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Overview

Plans are underway for the development of new homes located at 8511 15th NE in Seattle. As part of the permitting process tree preservation is required under the City of Seattle Municipal code. A Tree Inspection was requested to determine whether the trees on site require special consideration as Exceptional Trees according to the criteria established by the Department of Planning. A proposal was made to inspect the trees on site. The proposal includes:

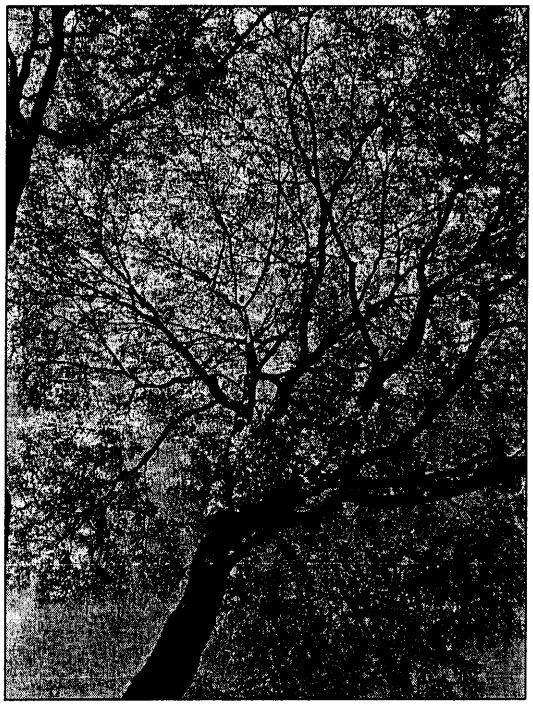
- To perform a baseline inspection of the trees prior to the development of the site at 8511 15th NE in Seattle with reference to the site survey.
- To determine the health and structural stability of the trees.
- To assess the suitability of the trees for retention based on size, species and survivability.
- To evaluate whether the trees are exceptional as determined by the Directors Rule 6 2001.

The proposal was accepted and the inspection took place March, 2007.

Tree Inspection

To develop an accurate picture of tree health and condition, information must be gathered about the multiple, changeable, factors which influence tree vitality and stability. Vital, healthy tree growth is the result of a complex association of internal and external influences and to consider each tree as an isolated entity is to fall short in understanding the whole picture. As a practical matter, this information must be gathered and structured in the best way to communicate the results of the observations and to impart any recommendations for treatment.

Individual tree inspection begins at ground level; tree genus and species is determined and soil quality, rooting conditions, soil level, irrigation and drainage characteristics are observed. Soil is a living micro-system that relies on an active working relationship between structural and living organic components. The structural condition of the soil is most commonly adversely affected.



The quality of the soil may be assessed in its ability to contain and disperse available moisture and the level of soil compaction may be tested to evaluate the aeration capacity of the soil. Some soil types are easily compacted and although they are high in nutrient quantity, little of that nutrient quality is available to the growing tree. Compact soils also cause problems by restricting the trees ability to discharge the gasses produced as part of the growth cycle.

The visible parts of the tree, the trunk, branches and leaves live in balance with the unseen roots. Damage to the soil leads to inhibited root growth and causes a lack of vitality and decline within the tree as a whole. Soil compaction is

commonly the result of heavy traffic in the root zone. The effects of soil compaction may not become apparent in the tree for decades following the initial compaction event.

If signs of stress are present, a soil test may be made to assess the fertility of the soil. Testing establishes the presence and degree of vital nutrients and micro-flora. Vital soil is essential to vital tree growth, the presence of nutrients and organisms within the soil mean that growth can continue. An imbalance of nutrients can cause poor vitality; often exhibited by leaf discoloration or lack of annual growth. Poor nutrition will slow growth and can diminish the trees natural defense mechanisms and expose the tree to disease.

In nature, few tree species grow alone; the forest is their natural and protected setting. Whether native or introduced, irregardless of a trees origin, trees in a landscape setting demand special attention. Although bound by the genetic code of its predecessors each tree is also the product of its local environment in terms of health and stability.

Looking at the overall picture, the health of the soil, turf and other plants and trees can reveal the cause of disease, or indicate potential problems. The presence of certain species of fungus can indicate decay. Certain decay fungi may destroy support tissues and leave conductive tissues unharmed. The tree may appear healthy and continue to grow until the internal decay outpaces the new outer growth.

A root crown examination may be necessary if root decay is suspected. By removing the soil at the base of the tree, the location, health and condition of the absorbing and support roots can be determined.

In the primary examin-ation of the root crown and trunk a mallet is used to test for loose bark. Bark lifting can indicate dead or hollow areas and give signs of the presence of decay in the root crown zone and at the base of the trunk. The mallet may be used to "sound" for decay but has limited reliability. If decay is suspected the tree will be tested using the Resistograph. The Resistograph is an instrument that inserts a constant velocity probe into the suspect area of the tree. The resistance to the probe is graphed by the machine. The graph profile can tell a great deal about the internal character of the wood. Internal defects can be detected, cracks, hollows and early stage decay. The type of decay and its effect on the stability of the wood depends on the species of fungus involved. Soil and root tissue samples may be taken to determine the cause of disease by laboratory testing.

The inspection continues with an evaluation of the tree crown, first by eye or with the use of binoculars then, if necessary, by climbing into the canopy of the tree. The color, size and condition of the leaves, trunk, branches and twigs is assessed. The form and formation of all the trees components give information about health, vitality and structural strength. The crown density, the number of leaves on each stem, and past and current growth extension, indicate current health and reveal previous problems. Changes in growth rate in past growth may indicate prior disease or injury.

An evaluation of the general growth habit will reveal any problems related to vigor, or the genetic component of tree growth. Previous treatments such as pruning or cabling are observed, the quality of the work, and its effect on the tree. Any growth abnormalities are noted: weak limbs, discolored or missing bark, cracks or cavities in branches or trunks. Indications of disease are observed

within the canopy of the tree, disease may be indicated by leaf blight, stem canker, fungal growth or insect and bird activity.

Trees produce adaptive growth to compensate for the stress related to growth and injury. The shape and formation of limbs and trunks can show the ability of the tree to compensate for weakness or indicate internal problems that may lead to limb or trunk breakage. The interpretation of these changes in form is part of a growing body of knowledge pioneered in Europe. The knowledge is not new but the application is: Dr. Claus Mattheck of the Karlsruhe Institute and colleagues, have developed a system of structural evaluation based on the principals of bio-engineering. I have chosen to use this approach to augment my own knowledge and experience.

Observations

One hundred and four trees were surveyed seventy-nine trees six inches and over were inspected and form the basis for this report. The trees are numbered on the survey and the numbers are shown on the fieldwork forms. The trees in eighteen species include:

- Pacific Madrone (*Arbutus menziesii*)
- Douglas fir (*Pseudotsuga menziesii*)
- Western Hemlock (*Tsuga heterophylla*)
- Alpine Fir (*Abies lasiocarpa*)
- Western White Pine (*Pinus monticola*)
- Red Maple (*Acer rubrum* var)
- Cherry (*Prunus avium* var)
- Birch (*Betula pendula*)

- Pacific Dogwood (*Cornus nuttallii*)
- Scots Pine *(Pinus sylvestris)*
- Mugo Pine *(Pinus mughus)*
- Western redcedar (*Thuja plicata*)
- Japanese Red Pine *(Pinus densiflora)*
- Japanese Black Pine *(Pinus Thunbergii)*
- Chinese Pine (*Pinus tabuliformis*)
- Arborvitae (*Thuja occidentalis* 'pyramidalis')
- Flowering Plum (*Prunus* 'Blieriana')
- Holly (*Ilex x altarclarensis* var.)

To determine whether the trees on site meet the criteria outlined in the Directors Rule 6-2001, the site was visited measurements of diameter, height and crown spread were taken the trees were identified and an evaluation of condition and survivability was made. The information was gathered on the attached field work forms. The form delineates into the following categories:

- **Tree Number** Identification number as shown on the attached sketch plan.
- **Species and Origin** Tree species, N=native nn= non-native.
- **DBH** Diameter of the trunk at 4.5'
- **Crown Spread** Average extension of limbs to dripline.
- **Height** Distance from the base of the tree to the highest point.
- **Threshold Diameter** Diameter at which a species should be evaluated.
- **AFA Points** One point per foot in height. One point per four feet of crown spread. One point per inch of circumference (DBH x 3.1416)
- **75% Champion Points** Whether the non native tree is 75% the size of the state champion tree.
- **Health and structural condition** An evaluation of the tree for vitality, disease, decay, defect and form. Poor, Moderate Good.

- **Survivability (20 years)** An estimation of whether the tree will continue healthy growth without developing serious structural weakness for 20 years following construction. Low, Moderate, Good
- **Directors Rule status** Given the preceding criteria whether the tree should be designated as exceptional. If non exceptional excluded by poor condition C, low survivability S non exceptional species Spp. Below threshold size Si.

The Directors Rule

The Director's Rule 6: 2001 contains specifications that call for the basic delineation of trees by two criteria, tree species and size. Tree species are further classified by origin; native and non-native species. Native species are further delineated by desirability as trees that ***never should be designated***, trees that ***sometimes should be designated*** and trees that ***should be designated in all cases***. A list of species and ***threshold diameters*** is provided in the Directors Rule.

The method of size measurement differs between native and non-native species. Native species are evaluated by trunk girth, measured at 4.5' above the ground (DBH). Non-native species are measured using the American Forestry Association (AFA) system which combines circumference at 4.5' (CBH) with a measurement of height and crown spread and attributes points based on a combination of the measurements. The intent of the specification is to identify ***exceptional trees.*** These are trees of particular species, of significant size in good condition. The Directors rule states that exceptional tree determination will be attributed to a Non Native tree that is 75% of the Washington Champion Trees' AFA points rating. In designating a Native Tree, size, condition, historical value, projected life-span, survivability and hazard potential are considered and threshold diameters are provided.

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
1	Douglas fir N	22"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
2	Madrone N	6"	12'	18'	NA	NA	NA	Good Good	Good	Exceptional
4	Douglas fir N	24"	NA	NA	36"	NA	NA	Mod Mod/Poor	Mod	Non Exceptional Si
5	Douglas fir N	32"	NA	NA	36"	NA	NA	Good Mod	Good	Non Exceptional Si
6	Douglas fir N	24"	NA	NA	36"	NA	NA	Poor/Mod Mod	Mod	Non Exceptional Si
7	Hemlock N	16"	NA	NA	24"	NA	NA	Dead Tree	NA	NA
8	Douglas fir N	26"	NA	NA	36"	NA	NA	Poor/Mod Poor	Low	Non Exceptional S, C
9	Douglas fir N	10"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
10	Hemlock N	18"	NA	NA	24"	NA	NA	Poor Poor	Low	Non Exceptional S, C

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
11	Douglas fir N	30"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
12	Douglas fir N	18"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C
13	Hemlock N	12"	NA	NA	24"	NA	NA	Dead Tree	NA	NA
14	Douglas fir N	10"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
15	Douglas fir N	20"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
16	Douglas fir N	16"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
17	Douglas fir N	26"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
18	Douglas fir N	32"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
19	Douglas fir N	14"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
20	Douglas fir N	24"	NA	NA	36"	NA	NA	Poor Mod	Mod	Non Exceptional C
21	Douglas fir N	28"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
22	Douglas fir N	22"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
23	Douglas fir N	22"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
24	Douglas fir N	16"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
25	Douglas fir N	12"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C
26	Douglas fir N	20"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C
27	Douglas fir N	14"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C
29	Holly nn	6"	21'	26'	NA	49	81	Good Good	Good	Non Exceptional Si

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
30	Douglas fir N	12"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C
31	Hemlock N	18"	NA	NA	24"	NA	NA	Poor Poor	Low	Non Exceptional S, C
32	Douglas fir N	16"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
33	Douglas fir N	16"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
34	Douglas fir N	16"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
35	Douglas fir N	20"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
36	Hemlock N	22"	NA	NA	24"	NA	NA	Mod Poor	Low	Non Exceptional S, C
37	Douglas fir N	24"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C
38	Douglas fir N	22"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
39	Cherry nn	22"	45'	35'	NA	115	198	Mod Poor	Mod	Non Exceptional Si
40	Douglas fir N	24"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
41	Douglas fir N	36"	40'	98'	36"	NA	NA	Mod Good	Mod	Exceptional
42	Douglas fir N	32"	NA	NA	36"	NA	NA	Mod/Poor Mod/Poor	Low	Non Exceptional S, C
43	Redcedar N	16"	NA	NA	48"	NA	NA	Good Good	Good	Non Exceptional Si
44	Douglas fir N	28"	NA	NA	36"	NA	NA	Mod Mod	Mod	Non Exceptional Si
45	Douglas fir N	12"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
46	Douglas fir N	14"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional C
47	Douglas fir N	20"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
49	Douglas fir N	18"	NA	NA	36"	NA	NA	Poor Poor	Low	Non Exceptional S, C
50	Douglas fir N	24"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional C
51	Dogwood N	16"	NA	NA	6"	NA	NA	Poor Poor	Low	Non Exceptional S, C
52	Douglas fir N	24"	NA	NA	36"	NA	NA	Good Mod	Good	Non Exceptional Si
53	Douglas fir N	26"	NA	NA	36"	NA	NA	Poor Mod	Low	Non Exceptional C
54	Douglas fir N	26"	NA	NA	36"	NA	NA	Poor Mod	Low	Non Exceptional C
62	Dogwood N	6"	15'	19'	6"	NA	NA	Good Good	Good	Exceptional
66	White Pine N	24"	48'	62'	24"	NA	NA	Good Poor/Mod	Mod	Non Exceptional C S
67	Cypress nn	6"	12'	13'	NA	35	133	Mod Poor	Low	Non Exceptional C

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
68	White Pine N	10"	NA	NA	24"	NA	NA	Mod Mod	Mod	Non Exceptional Si
69	Hemlock N	20"	NA	NA	24"	NA	NA	Good Mod	Mod	Non Exceptional Si
70	Douglas fir N	36"	45'	85'	36"	NA	NA	Mod/Good Mod/Good	Mod	Exceptional
71	Douglas fir N	25"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional S, C
73	Mugo Pine nn	8"	26'	30'	NA	61	122	Poor Poor	Low	Non Exceptional S, C
74	Mugo Pine nn	8"	35'	32'	NA	66	122	Mod Mod	Mod	Non Exceptional Si
75	Holly nn	8"	15'	18'	NA	47	81	Mod Mod	Mod	Non Exceptional Si
78	Holly nn	10"	12'	18'	NA	52	81	Mod Mod	Mod	Non Exceptional Si
83	Mugo Pine nn	6"	12'	20'	NA	42	122	Mod Mod	Mod	Non Exceptional Si

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
84	Mugo Pine nn	12"	22'	25'	NA	68	122	Mod Mod	Mod	Non Exceptional Si
85	Chinese Pine nn	12"	18'	10'	NA	53	126	Poor Poor	Low	Non Exceptional C, Si
86	Douglas fir N	22"	NA	NA	36"	NA	NA	Mod Poor	Low	Non Exceptional C, S
87	Birch nn	18"	45'	45'	NA	113	178	Good Good	Mod	Non Exceptional Si
88	Birch nn	16"	30'	45'	NA	102	178	Good Good	Mod	Non Exceptional Si
89	Birch nn	16"	39'	42'	NA	102	178	Good Good	Mod	Non Exceptional Si
91	J. Red Pine nn	14"	36'	22'	NA	75	109	Mod Poor/Mod	Mod	Non Exceptional C Si
92	Flowering Plum nn	8"	25'	21'	NA	52	78	Good Good	Mod	Non Exceptional Si
94	J Black Pine nn	8"	22'	30'	NA	61	103	Good Good	Mod	Non Exceptional Si

Tree Number	Species and Origin	DBH	Crown Spread	Height	Threshold Diameter	AFA Points	75% Champion Points	Health and structural condition	Surviv-ability (20 years)	Directors rule status
95	Arborvitae nn	8"	6'	18'	NA	44	132	Good Mod	Good	Non Exceptional Si
96	Arborvitae nn	6"	6'	18'	NA	37	132	Good Mod	Good	Non Exceptional Si
98	Red Maple nn	8"	18'	22'	NA	52	167	Good Good	Good	Non Exceptional Si
101	Holly nn	6"	30'	26'	NA	52	81	Good Good	Good	Non Exceptional Si
102	Holly nn	6"	30'	26'	NA	52	81	Good Good	Good	Non Exceptional Si
103	Scots Pine nn	12"	30'	38'	NA	83	148	Mod Good	Good	Non Exceptional Si
104	Alpine Fir N	8"	NA	NA	NA	NA	NA	Poor Mod	Low	Non Exceptional S C

Conclusions

Seventy-nine trees were examined using the criteria established by the Department of Planning and Development in the Director's Rule, 6-2001. Four trees were determined to be exceptional based on threshold diameter and tree condition. The species and tree number are Madrone #2, Douglas fir #41, Dogwood #62 and Douglas fir #70. All of the trees are Native to the Pacific Northwest and determined to have a good chance of surviving construction activities providing protective measures are implemented.

The remaining seventy-five trees are determined to be non-exceptional, either based on size, current condition or low survivability during and following construction. Trees that were given higher rating in health and structural condition may be considered as suitable for retention regardless of their non-exceptional status. The Western White Pine #66 met the threshold diameter to be considered as exceptional however, the condition of the tree and the projected survivability precluded it from exceptional status.

The final choice of non exceptional trees for retention should be based on the condition, survivability and proximity of the trees to the structures and utilities in the preferred final design. Site specific information on tree preservation during construction can be supplied once design review has taken place.