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American Forest Management
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www.americanforestmanagement.com

May 17, 2016

Ms. Taine Wilton
Capital Projects Office
Edmonds School District #15
20420 -68th Ave W.
Lynnwood, WA 98036

Re: Madrona K-8 School Project Tree Survey

Dear Ms. Wilton:

Per the terms of our Proposal dated December 10, 2015 and the associated Purchase Order #2001500154 dated December 14, 2015 we are pleased to present our Madrona K-8 School Project Tree Survey and Assessment.

Competence

American Forest Management and its predecessor, International Forestry Consultants, Inc. has been practicing urban forestry since 1999. The survey and assessment was carried out by Tom Hanson, RCA /TRAQ and Kelly Wilkinson, TRAQ.

Tom is certified by the International Society of Arboriculture and is a Registered Consulting Arborist by the American Society of Consulting Arborists. He has been practicing arboricultural consulting since 1999. He has been a practicing consulting forester in Washington since 1971and is TRAQ (Tree Risk Assessor Qualified) by the International Society of Arboriculture.

Kelly is also certified by the International Society of Arboriculture and is Tree Risk Assessor Qualified. She has been practicing urban forestry for three years.

Description

The subject trees were indicated on maps prepared by Pace Engineering Company, Kirkland, Washington. The trees include those in and around the existing campus buildings and in a 10-foot wide range around the perimeter of the School site, including Madrona K-8 and the current Lynndale (Woodway) Elementary School.

The trees include a mix of native coniferous and deciduous species along with a few non-native ornamentals within the building areas. Madrona School stands on a ridge with the

majority of the trees around the perimeter, just over the edge. At Lynndale, the school stands in a valley with the majority of the trees uphill, slightly up the valley edge.

Methodology

Each tree indicated on the maps was visited and identified with a numbered aluminum tag. The trees were assessed under TRAQ (Tree Risk Assessor Qualified) level 2 assessment methods (visual inspection). This assessment is valid for the conditions of the tree and site on the date of inspection and does not consider future construction issues, if any. Therefore, assessment of targets was not done. We recommend a three-year or post construction reassessment.

TRAQ Level 2 Assessment

- Locate and Identify Subject Trees
- Determine Targets
- Review Site History
- Assess Tree Health
- Inspect: ocular, mallet, probes etc.
- Record Observations: defects, site conditions, growth rates
- Determine the Likelihood and consequences of failure
- Determine Level of Risk
- Recommend Mitigation if appropriate
- Suggest re-inspection levels

Tree Assessment included:

- Species identification
- Measured for Diameter at 4.5 feet above ground (DBH)
- Total height by hypsometer
- Extent of live limbs (Dripline)
- Live green crown estimated
- TRAQ Level 2 Assessment
- Description of defects and tree vigor

In some instances, trees not shown on the maps but within the stated survey area were added.

Please refer to the attached Exhibits:

1. Tree Assessment Table
2. Glossary of Commonly Used Terms
3. Descriptive Photographs
4. Tree Protection and Mitigation Guidelines

Observations and Discussion

Over the entire project, 554 trees were assessed as indicated in the following table. Of those we are recommending the removal of 32 due to conditions leading to imminent failure.

In general, the coniferous trees are about 50 years in age. Many of the deciduous alder trees are significantly younger, having naturally regenerated after original site construction. Overall, tree health and vigor is good with few significant defects. In the case of dead or highly defective trees, we have recommended removals for safety sake. Defects are generally limited to forked trunks, or broken trunks. We did find indications of root disease in several deciduous trees as noted on the tree summary. We also observed areas of conifer root disease beyond the assessment area and noted those on the maps.

Recommendations

Rules of Thumb for tree protections during construction projects typically suggest no activity within the drip lines of trees. However this should be considered on a tree by tree basis during the design phase and monitored during and after construction.

We were specifically asked to consider the opportunities for tree relocation and/or protection for trees within the building campus area. In general, we would recommend that re-location not be attempted, and at the same time, the preparation of tree-specific protections to be incorporated into the design phase.

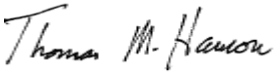
Limiting Conditions

This assessment is made subject to Level 2 TRAQ assessment guidelines and represents our observations on the date of the inspection. The assessment is valid for no more than 3 years.

There is no warranty suggested for any of the trees subject to this report. Weather, latent tree conditions, and future man-caused activities could cause physiologic changes and deteriorating tree condition. Over time, deteriorating tree conditions may appear and there may be conditions, which are not now visible which, could cause tree failure. This report or the verbal comments made at the site in no way warrant the structural stability or long term condition of any tree, but represent my opinion based on the observations made.

Nearly all trees in any condition standing within reach of improvements or human use areas represent hazards that could lead to damage or injury.

Respectfully Submitted,



Tom Hanson CF, RCA, TRAQ

Exhibits

1. Tree Assessment Table
2. Glossary of Commonly Used Terms
3. Descriptive Photographs
4. Tree Protection and Mitigation Plan

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Tree Assessment Summary Form
For: Madrona School

American Forest Management
Date: January 2015
Inspectors: Tom Hanson and Kelly Wilkinson

Tree #	Species	DBH (inches)	Height (feet)	Crown Ratio (%)	Dripline				Defects	Recommendations
					N	E	S	W		
1	Douglas-fir	24	117	60	2	4	22	12	pitchy bole	retain
2	Douglas-fir	27	119	60	8	18	20	22	pitchy bole	retain
3	Douglas-fir	21	111	70	18	22	10	20	basal pitching	retain
4	western red cedar	15	38	70	13	14	17	11	3` basal seam	retain
5	Douglas-fir	20	80	60	17	19	16	10		retain
6	Douglas-fir	29	110	70	21	16	20	23		retain
7	western hemlock	21	75	70	16	4	18	19		retain
8	western red cedar	22	62	70	10	14	15	6		retain
9	Douglas-fir	18	94	80	8	6	20	17		retain
10	western red cedar	15	54	80	12	12	12	13	pencil rot	retain
11	Douglas-fir	28	122	70	27	27	14	12	pitchy	retain
12	Douglas-fir	16	81	60	14	19	13	6		retain
13	Douglas-fir	33	120	60	20	27	29	30		retain
14	pacific madrone	9	38	40	4	4	13	21	20% dieback	retain
15	pacific madrone	11, 9, 7	35	50	6	10	28	18	decay, 20% dieback, trunk wound	retain
16	western red cedar	22	66	80	12	13	12	14	fork at 25', pencil rot	retain
17	pacific madrone	14, 12	76	70	40	12	6	33	minor basal decay, 20% dieback	retain
18	Douglas-fir	31	119	80	26	25	21	21	pitchy	retain
19	birch	9	25	30	8	10	10	13	dead top, fungus	remove
20	Douglas-fir	24	91	50	14	12	19	20	forks at 6'	retain
21	Douglas-fir	13	53	50	14	4	2	16	pink conks	remove
22	Douglas-fir	25	107	70	23	13	10	21		retain
23	Douglas-fir	21	95	50	18	16	18	14	fork at 50`	retain
24	pacific madrone	12	56	50	14	12	16	18	40% dieback, basal scar	retain
25	pacific madrone	12	64	20	1	13	26	15	30% dieback	retain
26	Douglas-fir	27	113	70	20	14	20	22		retain
27	Douglas-fir	18	96	70	15	15	18	24		retain
28	Douglas-fir	33	110	70	21	25	26	24	pitchy	retain
29	Douglas-fir	24	109	60	18	20	22	18	pitchy	retain
30	Douglas-fir	26	114	70	22	14	18	18	butt swell, pitchy	retain
31	Douglas-fir	27	104	60	23	18	18	20		retain
32	Douglas-fir	28	111	50	20	21	22	21	forked	retain
33	pacific madrone	11, 5, 5	49	60	6	6	25	15		retain
34	pine	7	39	70	4	8	10	6		retain
35	pacific dogwood	6, 4, 8	36	70	15	16	23	20	three dead stems	retain
36	pacific madrone	19	56	30	8	26	18	15	hollow stem to 20', fungal conks, 40% dieback	remove
37	Douglas-fir	18	110	80	15	13	9	13		retain
38	western red cedar	16	53	90	12	12	12	13	minor pencil rot	retain
39	Douglas-fir	24	110	50	15	8	9	12		retain
40	Douglas-fir	21	106	50	18	8	18	11	flat side	retain
41	Douglas-fir	15	81	70	10	15	20	4		retain
42	Douglas-fir	14	94	60	9	10	12	8		retain
43	pacific madrone	11	63	30	0	26	0	18	bole decay, 50% dieback	remove
44	Douglas-fir	25	96	70	13	23	9	21	pitchy, swollen butt	retain
45	pacific madrone	10, 7	38	70	12	12	16	6	30% dieback, bole decay	remove
46	Douglas-fir	19	82	50	10	14	12	8		retain
47	pacific madrone	16, 11	63	30	0	22	16	12	bole decay, 40% dieback	retain
48	Douglas-fir	34	114	60	16	13	20	22	broken top, butt swell	retain
49	Douglas-fir	28	120	40	18	16	14	14	butt swell	retain
50	pacific madrone	9	42	10	2	0	0	0	bole decay, 90% dieback	remove
51	Douglas-fir	24	90	40	13	6	15	10	broken top, heart rot	retain
52	Douglas-fir	35	126	50	11	30	22	20	flat side	retain
53	pacific madrone	6	42	30	0	8	6	2	heart rot, 40% dieback	retain
54	plum	9	22	70	14	12	14	7	former co-dominant stems	retain
55	plum	10	25	70	12	14	12	12		retain

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Tree #	Species	DBH (inches)	Height (feet)	Crown Ratio (%)	Dripline				Defects	Recommendations
					N	E	S	W		
56	pacific dogwood	8, 5, 3, 3	30	90	6	12	12	10		retain
57	European white birch	19	73	90	17	18	15	14		retain
58	plum	8	19	80	8	9	10	10		retain
59	maple	14	45	70	15	12	18	15		retain
60	Douglas-fir	19	81	80	12	16	20	18		retain
61	Douglas-fir	16	73	90	14	9	10	14		retain
62	Douglas-fir	30	115	60	13	22	20	18		retain
63	Douglas-fir	33	117	70	20	24	26	24		retain
64	Douglas-fir	27	118	70	26	18	12	16		retain
65	Douglas-fir	24	83	50	15	20	24	21	broken top	retain
66	Douglas-fir	33	126	60	13	23	10	16	pitchy, swollen butt	retain
67	Douglas-fir	24	93	80	22	18	4	16		retain
68	Douglas-fir	13	61	70	9	14	15	12		retain
69	European white birch	14	72	80	23	0	14	16	leans N	retain
70	pacific madrone	10	47	70	8	8	0	26	ivy on trunk, 30% dieback, leans W	retain
71	pacific madrone	8	29	70	12	0	0	24	leans W	retain
72	pacific madrone	11	41	60	8	8	0	28	leans W	retain
73	pacific madrone	7	33	50	0	6	0	22	50% dieback	retain
74	pacific madrone	9, 6, 8	68	40	0	0	0	26	leans W	retain
75	Douglas-fir	21	96	50	12	14	4	12		retain
76	Douglas-fir	23	105	60	4	14	12	25		retain
77	pacific madrone	10	28	70	0	0	0	38	leans W, 20% dieback	retain
78	pacific madrone	6	26	40	0	0	0	30	scar on bole, decay, 30% dieback	retain
79	Douglas-fir	29	115	70	14	24	16	24		retain
80	pacific madrone	8	35	20	0	0	0	21	40% dieback	retain
81	western red cedar	8, 8	32	90	10	2	1	15	forks at 2'	retain
82	western red cedar	10	32	90	8	2	8	6		retain
83	Douglas-fir	31	128	80	18	21	6	17		retain
84	Douglas-fir	32	114	70	12	20	22	12		retain
85	red alder	7, 6, 9	79	70	21	0	13	24	forks at base	retain
86	red alder	7	63	70	12	0	0	20		retain
87	red alder	7, 9, 5, 8	68	60	14	0	14	26	forks at base	retain
88	red alder	10	67	60	21	0	4	29		retain
89	red alder	12	85	70	10	0	9	26	leans W	retain
90	red alder	12	88	70	12	0	16	23	lower trunk scars, minor decay	retain
91	red alder	16	94	40	12	0	9	28	leans W	retain
92	Douglas-fir	26	105	30	13	14	6	9	severe dieback, root rot	remove
93	Douglas-fir	21	101	40	11	14	9	6		retain
94	red alder	15	85	40	8	0	10	30	leans W	retain
95	Douglas-fir	34	134	40	12	19	13	14		retain
96	Douglas-fir	30	125	40	8	12	8	6		retain
97	Douglas-fir	24	126	50	7	16	8	6		retain
98	Douglas-fir	13	60	40	9	12	11	9	suppressed, narrow crown	retain
99	Douglas-fir	29	123	60	29	15	29	29		retain
100	Douglas-fir	21	98	40	16	6	16	8		retain
101	western hemlock	16							dead	remove
102	western hemlock	44	132	60	16	11	10	16		retain
103	Douglas-fir	39	136	80	24	14	32	28		retain
104	Douglas-fir	44	136	80	27	19	12	14		retain
105	Douglas-fir	29	128	50	22	21	15	16		retain
106	red alder	28	65	70	24	24	2	23	in butt, low risk, would fall away from school, has compartmentalized deca	retain
107	red alder	13	71	60	20	6	0	24	decay at branch nodes, leans W	remove
108	red alder	12	86	50	4	10	0	26	leans W	retain
109	red alder	19	108	70	20	22	2	32	weak branch attachments, early stages of phytopthera	remove
110	red alder	14	112	50	10	0	21	24		retain

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Tree #	Species	DBH (inches)	Height (feet)	Crown Ratio (%)	Dripline				Defects	Recommendations
					N	E	S	W		
111	big leaf maple	24, 23, 7, 9, 4	94	70	19	10	25	22	forks at base, some included bark	retain
112	red alder	11	62	70	20	0	16	26	crook, leans W	retain
113	red alder	8	65	70	24	0	16	28	leans W	remove
114	red alder	10	72	50	4	0	4	24	leans W	remove
115	red alder	10	78	70	5	0	6	25	forks at 10', leans W	remove
116	bitter cherry	10	55	40	12	2	12	14		retain
117	red alder	12	68	50	12	2	12	26		retain
118	red alder	13	87	70	10	6	12	20		retain
119	red alder	17	76	60	0	0	0	35		retain
120	red alder	28	108	60	14	10	16	20	in decline	retain
121	red alder	13	68	50	12	0	12	24		retain
122	red alder	11, 7	67	70	12	0	20	24	leans W	retain
123	red alder	8, 8	62	80	9	0	9	20	forks at base, leans W	retain
124	red alder	10	69	70	4	4	6	22		retain
125	red alder	15	72	50	4	10	12	14	thick ivy on trunk	retain
126	willow	8, 6, 5, 3	39	60	12	10	12	15	ivy on trunk	retain
127	red alder	8	48	50	6	4	20	20		retain
128	Douglas-fir	19	86	40	14	14	14	18	broken top	retain
129	Douglas-fir	24	121	50	15	18	12	16		retain
130	Douglas-fir	31	118	60	14	23	20	26		retain
131	Douglas-fir	26	136	40	15	25	14	14	thin crown	retain
132	Douglas-fir	31	132	50	31	26	18	18	thin crown	retain
133	Douglas-fir	22	122	60	20	6	8	24	thin crown	retain
134	willow	7	38	60	14	10	9	4		retain
135	willow	8	39	50	6	6	3	9		retain
136	willow	6	42	50	4	10	0	11	leans N	retain
137	pacific madrone	18	48	30	10	7	9	5	dieback, heavy decay	remove
138	Douglas-fir	16	57	80	12	10	14	14		retain
139	pacific madrone	11	27	40	18	14	6	0	50% dieback	remove
140	Douglas-fir	20	65	80	21	24	4	20		retain
141	Douglas-fir	10	49	80	5	6	5	15		retain
142	Douglas-fir	13	55	80	5	9	21	18		retain
143	Douglas-fir	19	67	80	8	20	25	15		retain
144	Douglas-fir	18	62	70	21	21	8	21	thin crown	retain
145	Douglas-fir	19	56	80	8	17	16	16	thin crown	retain
146	Douglas-fir	10	61	60	18	11	2	15	thin crown, pitchy, root rot	remove
147	red alder	9	59	60	32	21	0	10	leans N	retain
148	western hemlock	11	42	20	18	6	3	4	dead top, thin crown	remove
149	western hemlock	13	60	80	20	4	3	7		retain
150	deciduous	6, 6	47	70	20	0	0	9	decay, crooks	remove
151	Douglas-fir	10	68	30	8	5	4	5	root rot, thin crown	remove
152	Douglas-fir	15	80	40	16	8	8	9	root rot, thin crown	remove
153	Douglas-fir	10	45	50	16	4	4	12	asymetrical crown	retain
154	red alder	13	74	40	26	12	6	8		retain
155	red alder	12	85	50	27	0	20	14		retain
156	red alder	16	83	60	30	20	0	6		retain
157	red alder	14	86	40	30	6	0	23		retain
158	red alder	8, 6	56	70	17	16	9	10	dead stems	retain
159	red alder	22	64	70	31	16	16	20		retain
160	willow	19	55	70	24	16	12	14		retain
161	red alder	9	39	60	20	14	2	12		retain
162	red alder	7	57	40	14	6	6	2	leans N	retain
163	red alder	5, 6, 4, 4	41	40	20	14	0	13	leans SW	retain
164	red alder	11	59	50	21	4	12	21	forks at 20'	retain
165	red alder	6	38	50	16	8	6	14		retain

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Tree #	Species	DBH (inches)	Height (feet)	Crown Ratio (%)	Dripline				Defects	Recommendations
					N	E	S	W		
166	pacific madrone	17	83	70	34	15	4	15		retain
167	pacific madrone	6	41	40	29	14	0	0	leans N	retain
168	willow	17	63	60	25	15	8	10		retain
169	red alder	6	30	30	23	0	0	13	dieback, lean E	remove
170	red alder	6							dead	remove
171	red alder	8, 9	52	50	18	18	6	9	dead wood, stem decay	remove
172	red alder	11	73	70	29	16	0	17		retain
173	red alder	16	100	90	26	19	4	6		retain
174	western red cedar	12	38	80	14	7	9	4		retain
175	western red cedar	18	59	80	13	8	5	5		retain
176	western red cedar	12	60	70	16	8	7	2		retain
177	Douglas-fir	16	65	60	16	6	8	6		retain
178	western red cedar	10	57	80	14	12	0	14		retain
179	western red cedar	14	51	80	14	10	10	1		retain
180	western red cedar	15	52	80	14	10	1	14		retain
181	western red cedar	23	65	70	18	8	13	6		retain
182	western red cedar	15	52	70	14	6	6	4		retain
183	western red cedar	13	50	70	12	2	12	2		retain
184	western red cedar	16	46	80	18	6	8	14		retain
185	western red cedar	10	34	80	12	6	12	12		retain
186	bitter cherry	9	41	60	16	4	5	15		retain
187	Douglas-fir	19	101	30	16	16	23	8	broken top	retain
188	bitter cherry	7	42	50	12	10	4	14		retain
189	Douglas-fir	24	135	60	20	12	26	2	thin crown	retain
190	Douglas-fir	22	140	60	23	2	23	2		retain
191	Douglas-fir	33	159	50	24	30	14	15		retain
192	Douglas-fir	19	120	40	19	19	16	6		retain
193	Douglas-fir	25	127	50	18	25	18	6	broken top	retain
194	pacific dogwood	16	36	70	16	16	14	0	co-dominant stems	retain
195	willow	15	62	60	14	21	13	0		retain
196	red alder	14	77	70	19	22	19	0		retain
197	black cottonwood	30	121	70	30	35	19	19		retain
198	red alder	15, 4, 8, 10	101	70	30	32	16	0		retain
199	red alder	22	105	60	26	55	30	0		retain
200	red alder	17	80	60	32	55	0	0	leans E	retain
201	red alder	13	55	50	19	51	22	0	leans E	retain
202	red alder	20	127	60	19	36	27	0		retain
203	red alder	12	56	60	0	43	6	0	leans E	retain
204	red alder	14	60	70	15	29	18	0		retain
205	red alder	16	69	60	6	35	19	0		retain
206	red alder	12	68	60	25	27	0	0		retain
207	red alder	17	120	70	17	34	21	0	former co-dominant stem broke off	retain
208	red alder	14	88	70	23	26	21	0		retain
209	red alder	11	86	60	16	22	16	0	cracks in bole, decay	remove
210	red alder	12	72	60	14	32	0	0		retain
211	red alder	15	81	60	17	35	0	0		retain
212	red alder	13	72	70	10	22	0	0		retain
213	red alder	8	68	70	14	10	0	0		retain
214	red alder	11	70	60	12	36	0	0	hollow knot	retain
215	red alder	13	75	50	20	30	26	0		retain
216	red alder	16	69	50	10	25	14	0	rotten knot	retain
217	red alder	16	75	60	16	28	13	0	crook, rotten knot	retain
218	red alder	17	84	60	16	38	13	0		retain
219	red alder	18	76	70	25	31	12	0	rotten knot	retain
220	pacific madrone	16	36	70	18	28	4	0	leans E, dead stems	retain

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Tree #	Species	DBH (inches)	Height (feet)	Crown Ratio (%)	Dripline				Defects	Recommendations
					N	E	S	W		
221	willow	17	42	60	20	26	14	0	rotten	remove
222	pacific madrone	17, 9	53	50	10	33	13	0	leans E, 20% dieback	retain
223	Douglas-fir	21	110	30	13	19	17	14		retain
224	Douglas-fir	42	146	90	24	28	22	22	pitchy, flat side	retain
225	European white birch	6, 6, 6	26	30	14	8	8	12	extensive decay	remove
226	maple	20	51	70	18	18	21	17	minor heart rot	retain
227	maple	16	38	70	16	15	15	14	forks at 6'	retain
228	Douglas fir	23	105	50	22	8	8	20	Pitchy, conks	Retain
229	Douglas fir	77	95	40	12	6	19	24		Retain
230	Douglas fir	21	100	50	6	8	18	16		Retain
231	red alder	15	62	80	21	14	18	14	Pytopthera	remove
232	red alder	13	64	70	11	13	12	18		Retain
233	red alder	13	60	80	72	17	16	16	crook	Retain
234	Hemlock	6	32	40	2	71	11	2		Retain
235	Douglas fir	7	42	70	8	6	10	6		Retain
236	western red cedar	16	40	80	12	11	6	14		Retain
237	western red cedar	18	37	80	20	14		14		Retain
238	Cherry	12, 10, 10	30	50	14	10	10	9		Retain
239	western red cedar	20	57	80	12	12	18	20	Cavities pencil rot	Retain
240	Douglas fir	34	132	70	20	26	20	20	Pitchy	Retain
241	Pacific madrone	20	56	80	12	24	14	0	10% die back	Retain
242	Pacific madrone	14	55	50	22	20		0	20% die back	Retain
243	Douglas fir	10	68	30	8	15	8	6		Retain
244	Douglas fir	12	67	50	12	14	10	6		Retain
245	Douglas fir	12	53	40	12	12	12	2		Retain
246	red alder	13	63	70	16	20	16	0	Cavity	Retain
247	Douglas fir	8	37	30	9	10	7	0		Retain
248	western red cedar	16, 18	71	90	14	16	16	6	Fork at 3'	Retain
249	Douglas fir	18	80	60	12	22	16	14		Retain
250	red alder	15	62	60	0	22		0		Retain
251	red alder	11	55	70	0	4	22	30		Retain
252	red alder	5, 12, 7, 11	55	80	24	24	16	0		Retain
253	red alder	2, 5	68	90	26	29	26	16		Retain
254	red alder	20	64	60	30	32	32	14	Black knots	Retain
255	Pacific madrone	19	90	20	10	39	24	0	20% die back	Retain
256	Douglas fir	16	77	20	0	8	8	6		Retain
257	Douglas fir	39	124	60	18	34	24	78	Pitchy	Retain
258	Douglas fir	44	134	70	30	28	22	20		Retain
259	Douglas fir	33	125	40	28	29	22	20		Retain
260	western red cedar	18	50	80	20	17	16	16		Retain
261	Deciduous	24	75	80	16	18	18	20		Retain
262	Alaska yellow cedar	13	38	90	5	7	6	8		Retain
263	Deciduous	17	32	60	14	16	18	16		Retain
264	Deciduous	13	39	70	17	12	16	13	Decay cavity	Retain
265	spruce	8	25	80	8	8	8	8		Retain
266	Flowering Cherry	10, 5	11	70	7	12	15	8	Root decay, cannot be moved	retain
267	Flowering Cherry	7, 4, 8, 6	12	20	17	17	16	14	Limb 6 decay & funbus conks	retain
268	Flowering Cherry	7, 7	12	70	8	12	11	10		Retain
269	Alaska yellow cedar	9	30	90	7	8	7	8		Retain
270	Alaska yellow cedar	7	30	90	5	6	6	6		Retain
271	Alaska yellow cedar	10	31	90	8	8	8	8		Retain
272	Evergreen white birch	16	52	70	13	14	19	13	Cannot be moved	retain
273	Laurel	5, 9	22	80		6	6			retain
274	Laurel	6, 9	22	80	12	5	6	12		retain
275	Douglas fir	29	125	70	8	12	14	15	upper bole pitchy	retain

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					N	E	S	W		
276	Douglas fir	10	35	60	5	11	12	10		retain
277	Douglas fir	22	83	40	6	7	22	18	Top broken out at 35'	retain
278	Douglas fir	20, 28	53	60	4	12	12	10	Top broken out	retain
279	Douglas fir	19	91	30	7	16	12	9		retain
280	Grand fir	28	90	40	16	19	9	19		Retain
281	Grand fir	9	61	30	4	6	6	7		Retain
282	Douglas fir	14	82	30	6	8	8	7		Retain
283	Douglas fir	11	80	20	9	8	4	8		Retain
284	western red cedar	13	43	90	9	10	12	13	Basal cavity at 2'	Retain
285	Douglas fir	9	35	70	9	10	9	11	Supressed	Retain
286	Douglas fir	14	83	20	6	5	6	7	flat side, butt swell	Retain
287	Douglas fir	23	97	40	11	7	10	12	Top broken out	Retain
288	Douglas fir	21	112	30	9	13	12	10		Retain
289	Douglas fir	12	74	40	8	8	7	7		Retain
290	Douglas fir	12	70	60	8	14	12	6		Retain
291	Douglas fir	10	16	30	6	12	5	15	Severe decay	remove
292	Douglas fir	23	113	40	6	4	10	14		Retain
293	Douglas fir	19	112	30	9	8	5	9		Retain
294	Douglas fir	22	114	30	6	7	8	6	Basal scar	Retain
295	Douglas fir	25	121	40	9	11	10	8	butt swell, pitching	Retain
296	Douglas fir	15	68	50	13	13	12	8		Retain
297	Douglas fir	10	43	30	9	6	12	14		Retain
298	Douglas fir	12	74	20	12	6	7	9	Top broken out	Retain
299	Douglas fir	11	68	20	9	6	7	7		Retain
300	Douglas fir	10	54	40	6	7	9	13		Retain
301	Douglas fir	26	129	50	9	8	11	9		Retain
302	Pacific madrone	15	57	40	15	0	0	25	10% die back	Retain
303	Pacific madrone	17	57	50	31	4	2	6		Retain
304	Douglas fir	42	136	30	12	15	9	10	crack at 20'	Retain
305	Douglas fir	24	116	50	15	32	18	10		Retain
306	Pacific madrone	15, 13	55	40	18	38	8	10	10% die back	Retain
307	Douglas-fir	9	33	80	11	14	6	6		Retain
308	Douglas-fir	29	125	40	8	20	22	20		Retain
309	Douglas-fir	25	115	60	18	10	14	16		Retain
310	Pacific madrone	20	49	60	21	8	25	25		Retain
311	Douglas-fir	24	131	40	20	10	26	14	scar on trutk	Retain
312	Douglas-fir	28	150	40	26	21	20	15	flat side, minor pitching	Retain
313	Pacific madrone	11	62	70	13	0	13	17	leans w	Retain
314	Pacific madrone	7	61	50	18	2	8	10	leans w	Retain
315	Douglas-fir	28	142	60	14	20	20	14	flat side	Retain
316	Douglas-fir	6	41	70	11	4	4	11		Retain
317	Douglas-fir	11	62	70	18	9	9	0		Retain
318	Douglas-fir	7	54	70	3	0	9	14		Retain
319	Douglas-fir	10	75	70	13	8	6	13		Retain
320	Douglas-fir	26	112	40	39	6	14	22	bt, 10% dieback, cavity at 12`	remove
321	Douglas-fir	15	89	50	22	2	27	26		retain
322	Douglas-fir	11	78	40	16	4	22	21		retain
323	big leaf maple	10, 13, 13	65	70	33	0	26	31	forks at 1`	retain
324	big leaf maple	11, 10, 12, 11, 1	71	70	18	6	29	27	forks at 1`	retain
325	western red cedar	6	29	90	9	2	8	10		retain
326	Douglas-fir	18	99	80	14	12	15	13	corrected sweep	retain
327	Douglas-fir	15	85	70	24	6	19	17	self corrected sweep	retain
328	Douglas-fir	14	100	70	18	4	14	15		retain
329	Douglas-fir	7	49	70	7	0	8	10		retain
330	Douglas-fir	7	52	70	9	8	10	12		retain

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					N	E	S	W		
331	Douglas-fir	8	51	80	12	6	8	13		retain
332	Douglas-fir	7	56	70	12	6	8	10		retain
333	Pacific madrone	16	72	60	16	0	19	26		retain
334	Douglas-fir	8	45	70	15	2	14	6	crook at 10`	retain
335	Pacific madrone	7, 5	49	60	10	0	16	14		retain
336	bitter cherry	7	55	80	6	4	6	14		retain
337	Douglas-fir	9	64	50	4	2	16	9		retain
338	Douglas-fir	9	59	50	5	4	12	6		retain
339	Douglas-fir	12	61	50	8	4	7	14		retain
340	Douglas-fir	10	60	70	12	7	7	14		retain
341	Douglas-fir	13	74	80	12	4	12	16		retain
342	Douglas-fir	14	82	80	9	6	13	16		retain
343	Douglas-fir	11	65	80	17	6	13	15		retain
344	Douglas-fir	11	59	80	13	5	10	14		retain
345	Douglas-fir	9	35	90	12	5	10	14		retain
346	Douglas-fir	9	67	70	8	2	9	14		retain
347	Douglas-fir	10	69	70	6	4	6	14		retain
348	Douglas-fir	11	50	90	9	4	9	16		retain
349	Douglas-fir	11	91	80	4	4	8	16		retain
350	Douglas-fir	10	59	80	9	7	6	14		retain
351	Douglas-fir	11	55	70	12	6	8	16		retain
352	Pacific madrone	8	36	50	6	0	7	24	10% dieback	retain
353	Pacific madrone	14	41	70	10	0	11	29		retain
354	western red cedar	10	47	80	13	8	10	14		retain
355	Douglas-fir	30	132	50	25	14	18	36	thin crown, pitchy, flat side, root rot	remove
356	western red cedar	10	27	90	13	6	9	14		retain
357	Douglas-fir	23	83	50	10	6	28	34	root rot	remove
358	Douglas-fir	27	160	40	24	10	18	22	root rot, thin crown	remove
359	Douglas-fir	12	68	20	14	0	5	25	small crown, old lightning scar	remove
360	Douglas-fir	7	35	80	6	0	11	11		retain
361	willow	10, 9	67	70	14	0	10	27	forks at 1`	retain
362	western red cedar	13	58	80	14	4	8	17		retain
363	western red cedar	22	74	90	10	4	14	19		retain
364	Pacific madrone	10	45	70	14	0	9	24	leaf spot	retain
365	western red cedar	19	64	80	14	5	12	19		retain
366	Douglas-fir	25	126	30	14	8	14	22	thin crown, pitchy, flat side	retain
367	Pacific madrone	5	22	60	4	0	6	16	leaf spot	retain
368	Douglas-fir	4	20	80	6	4	8	12		retain
369	Pacific madrone	7	34	70	8	0	8	18		retain
370	Douglas-fir	33	143	40	24	9	28	20	broken top	retain
371	Douglas-fir	8	56	70	10	11	9	4		retain
372	Pacific madrone	6	23	70	4	0	4	19		retain
373	Douglas-fir	31	150	50	29	29	24	32		retain
374	Douglas-fir	30	146	60	21	20	27	26		retain
375	Pacific madrone	10, 10	54	70	18	0	26	35		retain
376	Douglas-fir	9	62	30	6	6	8	8		retain
377	birch	8	52	50	5	0	0	18		retain
378	red alder	12	64	60	18	4	12	22	trunk seam	retain
379	red alder	8	50	60	8	0	6	16		retain
380	red alder	11	66	70	8	3	15	22		retain
381	red alder	8	60	60	14	0	0	25		retain
382	Douglas-fir	12	68	80	9	8	9	15		retain
383	Douglas-fir	8	40	50	14	0	4	16	sweep	retain
384	Douglas-fir	13	60	70	15	3	16	19	crooks	retain
385	Douglas-fir	14	86	60	10	6	12	16		retain

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					N	E	S	W		
386	Douglas-fir	11	84	50	8	2	8	20	leaner	retain
387	Douglas-fir	20	86	80	12	7	13	24		retain
388	red alder	8	75	60	26	0	0	23		retain
389	Douglas-fir	17	89	70	12	8	10	13		retain
390	Douglas-fir	9	65	70	11	4	12	14		retain
391	Douglas-fir	7	46	80	8	4	7	11		retain
392	Douglas-fir	28	119	40	15	6	10	15	flat side	retain
393	Douglas-fir	29	142	40	15	10	15	16		retain
394	Pacific madrone	10	40	50	2	0	15	18	10 % dieback	retain
395	Douglas-fir	25	123	40	12	14	9	17	flat side	retain
396	Pacific madrone	10	51	40	5	0	5	19		retain
397	Pacific madrone	11	51	40	5	0	5	10		retain
398	Douglas-fir	10	68	60	6	4	10	6		retain
399	red alder	10	577	60	40	0	3	15		retain
400	Douglas-fir	16	88	80	8	7	7	19		retain
401	western hemlock	13	60	70	6	1	8	12		retain
402	western red cedar	5	18	50	7	2	6	14		retain
403	Douglas-fir	14	48	70	9	7	12	14		retain
404	Douglas-fir	37	150	40	14	7	12	20	flat side	retain
405	Douglas-fir	24	123	40	12	14	11	13		retain
406	Douglas-fir	13	68	40	11	7	10	11	ivy	retain
407	Douglas-fir	11	61	40	9	7	10	10	ivy	retain
408	Pacific madrone	14	53	60	0	5	17	19		retain
409	western hemlock	23	75	70	10	13	15	24		retain
410	western red cedar	13	43	90	17	15	10	15		retain
411	red alder	24	93	60	35	35	12	4		retain
412	red alder	12	75	30	1	18	15	0	upper trunk decay	retain
413	bitter cherry	11	76	30	10	10	7	4	trunk seam	retain
414	western hemlock	8	48	80	9	15	9	8		retain
415	red alder	9	83	40	11	11	15	6		retain
416	red alder	14	84	60	25	28	16	8		retain
417	red alder	9	64	40	9	0	9	16		retain
418	red alder	7	35	40	4	19	0	0		retain
419	Douglas-fir	10	51	40	6	11	8	0		retain
420	red alder	9	41	20	0	0	5	19		retain
421	Douglas-fir	6	50	30	6	0	9	6		retain
422	Douglas-fir	7	39	50	8	11	8	0	lower trunk wounds	retain
423	willow	9	37	30	8	16	0	0		retain
424	red alder	11	55	60	18	24	11	0		retain
425	red alder	10	72	40	14	13	9	10		retain
426	red alder	9	50	40	4	45	0	0		retain
427	red alder	8,6	50	40	4	20	0	0		retain
428	red alder	10	52	40	0	10	0	0		retain
429	black cottonwood	25	108	60	16	31	19	13		retain
430	Douglas-fir	8	32	30	10	15	5	4		retain
431	Douglas-fir	8	32	30	10	20	5	0		retain
432	red alder	14	66	70	7	28	7	9		retain
433	Pacific madrone	7,6	41	30	7	20	14	0	10 percent dieback	retain
434	Douglas-fir	33	133	60	12	12	7	10		retain
435	birch	7,4,8,5	71	30	10	13	14	3		retain
436	red alder	10	63	50	20	15	5	0		retain
437	red alder	6,7	63	50	18	15	3	7		retain
438	red alder	17	82	70	28	34	26	12		retain
439	red alder	15	69	70	12	22	12	0		retain
440	red alder	9,9,7	69	50	10	11	29	1		retain

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					N	E	S	W		
441	Douglas-fir	39	141	60	15	16	17	17		retain
442	Pacific madrone	6,11	40	50	11	20	7	8		retain
443	Douglas-fir	24	111	40	10	14	13	8		retain
444	bitter cherry	9	32	70	11	12	6	4		retain
445	Pacific madrone	9	48	30	0	18	0	0	dead fork	retain
446	Douglas-fir	11	62	70	10	13	8	8		retain
447	Douglas-fir	13	69	70	9	16	14	3		retain
448	Douglas-fir	10,7	65	70	13	20	8	6		retain
449	Douglas-fir	6	26	30	5	8	6	6		retain
450	western red cedar	17	70	50	13	15	10	8		retain
451	western hemlock	23	111	70	13	20	13	10		retain
452	Douglas-fir	23	122	30	14	14	11	9		retain
453	Douglas-fir	11	79	20	9	13	8	6		retain
454	Douglas-fir	14	97	20	8	10	5	5		retain
455	Douglas-fir	18	119	30	5	6	8	7		retain
456	Douglas-fir	23	129	40	18	25	6	4		retain
457	Douglas-fir	30	163	50	16	18	10	7	butt swell	retain
458	Douglas-fir	14	120	20	4	12	10	5		retain
459	Douglas-fir	27	153	20	9	10	8	8		retain
460	Douglas-fir	23	150	20	10	11	10	8		retain
461	Douglas-fir	31	154	40	14	13	9	12	pitchy	retain
462	Douglas-fir	44	154	40	12	18	13	9	pitchy	retain
463	western hemlock	10	38	60	12	20	12	12		retain
464	western hemlock	18,19	130	30	16	12	13	15	double stem	retain
465	Douglas-fir	33	155	30	15	13	13	11		retain
466	Douglas-fir	12	67	10	7	21	16	5		retain
467	Douglas-fir	21	92	10	0	20	8	0	broken top	retain
468	Douglas-fir	33	148	30	6	15	13	14		retain
469	Douglas-fir	27	142	40	12	15	12	7		retain
470	Douglas-fir	20	150	20	4	5	9	7		retain
471	Douglas-fir	22	103	30	10	13	12	8		retain
472	Douglas-fir	20	140	30	4	10	14	5		retain
473	Douglas-fir	34	148	40	22	23	17	11		retain
474	Douglas-fir	10	75	40	10	11	10	5		retain
475	Douglas-fir	13	104	30	9	14	10	5		retain
476	Douglas-fir	17	99	50	9	9	10	8		retain
477	Douglas-fir	28	135	30	11	7	12	11		retain
478	Douglas-fir	35	145	40	15	23	15	6		retain
479	Douglas-fir	26	147	40	16	18	10	15		retain

Glossary of Common Terms

DBH Diameter at breast height, 4 ½' above ground level

Basal In the vicinity of the root/trunk connection at ground level

Bole The tree stem (**Trunk)**

Butt Swell Abnormal swelling at the base of the tree

Canker Localized diseased area on stems, roots and branches. Often shrunken and discolored.

Codominant Two or more trunks originating from a single main trunk

Conk The fruiting body of a fungus

Crook Abrupt bend in a branch or trunk

Crown The live branches or live leaves or live needles of a tree

Crown ratio The percentage of live green leaves or needles to total height

Dieback Notable dead foliage, starting at the end of a branch or the top of a tree

Dripline The extent of live limbs from the trunk

Epicormic A shoot arising from a dormant bud following exposure to sunlight

Flat Side Trunk of the tree has a flattened appearance on the side, sometimes an indicator of internal decay

Girdling Root A root that winds around the stem at ground level

Included Bark Bark that is pinched between codominant stems; a common weak point

Leader The central stem tip

Leaf Spot Diseased areas on foliage

Limb Collar The swelling at the junction of the bole and limb

Pencil rot Severe stem decay and butt rot of western red cedar caused by *Postia sericiomollis*

Photosynthesis The process of converting water, nutrients and CO2 to carbohydrates (wood)

Phytopthera	Pathogen affecting roots of trees especially red alder in wet conditions
Pitchy	Excessive sap exuding from the tree trunk; often an indicator of stress
Pruning	The cutting and removal of limbs **(Crown Raising)**
Rotten knot (Black knot)	Point of the stem where limb removal has allowed pathogen infection and decay
Taper	The ratio of diameter on different points of a trunk, stem or branch
Thin Crown	Comparatively low live foliage percentage; often an indicator of root disease
Topping	Removal of the main stem above live, green limbs
Trimming	Shortening or cutting of limbs; sometimes called **heading**
Trunk Seam	A seam in the trunk, suggests internal decay
Viable	A structurally sound and healthy condition
Vigor	Tree health and growth rate
Vitality	The suitability of the tree for the site.

Tree Species Common to Madrona School

Alaska yellow cedar	Cupressus nootkatensis
Bitter Cherry	*Prunus emarginata*
Black cottonwood	Populus nigra
Douglas-fir	*Psuedotsuga menziesii*
Flowering cherry	Prunus kwanzan
Laurel	*Prunus lusitanica*
Lodgepole pine	*Pinus contorta*
Pacific dogwood	*Cornus nuttallii*
Pacific Madrone	*Arbutus menziesii*
Spruce	*Picea sp.*
Red Alder	*Alnus rubra*
Western red cedar	Thuya plicata
Western hemlock	*Tsuga heterophylla*
White birch	*Betula papyrifera*
Willow	*Salix scouleriana*

Back filled root collar on tree #502

Normal root collar Tree #28

Red smooth bark on cedar #8, indicating pencil rot

Red alder normally reaching for light

Thin crowns indicating laminated root rot in trees #132 and 133

Brown cubical rot – fungal conk on tree #494

Laminated Root Rot on failed tree

Pitching on tree #461

Bacterial disease on madrone #364

Thin crowns—evidence of laminated root rot tree #357

Fungus on white birch

Codominant stems and included bark Tree #32

Trunk decay in madrone Tree #43

Tree Protection and Mitigation Guidelines

The following general guidelines are recommended to ensure that the designated space set aside for the retained trees are protected and construction impacts are kept to a minimum. Potentially harmful activities can include:

- Trenching
- Re-grading—lowering or raising the grade
- Over-filling with soil, asphalt, concrete, etc.
- Compaction
- Pruning for building clearance
- Equipment Storage

All workers should be educated as to the reasons for protecting trees and the potential impacts of construction activities.

These guidelines acknowledge the integration of play activities within the root zones of the trees and refer only to those trees in and near future construction zones.

Retained Trees

1. Tree protection fencing should be erected around retained trees and positioned just beyond the drip-line edge prior to moving any heavy equipment on site. Doing this will set clearing limits and avoid compaction of soils within root zones of retained trees.

2. Any existing infrastructure to be removed within the drip-line or tree protection zone shall be removed by hand or utilizing a tracked mini-excavator.

3. Excavation limits should be laid out in paint on the ground to avoid over excavating.

4. Excavations within the drip-lines shall be monitored by a qualified tree professional so necessary precautions can be taken to decrease impacts to tree parts. A qualified tree professional shall monitor excavations when work is required and allowed within the "limits of disturbance".

5. To establish sub grade for foundations, curbs and pavement sections near the trees, soil should be removed parallel to the roots and not at 90 degree angles to avoid breaking and tearing roots that lead back to the trunk within the drip-line. Any roots damaged during these excavations should be exposed to sound tissue and cut cleanly with a saw. Cutting tools should be sterilized with alcohol.

6. Areas excavated within the drip-line of retained trees should be thoroughly irrigated weekly during dry periods.

7. Preparations for final landscaping shall be accomplished by hand within the drip-lines of retained trees. Large equipment shall be kept outside of the tree protection zones at all times. Simply finish landscape within 10' of retained trees with a 2" to 4" layer of organic mulch.

8. Limb removal (pruning) should be conducted by a trained arborist to ANSI 300 standards. Specific pruning guidelines can be developed on a tree by tree basis.

9. Once construction plans are in place, protection plans specific to individual trees should be developed and a monitoring plan put in place.

10. Existing trees within the existing building campuses are not likely to be candidates for relocation. In fact most of those assessed have broadly spreading and shallow root structures that should be protected to a greater extent than the dripline. Once construction plans are in place, specific protections should be implemented on a tree by tree basis.

Mitigation Guidelines

Trees to be retained can be "adjusted" to provide wildlife habitat while reducing hazard risk.

1. Trees unsafe to climb should be felled at the stump and if possible left on site to provide burrowing sites.

2. Coniferous trees that can be climbed by a professional tree climber can be height reduced to about 30-feet (or less if a failure would strike infrastructure) and any limbs below the height reduction removed.

3. Deciduous trees that can be climbed by a professional tree climber can be height reduced to about 30-feet (or less if a failure would strike infrastructure) and any limbs below the height reduction removed. Sprouting is likely, thus periodic re-cutting of sprouts will likely be required.

4. Debris can be left on site, off trails and out of open areas as additional habitat.

General

Tree removal and mitigation debris can be left on site if space allows. Chipping of debris is an alternative but care must be taken not to pile chips around tree bases, but rather spread in a layer no deeper than 6-inches across the forest floor.

In any event, the Madrona trees should be inspected on a three year cycle for the appearance of defects or declining vigor.