PRJ19-00008 Attachment 050

2021

Zsofia Pasztor

TREE EVALUATION AND RETENTION 4/2021

PRJ19-00008 Attachment 050

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Dear Mr. Mullins,
During July and August 2019, at your request, I performed a complete tree evaluation at the address of 4221 – 228th Ave SE in Issaquah WA.
This report is a summary of my observations and conclusions.

Definition of the assignment

You contacted me because you are planning to develop the property. You asked for an evaluation and a report completed by a Tree Risk Assessor Arborist.
As you and I discussed, my assignment was to:

- evaluate the health and condition of the trees at this time
- determine if preservation is possible before, during and after construction
- recommend a preservation and if needed, mitigation plan
- write and submit to you a report

Summary of findings

Visiting the site and examining the trees on the property I found that the trees are generally in poor condition for the most part. Most of the western red cedars, many of the Douglas firs, hemlocks, Bigleaf maples, cottonwoods and alders on the site are declining, largely because of the recent dryer years and the environmental pressures we are seeing in our forested areas now because of the shift in weather patterns. In many cases they are stump sprouts or seedlings sprouted too close to one another.

The site's area dictates that the minimum number of significant trees for the site are 1,326.
There are 2,847 trees on the site. 2.185 trees will be removed, and 662 trees will be retained. This means that the replanting should consist of 664 new trees.
The overall DBH of the existing trees is 47,417". 35,984" will be removed and 10,903" will be retained. The city typically requires that 25% of the existing tree DBH is retained when a site is developed. In this case the retained DBH is approximately 23% however due to the condition of the trees on site and how many trees should be removed due to declining conditions, this number is realistic for project.

During the construction some of the trees currently stressed might improve or decline further. If they continue their decline, they might need to be removed and additional new trees might need to be planted to compensate for their removal. It is recommended that the trees are monitored during construction.

Methodology

To evaluate the trees and to prepare the report, I drew upon my 30 years of experience in the field of horticulture, site management, and arboriculture and my formal education in natural resources management, natural habitat ecology, plant identification, and plant physiology. I also followed the protocol of the International Society of Arboriculture (ISA) for Visual and Level 2 Assessment (VA and L2) that includes looking at the overall health of the tree as well as the site conditions. This is a scientifically based process to look at the entire site, surrounding landscape and soil, as well as a complete look at the trees themselves.

In examining the trees, I looked at such factors as: size, vigor, canopy and foliage condition, density of leaves, injury, insect activity, root damage and root collar health, crown health, evidence of disease-causing bacteria, fungi or virus, dead wood and hanging limbs.

Field Data

The tree table is attached to the back of this report.

To preserve the trees designated for retention, I recommend placing a temporary protection fencing of 5 feet chain link fence along the lines as the fence is marked approximately on the map in green. No construction activity should take place within this fenced area and that includes, but not limited to storage, parking, staging, or equipment clean out.
If, during the construction, roots 2” or larger are damaged on accident, these roots should be recut with a clean, disinfected saw and covered with soil or moist plastic or burlap. A certified arborist should reevaluate the injured trees if there are concerns about their health.

The preserved trees are in the same general condition as the trees removed. The western red cedars especially are struggling, many are in very poor condition. The removal of other trees around them if combined with better soil care and significant irrigation watering a minimum of 2” per week during dry periods, will benefit these struggling trees. They will receive more light and water.

Spreading compost and shredded or chipped wood from the removals will also help the trees as it will add nutrients to the very poor-quality soil and help it retain moisture during the summer. The western hemlock trees are struggling for similar reasons as the cedars. The birch tree is affected by the bronze birch borer. These insects are invading our area. In some rare cases these insects can affect alder trees as well. It is best if the trees are monitored for diseases and pests in the years to come.

Some of the Douglas firs have ants near their base, this should be monitored in the preserved trees and controlled if the ants do move into the preserved trees.
Many of the bigleaf maples show some verticillium or other fungal disease spreading within their system. They can be preserved and monitored. The older trees are maturing, some are becoming overmature and their monitoring would be recommended even if the site would not be developed. These trees will also benefit from the better care following the removals and the more sun they will be receiving.

I recommend removing the invasive weeds such as blackberries and English ivy.

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In summary only a handful of the existing trees are in good health. The soil is very poor. In order to plant new trees and to support the retained ones, the soil should be amended within each tree's root area with compost. Rather than tilling around existing trees, a layer of 2 inches of compost should be placed and covered with a layer of 3-4 inches deep woodchips. The compost and woody mulch layers should be kept from touching the trunks of any of the trees.

Because the city requires 4 significant trees for every 5,000 sqft area and the site is just shy of 39 acres, after the construction new trees will need to be added to the landscape. The site has 2,847 existing trees. 2,185 trees will be removed. This leaves 662 trees. To meet the 4 trees per every 5,000 sqft, the site needs 1,326 trees. A total of 664 new trees added should satisfy the city requirements.

Care must be taken when placing the trees so they will form a healthy canopy over time and not crowd each other out. Using small, medium and large trees in the plan will help with closer placement and dense canopy cover while the space is maximized. **It is important to keep in mind that the site may not have large enough area for the mitigation planting and an offsite replanting at a mitigation bank may become necessary for parts of the required new trees.**

For small tree species I recommend using vine maples, witchhazel, small magnolias, serviceberries, cascara trees and dwarf, spreading conifers. For medium trees crabapples, medium size magnolias, Japanese maples, linden trees, sourwood and hybrid mountain ashes are all very good choices. Large tree species can be planted to fill the space above the ones just listed. These can be cedars, cypresses, pines and deciduous, such as ginkgo, tulip tree, Turkish hazel, Persian ironwood, oaks, beeches, and horsechestnuts.

I recommend not to use any birch trees since the bronze birch borer is a real threat to our birch trees and is already in the area and is on the site. Sitka spruces can be used in the more wet areas, but other spruces should be planted only if they will be the only tree in a large open spot with well-draining soil and will receive full sun.

The retained trees and any of the new ones if planted during the construction, need to be protected and a fence as described above need to be placed for the duration of the construction. The fence should be placed at a minimum of 70% of the tree root zone as it is listed above for each tree. Most trees can cope with 30% root loss therefore encroachment up to 30% is acceptable usually.

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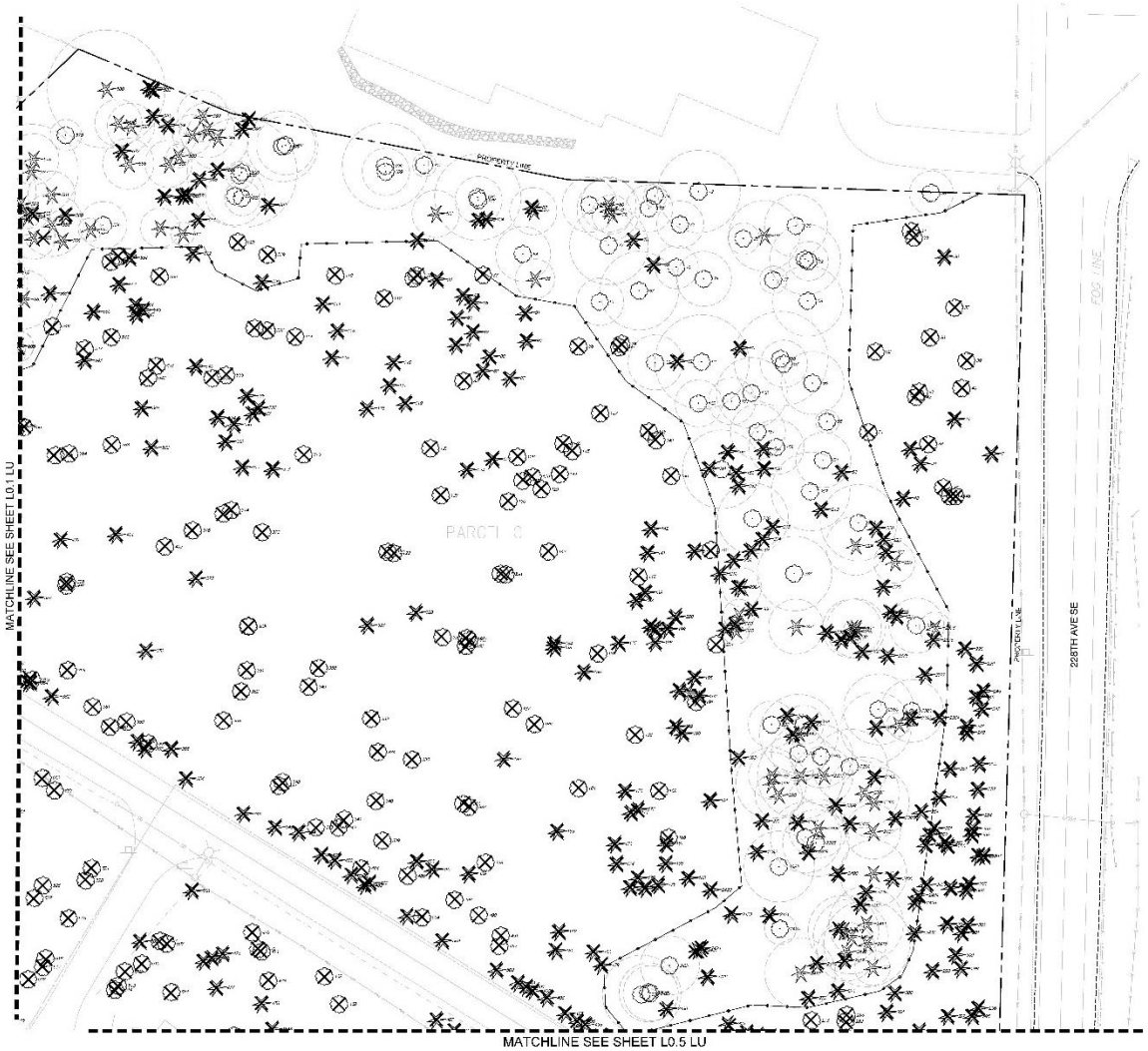

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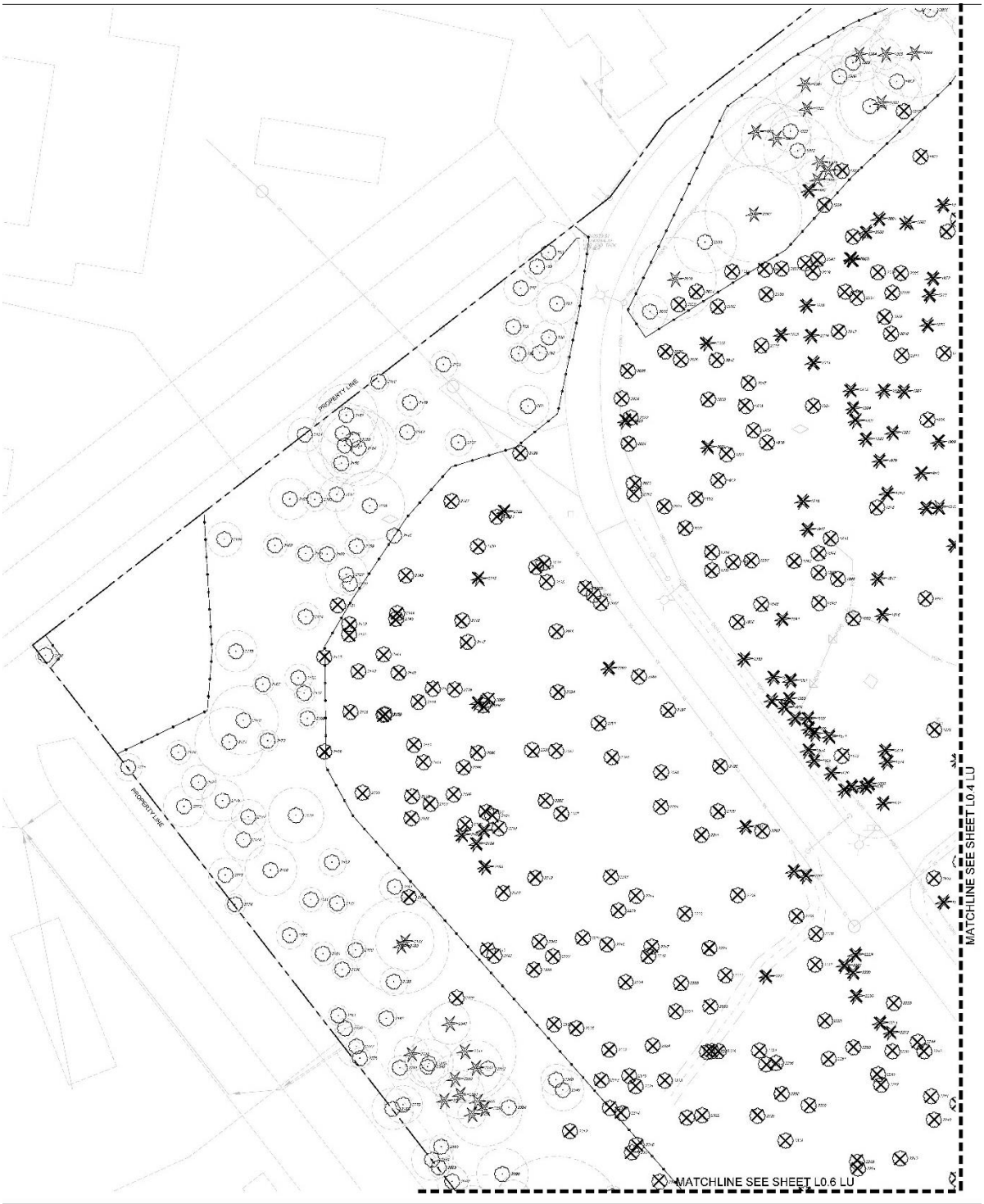

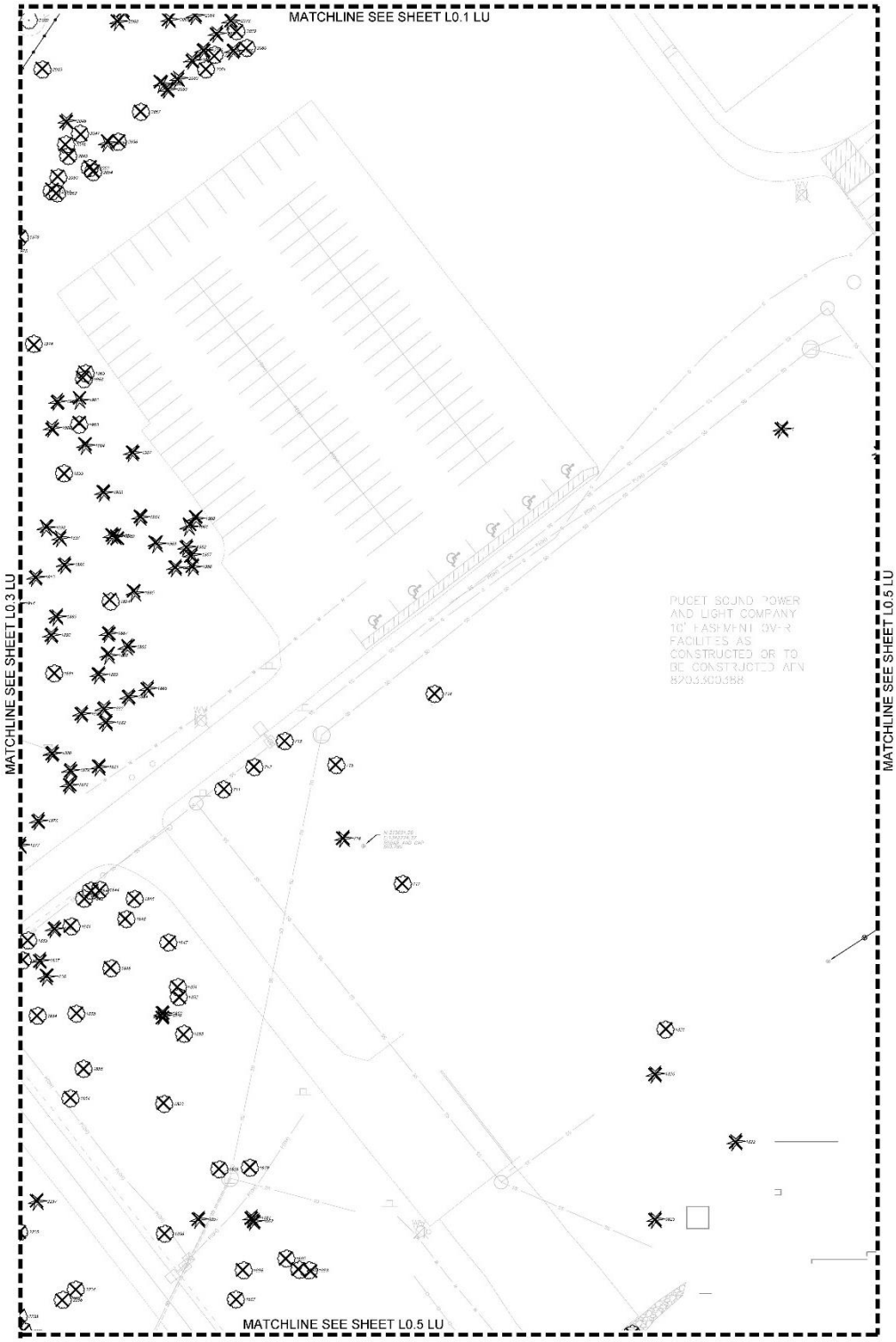
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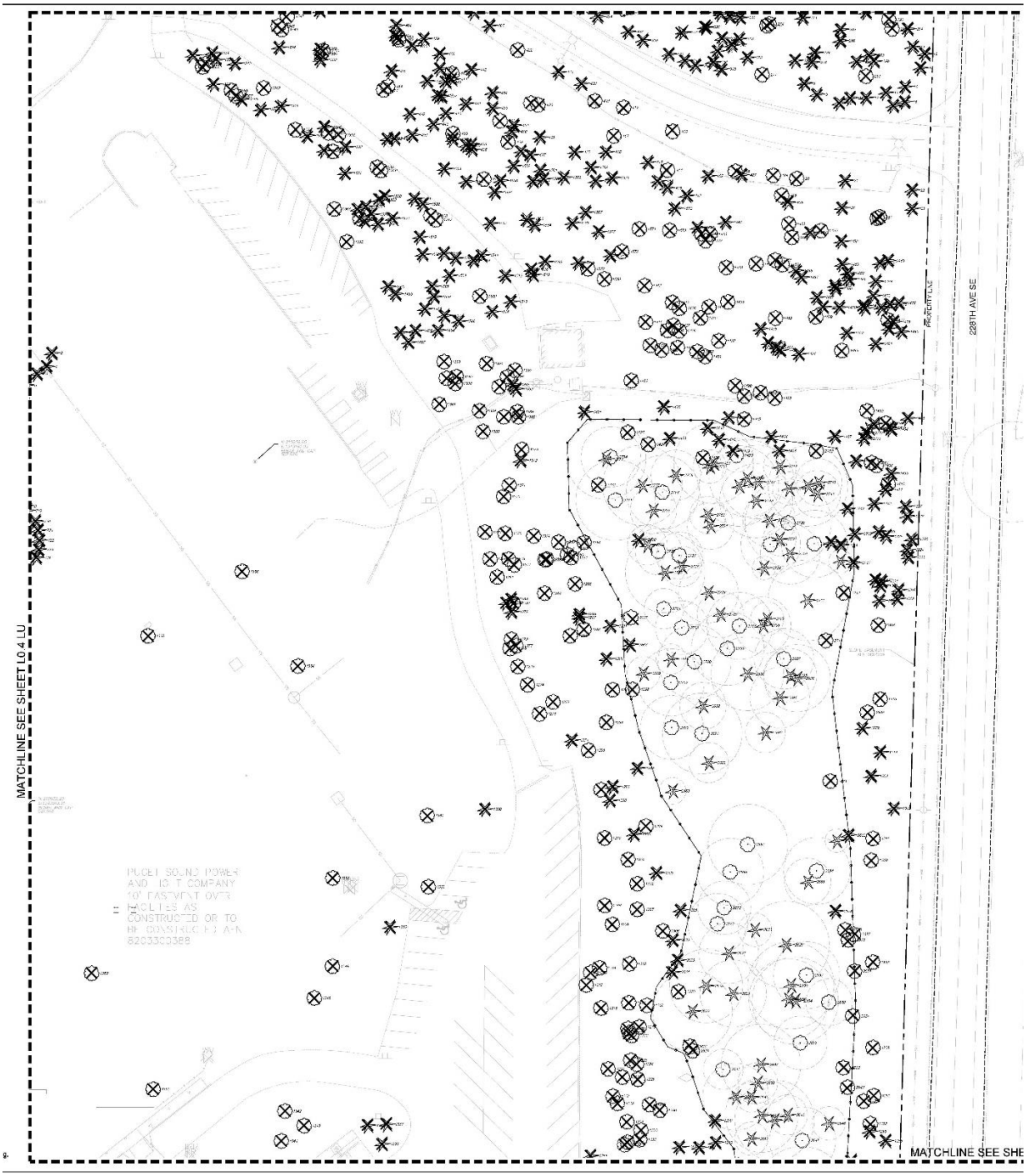

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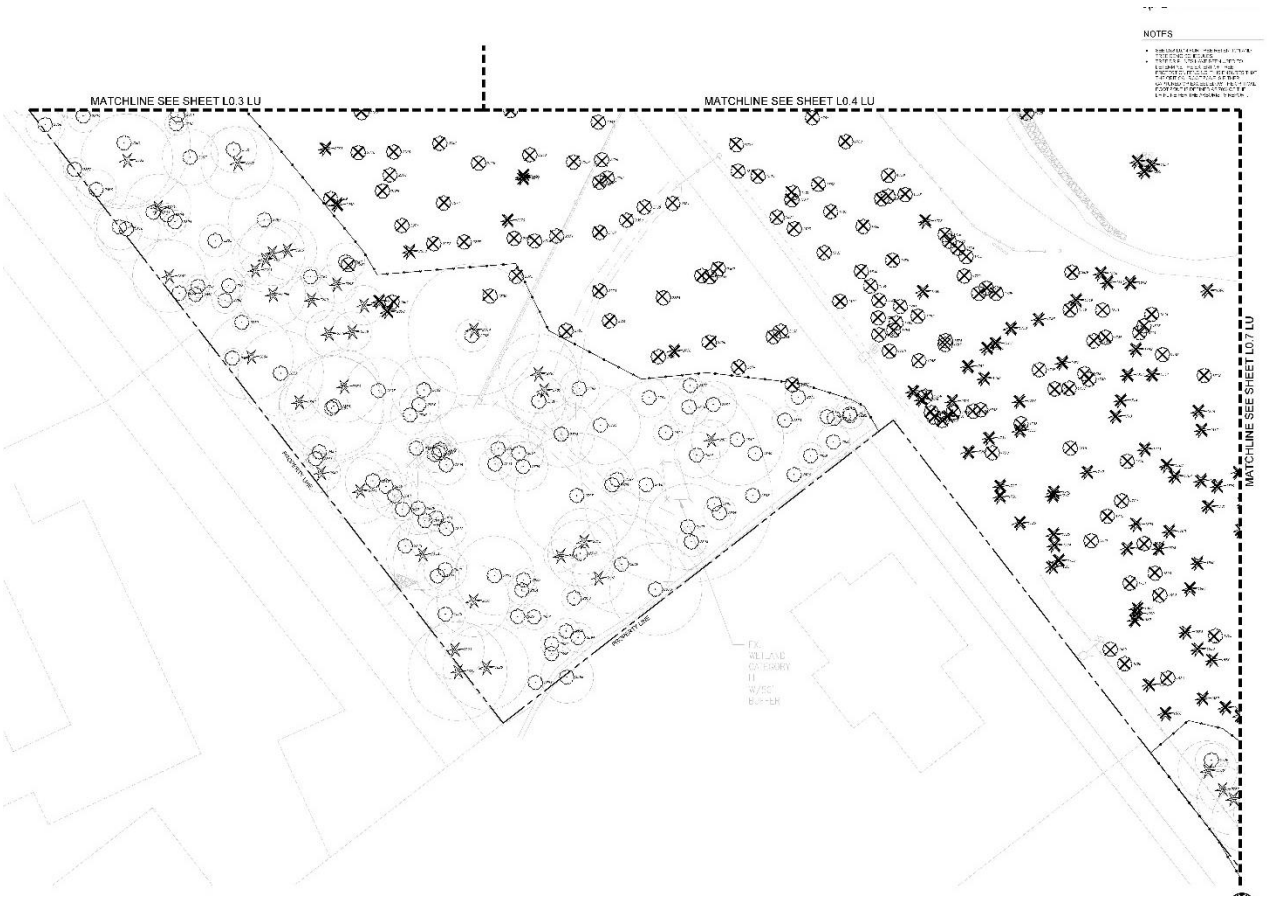

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Some dieback in many of the maples

Very poor soils

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Dying cedar trees, very poor condition

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Ants at the base of several Douglas firs

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Some of the trees broke out due to brown rot

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Most cedar trees are declining

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The maples show dieback in the canopy but might recover with more light and regular watering.

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Some of the small suppressed trees have wounded trunks.

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Blackberry and invasive weeds are growing into the forested area.

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The dead trees are not significant at the old entrance.

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Powerlines along the road necesitated extensive pruning over the years.

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Waiver of Liability

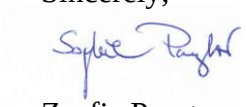
There are many conditions affecting a tree's health and stability, which may be present and cannot be ascertained, such as, root rot, previous or unexposed construction damage, internal cracks, stem rot and more which may be hidden. Changes in circumstances and conditions can also cause a rapid deterioration of a tree's health and stability. Adverse weather conditions can dramatically affect the health and safety of a tree in a very short amount of time.
While I have used every reasonable means to examine these trees, this evaluation represents my opinion of the tree health at this point in time. These findings do not guarantee future safety nor are they predictions of future events.

The tree evaluation consists of an external visual inspection of an individual tree's root flare, trunk, and canopy from the ground only unless otherwise specified. The inspection may also consist of taking trunk or root soundings for sound comparisons to aid the evaluator in determining the possible extent of decay within a tree. Soundings are only an aid to the evaluation process and do not replace the use of other more sophisticated diagnostic tools for determining the extent of decay within a tree.

As conditions change, it is the responsibility of the property owners to schedule additional site visits by the necessary professionals to ensure that the long-term success of the project is ensured. It is the responsibility of the property owner to obtain all required permits from city, county, state, or federal agencies. It is the responsibility of the property owner to comply with all applicable laws, regulations, and permit conditions. If there is a homeowners association, it is the responsibility of the property owner to comply with all Codes, Covenants, and Restrictions (CC&R's) that apply to tree pruning and tree removal.

This tree evaluation is to be used to inform and guide the client in the management of their trees. This in no way implies that the evaluator is responsible for performing recommended actions or using other methods or tools to further determine the extent of internal tree problems without written authorization from the client. Furthermore, the evaluator in no way holds that the opinions and recommendations are the only actions required to insure that the tree will not fail. A second maybe sought if client feels it's necessary. The client shall hold the evaluator harmless for any and all injuries or damages incurred if the tree examined fails for any reason or if the evaluator's recommendations are not followed or for acts of nature beyond the evaluator's reasonable expectations, such as severe winds, excessive rains, heavy snow loads, etc.

Should you have any questions or concerns, or if I may be of further assistance, please call.
Sincerely,



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Certified Arborist Cert. # PN5795A;
Certified Tree Risk Assessor Cert. # 480
Certified LID Consultant and Designer
Landscape Designer and Construction Consultant

ATTACHMENT 1 – GLOSSARY

Terms Used in This Report, on the Tree Condition and Their Significance

In an effort to clearly present the information for each tree in a manner that facilitates the reader's ability to understand the conclusions I have drawn for each tree, I have collected the information in a report format. This report was developed by Zsofia Pasztor and it is based upon the *Tree Risk Assessment in Urban Areas and the Urban/Rural Interface* course manual and the *Tree Risk Assessment Form*, both sponsored by the International Society of Arboriculture, and the *Hazard Tree Evaluation Form* from the book, *The Evaluation of Hazard Trees in Urban Areas*, by Matheny and Clarke. The descriptions were left brief in the report in an effort to include as much pertinent information as possible, to make the report manageable, and to avoid boring the reader with infinite levels of detail. However, a review of these terms and descriptions will allow the reader to rapidly move through the report and understand the information.

1) **TREE LOCATION--**indicates what general area of the site the tree is on, or whether the tree is Off the Project property.

2) **TREE #**—the individual number of each tree.

3) **SPECIES**—this describes the species of each tree with both most readily accepted common name and the officially accepted scientific name.

4) **DBH**—Diameter-at-Breast-Height. This is the standard measurement of trees taken at 4.5 feet above the average ground level of the tree base.

i) Occasionally it is not practical to measure a tree at 4.5 feet above the ground. The most representative area of the trunk near 4.5 feet is then measured and noted on the spreadsheet. For instance, a tree that forks at 4.5 feet can have an unusually large swelling at that point. The measurement is taken below the swelling and noted as, '28.4" at 36"'.

ii) Trees with multiple stems are listed as a "clump of x," with x being the number of trunks in the clump. Measurements may be given as an average of all the trunks, or individual measurements for each trunk may be listed.

(iii) Every effort is made to distinguish between a single tree with multiple stems and several trees growing close together at the bases.

5) **DRIP LINE**—the radius, the distance from the trunk to the furthest branch tips (sometimes the average of these measurements around the tree).

6) **% LCR**—Percentage of Live Crown Ratio: the relative proportion of green crown to overall tree height. This is an important indication of a tree's health. If a tree has a high percentage of Live Crown Ratio, it is likely producing enough photosynthetic activity to support the tree. If a tree has less than 30 to 40% LCR it can create a shortage of needed energy and can indicate poor health and vigor.

7) **SYMMETRY**—is the description of the form of the canopy. That is, the balance or overall shape of the canopy and crown. This is the place I list any major defects in the tree shape—does the tree have all its foliage on one side or in one unusual area. Symmetry can be important if there are additional defects in the tree such as rot pockets, cracks, loose roots, weak crown etc. Symmetry is generally categorized as Generally Symmetrical, Minor Asymmetry or Major Asymmetry:

i) Gen. Sym.—Generally Symmetrical. The canopy/foliage is generally even on all sides with spacing of scaffold branches typical for the species, both vertically and radially.

ii) Min. Asym.—Minor Asymmetry. The canopy/foliage has a slightly irregular shape with more weight on one side but appears to be no problem for the tree.

iii) Maj. Asym.—Major Asymmetry. The canopy/foliage has a highly irregular shape for the species with the majority of the weight on one side of the tree. This can have a significant impact on the tree's stability, health and hazard potential—especially if other defects are noted such as cracks, rot, root defects.

8) **FOLIAGE/BRANCH**—describes the foliage of the tree in relation to a perfect specimen of that particular species. First the branch growth and foliage density is described, and then any signs or symptoms of stress and/or disease are noted. The condition of the foliage, or the branches and buds for deciduous trees in the dormant season, are important indications of a tree's health and vigor.

i) For Deciduous trees in the dormant season:

- The structure of the tree is visible,
- The quantity and quality of buds indicates health, and is described as
- good bud set, average bud set, or poor bud set. These are abbreviated
- in the spreadsheet as: gbs, abs, or pbs.
- The amount of annual shoot elongation is visible and is another major
- indication of tree health and vigor. This is described as:

a) Excellent, Good, Average, or Short Shoot Elongation. These are abbreviated in the spreadsheet as ESE, GSE, ASE, OR SSE.

ii) For evergreen trees year round and deciduous trees in leaf, the color and density of the foliage indicates if the tree is healthy or stressed, or if an insect infestation, a bacterial, fungal, or viral infection is present. Foliage is categorized on a scale from:

- Dense—extremely thick foliage, an indication of healthy vigorous
- growth,
- Good—thick foliage, thicker than average for the species,
- Normal/Average—thick foliage, average for the species, an indication
- of healthy growth,
- Thin or Thinning—needles and leaves becoming less dense so that
- sunlight readily passes through; an indication that the tree is under
- serious stress that could impact the long-term survivability and safety
- of the tree,
- Sparse—few leaves or needles on the twigs, an indication that the tree
- is under extreme stress and could indicate the future death of the tree
- Necrosis—the presence of dead twigs and branchlets. This is another
- significant indication of tree health. A few dead twigs and branches
- are reasonably typical in most trees of size. However, if there are dead

- twigs and branchlets all over a certain portion of the tree, or all over
- the tree, these are indications of stress or attack that can have an
- impact on the tree's long-term health.
- Hangers—a term to describe a large branch or limb that has broken off
- but is still hanging up in the tree. These can be particularly dangerous
- in adverse weather conditions.

9) **CROWN CONDITION**—the crown is uppermost portion of the tree, generally considered the top 10 to 20% of the canopy or that part of the canopy above the main trunk in deciduous trees and above the secondary bark in evergreen trees.

i) The condition of the tree's crown is a reflection of the overall health and vigor of the entire tree. The crown is one of the first places a tree will demonstrate stress and pathogenic attack such as root rot.

ii) If the **Crown Condition** is healthy and strong, this is a good sign. If the crown condition is weak, broken out, or shows other signs of decline, it is an indication that the tree is under stress. It is such an important indication of health and vigor that this is the first place a trained forester or arborist looks to begin the evaluation of a tree. Current research reveals that, by the time trees with root rot show significant signs of decline in the crown, fully 50% or more of the roots have already rotted away. **Crown Condition** can be described as:

- Healthy Crown—exceptional growth for the species.
- Average Crown—typical for the species.
- Weak Crown—thin spindly growth with thin or sparse needles.
- Flagging Crown—describes a tree crown that is weak and unable to
- grow straight up.
- Dying Crown—describes obvious decline that is nearing death.
- Dead Crown—the crown has died due to pathological or physical
- injury. The tree is considered to have significant stress and/or
- weakness if the crown is dead.
- Broken out—a formerly weak crown condition that has been broken
- off by adverse weather conditions or other mechanical means.
- Regenerated or Regenerating—formerly broken out crowns that are
- now growing back, Regenerating crowns may appear healthy, average,
- or weak and indicate current health of the tree.
- Suppressed—a term used to describe poor condition of an entire tree
- or just the crown. Suppressed crowns are those that are entirely below
- the general level of the canopy of surrounding trees which receive no
- direct sunlight. They are generally in poor health and vigor.
- Suppressed trees are generally trees that are smaller and growing in the
- shade of larger trees around them. They generally have thin or sparse
- needles, weak or missing crowns, and are prone to insect attack as well
- as bacterial and fungal infections.

10) **TRUNK**—this is the area to note any defects that can have an impact on the tree's stability or hazard potential. Typical things noted are:

i) FORKED—bifurcation of branches or trunks that often occur at a narrow angle.
ii) INCLUDED BARK—a pattern of development at branch or trunk junctions where bark is turned inward rather than pushed out. This can be a serious structural defect in a tree that can and often does lead to failure of one or more of the branches or trunks especially during severe adverse weather conditions.
iii) EPICORMIC GROWTH—this is generally seen as dense thick growth near the trunk of a tree. Although this looks like a healthy condition, it is in fact the opposite. Trees with Epicormic Growth have used their reserve stores of energy in a last ditch effort to produce enough additional photosynthetic surface area to produce more sugars, starches and carbohydrates to support the continued growth of the tree. Generally speaking, when conifers in the Pacific Northwest exhibit heavy amounts of Epicormic Growth, they are not producing enough food to support their current mass and are already in serious decline.
iv) INTERNAL STRUCTURAL WEAKNESS—a physical characteristic of the tree trunk, such as a **kink, crack, rot pocket, or rot column** that predisposes the tree trunk to failure at the point of greatest weakness.
v) BOWED—a gradual curve of the trunk. This can indicate an Internal Structural Weakness or an overall weak tree. It can also indicate slow movement of soils or historic damage of the tree that has been corrected by the curved growth.
vi) KINKED—a sharp angle in the tree trunk that indicates that the normal growth pattern is disrupted. Generally this means that the internal fibers and annual rings are weaker than straight trunks and prone to failure, especially in adverse weather conditions.
vii)GROUND FLOWER—an area of deformed bark near the base of a tree trunk that indicates long-term root rot.

11) **ROOT COLLAR**—this is the area where the trunk enters the soil and the buttress roots flare out away from the trunk into the soil. It is here that signs of rot, decay, insect infestation, or fungal or bacterial infection are noted. **NAD** stands for **N**o **A**pparent **D**efects.

12) **ROOTS**—any abnormalities such as girdling roots, roots that wrap around the tree itself that strangle the cambium layer and kill the tree, are noted here.

13) **COMMENTS**—this is the area to note any additional information that would not fit in the previous boxes or attributes about the tree that have bearing on the health and structure of the tree.

14) **CURRENT HEALTH RATING**—A description of the tree's general health ranging from dead, dying, poor, senescent, suppressed, fair, good, very good, to excellent.

15) **PNW-ISA TREE RISK ASSESSMENT RATINGS FOR HAZARD POTENTIAL--**The Pacific Northwest Chapter of the International Society of Arboriculture now certifies arborists as *Certified Tree Risk Assessors* using an adjusted scale Low to Extreme. They are:

i) **TARGET RATING--**A scale of zero to three points depending upon the amount of use within the range of the tree and the amount of injury or damage that might occur if the tree or component part does fail. Target is both the level of use and the quality/value of the target combined with the foreseeable amount of injury or damage that will likely occur should the tree or component part fail.

- 0 Points, no target. **No Hazard.**
- 1 Point, Low human use is rare and random for short periods of time and/or low target value. (country roads, long-term or overflow parking, remote parks, wilderness trails)
- 2 Points, Moderate human use less than 50% time, occasional (any given time) and/or moderate target value. (picnic areas, camping areas, minor rural roads, moderate use trails)
- 3 Points, Moderately high human use more than 50% of the time, frequent or high value target and/or moderate target value. (bus stops, roads, parking areas, most rarely used vacation homes, playgrounds, etc.)
- 4 Points, High or constant human use and/or high target value. (Schools, hospitals, residential and family homes, utilities, visitor centers, emergency access roads and stations)

ii) **SIZE OF PART--** The larger the tree or component part that fails, the greater the potential for injury or damage.

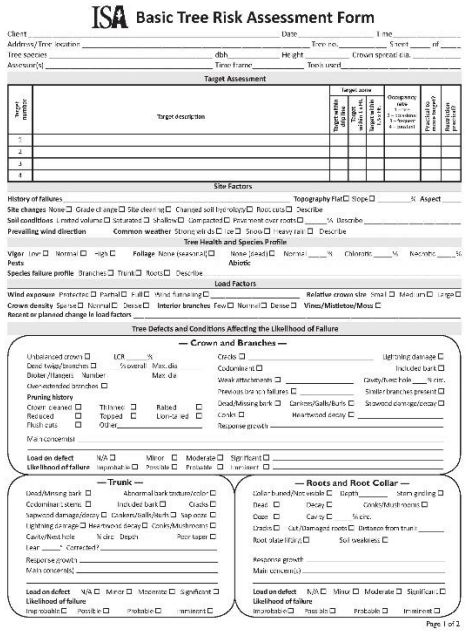
iii) **PROBABILITY OF FAILURE--**This component ranks the likelihood that the observed defect(s) will fail in a reasonable amount of time in the foreseeable future. The probability of failure automatically has associated with it threshold of action recommended to reduce or minimize the potential failure and associated injuries or damages that might occur.

iiii) **CONSEQUENCES**

16) ***ISA HAZARD or RISK RATING--***The combined component ratings used within a specific Matrix.

17) **RECOMMENDATION**— this is an estimate of whether or not the tree is of sufficient health, vigor, and structure that it is worth retaining. Specific recommendations for each tree are included in this column. They may include anything from pruning dead wood, mulching, aerating, injecting tree-based fertilizer into the root system, shortening into a habitat tree or wildlife snag, or to completely removing the tree.

i) **Monitor: "**Monitor" is a specific recommendation that the tree be reevaluated on a routine basis to determine if there are any significant changes in health or structural stability. "Monitor annually" (or bi-annually, triannually, etc.)" means the tree should be looked at once every year (or every 2 or 3 years, etc.) This yearly monitoring can be a quick look at the trees to see if there are any significant changes. Significant changes such as storm damage, loss of crown, partial failure of one or more roots, etc. require that a full evaluation be done of the tree at that time.



ISA Basic Tree Risk Assessment Form

Target Assessment

Site Factors

Tree Health and Species Profile

Load Factors

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

— Trunk —

— Roots and Root Collar —

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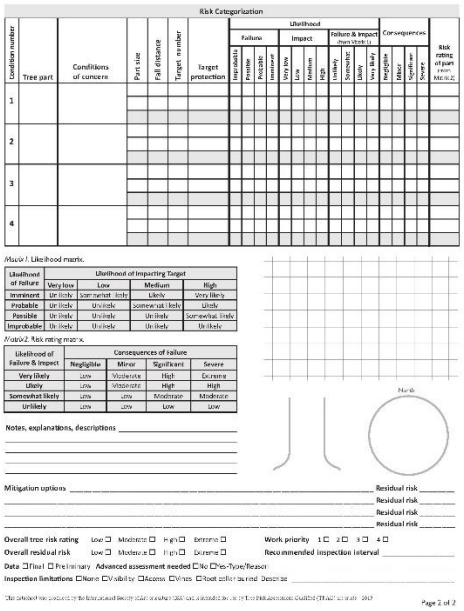

Risk Categorization

Mitigation options

Page 2 of 2

NOTE: TREES WITH THE SAME DESCRIPTION AND DIFFERENT RATINGS:
Two trees may have the same descriptions in the matrix boxes, one may be marked "Hazard," while another may be marked "Non-Hazard." The difference is in the degree of the description--early "necrosis" versus advanced "necrosis" for instance. Another example is center rot or base rot. In a Western Red Cedar or Oak tree the presence of low or even moderate rot is not significant and does not diminish the strength of the tree. However, low levels of rot in the base of a Douglas Fir or Big Leaf Maple tree in an area known to have virulent pathogens present is highly significant and predisposes that tree to windthrow. Again, these descriptions were left brief in an effort to include as much pertinent information as possible, to make the report manageable, and, not to bore the reader with infinite levels of detail.

ATTACHMENT 2– REFERENCES

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Zsofia Pasztor

TREE EVALUATION AND RETENTION 4/2021

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LETTER FROM AUGUST 2020

Dear Mr. Mullins,
During July 2020, at your request, I performed a revision of the tree retention plan for the address of 4221 – 228th Ave SE in Issaquah WA.
This letter is a summary of my observations and conclusions.

Definition of the assignment

You contacted me because you are planning to develop the property. You asked for an re-evaluation of the trees as many showed decline. You asked me to provide you with a summary of the visit and my conclusions.
As you and I discussed, my assignment was to:

- evaluate the health and condition of the trees at this time
- determine if preservation is possible before, during and after construction
- recommend a preservation and if needed, mitigation plan
- write and submit to you a report

Summary of findings

Visiting the site and examining the trees on the property I found that the trees are declining for the most part. A large portion of the western red cedar trees that looked stressed are now dead or dying. It is unfortunate that most of of the western red cedars, many of the Douglas firs, hemlocks, Bigleaf maples, cottonwoods and alders on the site are continuing to decline.
The condition of the trees was brought on largely because of the recent dryer years and the environmental pressures we are seeing in our forested areas.

The condition of the trees and the site constraints drove the adjustments and changes the design shows. After walking the site with the team, I support the changes the team had to make to the retention plans. The trees designated for retention are likely to remain windfirm. It is important to monitor the preserved trees because the trees on the site are likely to continue the decline.
The overall DBH of the existing trees is 43,034”. 34,400” will be removed and 8,634” will be retained. The city typically requires that 25% of the existing tree DBH is retained when a site is developed. In this case the retained DBH is only 20% however due to the condition of the trees on site and how many trees should be removed due to declining conditions, this number is realistic for project.

PRJ19-00008 Attachment 050

During the construction some of the trees currently stressed might improve or decline further. If they continue their decline, they might need to be removed and additional new trees might need to be planted to compensate for their removal. It is recommended that the trees are monitored during construction.

Methodology

To evaluate the trees and to prepare the report, I drew upon my 30 years of experience in the field of horticulture, site management, and arboriculture and my formal education in natural resources management, natural habitat ecology, plant identification, and plant physiology. I also followed the protocol of the International Society of Arboriculture (ISA) for Visual and Level 2 Assessment (VA and L2) that includes looking at the overall health of the tree as well as the site conditions. This is a scientifically based process to look at the entire site, surrounding landscape and soil, as well as a complete look at the trees themselves.

In examining the trees, I looked at such factors as: size, vigor, canopy and foliage condition, density of leaves, injury, insect activity, root damage and root collar health, crown health, evidence of disease-causing bacteria, fungi or virus, dead wood and hanging limbs

Waiver of Liability

There are many conditions affecting a tree's health and stability, which may be present and cannot be ascertained, such as, root rot, previous or unexposed construction damage, internal cracks, stem rot and more which may be hidden. Changes in circumstances and conditions can also cause a rapid deterioration of a tree's health and stability. Adverse weather conditions can dramatically affect the health and safety of a tree in a very short amount of time.
While I have used every reasonable means to examine these trees, this evaluation represents my opinion of the tree health at this point in time. These findings do not guarantee future safety nor are they predictions of future events.

The tree evaluation consists of an external visual inspection of an individual tree's root flare, trunk, and canopy from the ground only unless otherwise specified. The inspection may also consist of taking trunk or root soundings for sound comparisons to aid the evaluator in determining the possible extent of decay within a tree. Soundings are only an aid to the evaluation process and do not replace the use of other more sophisticated diagnostic tools for determining the extent of decay within a tree.

As conditions change, it is the responsibility of the property owners to schedule additional site visits by the necessary professionals to ensure that the long-term success of the project is ensured. It is the responsibility of the property owner to obtain all required permits from city, county, state, or federal agencies. It is the responsibility of the property owner to comply with all applicable laws, regulations, and permit conditions. If there is a homeowners association, it is the responsibility of the property owner to comply with all Codes, Covenants, and Restrictions (CC&R's) that apply to tree pruning and tree removal.

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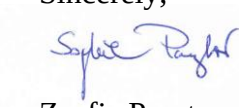
This tree evaluation is to be used to inform and guide the client in the management of their trees. This in no way implies that the evaluator is responsible for performing recommended actions or using other methods or tools to further determine the extent of internal tree problems without written authorization from the client. Furthermore, the evaluator in no way holds that the opinions and recommendations are the only actions required to insure that the tree will not fail. A second maybe sought if client feels it's necessary. The client shall hold the evaluator harmless for any and all injuries or damages incurred if the tree examined fails for any reason or if the evaluator's recommendations are not followed or for acts of nature beyond the evaluator's reasonable expectations, such as severe winds, excessive rains, heavy snow loads, etc.

Should you have any questions or concerns, or if I may be of further assistance, please call.
Sincerely,



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ATTACHMENT 1 – GLOSSARY

Terms Used in This Report, on the Tree Condition and Their Significance

In an effort to clearly present the information for each tree in a manner that facilitates the reader's ability to understand the conclusions I have drawn for each tree, I have collected the information in a report format. This report was developed by Zsofia Pasztor and it is based upon the *Tree Risk Assessment in Urban Areas and the Urban/Rural Interface* course manual and the *Tree Risk Assessment Form*, both sponsored by the International Society of Arboriculture, and the *Hazard Tree Evaluation Form* from the book, *The Evaluation of Hazard Trees in Urban Areas*, by Matheny and Clarke. The descriptions were left brief in the report in an effort to include as much pertinent information as possible, to make the report manageable, and to avoid boring the reader with infinite levels of detail. However, a review of these terms and descriptions will allow the reader to rapidly move through the report and understand the information.

1) **TREE LOCATION--**indicates what general area of the site the tree is on, or whether the tree is Off the Project property.

2) **TREE #**—the individual number of each tree.

3) **SPECIES**—this describes the species of each tree with both most readily accepted common name and the officially accepted scientific name.

4) **DBH**—Diameter-at-Breast-Height. This is the standard measurement of trees taken at 4.5 feet above the average ground level of the tree base.

i) Occasionally it is not practical to measure a tree at 4.5 feet above the ground. The most representative area of the trunk near 4.5 feet is then measured and noted on the spreadsheet. For instance, a tree that forks at 4.5 feet can have an unusually large swelling at that point. The measurement is taken below the swelling and noted as, '28.4" at 36"'.

ii) Trees with multiple stems are listed as a "clump of x," with x being the number of trunks in the clump. Measurements may be given as an average of all the trunks, or individual measurements for each trunk may be listed.

(iii) Every effort is made to distinguish between a single tree with multiple stems and several trees growing close together at the bases.

5) **DRIP LINE**—the radius, the distance from the trunk to the furthest branch tips (sometimes the average of these measurements around the tree).

6) **% LCR**—Percentage of Live Crown Ratio: the relative proportion of green crown to overall tree height. This is an important indication of a tree's health. If a tree has a high percentage of Live Crown Ratio, it is likely producing enough photosynthetic activity to support the tree. If a tree has less than 30 to 40% LCR it can create a shortage of needed energy and can indicate poor health and vigor.

7) **SYMMETRY**—is the description of the form of the canopy. That is, the balance or overall shape of the canopy and crown. This is the place I list any major defects in the tree shape—does the tree have all its foliage on one side or in one unusual area. Symmetry can be important if there are additional defects in the tree such as rot pockets, cracks, loose roots, weak crown etc. Symmetry is generally categorized as Generally Symmetrical, Minor Asymmetry or Major Asymmetry:

i) Gen. Sym.—Generally Symmetrical. The canopy/foliage is generally even on all sides with spacing of scaffold branches typical for the species, both vertically and radially.

ii) Min. Asym.—Minor Asymmetry. The canopy/foliage has a slightly irregular shape with more weight on one side but appears to be no problem for the tree.

iii) Maj. Asym.—Major Asymmetry. The canopy/foliage has a highly irregular shape for the species with the majority of the weight on one side of the tree. This can have a significant impact on the tree's stability, health and hazard potential—especially if other defects are noted such as cracks, rot, root defects.

8) **FOLIAGE/BRANCH**—describes the foliage of the tree in relation to a perfect specimen of that particular species. First the branch growth and foliage density is described, and then any signs or symptoms of stress and/or disease are noted. The condition of the foliage, or the branches and buds for deciduous trees in the dormant season, are important indications of a tree's health and vigor.

i) For Deciduous trees in the dormant season:

- The structure of the tree is visible,
- The quantity and quality of buds indicates health, and is described as
- good bud set, average bud set, or poor bud set. These are abbreviated
- in the spreadsheet as: gbs, abs, or pbs.
- The amount of annual shoot elongation is visible and is another major
- indication of tree health and vigor. This is described as:

a) Excellent, Good, Average, or Short Shoot Elongation. These are abbreviated in the spreadsheet as ESE, GSE, ASE, OR SSE.

ii) For evergreen trees year round and deciduous trees in leaf, the color and density of the foliage indicates if the tree is healthy or stressed, or if an insect infestation, a bacterial, fungal, or viral infection is present. Foliage is categorized on a scale from:

- Dense—extremely thick foliage, an indication of healthy vigorous
- growth,
- Good—thick foliage, thicker than average for the species,
- Normal/Average—thick foliage, average for the species, an indication
- of healthy growth,
- Thin or Thinning—needles and leaves becoming less dense so that
- sunlight readily passes through; an indication that the tree is under
- serious stress that could impact the long-term survivability and safety
- of the tree,
- Sparse—few leaves or needles on the twigs, an indication that the tree
- is under extreme stress and could indicate the future death of the tree
- Necrosis—the presence of dead twigs and branchlets. This is another
- significant indication of tree health. A few dead twigs and branches
- are reasonably typical in most trees of size. However, if there are dead

- twigs and branchlets all over a certain portion of the tree, or all over
- the tree, these are indications of stress or attack that can have an
- impact on the tree's long-term health.
- Hangers—a term to describe a large branch or limb that has broken off
- but is still hanging up in the tree. These can be particularly dangerous
- in adverse weather conditions.

9) **CROWN CONDITION**—the crown is uppermost portion of the tree, generally considered the top 10 to 20% of the canopy or that part of the canopy above the main trunk in deciduous trees and above the secondary bark in evergreen trees.

i) The condition of the tree's crown is a reflection of the overall health and vigor of the entire tree. The crown is one of the first places a tree will demonstrate stress and pathogenic attack such as root rot.

ii) If the **Crown Condition** is healthy and strong, this is a good sign. If the crown condition is weak, broken out, or shows other signs of decline, it is an indication that the tree is under stress. It is such an important indication of health and vigor that this is the first place a trained forester or arborist looks to begin the evaluation of a tree. Current research reveals that, by the time trees with root rot show significant signs of decline in the crown, fully 50% or more of the roots have already rotted away. **Crown Condition** can be described as:

- Healthy Crown—exceptional growth for the species.
- Average Crown—typical for the species.
- Weak Crown—thin spindly growth with thin or sparse needles.
- Flagging Crown—describes a tree crown that is weak and unable to
- grow straight up.
- Dying Crown—describes obvious decline that is nearing death.
- Dead Crown—the crown has died due to pathological or physical
- injury. The tree is considered to have significant stress and/or
- weakness if the crown is dead.
- Broken out—a formerly weak crown condition that has been broken
- off by adverse weather conditions or other mechanical means.
- Regenerated or Regenerating—formerly broken out crowns that are
- now growing back, Regenerating crowns may appear healthy, average,
- or weak and indicate current health of the tree.
- Suppressed—a term used to describe poor condition of an entire tree
- or just the crown. Suppressed crowns are those that are entirely below
- the general level of the canopy of surrounding trees which receive no
- direct sunlight. They are generally in poor health and vigor.
- Suppressed trees are generally trees that are smaller and growing in the
- shade of larger trees around them. They generally have thin or sparse
- needles, weak or missing crowns, and are prone to insect attack as well
- as bacterial and fungal infections.

10) **TRUNK**—this is the area to note any defects that can have an impact on the tree's stability or hazard potential. Typical things noted are:

i) FORKED—bifurcation of branches or trunks that often occur at a narrow angle.
ii) INCLUDED BARK—a pattern of development at branch or trunk junctions where bark is turned inward rather than pushed out. This can be a serious structural defect in a tree that can and often does lead to failure of one or more of the branches or trunks especially during severe adverse weather conditions.
iii) EPICORMIC GROWTH—this is generally seen as dense thick growth near the trunk of a tree. Although this looks like a healthy condition, it is in fact the opposite. Trees with Epicormic Growth have used their reserve stores of energy in a last ditch effort to produce enough additional photosynthetic surface area to produce more sugars, starches and carbohydrates to support the continued growth of the tree. Generally speaking, when conifers in the Pacific Northwest exhibit heavy amounts of Epicormic Growth, they are not producing enough food to support their current mass and are already in serious decline.
iv) INTERNAL STRUCTURAL WEAKNESS—a physical characteristic of the tree trunk, such as a **kink, crack, rot pocket, or rot column** that predisposes the tree trunk to failure at the point of greatest weakness.
v) BOWED—a gradual curve of the trunk. This can indicate an Internal Structural Weakness or an overall weak tree. It can also indicate slow movement of soils or historic damage of the tree that has been corrected by the curved growth.
vi) KINKED—a sharp angle in the tree trunk that indicates that the normal growth pattern is disrupted. Generally this means that the internal fibers and annual rings are weaker than straight trunks and prone to failure, especially in adverse weather conditions.
vii)GROUND FLOWER—an area of deformed bark near the base of a tree trunk that indicates long-term root rot.

11) **ROOT COLLAR**—this is the area where the trunk enters the soil and the buttress roots flare out away from the trunk into the soil. It is here that signs of rot, decay, insect infestation, or fungal or bacterial infection are noted. **NAD** stands for **N**o **A**pparent **D**efects.

12) **ROOTS**—any abnormalities such as girdling roots, roots that wrap around the tree itself that strangle the cambium layer and kill the tree, are noted here.

13) **COMMENTS**—this is the area to note any additional information that would not fit in the previous boxes or attributes about the tree that have bearing on the health and structure of the tree.

14) **CURRENT HEALTH RATING**—A description of the tree's general health ranging from dead, dying, poor, senescent, suppressed, fair, good, very good, to excellent.

15) **PNW-ISA TREE RISK ASSESSMENT RATINGS FOR HAZARD POTENTIAL--**The Pacific Northwest Chapter of the International Society of Arboriculture now certifies arborists as *Certified Tree Risk Assessors* using an adjusted scale Low to Extreme. They are:

i) **TARGET RATING--**A scale of zero to three points depending upon the amount of use within the range of the tree and the amount of injury or damage that might occur if the tree or component part does fail. Target is both the level of use and the quality/value of the target combined with the foreseeable amount of injury or damage that will likely occur should the tree or component part fail.

- 0 Points, no target. **No Hazard.**
- 1 Point, Low human use is rare and random for short periods of time and/or low target value. (country roads, long-term or overflow parking, remote parks, wilderness trails)
- 2 Points, Moderate human use less than 50% time, occasional (any given time) and/or moderate target value. (picnic areas, camping areas, minor rural roads, moderate use trails)
- 3 Points, Moderately high human use more than 50% of the time, frequent or high value target and/or moderate target value. (bus stops, roads, parking areas, most rarely used vacation homes, playgrounds, etc.)
- 4 Points, High or constant human use and/or high target value. (Schools, hospitals, residential and family homes, utilities, visitor centers, emergency access roads and stations)

ii) **SIZE OF PART--** The larger the tree or component part that fails, the greater the potential for injury or damage.

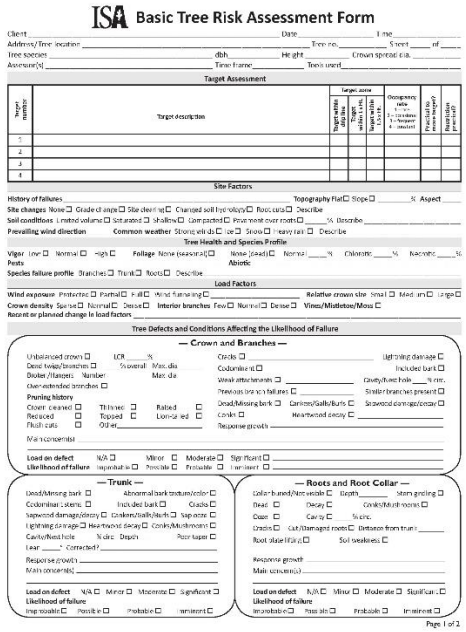
iii) **PROBABILITY OF FAILURE--**This component ranks the likelihood that the observed defect(s) will fail in a reasonable amount of time in the foreseeable future. The probability of failure automatically has associated with it threshold of action recommended to reduce or minimize the potential failure and associated injuries or damages that might occur.

iiii) **CONSEQUENCES**

16) ***ISA HAZARD or RISK RATING--***The combined component ratings used within a specific Matrix.

17) **RECOMMENDATION**— this is an estimate of whether or not the tree is of sufficient health, vigor, and structure that it is worth retaining. Specific recommendations for each tree are included in this column. They may include anything from pruning dead wood, mulching, aerating, injecting tree-based fertilizer into the root system, shortening into a habitat tree or wildlife snag, or to completely removing the tree.

i) **Monitor: "**Monitor" is a specific recommendation that the tree be reevaluated on a routine basis to determine if there are any significant changes in health or structural stability. "Monitor annually" (or bi-annually, triannually, etc.)" means the tree should be looked at once every year (or every 2 or 3 years, etc.) This yearly monitoring can be a quick look at the trees to see if there are any significant changes. Significant changes such as storm damage, loss of crown, partial failure of one or more roots, etc. require that a full evaluation be done of the tree at that time.



ISA Basic Tree Risk Assessment Form

Target Assessment

Site Factors

Tree Health and Species Profile

Load Factors

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

— Trunk —

— Roots and Root Collar —

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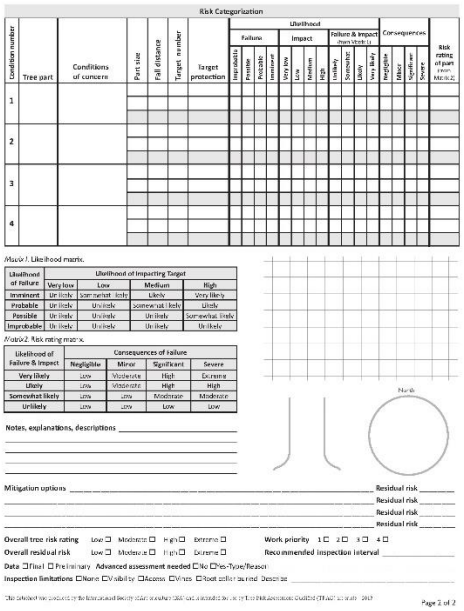

Risk Categorization

Mitigation options

Page 2 of 2

NOTE: TREES WITH THE SAME DESCRIPTION AND DIFFERENT RATINGS:
Two trees may have the same descriptions in the matrix boxes, one may be marked "Hazard," while another may be marked "Non-Hazard." The difference is in the degree of the description--early "necrosis" versus advanced "necrosis" for instance. Another example is center rot or base rot. In a Western Red Cedar or Oak tree the presence of low or even moderate rot is not significant and does not diminish the strength of the tree. However, low levels of rot in the base of a Douglas Fir or Big Leaf Maple tree in an area known to have virulent pathogens present is highly significant and predisposes that tree to windthrow. Again, these descriptions were left brief in an effort to include as much pertinent information as possible, to make the report manageable, and, not to bore the reader with infinite levels of detail.

ATTACHMENT 2– REFERENCES

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