

Arborist Report

To: Town of Yarrow Point, c/o Stacia Schroeder
Site: Right-of-Way fronting 3829 95th Ave NE
Re: Tree Risk Assessment
Date: May 13, 2021
Project Arborist: Haley Galbraith
ISA Board Certified Master Arborist PN-7512BM
ISA Qualified Tree Risk Assessor
Attached: Table of Trees

Summary

Tree Solutions Inc. visited the above-addressed site to perform a detailed visual assessment of one bigleaf maple (*Acer macrophyllum*) tree. The subject tree grows on Town of Yarrow Point property and is within range of a number of surrounding targets including power lines, 95th Ave NE, and adjacent private property, including the address referred to as “the site”. The Town requested these services to determine the current risk potential presented by the tree.

Using the International Society of Arboriculture (ISA) Basic Tree Risk Assessment method, I determined the risk currently presented by the maple tree to be high. Details of this risk assessment process can be found in Appendix G. Detailed information on the subject tree can be found in the attached Table of Trees.

Recommendations

- Based on the extent of decay I detected throughout the base of the tree, overall tree health and structural condition, and the presence/type of surrounding targets, I recommend that the subject tree be removed.

Risk Assessment

The likelihood of whole tree or part failure is based on what was visible during the time of my assessment and what would likely occur under normal weather conditions over a five year time period. This time frame should not be considered a guarantee period for the risk assessment. This assessment discusses the tree conditions found at the time of the inspection, but weather and activities in and around the trees since this inspection can have a significant impact on tree conditions and likelihood of failure.

A “Hazard Tree” is defined as “a tree that has been assessed as having characteristics that make it an unacceptable risk for continued retention. A hazard tree, or a hazardous component, exists when the sum of the risk factors equals or exceeds a predetermined threshold of risk.” The predetermined threshold for risk and the actions required to reduce the risk below that threshold is established by the risk manager.

As a Qualified Tree Risk Assessor, my job is to provide the risk manager, in this case the Town of Yarrow Point, with technical information required to make informed decisions. The risk manager must decide how to implement the actions required to reduce risk levels to acceptable levels.

Observations & Discussion

Site

The subject maple tree is located on Town of Yarrow Point property, in the Right-of-Way (ROW), west of private property along 95th Ave NE. The tree location and surrounding targets are shown on the site map below (see Figure 1).

Tree

The tree appeared to be in fair health and structural condition at the time of my assessment, however, following advanced testing at three points around the base of the tree, I rated the structural condition of the tree as poor. The tree measured 32.1 inches in diameter at standard height (DSH) and approximately 60 feet tall. I observed that the tree has a history of significant pruning for clearance of the power lines that run along 95th Ave NE and are in contact with the tree in some places (see Photo 2). Past pruning cuts had varying degrees of decay visible.

The base of the tree grows at an angle to the west, toward the roadway, and then corrects upward at roughly eight feet above grade. At this point, there is a narrowly-attached co-dominant union. There is a poor trunk to branch diameter ratio at this point, meaning that each of the two co-dominant leads are larger than the trunk below where they are attached (see Photo 3).

The west side of the tree base is resting against the stump of a formerly existing tree at grade level. The structural roots of the tree appear stilted, as if the whole tree originally grew over a stump which is now mostly gone. On the east side, several openings between structural roots are visible (see Photo 4). Based on this observation, I decided to perform micro-resistance drill testing. The results of testing, which are included below, showed significant decay at each of the three points tested. Therefore, I believe the structural integrity of the tree is compromised and whole tree failure may occur under normal operating conditions within a five year time frame.

Risk Assessment

Based on my observations, the likelihood of whole tree failure is probable within the next five years. There is a high likelihood of the tree causing severe damage to the power lines if whole tree failure was to occur. Additionally, whole tree failure into the roadway would have significant consequences. Based on this risk assessment, overall risk from the tree rates as high.

Conclusions

In my opinion, there is no remedial action that can be taken to improve the health and structural condition of the subject maple tree. Based on my observations, knowledge, training, and experience, I recommend that the tree be removed.

Appendix A Site Map



Figure 1. Aerial view of subject tree location and adjacent roadway.
(Source: Google Maps, accessed May 13, 2021)

Appendix B Photographs and Test Results



Photo 1. Looking south along 95th Ave NE at subject maple tree in ROW.



Photo 2. Power lines running along east side of 95th Ave NE in contact with tree in some places.



Photo 3. Co-dominant union of maple tree at roughly eight feet above grade.



Photo 4. Looking west at east side of tree base where several openings between structural roots are visible.



Photo 5. Looking north at south side of tree base; orange dot indicates location of drill test 1.

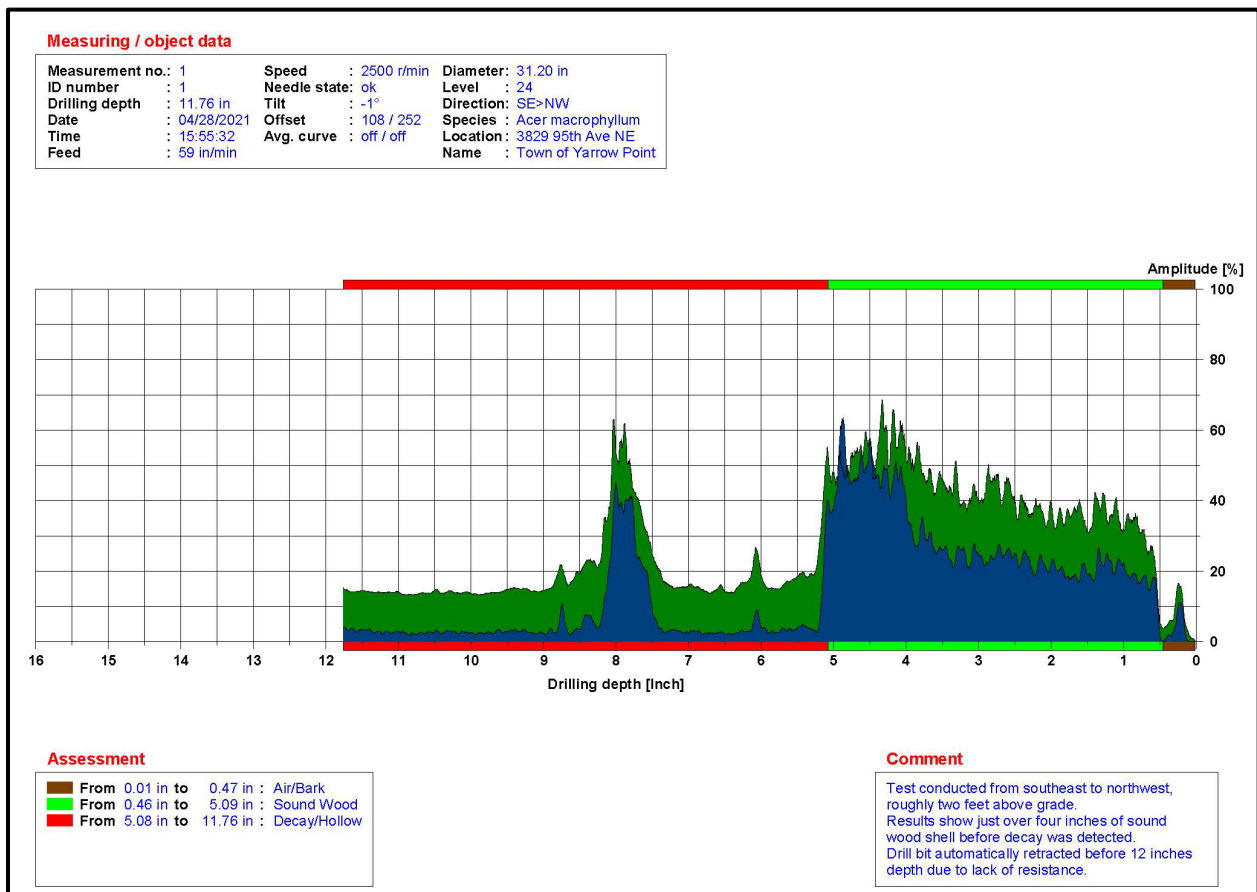


Figure 2. Results of drill test 1 show just over four inches of sound wood shell before decay was detected.



Photo 6. Looking north at south side of tree base; orange dot indicates location of drill test 2.

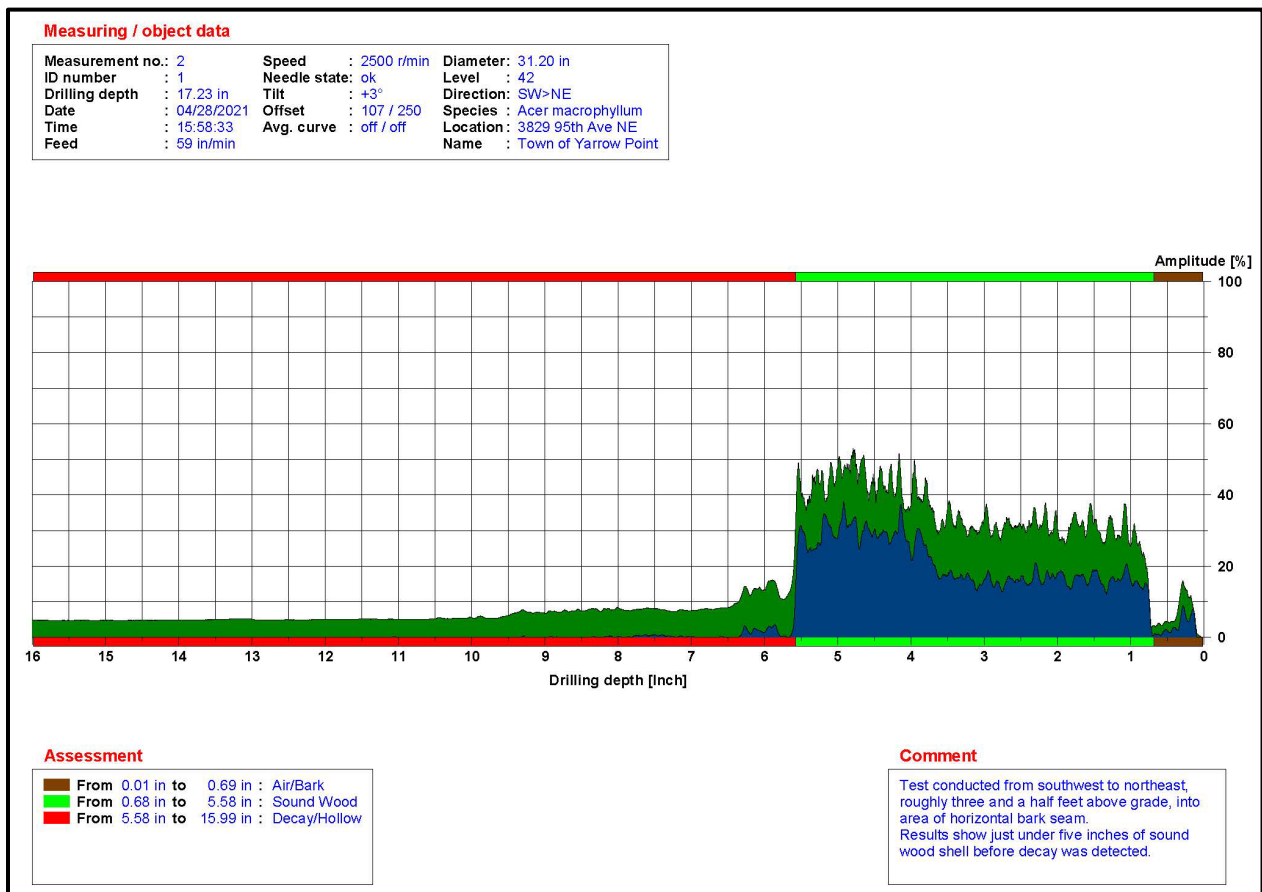


Figure 3. Results of drill test 2 show just under five inches of sound wood shell before decay was detected.



Photo 7. Looking at north side of tree trunk, roughly five feet above grade at location of drill test 3.

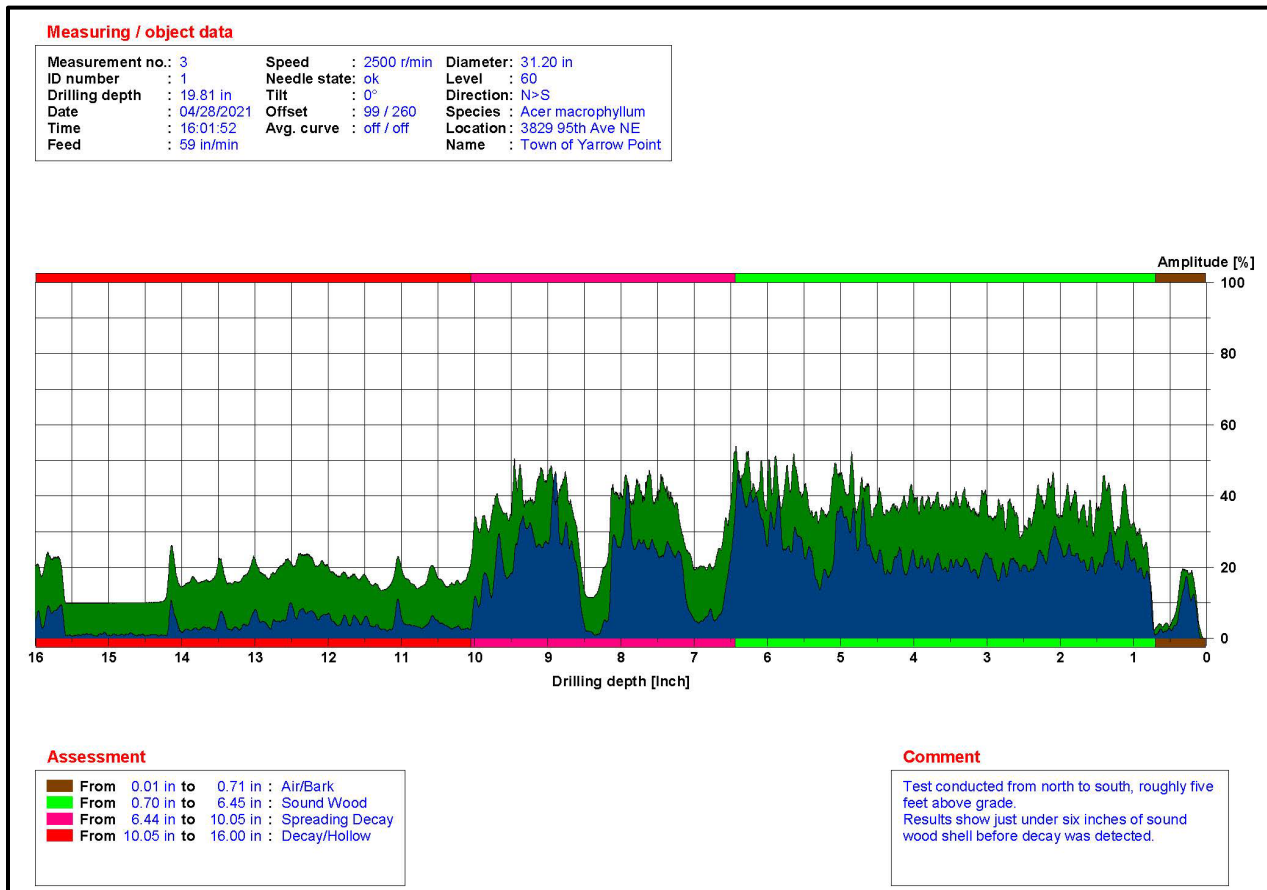


Figure 4. Results of drill test 3 show just under six inches of sound wood shell before decay was detected.

Appendix C Glossary

ANSI A300: American National Standards Institute (ANSI) standards for tree care

basic assessment: detailed visual inspection of a tree and surrounding site that may include the use of simple tools. It requires that a tree risk assessor walk completely around the tree trunk looking at the site, aboveground roots, trunk, and branches (ISA 2013)

chlorotic: foliage with whitish or yellowish discoloration caused by lack of chlorophyll

codominant stems: stems or branches of nearly equal diameter, often weakly attached (Matheny *et al.* 1998)

cracks: defects in trees that, if severe, may pose a risk of tree or branch failure (Lilly 2001)

crown: the aboveground portions of a tree (Lilly 2001)

DBH or DSH: diameter at breast or standard height; the diameter of the trunk measured 54 inches (4.5 feet) above grade (Matheny *et al.* 1998)

deciduous: tree or other plant that loses its leaves sometime during the year and stays leafless generally during the cold season (Lilly 2001)

evergreen: tree or plant that keeps its needles or leaves year round; this means for more than one growing season (Lilly 2001)

force: any action or influence causing an object to accelerate/decelerate. Calculated as mass multiplied by acceleration. Is a vector quantity (ISA 2013)

ISA: International Society of Arboriculture

lateral: secondary or subordinate branch (Lilly 2001)

level(s) of assessment: categorization of the breadth and depth of analysis used in an assessment (ISA 2013)

mitigation: process of reducing damages or risk (Lilly 2001)

monitoring: keeping a close watch; performing regular checks or inspections (Lilly 2001)

owner/manager: the person or entity responsible for tree management or the controlling authority that regulates tree management (ISA 2013)

phototropic growth: growth toward light source or stimulant (Harris *et al.* 1999)

retain and monitor: the recommendation to keep a tree and conduct follow-up assessments after a stated inspection interval (ISA 2013)

snag: a tree left partially standing for the primary purpose of providing habitat for wildlife

soil structure: the arrangement of soil particles (Lilly 2001)

structural defects: flaws, decay, or other faults in the trunk, branches, or root collar of a tree, which may lead to failure (Lilly 2001)

Visual Tree Assessment (VTA): method of evaluating structural defects and stability in trees by noting the pattern of growth. Developed by Claus Mattheck (Harris, *et al.* 1999)

Appendix D References

- Accredited Standards Committee A300 (ASC 300). ANSI A300 (Part 1) – 2017 Tree, Shrub, and Other Woody Plant Management – Standard Practices (Pruning). Londonderry: Tree Care Industry Association, 2017.
- Dunster & Associates Environmental Consultants Ltd. Assessing Trees in Urban Areas and the Urban-Rural Interface, US Release 1.0. Silverton: Pacific Northwest Chapter ISA, 2006
- Dunster, Julian A., E. Thomas Smiley, Nelda Matheny, and Sharon Lilly. Tree Risk Assessment Manual. Champaign, Illinois: International Society of Arboriculture, 2013
- E. Smiley, N. Matheny, S. Lilly. Best Management Practices: TREE RISK ASSESSMENT. ISA 2011.
- Lilly, Sharon. Arborists' Certification Study Guide. Champaign, IL: The International Society of Arboriculture, 2001.
- Matheny, Nelda and James R. Clark. Trees and Development: A Technical Guide to Preservation of Trees During Land Development. Champaign, IL: International Society of Arboriculture, 1998.
- Mattheck, Claus and Helge Breloer, The Body Language of Trees.: A Handbook for Failure Analysis. London: HMSO, 1994.

Appendix E Assumptions & Limiting Conditions

- 1 Consultant assumes that the site and its use do not violate, and is in compliance with, all applicable codes, ordinances, statutes or regulations.
- 2 The consultant may provide a report or recommendation based on published municipal regulations. The consultant assumes that the municipal regulations published on the date of the report are current municipal regulations and assumes no obligation related to unpublished city regulation information.
- 3 Any report by the consultant and any values expressed therein represent the opinion of the consultant, and the consultant's fee is in no way contingent upon the reporting of a specific value, a stipulated result, the occurrence of a subsequent event, or upon any finding to be reported.
- 4 All photographs included in this report were taken by Tree Solutions, Inc. during the documented site visit, unless otherwise noted. Sketches, drawings and photographs (included in, and attached to, this report) are intended as visual aids and are not necessarily to scale. They should not be construed as engineering drawings, architectural reports or surveys. The reproduction of any information generated by architects, engineers or other consultants and any sketches, drawings or photographs is for the express purpose of coordination and ease of reference only. Inclusion of such information on any drawings or other documents does not constitute a representation by the consultant as to the sufficiency or accuracy of the information.
- 5 Unless otherwise agreed, (1) information contained in any report by consultant covers only the items examined and reflects the condition of those items at the time of inspection; and (2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, climbing, or coring.
- 6 These findings are based on the observations and opinions of the authoring arborist, and do not provide guarantees regarding the future performance, health, vigor, structural stability or safety of the plants described and assessed.
- 7 Measurements are subject to typical margins of error, considering the oval or asymmetrical cross-section of most trunks and canopies.
- 8 Tree Solutions did not review any reports or perform any tests related to the soil located on the subject property unless outlined in the scope of services. Tree Solutions staff are not and do not claim to be soils experts. An independent inventory and evaluation of the site's soil should be obtained by a qualified professional if an additional understanding of the site's characteristics is needed to make an informed decision.
- 9 Our assessments are made in conformity with acceptable evaluation/diagnostic reporting techniques and procedures, as recommended by the International Society of Arboriculture.

Appendix F **Methods**

Measuring

I measured the diameter of each tree at 54 inches above grade, diameter at standard height (DSH).

Evaluating

I evaluated tree health and structure utilizing visual tree assessment (VTA) methods. The basis behind VTA is the identification of symptoms, which the tree produces in reaction to a weak spot or area of mechanical stress. A tree reacts to mechanical and physiological stresses by growing more vigorously to re-enforce weak areas, while depriving less stressed parts. An understanding of the uniform stress allows the arborist to make informed judgments about the condition of a tree.

Rating

When rating tree health, I took into consideration crown indicators such as foliar density, size, color, stem and shoot extensions. When rating tree structure, I evaluated the tree for form and structural defects, including past damage and decay. Tree Solutions has adapted our ratings based on the Purdue University Extension formula values for health condition (*Purdue University Extension bulletin FNR-473-W - Tree Appraisal*). These values are a general representation used to assist arborists in assigning ratings.

Excellent - Perfect specimen with excellent form and vigor, well-balanced crown. Normal to exceeding shoot length on new growth. Leaf size and color normal. Trunk is sound and solid. Root zone undisturbed. No apparent pest problems. Long safe useful life expectancy for the species.

Good - Imperfect canopy density in few parts of the tree, up to 10% of the canopy. Normal to less than ¾ typical growth rate of shoots and minor deficiency in typical leaf development. Few pest issues or damage, and if they exist they are controllable or tree is reacting appropriately. Normal branch and stem development with healthy growth. Safe useful life expectancy typical for the species.

Fair - Crown decline and dieback up to 30% of the canopy. Leaf color is somewhat chlorotic/necrotic with smaller leaves and “off” coloration. Shoot extensions indicate some stunting and stressed growing conditions. Stress cone crop clearly visible. Obvious signs of pest problems contributing to lesser condition, control might be possible. Some decay areas found in main stem and branches. Below average safe useful life expectancy

Poor - Lacking full crown, more than 50% decline and dieback, especially affecting larger branches. Stunting of shoots is obvious with little evidence of growth on smaller stems. Leaf size and color reveals overall stress in the plant. Insect or disease infestation may be severe and uncontrollable. Extensive decay or hollows in branches and trunk. Short safe useful life expectancy.

Appendix G Qualified Tree Risk Assessment

The International Society of Arboriculture has developed a standardized and systematic process for assessing tree risk. This approach evaluates the likelihood of whole tree or part failure and any associated consequences, based on what is visible during the time of the site visit and what would likely occur under normal weather conditions, over a limited time period.

Following are excerpts from Best Management Practices - Tree Risk Assessment Second Edition.¹

Levels of Risk Assessment

Level 1 – Survey

Level 1 shall be a limited visual assessment of an individual tree or a population of trees to identify specified conditions or defects. Conditions to be identified should include obvious defects. Level 1 assessment shall be from a limited, specified perspective, such as drive-by, walk-by or aerial patrol. Level 1 survey assessment methodology shall be specified. Periodic assessments, monitoring, and follow-up recommendations should be made based on the outcome of the assessment and the objectives.

Level 2 – Basic

Level 2 assessments shall include a 360-degree, ground-based visual inspection of the tree crown, trunk, above-ground roots, and site conditions around the tree. Use of hand tools, trowels, binoculars, or probes, shall not be precluded from a level 2 assessment. A mallet or other tool should be used to sound the trunk, root collar and above ground buttress roots in order to detect large hollows and loose bark. Level 2 shall provide a detailed visual inspection of a tree(s) to detect the conditions specified and tree defects in relation to surrounding targets.

A basic assessment should include the identification of conditions indicating the presence of structural defects including, but not limited to:

- Dead, diseased, broken branches, stems, and roots;
- Weakly attached branches and co-dominant stems;
- Mechanical damage and cracks into the wood;
- Abnormal growth such as swelling, ribs, flat areas, or seams;
- Indications of decay and cankers;
- Root plate lifting, abnormal trunk flare, lack of trunk flare, soil cracks, grade change, restricted or undermined roots;
- Unusual tree architecture including lean, low live crown ratio, poor taper, and crown asymmetry

Level 2 inspections should be conducted annually; more frequently if species, tree size, tree condition or other factors indicate a need for a more frequent interval. Scheduling inspections shall be the responsibility of the tree owner. Monitoring and follow-up recommendations should be made based on the outcome of the assessment and the objectives.

¹ E. Smiley, N. Matheny, S. Lilly. Best Management Practices: Tree Risk Assessment Second Edition. Champaign, IL: ISA 2017.

Level 3 – Advanced

Level 3 assessments shall include all Level 2 requirements. Level 3 shall include advanced method(s) to provide more detailed information on tree structural strength, the extent of specific structural defects, conditions, or other factors in relation to a target. Level 3 assessment shall include, but is not limited to, one or more of the following tree assessment techniques: *aerial assessment* of branch or stem defects; *micro-resistance drilling*; evaluation of *target risk*; *increment boring*; *probing*; *pull testing*; *radiation assessment* (e.g. radar, x-ray, gamma ray); *sonic assessment*; *sounding*; and, *sub-surface root and/or soil assessment*.

Likelihood of Failure

Improbable: the tree or branch is not likely to fail during normal weather conditions and may not fail in many severe weather conditions within the specified time frame.

Possible: failure could occur, but it is unlikely during normal weather conditions within the specified time frame.

Probable: failure may be expected under normal weather conditions within the specified time frame.

Imminent: failure has started or is most likely to occur in the near future, even if there is no significant wind or increased load. This is a rare occurrence for a risk assessor to encounter, and it may require immediate action to protect people from harm.

Likelihood of Impacting a Target

Very Low: the chance of the failed tree or branch impacting the specified target is remote. This is the case in a rarely used site fully exposed to the assessed tree or an occasionally used site that is partially protected by trees or structures. Examples included a rarely used trail or trail head in a rural area, or an occasionally used area that has some protection against being struck by the tree failure due to the presence of other trees between the tree being assessed and the targets.

Low: it is not likely that the failed tree or branch will impact the target. This is the case in an occasionally used area that is fully exposed to the assessed tree, a frequently used area that is partially exposed to the assessed tree, or a constant target that is well protected from the assessed tree. Examples include a little-used service road next to the assessed tree or a frequently used public street that has a street tree between the street and the assessed tree.

Medium: the failed tree or branch may not impact the target, with nearly equal likelihood. This is the case in a frequently used area that is fully exposed on one side to the assessed tree or a constantly occupied area that is partially protected from the assessed tree. Examples include a suburban street next to the assessed street tree or a house that is partially protected from the assessed tree by an intermediate tree.

High: the failed tree or branch will most likely impact the target. This is the case when a fixed target is fully exposed to the assessed tree or near a high-use road or walkway with an adjacent street tree.

Figure 5. Risk Rating Matrix

Likelihood of Failure (Tree)	Likelihood of Impacting Target (Person or Property)			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix shows the level of risk as the combined factors of 'likelihood of a tree failing' and 'likelihood of impacting a specified target'.

Consequences of Failure

Negligible: consequences are those that involve low-value property damage or disruption that can be replaced or repaired, and do not involve personal injury.

Minor: consequences are those that involve low-to-moderate property damage or small disruptions to traffic or a communication utility.

Significant: consequences are those that involve property damage of moderate-to-high value, considerable disruption, or personal injury.

Severe: consequences are those that could involve serious personal injury or death, damage to high-value property, or disruption of important activities.

Figure 6. Consequence Matrix

Likelihood of Failure and Impact	Consequences (to target)			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Matrix showing the level of risk as the combination of the likelihood of a tree failing and impacting a specified target, and the severity of the associated consequences.

Risk Rating Categories, Timing for Mitigation

In the tree risk assessment matrix, four terms are used to define levels of risk; low, moderate, high, and extreme. These risk ratings are used to communicate the level of risk and to assist in making recommendations to the owner or risk manager for mitigation and inspection frequency. **The priority for action depends upon the risk rating and risk tolerance of the owner or manager.**

Extreme: The extreme-risk category applies in situations in which failure is *imminent* and there is a high likelihood of impacting the target, and the consequences of the failure are “severe.” The tree risk assessor should recommend that **mitigation measures be taken as soon as possible**. In some cases, this may mean immediate restriction of access to the target zone area to avoid injury to people.

High: High-risk situations are those for which consequences are “significant” and likelihood is “very likely” or “likely,” or consequences are “severe” and likelihood is “likely.” This combination of likelihood and consequences indicates that the tree risk assessor should recommend mitigation measures be taken. **The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or manager. In populations of trees, the priority of high-risk trees is second only to extreme-risk trees.**

Moderate: Moderate-risk situations are those for which consequences are “minor” and likelihood is “very likely” or “likely”; or likelihood is “somewhat likely” and consequences are “significant” or “severe.” The tree risk assessor may recommend mitigation and/or retaining and monitoring. **The decision for mitigation and timing of treatment depends upon the risk tolerance of the tree owner or manager. In populations of trees, moderate-risk trees represent a lower priority than high- or extreme-risk trees.**

Low: The low-risk category applies when consequences are “negligible” and likelihood is “unlikely”; or consequences are “minor” and likelihood is “somewhat likely.” **Some trees with this level of risk may benefit from mitigation or maintenance measures, but immediate action is not usually required. Tree risk assessors may recommend retaining and monitoring these trees, as well as mitigation that does not include removal of the tree.**

Options for Mitigation

Remove the risk altogether, if possible, by cutting off one or more branches, removing dead wood, or possibly removing the entire tree. Extreme risk situations should be closed off until the risk is abated.

Modify the risk of failure probability. In some cases, it may be possible to reduce the probability of failure by adding mechanical support in the form of cables braces or props.

Modify the risk rating by moving the target. Risk ratings can sometimes be lowered by moving the target so that there is a much lower probability of the defective part striking anything. Moving the target should generally be seen as an interim measure.

Retain and monitor. This approach is used where some defects have been noted but they are not yet serious and the present risk level is only moderate.

Definitions (Risk)

consequences: outcome of an event (ISA 2013)

consequences of failure: personal injury, property damage, or disruption of activities due to the failure of a tree or tree part (ISA 2013)

likelihood: the chance of an event occurring. In the context of tree failures, the term may be used to specify: (1) the chance of a tree failure occurring; (2) the chance of impacting a specified target; and (3) the combination of the likelihood of a tree failing and the likelihood of impacting a specified target (ISA 2013)

likelihood of failure: the chance of a tree failure occurring within the specified time frame (ISA 2013)

likelihood of failure and impact: the chance of a tree failure occurring and impacting a target within the specified time frame (ISA 2013)

likelihood of impact: the chance of a tree failure impacting a target during the specified time frame (ISA 2013)

likely (likelihood of failure and impact): defined by its placement in the likelihood matrix (see *Matrix 1 on page 2 of the Tree Risk Assessment form*); imminent likelihood of failure and medium likelihood of impact, or probable likelihood of failure and high likelihood of impact (ISA 2013)

mitigation: process of reducing damages or risk (Lilly 2001)

risk rating: the level of risk combining the likelihood of a tree failing and impacting a specified target, and severity of the associated consequences (ISA 2013)

risk tolerance: degree of risk that is acceptable to the owner, manager, or controlling authority (ISA 2013)

target: person, object, or structure that could be injured or damaged in the event of tree or branch failure (Lilly 2001)

target management: acting to control the exposure of targets to risk (ISA 2013)

target value: the monetary worth of something; the importance or preciousness of something (ISA 2013)

target zone: the area where a tree or branch is likely to land if it were to fail (ISA 2013)

tree risk assessment: a systematic process used to identify, analyze, and evaluate tree risk (ISA 2013)

tree risk evaluation: the process of comparing the assessed risk against given risk criteria to determine the significance of the risk (ISA 2013)

tree risk management: the application of policies, procedures, and practices used to identify, evaluate, mitigate, monitor, and communicate tree risk (ISA 2013)



Table of Trees
3829 95th Ave NE
Yarrow Point

Arborist: H. Galbraith
Date of Assessment: 04.28.21
Table Prepared: 05.13.21

DSH (Diameter at Standard Height) is measured 4.5 feet above grade, or as specified in the Guide for Plant Appraisal, 10th Edition, published by the Council of Tree and Landscape Appraisers.

Tree ID	Scientific Name	Common Name	DSH (Inches)	Health Condition	Structural Condition	Tree Height (ft)	Dripline Radius (ft)	Distance from Target (ft)	Part to fail	Target	Likelihood of failure: (Improbable, Possible, Probable, Imminent)	Likelihood of Impacting a target: (Very Low, Low, Medium, High)	Matrix combined: (Unlikely, Somewhat likely, Likely, Very Likely)	Consequences to target: (Negligible, Minor, Significant, Severe)	Risk potential: (Low, Moderate, High, Very High)	Management Options	Notes
1	<i>Acer macrophyllum</i>	Bigleaf maple	31.2	Fair	Poor	approx. 60	32	0	Branches	Person	Probable	Low	Unlikely	Severe	Low	Removal recommended	See Arborist Report
									Branches	Vehicle	Probable	Medium	Somewhat likely	Significant	Moderate		
									Whole tree	Power lines	Probable	High	Likely	Severe	High		
									Whole tree	95th Ave NE	Probable	High	Likely	Significant	High		