quercus rubra*), English oak (*Quercus robur*), European hornbeam (*Carpinus betulus*), red maple (*Acer rubrum*), and vine maple (*Acer*

circinatum). The trees are summarized in Table 1 below. Their locations are illustrated on the aerial photo in Attachment 1.

Table 1. Summary of Street Trees in Centralia Downtown Core Area.

Species	DBH Range (in.)	Condition Range	# of Healthy Trees	# of Unhealthy Trees	Total # of Trees	% Composition
Norway Maple	4 - 20	Poor - Fair	62	3	65	53.3
Red Oak	4 - 36	Poor - Fair	15	1	16	13.1
Flowering Cherry	5 - 19	Poor - Fair	10	6	16	13.1
Flowering Plum	9 - 15	Poor - Good	2	7	9	7.4
English Oak	13 - 20	Fair - Good	7	0	7	5.7
European Hornbeam	15 - 21	Fair	4	0	4	3.3
Vine Maple	7 - 8	Poor - Fair	2	1	3	2.5
Red Maple	4 - 6	Poor - Fair	1	1	2	1.6
Total			103	19	122	100.0%

Norway maple is the most abundant tree species planted in the downtown core area. This tree species is highly tolerant of urban conditions such as poor soil and air pollution, but its root system is aggressive and usually grows near the soils surface, which can conflict with urban hardscape such as tree grates, sidewalks, other hard surfaces, and curbs. Most of the Norway maple trees and some of the oak trees in Centralia’s downtown core are relatively young and have yet to cause significant damage to the hardscape. The few instances of root-on-hardscape conflict can be resolved either by grinding exposed edges or by removing soil from tree grates and lowering the grates.



Photo 1. Lifted concrete slabs in the Central Park area of downtown Centralia. View looking east.

Most of the flowering cherry trees in the downtown area are surrounded by concrete with little soil surface. Often, the tree well is only slightly larger than the stem of the tree. If the health and vigor of these trees is to be sustained, and conflicts with the pavement avoided minimized, then enlargement of the tree wells is necessary.



Photo 2. View of street trees Pearl Street. View looking north.

The tree risk assessment for the downtown area found 10 trees at a ‘Moderate’ risk to fail and impact targets. Potential targets for tree failure include mostly vehicles and pedestrians.

Seven of these trees are flowering plums at the end of their useful life that should be removed and replaced. The other 3 trees can be crown-cleaned to remove dead or defective branches at risk to fail and impact targets.

The projected cost to remove, replace, and/or prune these 10 trees is \$4,000. Pruning should be done by an International Society of Arboriculture Certified Arborist[®]. Tree planting should occur in the fall planting season between October 15th and November 1st. Recommended species for planting include Persian parrotia (*Parrotia persica*), Redmond linden (*Tilia americana x eucholora* ‘Redmond’), and/or yellowwood (*Cladrastis kentukea*).

Table 2. Summary of Recommended Tree Work for Downtown Core Street Trees

Tree #	Species	DBH (in.)	Condition	Risk Rating	Target	Recommended Work	Comment
8	Norway Maple	24	Fair	Moderate - Branches	Vehicles, Pedestrians	Crown Clean, Crown Raise	

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Tree #	Species	DBH (in.)	Condition	Risk Rating	Target	Recommended Work	Comment
10	Norway Maple	22	Fair	Moderate - Branches	Vehicles, Pedestrians	Crown Clean, Crown Raise	
14	Flowering Plum	11	Poor - Stem Decay	Moderate - Whole Tree	Vehicles, Pedestrians	Remove and Replace	
25	Red Oak	23	Good	Moderate - Branches	Vehicles, Pedestrians	Crown Clean, Crown Raise	
61	Flowering Plum	15	Poor - Sapwood Rot	Moderate - Whole Tree	Vehicles, Pedestrians	Remove and Replace	307 Pearl
77	Flowering Plum	12	Poor - In Decline	Moderate - Branches	Vehicles, Pedestrians	Remove and Replace	Parking lot tree
78	Flowering Plum	9	Poor - Stem Decay	Moderate - Branches	Vehicles, Pedestrians	Remove and Replace	Parking lot tree
79	Flowering Plum	10	Poor - Stem Decay	Moderate - Branches	Vehicles, Pedestrians	Remove and Replace	Parking lot tree
80	Flowering Plum	9	Poor - Stem Decay	Moderate - Branches	Vehicles, Pedestrians	Remove and Replace	Parking lot tree
81	Flowering Plum	13	Poor - Stem Decay	Moderate - Branches	Vehicles, Pedestrians	Remove and Replace	Parking lot tree

The relative locations of the trees are shown on the aerial photo in Attachment #1.

Washington Park

There are 39 trees in Washington Park that range in size from 2 to 56 inches DBH. Only 1 tree is unhealthy, but is not considered hazardous. The remaining 38 trees are in 'Fair' condition or better.

The tree species include Colorado blue spruce (*Picea pungens* var. 'glauca'), flowering dogwood (*Cornus florida*), Douglas-fir (*Pseudotsuga menziesii*), English oak, giant sequoia (*Sequoiadendron giganteum*), European birch (*Betula pendula*), flowering cherry, Japanese maple (*Acer palmatum*), katsura (*Cercidiphyllum japonicum*), southern magnolia (*Magnolia grandiflorum*), Nordmann fir (*Abies nordmanniana*), Norway maple, Oregon white oak (*Quercus garryana*), northern red oak, sweet-gum (*Liquidambar styraciflua*), tulip-tree (*Liriodendron tulipifera*), and Japanese zelkova.



Photo 3. View of trees in Washington Park looking southwest.

Most of the trees in the park are mature and some have some twig or small branch dieback in the canopy. Four trees were found to have branches that are at a 'Moderate' risk to fail and impact targets. Dead and defective branches in these 4 trees are likely or somewhat likely to fail and impact pedestrians, vehicles, or structures in the park. Crown cleaning should be done to remove dead branches that are 1 inch diameter and larger.

Most of the park trees have low-hanging branches. These low-hanging branches should be pruned to provide at least 8 ft. of clearance over sidewalks and landscaped areas, and 15 ft. of clearance over streets. The cost of pruning trees in the park is projected to be \$1,200. The locations of all trees in Washington Park are illustrated on the aerial photo in Attachment 2.

Table 3. Summary of Recommended Tree Work in Washington Park.

Tree #	Species	DBH (in.)	Condition	Risk Rating	Target	Recommended Work
1	Sweet-gum	36	Good	Moderate - Branches	Pedestrians	Crown Clean*, Crown Raise
4	English Oak	41	Fair	Moderate - Branches	Pedestrians	Crown Clean
6	Tulip-tree	38	Fair	Moderate - Branches	Pedestrians, Gazebo	Crown Clean
23	Oregon White Oak	41	Fair	Moderate - Branches	Pedestrians, Vehicles	Crown Clean, Crown Raise

*Crown cleaning should be done for dead or dying branches larger than 1 inch diameter.



Photo 4. View of Tree #23, which should be pruned to provide clearance and to remove defective branches. View looking northwest.

The relative locations of the trees in the park are provided in Attachment #2.

Riverside Park

We found 154 trees in Riverside Park. They are a mix of mostly native broadleaved deciduous trees and conifers, with a few planted ornamental trees intermixed. Tree size ranges from 6 to 65 inches DBH. Tree condition ranges from ‘Dead’ to ‘Good,’ with most trees described as being in ‘Fair’ condition or better.

The tree species include Oregon ash (*Fraxinus latifolia*), bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus trichocarpa*), Douglas-fir, European beech (*Fagus sylvatica*), green alder (*Alnus viridis*), western redcedar (*Thuja plicata*), European birch, northern white-cedar (*Thuja occidentalis*), Shantung maple (*Acer truncatum*), and coast redwood (*Sequoia sempervirens*). The native tree species in the park are indicative of moist to wet soils.

Table 4. Summary of Trees in Riverside Park

Species	DBH Range (in.)	Condition Range	# of Healthy Trees	# of Unhealthy Trees	Total # of Trees	% Composition
Douglas-fir	14 - 63	Very Poor - Good	48	6	54	35.1
Bigleaf Maple	12 - 65	Poor - Good	23	5	28	18.2
Black Cottonwood	14 - 57	Dead - Fair	16	6	22	14.3
Western Redcedar	20 - 59	Very Poor - Good	17	1	18	11.7
European Birch	16 - 30	Very Poor - Fair	11	4	15	9.7
Oregon Ash	10 - 29	Fair- Good	10	0	10	6.5
Other Deciduous	6 - 11	Fair- Good	4	0	4	2.6
Other Conifer	17 - 52	Poor - Good	2	1	3	1.9
Total			131	23	154	100.0%



Photo 5. View of Trees in eastern portion of Riverside Park. View looking east.

Thirteen (13) of the 154 trees were found to carry a ‘Moderate’ risk rating or higher, due to decline, or the potential for branch or whole tree failure. Potential targets for tree failure include park visitors, parked vehicles, a kid’s play area, and other park structures.

Nine (9) of these trees are in ‘Poor’ condition or worse and should be removed as their risk ratings cannot be reduced through pruning. These trees are labeled with an orange dot at eye-level and at the base to facilitate their location in the field corresponding to Table 5 below. Trees that can be pruned to reduce their risk rating are similarly labeled in blue. The relative locations of these trees are provided on the aerial photo in Attachment #3.

The remaining 4 trees that require work are Douglas-firs with broken branches and dead tops. These dead tree parts could fail and impact nearby targets. These 4 trees should be crown-cleaned to remove dead tops and any other defective branches.

Douglas-fir typically loses branches during windstorms. Crown cleaning on most trees will reduce the numbers of branches lost in a storm, but it is not possible to eliminate the potential for all branch loss on a Douglas-fir tree. The risk rating from branch loss for these 4 trees – i.e. that a branch would fail, strike a target and cause damage is rated as ‘Moderate’. A brief description of the tree risk assessment process in Attachment 7.

Table 5. List of Trees that Require Work in Riverside Park.

Tree #	Species	DBH (in.)	Condition	Risk Rating	Target	Recommended Work
26	Douglas-fir	56	Fair - Hanging Branches	Moderate - Branches	Play Area	Crown Clean
59	Douglas-fir	33	Poor - Red Ring Rot	Moderate - Whole Tree	Pedestrians, Parking	Remove
70	Western Redcedar	27	Very Poor - Mostly Dead	High - Whole Tree	Pedestrians, Parking	Remove
86	Douglas-fir	19	Very Poor - Suppressed	Moderate - Whole Tree	Pump House, Pedestrians	Remove
89	Douglas-fir	46	Fair - Dead Top	Moderate - Branches	Parking, Pedestrians	Crown Clean
91	Douglas-fir	49	Fair - Dead Top	Moderate - Branches	Parking, Pedestrians	Crown Clean
92	Douglas-fir	59	Fair - Dead Top	Moderate - Branches	Parking, Pedestrians	Crown Clean
102	European Birch	25	Poor - Stem Decay	Moderate - Whole Tree	Pedestrians, Path, Exercise Station	Remove
104	European Birch	29	Poor - Stem Decay	Moderate - Whole Tree	Pedestrians, Path, Exercise Station	Remove
107	European Birch	27	Poor - Stem Decay	Moderate - Whole Tree	Pedestrians, Path, Exercise Station	Remove
109	European Birch	16	Very Poor - Mostly Dead	Moderate - Whole Tree	Pedestrians, Path, Exercise Station	Remove
110	Black Cottonwood	37	Dead	High - Whole Tree	Path, Pedestrians, Riverfront	Remove
111	Black Cottonwood	27	Dead	High - Whole Tree	Path, Pedestrians, Riverfront	Remove

Borst Park

There are 904 trees outside of the arboretum in Borst Park. These trees range in size from 4 to 62 inches DBH. Tree condition ranges from ‘Dead’ to ‘Good,’ with most trees described as being in ‘Fair’ condition or better.

The park is predominantly stocked with older Douglas-fir and its normal associates, including Oregon white oak, western red cedar, western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), grand fir (*Abies grandis*), cascara (*Rhamnus purshiana*) and red alder (*Alnus rubra*).

Other species include Oregon ash, black cottonwood, and bigleaf maple, deodar cedar (*Cedrus deodara*), Atlas cedar (*Cedrus atlantica*), red oak, cherry (*Prunus avium*), Port Orford-cedar (*Chamaecyparis lawsoniana*), Leyland cypress (*Cupressocyparis x. leylandii*), giant sequoia (*Sequoiadendron giganteum*), tulip-tree, willow oak (*Quercus phellos*), European birch, white oak (*Quercus alba*), English hawthorn (*Crataegus laevigata*), English yew (*Taxus baccata*), Norway maple, and holly (*Ilex aquifolium*).

Table 6 - Summary of Trees Borst Park.

Species	DBH Range	Condition Range	# of Healthy Trees	# of Unhealthy Trees	Total # of Trees	% Composition
Oregon White Oak	8-51	Very Poor - Good	390	30	420	47%
Oregon Ash	4-40	Very Poor - Good	87	10	97	11%
Douglas-fir	4 - 62	Poor - Good	237	6	243	27%
Bigleaf Maple	6-38	Very Poor - Good	24	7	31	3%
Giant Sequoia	35 - 57	Poor - Good	18	3	21	2%
Black Cottonwood	4-64	Poor - Good	17	2	19	2%
Cypress	14 – 24	Fair	10	0	10	1%
European Birch	16 – 26	Poor - Fair	8	1	9	1%
Red Oak	14 - 32	Fair - Good	5	0	5	<1%
Deodar Cedar	8 – 24	Fair- Good	5	0	5	<1%
Cherry	10-11	Fair	3	0	3	<1%
Colorado Blue Spruce	14 - 16	Fair	2	0	2	<1%
Grand Fir	8 - 43	Dead - Fair	4	3	7	<1%
Port Orford-cedar	18 - 34	Fair - Good	3	0	3	<1%
Tulip Tree	30 - 32	Fair - Good	2	0	2	<1%
Atlas Cedar	16 - 44	Good - Fair	6	1	7	<1%
Cascara	15	Good	1	0	1	<1%
Hawthorn	8 - 14	Fair	5	0	5	<1%
Hemlock	6	Fair	1	0	1	<1%
Norway Maple	28	Good	1	0	1	<1%
Western Redcedar	22 - 46	Good	2	0	2	<1%
Sitka Spruce	10 - 20	Fair	2	0	2	<1%
White Oak	17	Good	1	0	1	<1%
Yew	30	Good	1	0	1	<1%

Species	DBH Range	Condition Range	# of Healthy Trees	# of Unhealthy Trees	Total # of Trees	% Composition
Holly	22	Fair	1	0	1	<1%
Willow Oak	25	Good	1	0	1	<1%
Red Alder	28	Poor	0	4	4	<1%
Total			837	67	904	100.0%

A total of 30 trees were found to be at an elevated risk to fail and impact targets. Hazard trees requiring work are painted with an orange dot eye level and number at its base corresponding to Table 7 below. Locations of these trees are illustrated on aerial photo in Attachment #4. Potential targets for tree failure include park visitors, vehicles, a kid’s play area, Interstate 5, and park buildings.

Twenty-six (26) trees will need to be removed as there are no other options to mitigate the risk they present. Four (4) trees could be crown-cleaned to remove dead and defective branches and stems at risk to fail and impact targets. These 4 trees could also be removed. Where trees (usually Oregon white oaks) lean heavily over picnic tables, the tables should be moved out from under the trees. All tree work should be completed immediately.

Table 7. Summary of Hazard Trees in Borst Park.

Tree #	Species	DBH (in.)	Condition	Risk Rating	Target	Recommended Work
1	Sitka Spruce	21	Dead	Moderate - Whole Tree	Path, Trees	Remove
2	Walnut	17	Very Poor - Dieback, Stem Decay	Moderate - Branches, Whole Tree	House, Path	Crown-clean or Remove
3	Black Cottonwood	25	Poor - Dieback, Leaning	High - Branches	Garden, Path	Crown-clean or Remove
4	Black Pine	29	Dead	Moderate - Branches, Whole Tree	Path, Trees	Remove
5	Bigleaf Maple	41	Fair	Moderate - Branches, Whole Tree	Path, Road	Crown-clean, Crown-Raise
6	Bigleaf Maple	13, 15	Very Poor - Mostly Dead	Moderate - Branches, Whole Tree	Path, Road	Remove
7	Bigleaf Maple	28	Very Poor - Mostly Dead	Moderate - Branches, Whole Tree	Dog Park, Fence, Path	Remove
8	Black Cottonwood	41	Dead	Moderate - Branches, Whole Tree	Path	Cut Down or Convert to Snag
9	Black Cottonwood	46, 46	Very Poor - Mostly Dead	Moderate - Branches; High-Whole Tree	Path, Waterfront, I-5	Remove
10	Grand Fir	14	Dead	Moderate - Whole Tree	Play Area	Remove
11	Grand Fir	15	Dead	Moderate - Whole Tree	Play Area	Remove

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Tree #	Species	DBH (in.)	Condition	Risk Rating	Target	Recommended Work
12	Grand Fir	15	Dead	Moderate - Whole Tree	Play Area	Remove
13	Oregon White Oak	11, 9	Dead	Moderate - Whole Tree	Path, Park	Remove
14	European Birch	17	Very Poor - Suppressed, Stem Decay	Moderate - branches	Road, Sidewalk	Remove
15	Deodar Cedar	9, 10	Very Poor - Suppressed, Stem Decay	Moderate - Whole Tree	Park	Remove
16	Oregon White Oak	13	Very Poor - Mostly Dead	Moderate - Whole Tree	Road, Sidewalk	Remove
17	Bigleaf Maple	37	Very Poor - Mostly Dead	High - Branches	Road, Parking	Remove
18	Grand Fir	17	Dead	Moderate - Whole Tree	Shed, Path	Remove
19	Oregon White Oak	10, 11	Very Poor - Mostly Dead	Moderate - Whole Tree	Shelter, Path	Remove
20	Bigleaf Maple	41	Very Poor - Mostly Dead	Moderate - Whole Tree	Path, Dog Park	Crown-Clean
21	Douglas-fir	51	Very Poor - Red Ring Rot	High - Whole Tree	Blockhouse, Parking	Remove
22	Douglas-fir	42	Very Poor - Brown Cubicle Rot	High - Whole Tree	Freeway Entrance	Remove
23	Douglas-fir	36	Very Poor - Brown Cubicle Rot	High - Whole Tree	Freeway Entrance	Remove
24	Douglas-fir	26	Very Poor - Red Ring Rot	High - Whole Tree	Playground, Parking	Remove
25	Douglas-fir	36	Very Poor - Brown Cubicle Rot	Moderate - Whole Tree	Parking	Remove
26	Oregon White Oak	11	Dead	Moderate - Whole Tree	Park, Path	Remove
27	Bigleaf Maple	24	Very Poor - Mostly Dead	Moderate - Whole Tree	Path, Field	Remove
28	Red Alder	28	Very Poor - Mostly Dead	High - Whole Tree	Path, Rhododendrons	Remove
29	Red Alder	32	Very Poor - Mostly Dead	High - Whole Tree	Path, Rhododendrons	Remove
30	Red Alder	18, 20	Very Poor - Mostly Dead	High - Whole Tree	Path, Pedestrians	Remove

Summary

WFCI has evaluated 1,219 trees in 4 separate areas within the City of Centralia. The large majority (91%) of these trees are healthy, long-term landscape trees that provide benefits to the people of Centralia and surrounding communities. The locations of evaluated trees in the downtown area and Washington Park are illustrated in Attachments #1 and #2. The locations of hazard trees in Riverside Park and Borst Park are illustrated in Attachments #3 and #4.

Table 8. Summary of Evaluated Trees in Centralia Parks and Streets

Area	# of Healthy Trees	# of Unhealthy Trees	Total # of Trees	Hazard Trees to Remove	Hazard Trees to Prune
Downtown	103	19	122	7	3
Riverside Park	131	23	154	9	3
Washington Park	38	1	39	0	4
Borst Park	837	67	904	26	4
Total	1,109	110	1,219	42	14

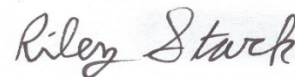
Of the 1,219 trees that were evaluated, 56 were found to be at an elevated risk to fail and impact targets. Forty-two (42) trees will need to be removed as there is no other option available to mitigate the risk that they present. The remaining 14 trees can be pruned to remove branches and stems at risk to fail. The conflicts between trees and existing hardscape downtown can be resolved by grinding pavement, lowering tree grates, or providing trees with more room to grow. All work to mitigate hazardous conditions should be done immediately.

Please give us a call if you have any questions.

Respectfully submitted,



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Attachment 1. Aerial Photo of Centralia Downtown Area with Locations of Evaluated Trees Indicated (North Half)

(2019 Lewis County GIS)



- Study Area
- Location of Tree to Remove
- Location of Tree to Prune
- Other Tree



- Study Area
- Location of Tree to Remove
- Location of Tree to Prune
- Other Tree

Attachment 2. Aerial Photo of Washington Park with Tree Locations Indicated

(2019 Lewis County GIS)



-  Study Area
-  Location of Tree to Prune
-  Other Tree

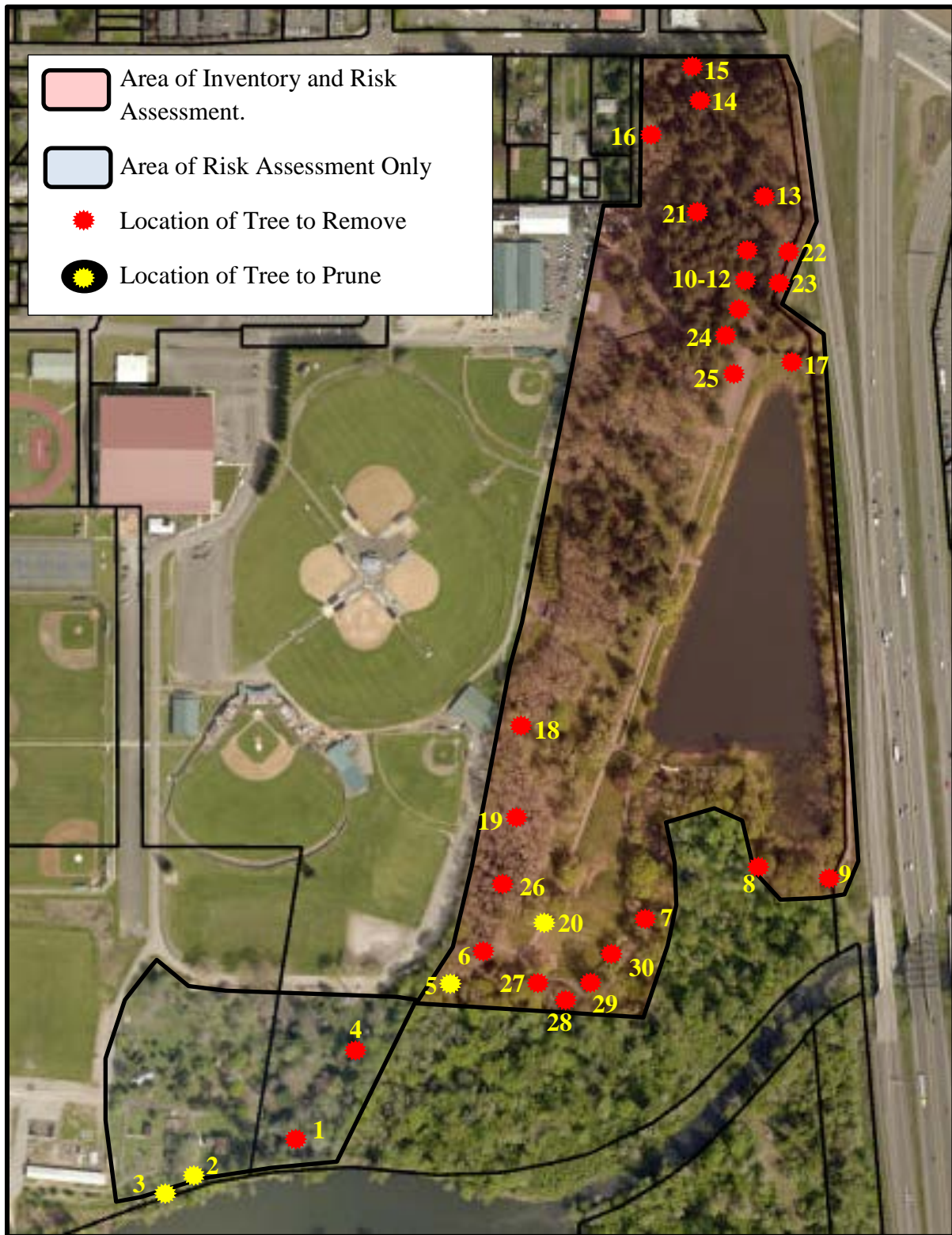
Attachment 3. Aerial Photo of Riverside Park with Hazard Tree Locations Indicated

(2019 Lewis County GIS)



- Study Area
- Location of Tree to Remove
- Location of Tree to Prune

Attachment 4. Aerial Photo of Borst Park and Arboretum with Approximate Hazard Tree Locations Indicated (2019 Lewis County GIS)



Attachment 5. List of Evaluated Trees in Downtown Area

Tree #	Species	DBH (in.)	Condition	Risk Rating	Recommended Work	Comment
1	Flowering Cherry	19	Poor - Bad Pruning	Low	None	Double Grafted
2	Flowering Cherry	15	Poor - Bad Pruning	Low	None	Double Grafted
3	Norway Maple	16	Fair	Low	Prune Suckers	
4	Norway Maple	12	Fair	Low	None	
5	Red Maple	3	Poor - Suppressed	Low	Prune Nearby Maple	
6	Norway Maple	6	Fair	Low	None	
7	Norway Maple	9	Fair	Low	None	Outgrowing Gate
8	Norway Maple	24	Fair	Moderate - Branches	Crown Clean, Crown Raise	
9	Norway Maple	4	Poor - Suppressed	Low	Prune Nearby Maple	
10	Norway Maple	22	Fair	Moderate - Branches	Crown Clean, Crown Raise	
11	Norway Maple	4	Poor - Suppressed	Low	Prune Nearby Maple	
12	Norway Maple	17	Fair	Low	None	
13	Norway Maple	9	Fair	Low	None	
14	Flowering Plum	11	Poor - Stem Decay	Moderate - Whole Tree	Remove and Replace	
15	Flowering Plum	13	Fair	Low	None	
16	Norway Maple	13	Fair	Low	None	
17	Norway Maple	11	Fair	Low	None	
18	Norway Maple	11	Fair	Low	None	
19	Norway Maple	13	Fair	Low	None	
20	English Oak	20	Good	Low	None	
21	English Oak	15	Fair	Low	None	
22	Red Oak	16	Good	Low	None	
23	Red Oak	13	Fair	Low	None	
24	Red Oak	18	Good	Low	None	
25	Red Oak	23	Good	Moderate - Branches	Crown Clean, Crown Raise	
26	English Oak	20	Good	Low	None	
27	English Oak	19	Good	Low	None	
28	Red Oak	20	Fair	Low	None	Cracked Curb - Minor
29	Red Oak	20	Fair	Low	None	Cracked Curb - Minor
30	Red Oak	18	Fair	Low	None	Cracked Curb - Minor
31	Red Oak	14	Fair	Low	None	Cracked Curb - Minor
32	English Oak	13	Fair	Low	None	Cracked Curb - Minor
33	Norway Maple	13	Fair	Low	None	
34	Norway Maple	14	Fair	Low	None	
35	Norway Maple	17	Fair	Low	None	

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Tree #	Species	DBH (in.)	Condition	Risk Rating	Recommended Work	Comment
36	Norway Maple	17	Fair	Low	None	Lifting Grate
37	Norway Maple	12	Fair	Low	None	
38	Norway Maple	13	Fair	Low	None	
39	Norway Maple	20	Fair	Low	None	Very root-bound, not lifting pavement
40	Vine Maple	4, 4, 4	Poor - Stem Decay	Low	None	Like a 7 in. DBH Tree
41	Norway Maple	13	Fair	Low	None	
42	Norway Maple	15	Fair	Low	None	
43	Norway Maple	13	Fair	Low	None	Flush cuts
44	Norway Maple	14	Fair	Low	None	Lifting Grate
45	Red maple	6	Fair	Low	None	
46	Hornbeam	15, 15	Fair	Low	Grind Pavement	lifting pavement
47	Hornbeam	11, 11	Fair	Low	None	Like a 15 in. DBH Tree
48	Hornbeam	13, 18	Fair	Low	None	
49	Hornbeam	10, 9, 9, 8, 8	Fair	Low	Grind Pavement	lifting pavement
50	Norway Maple	15	Good	Low	None	
51	Norway Maple	13	Poor - Bad Pruning	Low	None	
52	Norway Maple	13	Good	Low	None	
53	Norway Maple	13	Good	Low	None	
54	Vine Maple	6, 7, 7	Fair	Low	None	1 bad stem
55	Vine Maple	9	Good	Low	None	
56	Norway Maple	16	Good	Low	None	
57	Norway Maple	15	Good	Low	None	
58	Norway Maple	15	Good	Low	None	
59	Norway Maple	14	Good	Low	None	Cracked Pavement - Minor
60	Flowering Plum	13	Good	Low	None	
61	Flowering Plum	15	Poor - Sapwood Rot	Moderate - Whole Tree	Remove and Replace	307 Pearl
62	Flowering Cherry	19	Fair	Low	Crown Raise	Weeping Variety
63	Flowering Cherry	18	Poor - Broken Stems	Low	Crown Raise	Weeping Variety
64	Flowering Cherry	17	Fair	Low	Grind Pavement	
65	Norway Maple	11	Fair	Low	Lower Grate	Lifting Grate
66	Norway Maple	8	Fair	Low	None	
67	Norway Maple	14	Good	Low	None	
68	Norway Maple	13	Good	Low	None	
69	Norway Maple	15	Good	Low	None	
70	Norway Maple	13	Good	Low	None	
71	Norway Maple	15	Good	Low	None	Cracking Pavement - Minor
72	Norway Maple	4	Fair	Low	None	Sunscald
73	Norway Maple	9	Fair	Low	None	
74	Norway Maple	7	Fair	Low	None	
75	Norway Maple	7	Fair	Low	None	

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Tree #	Species	DBH (in.)	Condition	Risk Rating	Recommended Work	Comment
76	Flowering Cherry	5	Fair	Low	None	
77	Flowering Plum	12	Poor - In Decline	Moderate - Branches	Remove and Replace	Parking lot tree
78	Flowering Plum	9	Poor - Stem Decay	Moderate - Branches	Remove and Replace	Parking lot tree
79	Flowering Plum	10	Poor - Stem Decay	Moderate - Branches	Remove and Replace	Parking lot tree
80	Flowering Plum	9	Poor - Stem Decay	Moderate - Branches	Remove and Replace	Parking lot tree
81	Flowering Plum	13	Poor - Stem Decay	Moderate - Branches	Remove and Replace	Parking lot tree
82	Red Oak	36	Fair	Low	None	lifting pavement - Minor
83	Flowering Cherry	8	Poor - In Decline	Low	None	lifting pavement - Minor
84	Flowering Cherry	8	Poor - In Decline	Low	None	lifting pavement - Minor
85	Norway Maple	9	Good	Low	None	
86	Norway Maple	11	Good	Low	None	
87	Norway Maple	13	Good	Low	None	
88	Norway Maple	13	Good	Low	Lower Grate	Lifting Grate
89	Flowering Cherry	13	Poor - In Decline	Low	None	
90	Flowering Cherry	12	Fair	Low	None	
91	Norway Maple	14	Good	Low	None	
92	Norway Maple	9	Good	Low	None	
93	Norway Maple	14	Good	Low	Crown Raise	
94	Norway Maple	7	Fair	Low	Open Planter	
95	Norway Maple	9	Good	Low	None	
96	Norway Maple	15	Good	Low	None	
97	Norway Maple	15	Good	Low	None	
98	Flowering Cherry	14	Fair	Low	Open Planter	
99	Flowering Cherry	13	Fair	Low	Open Planter	
100	Flowering Cherry	19	Fair	Low	Open Planter	
101	Norway Maple	13	Good	Low	None	
102	Norway Maple	11	Good	Low	Crown Raise	
103	Norway Maple	13	Fair	Low	None	
104	Norway Maple	8	Good	Low	None	
105	Flowering Cherry	13	Fair	Low	Open Planter	
106	Norway Maple	15	Good	Low	Crown Raise	
107	Norway Maple	14	Good	Low	None	
108	Norway Maple	7	Fair	Low	None	
109	Norway Maple	11	Good	Low	Lower Grate	Lifting Grate
110	Flowering Cherry	15	Fair	Low	None	
111	Flowering Cherry	19	Fair	Low	Open Planter	Like a 21 in. DBH Tree
112	Norway Maple	17	Good	Low	Lower Grate	Lifting Grate
113	Norway Maple	13	Good	Low	Lower Grate	Lifting Grate
114	Red Oak	25	Good	Low	None	
115	Red Oak	18	Good	Low	None	
116	Red Oak	22	Good	Low	None	
117	English Oak	19	Good	Low	None	

City of Centralia - Downtown and City Park Tree Inventory and Tree Risk Assessment

Tree #	Species	DBH (in.)	Condition	Risk Rating	Recommended Work	Comment
118	English Oak	16	Good	Low	None	
119	Red Oak	4	Poor - Dead Top	Low	None	
120	Red Oak	17	Fair	Low	None	
121	Red Oak	24	Good	Low	None	
122	Red Oak	19	Good	Low	None	

Attachment 6. List of All Trees in Washington Park

Tree #	Species	DBH (in.)	Condition	Risk Rating	Recommended Work	Comment
1	Sweet-gum	36	Good	Moderate - Branches	Crown Clean, Crown Raise	
2	Japanese Maple	2	Fair	Low	None	
3	Flowering Cherry	26	Fair	Low	None	
4	English Oak	41	Fair	Moderate - Branches	Crown Clean	
5	Norway Maple	22	Good	Low	None	
6	Tulip-tree	38	Fair	Moderate - Branches	Crown Clean	
7	Sweet-gum	35	Good	Low	None	
8	Colorado Blue Spruce	35	Good	Low	None	
9	European Birch	23	Good	Low	None	
10	Nordmann Fir	4	Good	Low	None	
11	European Birch	20	Fair	Low	None	
12	Dogwood	5.5	Fair	Low	None	
13	Douglas-fir	28	Good	Low	None	
14	Red Oak	49	Good	Low	Crown Raise	
15	Red Oak	26	Good	Low	None	
16	Red Oak	27	Good	Low	None	
17	Oregon White Oak	27	Fair	Low	None	
18	Oregon White Oak	30	Fair	Low	None	
19	Oregon White Oak	22	Poor - In Decline	Low	None	
20	Oregon White Oak	30	Fair	Low	None	
21	Oregon White Oak	29, 30	Good	Low	None	
22	Oregon White Oak	31	Good	Low	None	
23	Oregon White Oak	41	Fair	Moderate - Branches	Crown Clean, Crown Raise	
24	Magnolia	12	Good	Low	None	
25	Oregon White Oak	38	Good	Low	None	
26	Dogwood	10	Good	Low	None	
27	Dogwood	11	Fair	Low	None	

City of Centralia - Downtown and City Park Tree Inventory and Tree Risk Assessment

Tree #	Species	DBH (in.)	Condition	Risk Rating	Recommended Work	Comment
28	Norway Maple	23	Good	Low	None	
29	Tulip-tree	20	Fair	Low	None	
30	Colorado Blue Spruce	15	Fair	Low	None	Codominant Tops
31	Giant Sequoia	56	Good	Low	None	
32	Douglas-fir	44	Good	Low	None	
33	Zelkova	31	Good	Low	None	
34	Oregon White Oak	42	Good	Low	None	
35	Dogwood	8, 10	Fair	Low	None	
36	Red Oak	26	Fair	Low	None	
37	English Oak	32	Fair	Low	None	
38	Katsura	26	Fair	Low	None	Some Stem Decay
39	Colorado Blue Spruce	4	Good	Low	None	

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 standard¹ for tree risk assessment. This standard is supported by a best management practices guide².

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 manual³, 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.

¹ 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.

² Smiley, E. Thomas, Nelda Matheny, and Sharon Lilly. 2011. *Best Management Practices – Tree Risk Assessment*. International Society of Arboriculture. Champaign, IL.

³ 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. 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 important 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

Cultural Care Needs:

ABBRV.	ACTIVITY	DESCRIPTION
CC	Crown Cleaning	Pruning of dead, dying, diseased, damaged, or defective branches over 1/2 inch in diameter –includes removal of dead tops
CT	Crown Thinning	Pruning of branches described in crown cleaning, plus thinning of up to 20% of the live branches over 1/2 inch diameter. Branch should be 1/3 to 1/2 the diameter of the lateral branch. Thinning should be well distributed throughout crown of tree, and should release healthy, long-term branches.
RC	Crown Reduction	Reduction of the crown of a tree by pruning to lateral branches. Generally used to remove declining branches or to lighten end weight on long branches.
CR	Crown Raising	Pruning of lower branches to remove deadwood or to provide ground or building clearances.
RMV	Remove	Remove tree due to decline or hazardous conditions that cannot be mitigated by pruning.
RS	Remove Sprouts	Remove basal sprouts from stem of tree.
Rep	Replace	Tree is small – is in decline or dead. Replace with suitable tree species.
HT	Hazard Tree	Tree is hazardous and cannot be mitigated by pruning. Recommendation is to remove tree.
None	No Work	No work necessary at this time.

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.
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- 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.
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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.