Report on the Davis Meeker Oak

May 23, 2024

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Introduction: On Risk and Trees

What is risk and how do we define it? Insurance agents, bankers, OSHA inspectors, and all others who must reckon with it can agree that it is a *possibility of loss or injury.* I want you to focus on what possibility is. While we can mitigate risk in many instances, it is impossible for us to live a life entirely free from it. Driving is a risk, you might crash. Eating is a risk, you might choke. These are risks, but there are also benefits to these actions.

It is impossible to live with trees without accepting some risk. Trees are living organisms and don't always behave predictably. They endure countless abuses that might further predispose them towards failure. These all pose risks. But they also provide fantastic benefits for those that are willing to live with the risk. They lower street temperature, improve air and water quality, provide economic benefits, and provide a home for wildlife[1]. You must ask yourselves: are the risks associated with the Davis/Meeker Oak acceptable?

To come to this decision, we must first understand how dangerous a tree really is. In the United States, there are roughly 228 billion trees[2]. Between 2008-2011, there were 354 incidents that resulted in death or injury involving tree failures[3]. This puts the chance of an

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1 "Benefits of Trees - Economic." Texas A&M Forest Service. Accessed April 13, 2024. https://tfsweb.tamu.edu/uploadedFiles/TFS_Main/Urban_and_Community_Forestry/About_Urban_and_Community_Forestry/Urban_Forest_Information_Sheets/Benefits%20of%20Trees%20-%20Economic.pdf

2The world's 3 trillion trees, mapped - the Washington Post. Accessed April 13, 2024. https://www.washingtonpost.com/news/energy-environment/wp/2015/09/16/the-countries-of-the-world-ranked-by-their-tree-wealth/.

3Dunster, Julian. n.d. Are Trees Really Risky? Accessed April 13, 2024. https://dunster.ca/wp-content/uploads/bsk-pdf-manager/2020/04/2012-TSC-Fall.-Are-Trees-Really-Risky.pdf.

individual tree causing a person harm at roughly 0.000000155%. That's a 1 in 645,161,290 chance, which is about twice as unlikely as winning the lottery.

In several hundred years, the results of failure from this tree have been congruent with these odds. A new report does not change its possibility, only our perceptions of it. As I will describe, the city arborist's report is deeply flawed to the point of being moot. Additionally, an email from the city attorney to WCIA prompts some important questions to be asked.

An opinion I'll leave you with is this. I believe there is an intrinsic flaw in the notion of a tree risk assessment. As all trees have associated risk, it is very easy to ignore the benefits. There is no quarter given in the form for them & they are often overlooked by both the writer and the audience. If our only tool is a hammer (risk assessment), then everything starts to look like a nail (risk). As arboricultural professionals, we can and must strive to do better than this report.

Previous Preservation Efforts

While documentation of work on the oak prior to 1990 is lacking, the first records I found of serious work being undertaken come from Neal Wolbert in late 1990. The following is an excerpt from an email written to the granddaughter of Jack Davis. The full email can be found in Appendix 1.

> In the late 90's I discovered Armillaria wood destroying fungus eating away at the roots and the trunk evidenced by mushrooms growing up the trunk on the road side. That's what caught my attention and lead to the pathogen identification and treatments. Our company and Rob Lloyd, Lloyd's Arboricultural Consulting, Vancouver, WA performed a root crown excavation with a tool called an air knife that safely blows soil off roots without damaging them. After your grandfather's intervention lead to bending the road to save the tree, the new road construction left nearly 3' of soil over the root crown of the tree. After the base of the tree was uncovered, a cavity was revealed that was plugged with soil and Armillaria mycelia (mold). The excavation process broke the contact with the soil and the fungus stopped progressing. Since then the roots have been regularly fertilized and treated with biological additives to stimulate new feeder root development. Medicine (fungicide) was added to stop any further invasion by other types of root rotting fungi. Sadly, Armillaria itself is untreatable but keeping the tree in good health and protecting it from other invaders will definitely prolong its life. We also eliminated the grass under the tree and spread washed dairy manure compost over most of the root zone which lead to a rapid increase in feeder roots. Compost has been re-applied periodically since then.
>
> The area under the street could not be treated however, and the city has been unwilling to consider drilling holes or installing grates in the street so treatments can be

administered. If you want to help that cause, a letter to the Tumwater City Council would be welcome. It's a huge deal to get approval for a project like that. Just dealing with re-routing the traffic is a major thing. Access to the roots under concrete and subsequent treatments would encourage new rooting on the weak side of the tree extending the life of the tree even more.

We can now understand how this decay and the resultant cavity came to be. When the road was moved, the root flare and trunk of the tree was buried. This provided ideal conditions for Armillaria fungus to begin to colonize the tree. By using air excavation, Mr. Wolbert was able to disrupt the fungi and allow the tree a fighting chance. As we will come to see, it has continued to survive with great vigor. Mr. McFarland misidentified this fungi as Ganoderma during a council meeting, despite the lack of any visible conks that would allow easy identification of it.

In 2008, the oak with struck by an unidentified vehicle (or parts of one) and sustained a serious injury to the truck. As was previously established by Mr. Wolbert, the decay cavity was already present at this time. This large new wound was treated with a method that was, at the time, experimental. The rough edges of the injured area were cleaned up and a section of burlap was secured over the area to allow the retention of moisture[4].

Previous Preservation Efforts

The following excerpt is from an email from Mr. Wolbert to the granddaughter of Jack Davis.

There were pieces of safety glass and plastic car parts on and around the tree so our suspicion is that a part fell off a junk hauler on the way to the scrap yard down the road. The wound is about 18" to 24" in diameter and the bark was completely sliced off. Our company is helping Ray Gleason, Cascade Tree Experts, Olympia, with a new post injury treatment. With the help of a government researcher, Ray is installing a wrap that will allow gas exchange, vital to callous formation, and protect the tree from the road spray contamination. It also will keep the wound dark in hopes of encouraging more callous formation on the wound itself. There have been promising results from some much smaller projects, so we hope this helps the old timer. The project will be completed Monday afternoon with a final covering of burlap (not paper) around the trunk. It will stay in place until July or August, if vandals leave it alone. John Dodge, who writes the "Soundings" column for The Olympian, will print an article this week which should satisfy the curious and possibly deter any would-be vandals. The tree is quite healthy as far as we know, so it should close

4 Dodge, John. "Aged Oak Treated for Injury to Trunk." HeraldNet. Accessed April 15, 2024. https://www.heraldnet.com/news/aged-oak-treated-for-injury-to-trunk/.

the wound within a few years. A lower limb was removed many years ago (the hanging limb?) that left a much larger open wound that the tree completely closed, so it has the moxie to heal well.

Figure 1: The Tree being prepared by Ray Gleason for treatment after wounding

Previous Preservation Efforts

Figure 2: Treatment applied. Note the opening to the cavity at the base of the tree

Figure 3: Two years after wounding. Note the reduced size of the

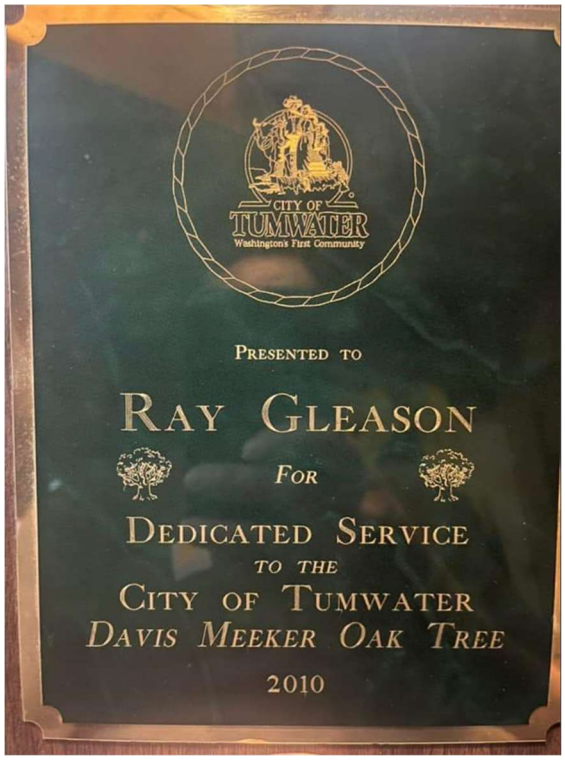
Previous Preservation Efforts

Previous Preservation Efforts

In the years that followed the work done to help the tree after the collision, Mr. Gleason did additional work as a donation to the city. The following quote is his account of it. The email is attached with this report in Appendix 2. It is also worth noting that Mr. Gleason

Figure 5: A diagram of how the tree is sealing up the wound. The wood indicated by line 4 is structurally stronger and a strong chemical barrier to the spread of decay.

was awarded a plaque from the city in 2010 for his efforts to preserve the tree.



Between 2008 and 2015, I worked on the historic Davis Meeker oak tree 3 separate times other than the multiple intermittent inspections.

First, being the application of semi permeable membrane after cleaning the damaged area currently nearly completely compartmentalized.

Second, was road clearance for hwy 99 with the assistance of state patrol officers traffic flaggers. During this time I inspected the upper canopy of the tree and pruned the canopy near the power line to the hangar for clearance. All at a donation to the public.

During this process I asked the city of Tumwater for assistance and found that donating was the only way to preserve this historic tree. The city of Tumwater had no interest in investing in management other than removal.

Third, a branch fell from the tree into the (RMZ) root management zone area, I was contacted by the city of Tumwater to clean up the material if possible. I donated time to the city of Tumwater on behalf of the public and future generations. [I] have hauled/deposited wood chips into the root management zone twice during this time.

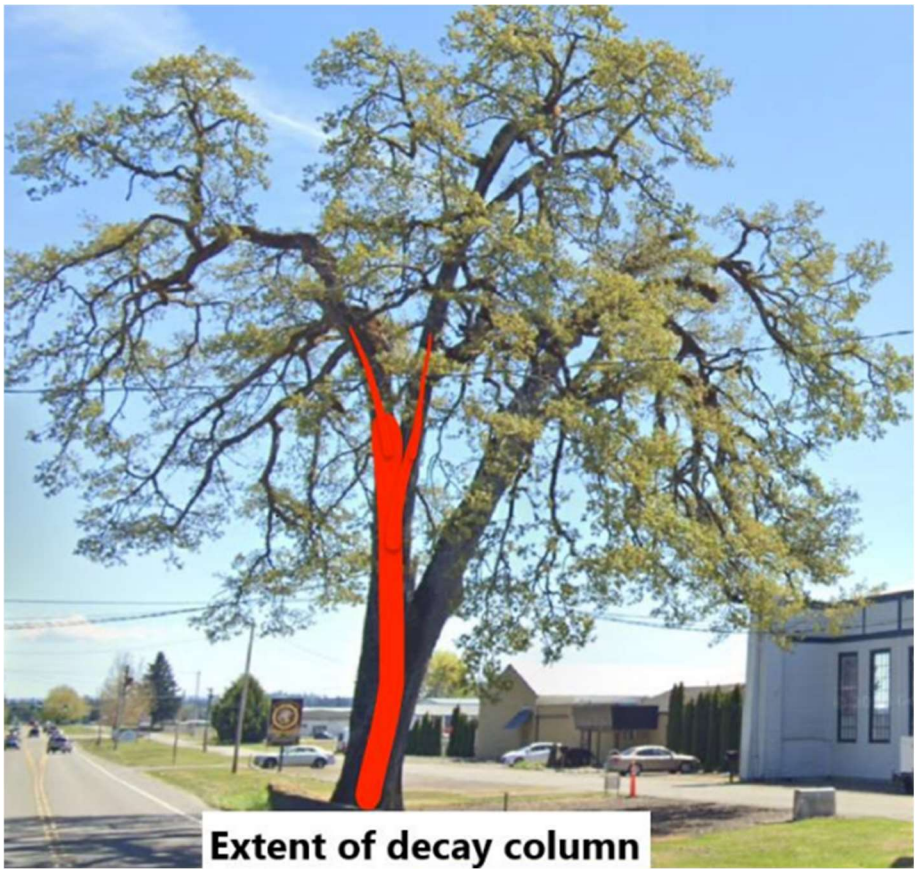
The takeaways from this section documenting previous work are that the decay in the tree is not new, nor is it the worst the tree has endured over a long lifetime. Were the stem weakened to the point of imminent failure, it would have fractured from the impact that wounded it. Were the tree not in excellent health, it would not have been able to rapidly seal up the wound.

In no small part, the tree survives because the community cares. From Jack Davis getting a highway moved, the city listing it as its first heritage tree, and efforts by arborists over the years, its history is punctuated by care and devotion. The pushback this report received is a continuation of that.

Introduction to Analysis of the City Arborist's Report

To understand the nature of the errors in this report, I strongly encourage you to read the manual provided with it by the International Society of Arboriculture. I have provided this in Appendix 3. It contains an easily readable walk-through of the steps involved and a glossary of definitions. I may quote this in the main body of my analysis for particularly important points, but I am providing it because it is a valuable tool for understanding the report.

Analysis of the City Arborist's Report



This image was included in the opening of the report, but how did it come to be? In modern arboriculture, the common tool employed for this is a micro-resistance drill. This device uses a very small diameter drill bit and a read-out of resistance encountered to determine the strength or presence of wood in a given branch or stem. These devices have

been commercially available since the 1990s. At my current job, we have 5 of them and use them daily for assessment.

Analysis of the City Arborist's Report

Mr. McFarland used a mallet. While this is sometimes useful to determine if a tree needs to be drilled, hitting a tree with a hammer is not a reliable way of determining the true extent or presence of decay. While a tomograph and increment borer was also employed, the data from these methods are 2 dimensional and does not show how decay progresses up the stem. Furthermore, the illustration is not congruent with the data from the tomograph or increment borer. As such, there is nothing to demonstrably show this illustration to be even remotely accurate.

Target number	Target description	Target zone			Occupancy rate 1 – rare 2 – occasional 3 – frequent 4 – constant	Practical to move target?	Restriction practical?
		Target within dripline	Target within 1 x Ht.	Target within 1.5 x Ht.			
1	Hwy 99	✓			4	No	No
2	Airplane hangar		✓		3	No	No
3	North and south parking		✓		3	No	No
4	Electric service drop	✓			4	No	No

This table lays out the targets, which are things that could be impacted by the tree or parts thereof were to fail. There are errors in 4 of the 8 columns.

- Target #1: Highway 99
    - The initial premise of this target is wrong. We are not worried about the tree or a branch landing on asphalt. We are worried about it striking a motorist. As such, the Occupancy Rate should by Frequent (3) rather than Constant (4). The correct target description would be "Cars & Passengers on Old Highway 99 SE".
- Target #2: Airplane Hangar.
    - Common sense would dictate that buildings do not occasionally go for a walk. Buildings are always Constant (4) rather than Frequent (3) occupancy.
- Target #3: North & South Parking
    - Similarly to Target #1, we are concerned with occupants and vehicles being impacted, not pavement. The title should be "Cars & Passengers in parking lots". Having driven by frequently, I can confidently say that the parking is Occasional (2), not Frequent (3) occupancy. It would be easily practicable to close several parking spaces in both lots to fully mitigate any risk.

- Target #4: Electric Service Drop.
    - This is mostly correct, though it is possible to relocate the lines. That said, this would cost more than repairing any potential damage to the lines.

Analysis of the City Arborist's Report

Site Factors

History of failures: Large scaffold branches, recent and past — Topography: Flat ☒ Slope ☐ _____ % Aspect ____

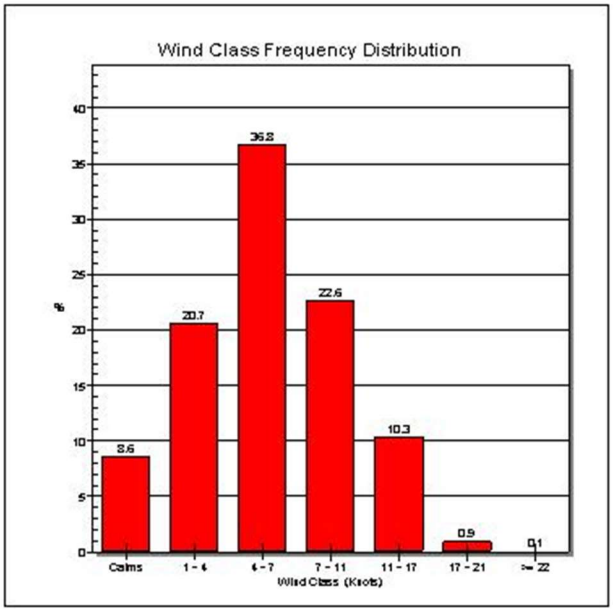
Site changes: None ■ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe ____

Soil conditions: Limited volume ■ Saturated ☐ Shallow ☐ Compacted ■ Pavement over roots ■ 40 % Describe: Road and parking

Prevailing wind direction: SW — Common weather: Strong winds ■ Ice ☐ Snow ☐ Heavy rain ■ Describe ____

Tree Health and Species Profile

- Site Changes
    - As documented by Mr. Wolbert, the root flare of the tree was buried by several feet of fill when the road was moved. This constitutes a grade change.
    - A change in the location of the road and the deposition of fill will generally change the local soil hydrology.
    - In short, "None" is the wrong answer.
- Soil Conditions
    - "Limited Volume" is soil condition commonly associated with city street trees growing in a



small allotment of soil surrounded by sidewalks[5]. This is not the case with this oak.

- Common Weather
  - Common sense would tell you that an airport is likely not in a location that is prone to frequent strong winds and especially heavy rains. This is documented by the Office of the State Climatologist[6], which maintains a weather station there. The average wind speed is 6-7 knots (about 7mph). As such, "Heavy Winds" was checked off erroneously. "Heavy Rain" could be applicable to anything west of the Cascades.

Analysis of the City Arborist's Report

Before we look at the Risk Categorization Table, it is necessary to understand the matrix used in the likelihood of failure and impact. While I encourage you to refer to the document included in Appendix 3, I will also define these terms below. These definitions are from the ISA[7].

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 period.

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

Probable—failure may be expected under normal weather conditions within the specified time period.

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5 "Section 3.14 Tree Planting and Preservation." Department of Energy & Environment, District of Columbia. https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/Section%203.14%20%20Tree%20Planting%20and%20Preservation.pdf (Accessed April 15, 2024), p. 244.

6 "Wind Rose Plots." Washington State Climate Office. https://climate.washington.edu/climate-data/wind- rose-plots/ (Accessed April 15, 2024).

7 ISA Basic Tree Risk Assessment Form Instructions. International Society of Arboriculture. https://www.isa- arbor.com/education/resources/ISABasicTreeRiskAssessmentForm_Instructions.pdf (Accessed April 15, 2024).

Imminent—failure has started or is most likely to occur in the near future, even if there is no significant wind or increased load.

Likelihood of Impact

Very low—the chance of the failed tree or tree part impacting the specified target is remote. Likelihood of impact could be very low if the target is outside the anticipated target zone or if occupancy rates are rare. Another example of very low likelihood of impact is people in an occasionally used area with protection against being struck by the tree failure due to the presence of other trees or structures between the tree being assessed and the targets.

Low—there is a slight chance that the failed tree or tree part will impact the target. This is the case for people in an occasionally used area with no protection factors and no predictable direction of fall, a frequently used area that is partially protected, or a constant target that is well protected from the assessed tree. Examples are vehicles on an occasionally used service road next to the assessed tree, or a frequently used street that has a large tree providing protection between vehicles on the street and the assessed tree.

Medium—the failed tree or tree part could impact the target, but is not expected to do so. This is the case for people in a frequently used area when the direction of fall may or may not be toward the target. An example of a medium likelihood of impacting people could be passengers in a car traveling on an arterial street (frequent occupancy) next to the assessed tree with a large, dead branch over the street.

High—the failed tree or tree part is likely to impact the target. This is the case when there is a constant target with no protection factors, and the direction of fall is toward the target.

Analysis of the City Arborist's Report

Consequences of Failure

Negligible—no personal injury, low-value property damage, or disruptions that can be replaced or repaired.

Minor—minor personal injury, low-to-moderate value property damage, or small disruption of activities.

Significant—substantial personal injury, moderate- to high-value property damage, or considerable disruption of activities.

Severe—serious personal injury or death, high-value property damage or major disruption of important activities.

As we review the Risk Categorization Table, please refer back to these pages as needed.

The steps to use Matrix 1 are to take the ***Likelihood of Failure (LOF)*** and the ***Likelihood of Impacting Target (LOI)*** to arrive at a ***Likelihood of Failure & Impact (LFI)***. As an example, "Possible" ***LOF*** and "Medium" ***LOI*** would work out to an "Unlikely" ***LFI***.

In Matrix 2, we take the resultant ***LFI*** and the ***Consequences of Failure (CF)*** to arrive at our final risk rating. If our ***LFI*** is "Unlikely" and our ***CF*** is "Significant", then our final Risk Rating would be "Low."

Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

I know this is jargon-heavy, but it will make more sense as we see it in action.

I'd like to stress that the final Risk Rating is what informs parties that manage risk. Most municipalities draw the line of acceptable vs unacceptable risk between "Moderate" and "High". Keep this in mind as we look at the city arborist's report.

Analysis of the City Arborist's Report

Risk Categorization

Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating of part (from Matrix 2)
1	Large scaffold branch	Failure due to decay	16"	6'	1	None	○	◉	○	○	○	○	○	◉	○	○	◉	○	○	○	○	◉	High
			16"	30'	3	None	○	◉	○	○	○	○	○	◉	○	○	◉	○	○	○	○	◉	High
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
2	Co-dominant stem	Suspect weak union at stem inclusion due to decay	30"	80'	2	None	○	◉	○	○	○	○	○	◉	○	○	◉	○	○	○	○	◉	High
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3	Branch	Poor attachment	6"	4'	4	None	○	◉	○	○	○	○	◉	○	◉	○	○	○	○	○	◉	○	Low
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

Figure 6: Risk Categorization Table from McFarland Report

- Condition #1: Failure of a Large Scaffold Branch.
  - Target #1: Highway 99
    - Note that ***LOF*** is listed as "Possible" and ***LOI*** is listed as "High". This would result in a ***LFI*** of "Somewhat Likely". Mr. McFarland wrongly indicated it as "likely".
      When the ***LFI*** of "Somewhat Likely" is paired with "Severe" ***CF***, we would arrive a final risk rating of "Moderate". Because of the previous mistake, it was wrongly listed as "High".
    - Furthermore, a "High" ***LOI*** is wrong. The ISA defines a "Medium" ***LOI*** as: "*An example of a medium likelihood of impacting people could be passengers in a car traveling on an arterial street (frequent occupancy) next to the assessed tree with a large, dead branch over the street*". This is an exact description of the conditions presented by the tree and surroundings. "Possible" ***LOF*** and "Medium" ***LOI*** would result in an "Unlikely" ***LFI***. Even with "Severe" ***CF***, this would equate to a "Low" Risk Rating.

Analysis of the City Arborist's Report

- Target #3: North & South Parking
  - Note that ***LOF*** is listed as "Possible" and ***LOI*** is listed as "High". This would result in a ***LFI*** of "Somewhat Likely". Mr. McFarland wrongly indicated it as "likely".
    When the ***LFI*** of "Somewhat Likely" is paired with "Severe" ***CF***, we would arrive a final risk rating of "Moderate". Because of the previous mistake, it was wrongly listed as "High".
  - We can see from the image below that branches from the tree do not overhang either parking lot. As such, ***LOI*** would be low, given that things usually fall down rather than sideways. "Possible" ***LOF*** and "Low" ***LOI*** would result in an "Unlikely" ***LFI***. Even with "Severe" ***CF***, this would equate to a "Low" Risk Rating.

Figure 7: Google Street View

Analysis of the City Arborist's Report

- Condition #2: Co-dominate Stem
  - Target #2: Hangar
    - Note that ***LOF*** is listed as "Possible" and ***LOI*** is listed as "High". This would result in a ***LFI*** of "Somewhat Likely". Mr. McFarland wrongly indicated it as "likely".
      When the ***LFI*** of "Somewhat Likely" is paired with "Severe" ***CF***, we would arrive a final risk rating of "Moderate". Because of the previous mistake, it was wrongly listed as "High".
      - *This is the third time in a row that this mistake was made*.
    - As we can see from this image, were the stem to fail at the base, the part of the tree impacting the building would be in the 6-12" range. While this would likely damage the roof and siding, it would not arrive to the point of "Severe" ***CF***. In any case, the correct Risk Rating would still be "Moderate".

Figure 8: Google Street View

- Condition #3: Branch
  - Target #4: Power lines
    - The matrix for this one was used correctly. The correct risk rating is "Low."
      - The cost from PSE to relocate a power pole is in the neighborhood of $6000[8]. It does not make fiscal sense to do this to mitigate a hypothetical situation that would be far cheaper to repair after the fact.

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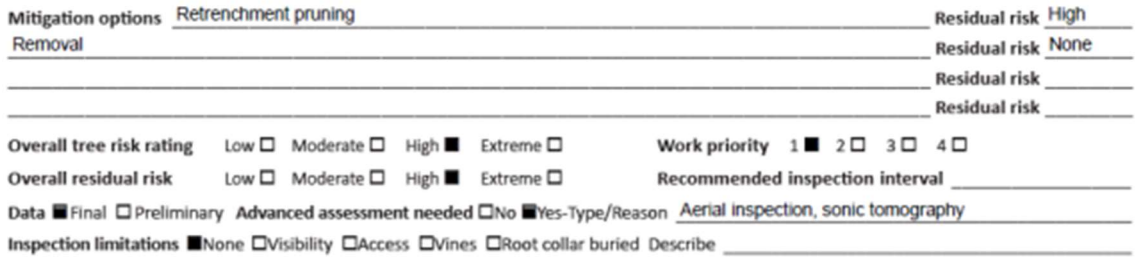
8 PSE Electric Service Commercial/Industrial and Multifamily Permanent and Temporary Service: Overhead Site Checklist." Puget Sound Energy. Accessed April 15, 2024. https://www.pse.com/-/media/Feature/PSE/Construction-Service/Technical-Resource-Documents/Electric-Service-CommercialIndustrial-and-Multifamily-Permanent-and-Temporary-Service/Overhead-Site-Checklist.pdf?modified=20190806200257

In closing, the risk rating matrix was used incorrectly to generate an artificially inflated rating. This tree, at most, would present a “Moderate” risk. The errors present here make the assessment of the tree as being a “High” risk are the result for a series of mistakes.

Analysis of the City Arborist's Report

Figure 9: Final Section of ISA TRAQ Report



We have clarified that the tree's true Risk Rating is "Moderate" rather than "High". This makes the notion of a "High" residual risk founded on information that is fundamentally incorrect. That said, let's look at the options.

- Mitigation Options
  - Retrenchment Pruning
    - This option was misconstrued during multiple meetings. No arborist familiar with the technique would recommend cutting everything within 15' of the edge of the crown in one pass. This sort of pruning is a multi-year process where defects with targets take priority[9]. The risk to targets after several years would be "Low" as weight is shifted into a more stable configuration for long term growth.
  - Cabling and Bracing.

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9 Meilleur, Guy. "Regenerative Pruning for Smaller, Safer Trees." Georgia Arborist Association. Accessed April 15, 2024. https://www.georgiaarborist.org/resources/Documents/Regenerative%20Pruning%20for%20Smaller,%20Safer%20Trees%20200827.pdf.

- Mr. McFarland stated that he did not believe this to be possible given the tree's size and location. However, more determined and imaginative members of our profession have accomplished this many times over[10]. The option exists & should be seriously considered. This would reduce all eventualities to a "Low" in one visit.

10 "Preserving Wedgwood's Scarlet Oak Heritage Tree." Wedgewood in Seattle History. Accessed April 15, 2024. https://wedgwoodinseattlehistory.com/2016/06/25/preserving-wedgewoods-scarlet-oak-heritage- tree/.

Analysis of the City Arborist's Report

- Soil Improvements.
  - There is limited input of leaf decomposition for returning nitrogen and other nutrients to the soil. This soil is likely in poor condition and should be tested to determine what amendments are needed. Poor soil conditions can lead trees to shed branches to ensure their survival[11]. As we wait for test results to be processed, adding mulch to the root zone would be beneficial in any eventuality.
- Removal
  - As we discussed in the introduction, all trees that we live with have some risk present. A stump has no risk. It also has no benefits to the community.

11 Meilleur, Guy. "Regenerative Pruning for Smaller, Safer Trees." Georgia Arborist Association. Accessed April 15, 2024. https://www.georgiaarborist.org/resources/Documents/Regenerative%20Pruning%20for%20Smaller,%20Safer%20Trees%20200827.pdf.

Comments by Tree Solutions Inc

Appendix A **Test Results**

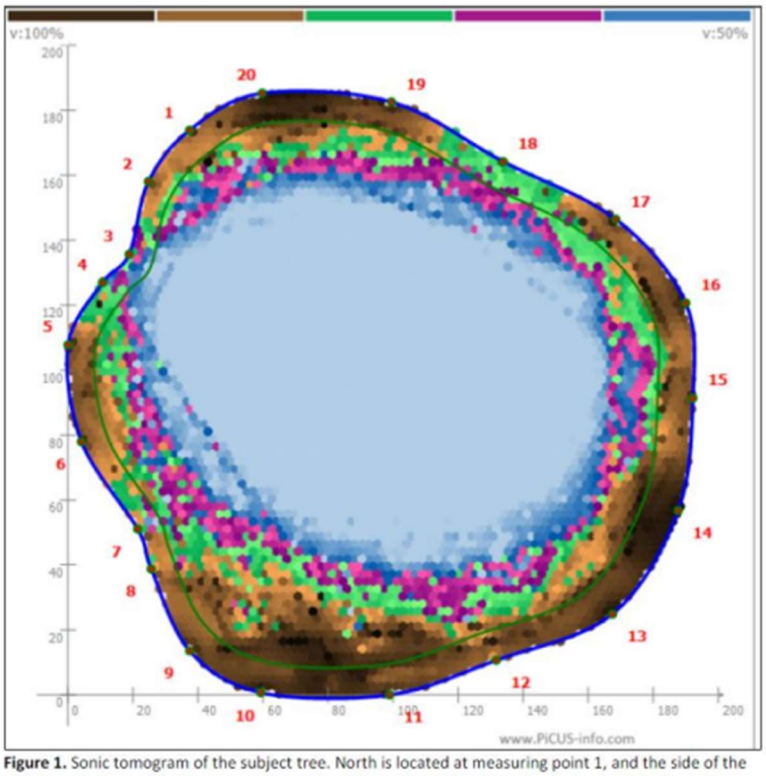

Figure 1. Sonic tomogram of the subject tree. North is located at measuring point 1, and the side of the tree towards the highway is along measuring points 17, 18, and 19. The blue areas indicate decay or a decay cavity, and the brown areas indicate sound wood. The purple and green areas indicate early or spreading decay. The green line is the calculated shell wall of sound wood required for the tree to remain stable.

Tree Solutions is a well-known company in the field of tree preservation and have completed high-profile work of a seldom rivaled quality[12]. They are some of the leading experts and innovators in the field.

They did not recommend removal, but rather retrenchment. Their tomograph shows the tree has more than enough wood to maintain stability. In light of the targets near the tree, retrenchment would offer a long-term benefit of decreased future risks. Mulching,

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12 Tree Solutions. Accessed April 15, 2024. https://treesolutions.net/portfolio/.

which has been done in the past, would be an excellent practice to continue into the future.

During a city council meeting, Mr. McFarland claimed the tree would need annual re-inspection. This was not their recommendation. Rather, they recommended a 5 year interval.

It is important to listen to the best source of information you can find. In this case, that would be Scott Baker and Tree Solutions.

Washington City's Insurance Authority

Hearing the claim that Washington Cities Insurance Authority (WCIA) had requested the city remove the tree was a red flag. In my experience, it is exceedingly rare for an insurer to mandate that a tree be removed. Because I was skeptical, I called them. The person I spoke to (off the record) categorically denied that WCIA had made any such request or recommendation. They recommended that I file a public records request on April 4th to verify this.

The request was prossessed by April 10th and showed no evidence that WCIA had made any recommendation to the City of Tumwater for or against the removal of that tree. The summery of the communication is shown here:

WCIA did not recommend the removal of the tree. They did send some bulletins and information concerning liability for known hazards that weren't mitigated, but these almost exclusively dealt with impaired traffic visibility as a result of vegetation.

An email sent from a City Attorney (Davis Abbott) is concerning for its use of wording.

Good Morning, Farah,

Hope you are doing well! I am reaching out because we are getting some pushback from city council on removing a historical, but now very dead, oak tree in Tumwater.

I am putting together a memo on tort liability and duty of care of property owners, I am wondering if you could provide me with a couple examples of cases where situations like this went wrong for cities?

Specifically high dollar amount verdicts finding the city/property owner liable when they were aware of a hazard but failed to correct it. I have some other cases explaining the way liability is determined, but it is hard to find ones with dollar amounts in damages to convey what this could potentially cost.

If you know of anything like that, I'd greatly appreciate any info you have or even just a point in a different direction.

Thanks,

Davis Abbott | Assistant City Attorney
Tumwater City Attorney's Office
555 Israel Road SW | Tumwater, WA 98501
Work Cell: (360)742-4830
Direct: (360)754-3926 | Legal: (360)754-4121
DAbbott@ci.tumwater.wa.us | www.ci.tmwater.wa.us

WCIA

Member:**Tumwater**

Entry Date	Entry User	Note Type	Note
3/13/2024	Farah Derosier	Risk Discussions	Davis reached out because they are getting push back from their city council on removing a historical, but very dead oak tree in Tumwater. He asked if we had any resources. I sent him PAR. 18 Municipal Tree Management, Bulletin 72, When a tree falls newsletter and Opinions Can Be Expensive article done by claims.

Figure 10: Notes on discussion between WCIA and Tumwater

Washington City's Insurance Authority

This tree is a lot of things, but it is not dead. This email was sent on March 12th, 2024. The report by Mr. McFarland was already published and available to Mr. Abbott when he sent this communication to the WCIA. The first record they have of the report was from November 2023. It is unclear why he referred to the tree as being "very dead" and I will not venture a guess as to his reasons. I did make a call Mr. Abbott and ask for clarification, but he would not do so.

It is clear from this that the city's communication with the WCIA was predicated on information that was not true. As such, even if they had made a decision, it would be based on factors that are not applicable. Further communication from City Attorney, Karen Kirkpatrick, attempted to convince WCIA to try to sway the council. I have watched the online meeting and they did not.

I also wanted to quickly let you know that we are having an issue regarding a hazardous tree that needs to be removed. However, it is a beloved historic tree the council and historic commission are resisting delisting from our historic registry due to public outcry. Your presentation will be a good opportunity to remind the council not to substitute their judgement in place of expert opinion and any other don'ts that may apply to such a hypothetical situation.
This will be a timely presentation for the council. We're looking forward to it and seeing you again.

I am including the entirety of the information included in the Public Records Request Response as an attachment when I send this in. If there is any trouble accessing it, I will be glad to individually provide it if requested.

Conclusion

We have made our way through this report, and thank you for taking the time to undertake this! These reports are complex, but for good reason. To make a decision on the fate of a living organism should not be undertaken lightly. It is our duty, as arborists, to double check the work. The loss of a tree due to an error in paperwork represents, in a final sense, a theft from the community where it grows and the natural world that interfaces with it. This report, as written, can not provide justification to remove this tree.

As has been shown, the report condemning the tree contains a litany of mistakes, failed to use arboricultural best practices, ignored recommendations from more experienced parties, and is a generally poor reflection of the field of arboriculture.

I strongly encourage the city to contract a neutral 3rd party, experienced in the nuances and issues surrounding the intersection of historic trees and populations, to complete a new report. In the interim, amendment of the soil underneath the tree is inexpensive and will be generally beneficial to the overall condition of the tree until long-term management plans are in place.

Beowulf Brower

ISA Certified Arborist
Tree Risk Assessment Qualification
PN-9801A

Appendix 1: Email from Neal Wolbert

From: Neal Wolbert <Neal@wolberts.com>
Sent: Sunday, February 3, 2008 3:35:23 PM
To: Dianna Moore <dlmoor2@coastaccess.com>
Cc: cascadetreeexperts@hotmail.com <cascadetreeexperts@hotmail.com>; bert@wolberts.com <bert@wolberts.com>
Subject: RE: Davis-Meeker Oak

Hi Dianna,
Yes, sadly, I discovered the damage last week. There were pieces of safety glass and plastic car parts on and around the tree so our suspicion is that a part fell off a junk hauler on the way to the scrap yard down the road. The wound is about 18" to 24" in diameter and the bark was completely sliced off. Our company is helping Ray Gleason, Cascade Tree Experts, Olympia, with a new post injury treatment. With the help of a government researcher, Ray is installing a wrap that will allow gas exchange, vital to callous formation, and protect the tree from the road spray contamination. It also will keep the wound dark in hopes of encouraging more callous formation on the wound itself. There have been promising results from some much smaller projects, so we hope this helps the old timer. The project will be completed Monday afternoon with a final covering of burlap (not paper) around the trunk. It will stay in place until July or August, if vandals leave it alone. John Dodge, who writes the "Soundings" column for The Olympian, will print an article this week which should satisfy the curious and possibly deter any would-be vandals. The tree is quite healthy as far as we know, so it should close the wound within a few years. A lower limb was removed many years ago (the hanging limb?) that left a much larger open wound that the tree completely closed, so it has the moxie to heal well.

In the late 90's I discovered Armillaria wood destroying fungus eating away at the roots and the trunk evidenced by mushrooms growing up the trunk on the road side. That's what caught my attention and lead to the pathogen identification and treatments. Our company and Rob Lloyd, Lloyd's Arboricultural Consulting, Vancouver, WA performed a root crown excavation with a tool called an air knife that safely blows soil off roots without damaging them. After your grandfather's intervention lead to bending the road to save the tree, the new road construction left nearly 3' of soil over the root crown of the tree. After the base of the tree was uncovered, a cavity was revealed that was plugged with soil and Armillaria mycelia (mold). The excavation process broke the contact with the soil and the fungus stopped progressing. Since then the roots have been regularly fertilized and treated with biological additives to stimulate new feeder root development. Medicine (fungicide) was added to stop any further invasion by other types of root rotting fungi. Sadly, Armillaria itself is untreatable but keeping the tree in good health and protecting it from other invaders will definitely prolong its life. We also eliminated the grass under the tree and spread washed dairy manure

compost over most of the root zone which lead to a rapid increase in feeder roots. Compost has been re-applied periodically since then.

The area under the street could not be treated however, and the city has been unwilling to consider drilling holes or installing grates in the street so treatments can be administered. If you want to help that cause, a

Appendix 1: Email from Neal Wolbert

letter to the Tumwater City Council would be welcome. It's a huge deal to get approval for a project like that. Just dealing with re-routing the traffic is a major thing. Access to the roots under concrete and subsequent treatments would encourage new rooting on the weak side of the tree extending the life of the tree even more.

I'm so glad you wrote and many people would appreciate any info you could send along about this stately piece of history. We'd like to see this living historic monument thrive for a few hundred more years. We are committed to do whatever we can to help save this tree.

Cordially,

Neal Wolbert
360-239-3126

P.S.

Watch for John Dodge's article, it will have a photo or two.

From: Dianna Moore [mailto:dlmoor2@coastaccess.com]
Sent: Sunday, February 03, 2008 1:01 PM
To: info@wolberts.com
Subject: re: Davis-Meeker Oak

Hi…I understand you worked on the root fungus problem back in 1991 on the Davis-Meeker Oak. My father was Jack Davis…he fought to save that tree from being cut down to enlarge Hwy 99, and the tree was renamed to honor him. When he died in 1998 I moved to Ocean Shores to be closer to my mother, and I have kept in touch with local Tumwater residents. They have told me this tree is now undergoing some sort of work…a large piece of bark has been removed or has fallen off and the area is now covered by paper (?). Do you know anything about this?

Thanks in advance for information.

Dianna Moore
Ocean Shores, Wa.
dlmoor2@coastaccess.com
360-289-5048

Appendix 2: Email from Ray Gleason

Between 2008 and 2015

I worked on the historic Davis Meeker oak tree 3 separate times other than the multiple intermittent inspections.

First, being the application of semi permeable membrane after cleaning the damaged area currently nearly completely compartmentalized.

Second, was road clearance for hwy 99 with the assistance of state patrol officers traffic flaggers. During this time I inspected the upper canopy of the tree and pruned the canopy near the power line to the “hangar” for clearance. All at a donation to the public.

During this process I asked the city of Tumwater for assistance and found that donating was the only way to preserve this historic tree. The city of Tumwater had no interest in investing in management other than removal.

Third, a branch fell from the tree into the (RMZ) root management zone area, I was contacted by the city of Tumwater to clean up the material if possible. I donated time to the city of Tumwater on behalf of the public and future generations. Have hauled/deposited wood chips into the root management zone twice during this time.

Ray Gleason

CTE Cascade Tree Experts, LLC

ISA Certified Arborist #PN1972A

360-701-8872

Appendix 1
Using the ISA Basic Tree Risk Assessment Form

This form is provided with the *ISA Tree Risk Assessment Manual* and is intended to act as a guide for collecting and recording tree risk assessment information. This form is for trees receiving a basic (Level 2) risk assessment. It is *not intended for use* with limited visual (Level 1) or advanced (Level 3) assessments. Space is provided to write comments and notes for various conditions that are not included elsewhere on the form or for points that need additional explanation. *It is not necessary to mark every box or to fill in every line on this form.* Only information relevant to the tree risk assessment should be collected. You may adapt this form for your specific needs or you may use your own method of collecting and analyzing field data.

PAGE 1—DATA COLLECTION

Section 1—Assignment and Tree ID

Client _____ Date _____ Time _____
Address/Tree location _____ Tree no. _____ Sheet _____ of _____
Tree species _____ dbh _____ Height _____ Crown spread dia. _____
Assessor(s) _____ Tools used _____ **Time frame** _____

This section outlines the basic information for your assessment. This will be valuable information when drafting your written report. Be sure to refer back to the time frame stated in this section when determining likelihood of failure later on this form.

Client—name of the person who hired you to perform the assessment or agency for which you are working.

Date—date of the tree inspection.

Time—time of the tree inspection.

Address/Tree location—the physical address, GPS coordinates, or other location description of the tree and the location of the tree on the property, such as "backyard" or "between street and sidewalk on the north side of walk." A typical entry may be "411 Pine Street, Oakville. Large tree on left near driveway."

Tree no.—if the tree has an inventory tag with a number, it should be entered here. If a group of trees without tags are assessed, they may be assigned a sequence number.

Sheet—if multiple sheets are used for a tree assessment—or if a group of trees are assessed—the sheet number and total number of sheets used on the job may be entered.

Tree species—include the common and/or scientific name of the tree; cultivar, if known.

dbh—diameter at breast height [U.S., 4.5 feet (1.37 m); or customary diameter measure for your country; IUFRO standard is 1.3 m above ground] measured in inches or centimeters.

Height—tree height either visually estimated or measured. If measured, the tool used for this measurement should be noted in Tools used.

Crown spread dia.—average diameter of the drip line of the tree; measured or estimated.

Assessor(s)—name of the person or people collecting the tree risk information; may also include qualifications such as "TRAQ."

Tools used—list of tools used in the assessment such as "mallet" or "binoculars." If no tools were used, write "none" or leave blank.

Time frame—period in which you are estimating the likelihood of failure, typically between one and five years. Time frame is essential when rating the likelihood of failure with all categories except *imminent*, which has a different time frame (very soon).

Appendix 3: Using The Basic Tree Risk Assessment Form

Section 2—Target Assessment

Target Assessment								
Target number	Target description	Target protection	Target zone: Target within drip line	Target zone: Target within 1 x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate 1 – rare 2 – occasional 3 – frequent 4 – constant	Practical to move target?	Restriction practical?
1								
2								
3								
4								

The Target Assessment chart is used to list target(s)—people, property, or activities that could be injured, damaged, or disrupted by a tree failure—within the striking distance (target zone) of the tree part concerned. Four lines are provided; additional targets can be listed on a separate form. Target information will correspond with the Risk Categorization chart on the back of the form.

Target number—many trees have multiple targets within the target zone; the target number is provided to list individual targets and to facilitate inclusion of this number in the Risk Categorization chart so that the target description does not need to be rewritten.

Target description—brief description such as "people near tree," "house," "play area," or "high-traffic street." Location of the target can be noted by checking one of the distance boxes under Target zone.

Target protection—note any significant factors that could protect the target because this may affect the likelihood of impact and/or the consequences of failure.

Target zone—identify where the targets are in relation to the tree or tree part:

Within drip line—target is underneath the canopy of the tree.

Within 1 × Ht—target is within striking distance if the trunk or root system of the tree fails (1 times the height of the tree).

Within 1.5 × Ht—target is within striking distance if the trunk or root system of the tree fails and there are dead or brittle branches that could shatter and fly from the failed tree.

Occupancy rate—an estimated amount of time the target is within the target zone. Use corresponding numbered codes (1–4):

1. **Rare**—the target zone is not commonly used by people or other mobile/movable targets.
2. **Occasional**—the target zone is occupied by people or other targets infrequently or irregularly.
3. **Frequent**—the target zone is occupied for a large portion of the day or week.
4. **Constant**—a target is present at nearly all times, 24 hours a day, 7 days a week.

Practical to move target?—check box if it is practical to move the target out of the target zone if mitigation is required.

Restriction practical?—check box if it is practical to restrict access to the target zone.

Appendix 3: Using The Basic Tree Risk Assessment Form

Section 3—Site Factors

Site Factors

History of failures _____ **Topography** Flat☐ Slope☐ _____% **Aspect** _____

Site changes None☐ Grade change☐ Site clearing☐ Changed soil hydrology☐ Root cuts☐ Describe _____

Soil conditions Limited volume☐ Saturated☐ Shallow☐ Compacted☐ Pavement over roots☐ _____% Describe _____

Prevailing wind direction _____ **Common weather** Strong winds☐ Ice☐ Snow☐ Heavy rain☐ Describe _____

Site factors may influence the likelihood of tree failure. This section provides a list of common site factors that should be considered. There may be other site factors that are critical on a given site or that you should note even if they are not on this form. Any of these factors can be further described in the space provided or on additional paper. Other site factors affecting wind load should be noted. These may include the site elevation, surface roughness, and hilltop locations.

History of failures—note and describe evidence of previous whole-tree failures on the site, and estimate the time frame for how recently they occurred. Previous branch failures should be noted in the Crown and Branches box (located in the Tree Defects and Conditions Affecting the Likelihood of Failure section of the form).

Topography—check boxes for flat or sloping topography; an estimate of the slope percentage may be included.

Aspect—the compass direction that the slope is facing.

Site changes—factors affecting the root system of the tree or the change in exposure of the tree to wind. Check all that apply:

- **None**—no evidence of recent site changes.
- **Grade change**—soil was added or removed from the site.
- **Site clearing**—adjacent trees, which may have blocked the wind, have been removed or significantly reduced.
- **Changed soil hydrology**—changes have been made that affect water flow in or out of the site.
- **Root cuts**—the root system has been cut or otherwise significantly damaged. Additional information on root cuts will be included in the Roots and Root Collar box.
- **Describe**—note applicable details or further descriptions of site changes.

Soil conditions—factors that can affect the ability of the root system to mechanically support the tree, as well as the general health and vitality of the tree. Check all that apply:

- **Limited volume**—soil volume limited by rocks, water table, building foundations, size of a container, or other factors.
- **Saturated**—soil saturated due to poor drainage, high water table, excess irrigation, or location in a low area. May be saturated now or have a history of inundation.
- **Shallow**—rooting depth limited by one or more factors including high water table, rock ledges, compacted layers, or underground structures such as parking decks.
- **Compacted**—soil is severely compacted, limiting the depth, spread, and distribution of the root system.
- **Pavement over roots**—concrete, asphalt, pavers, or other materials restricting root growth or water movement into the root zone. If present, enter the percentage of the area within the drip line that is paved.
- **Describe**—note applicable details or further descriptions of site conditions.

Prevailing wind direction—a typical, consistent, moderate-to-strong wind, usually from a single direction, that has affected tree crown and root system development.

Common weather—trees will adapt to a number of climatic conditions if they occur regularly. Check all that apply (strong winds, ice, snow, or heavy rain).

- **Describe**—note any further descriptions regarding common weather.

Appendix 3: Using The Basic Tree Risk Assessment Form

Section 4—Tree Health and Species Profile

Tree Health and Species Profile

Vigor Low ☐ Normal ☐ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal ____% Chlorotic ____% Necrotic ____%
Pests/Biotic _____ **Abiotic** _____
Species failure profile Branches ☐ Trunk ☐ Roots ☐ Describe _____

This section provides the opportunity to note any species-specific failure patterns that you suspect may influence likelihood of failure. Any species information you feel is important should be noted in this section. Any of these factors can be further described in the spaces provided or on additional paper.

Vigor—an assessment of overall tree health. Classify as low, normal, or high:

Low—tree is weak, growing slowly, and/or under stress.

Normal—tree has average vigor for its species and the site conditions.

High—tree is growing well and appears to be free of significant health stress factors.

Foliage—size and color are indications of tree health; compare with a healthy specimen of the same species in the area:

None (seasonal)—a deciduous tree that has dropped its leaves for the winter.

None (dead)—a tree that has dropped its leaves because it is dead.

Normal—percentage of foliage size and color that is normal for the species in the area.

Chlorotic—percentage of foliage that is yellowish green to yellow.

Necrotic—percentage of dead foliage in the crown.

Pests/Biotic—insects and diseases that may significantly affect tree health or stability.

Abiotic—abiotic problems that may significantly affect tree health or stability.

Species failure profile—any known failure problems with the species in the branches, trunk, or roots.

Describe—note any further species failure details.

Section 5—Load Factors

Load Factors										
Wind exposure	Protected ☐	Partial ☐	Full ☐	Wind funneling ☐ _____		**Relative crown size**	Small ☐	Medium ☐	Large ☐	
Crown density	Sparse ☐	Normal ☐	Dense ☐	**Interior branches**	Few ☐	Normal ☐	Dense ☐	**Vines/Mistletoe/Moss** ☐	_____	
Recent or expected change in load factors _____										

Generally, two types of loads need to be considered when evaluating tree risk. Dynamic load is from wind as it impacts the tree, and static load is from gravity acting on the tree. These two loads can interact.

Wind exposure—factors that affect wind load on the tree. Check all that apply:

- **Protected**—trees or structures in the area significantly reduce wind velocity or the tree's exposure to wind.
- **Partial**—other trees, or buildings near the tree, moderately reduce the impact of wind on the tree.
- **Full**—tree is fully exposed to wind.
- **Wind funneling**—wind may be "funneled" or "tunneled" (by buildings, canyons, large stands of trees) toward the tree so that wind velocity experienced by the tree is increased.

Relative crown size—comparison of the tree's crown size to the trunk diameter. Classify as small, medium, or large.

Crown density—the relative wind transparency of the crown:

- **Sparse**—crown allows a large degree of wind and light penetration; varies with species.
- **Normal**—indicates moderate wind and light penetration.
- **Dense**—crown does not allow much light or wind penetration.

Interior branches—increase wind resistance but dampen branch/tree movement:

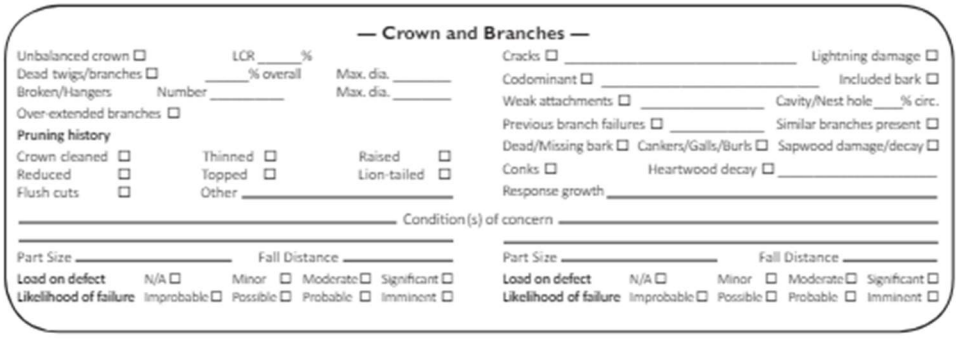
- **Few**—little wind resistance and damping.
- **Normal**—moderate wind resistance and damping.
- **Dense**—significant wind resistance and damping.

Vines/Mistletoe/Moss—check box if present at moderate to high levels that increase weight or wind resistance. Moss refers to Spanish or ball moss (epiphytes).

Recent or expected change in load factors—record any factors, recent or planned, that may significantly affect the load on any defects.

Appendix 3: Using The Basic Tree Risk Assessment Form

Section 6—Tree Defects and Conditions Affecting the Likelihood of Failure



— Crown and Branches —

Unbalanced crown ☐ LCR _____%
Dead twigs/branches ☐ _____% overall Max. dia. _____
Broken/Hangers Number _____ Max. dia. _____
Over-extended branches ☐
Pruning history
Crown cleaned ☐ Thinned ☐ Raised ☐
Reduced ☐ Topped ☐ Lion-tailed ☐
Flush cuts ☐ Other _____
Condition(s) of concern
Part Size _____ Fall Distance _____
Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Cracks ☐ _____ Lightning damage ☐
Codominant ☐ _____ Included bark ☐
Weak attachments ☐ _____ Cavity/Nest hole ___% circ.
Previous branch failures ☐ _____ Similar branches present ☐
Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐
Conks ☐ Heartwood decay ☐ _____
Response growth _____
Condition(s) of concern
Part Size _____ Fall Distance _____
Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

This section provides a systematic checklist for assessing the tree, dividing it into Crown and Branches, Trunk, and Roots and Root Collar. Check only factors that apply to the assessed tree. These factors may or may not contribute to Condition(s) of concern, Load on defect, or Likelihood of failure.

Crown and Branches

Unbalanced crown—check box if foliage is not uniformly distributed.

Live crown ratio (LCR)—the ratio of the height of the live crown to the height of the entire tree [LCR = (crown height/tree height) × 100].

Dead twigs/branches—small-diameter, dead branches. Check box if present and indicate percentage and size (maximum diameter).

Broken/Hangers—broken or cut branches remaining in the crown. Record the number and size (maximum diameter).

Over-extended branches—check box if there are branches that extend beyond the tree's canopy or that are excessively long with poor taper.

Pruning history—check appropriate boxes if pruning is known and relevant:

Crown cleaned—pruning of dead, dying, diseased, and broken branches from the tree crown.

Thinned—selective removal of live branches to reduce crown density. Other pruning types include, but are not limited to, structural, pollarding, espalier, and vista, and may be included in your notes.

Raised—removal of lower branches to provide clearance.

Reduced—pruning to decrease tree height or spread by cutting to lateral branches.

Topped—inappropriate pruning technique used to reduce tree size; characterized by internodal cuts.

Lion-tailed—inappropriate pruning practice removing an excessive number of inner and/or lower lateral branches.

Flush cuts—pruning cuts through (or removal of) the branch collar, causing unnecessary injury to the trunk or parent branch.

Other—note any other pruning history that may affect the likelihood of failure.

Cracks—separation in the wood in either a longitudinal (radial, in the plane of ray cells) or transverse (across the stem) direction. Check box if present and describe briefly.

Lightning damage—often evidenced by a centrally located line of sapwood damage and bark removal on either side in a spiral pattern on the trunk or branch. Check box if present.

Codominant—branches of nearly equal diameter arising from a common junction and lacking a normal branch union. Check box if present and describe.

Included bark—bark that becomes embedded in a union between branch and trunk, or between codominant stems, causing a weak structure. Check box if present.

Weak attachments—branches that are codominant or that have included bark or splits at or below the junctions. Check box if present and describe.

Appendix 3: Using The Basic Tree Risk Assessment Form

Cavity/Nest hole—openings from the outside into the heartwood area of the tree. Record the percentage of the branch circumference that has missing wood.

Previous branch failures—check box if there is evidence of previous branch failures and describe briefly. Check "similar branches present" if relevant.

Dead/Missing bark—check box if branches are dead or if areas of dead cambium are present where new wood will not be produced.

Cankers/Galls/Burls—check box if relevant and circle which one(s) are of concern:

- **Canker**—localized diseased areas on the branch; often sunken or discolored.
- **Gall**—abnormal swellings of tissue caused by pests; may or may not be a defect.
- **Burl**—outgrowth on the trunk, branch, or roots; not usually considered a defect.

Sapwood damage/decay—check box if there is mechanical or fungal damage in the sapwood that may weaken the branch, or decay of dead or dying branches. If checked, you may circle "damage" or "decay" to indicate which one is present.

Conks (mushrooms, brackets)—fungal fruiting structures; common, definite indicators of decay. Check box if present and describe under Condition(s) of concern.

Heartwood decay—check box if present and describe.

Response growth—reaction wood or additional wood grown to increase the structural strength of the branch. Note location and extent.

Condition(s) of concern—conditions in the crown and branches that may affect likelihood of failure. Note the main concern(s); if there are no concerns, write "none."

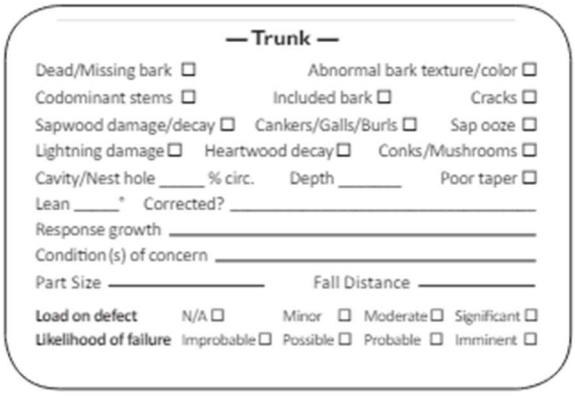
Part Size—a characterization of the part of the tree that may fail toward the target. Usually this is the diameter of the branch that can fall or the dbh of the tree. It may be appropriate to indicate the size of the part that could impact the target. Include units of measurement.

Fall Distance—if applicable, record the distance that the tree or tree part will fall before hitting a target; this may be relevant to the consequences of failure.

Load on defect—a consideration of how much loading is expected on the tree part of concern. Record as N/A (not applicable), minor, moderate, or significant, and/or note the cause of loading.

Likelihood of failure—the rating (*improbable*, *possible*, *probable*, or *imminent*) for the crown and branches of greatest concern. If there is a main concern, this information should be transferred to the Risk Categorization chart.

Appendix 3: Using The Basic Tree Risk Assessment Form



— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
Codominant stems ☐ Included bark ☐ Cracks ☐
Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐
Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
Cavity/Nest hole _____ % circ. Depth _____ Poor taper ☐
Lean _____° Corrected? _____
Response growth _____
Condition(s) of concern _____
Part Size _____ Fall Distance _____

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Trunk

Dead/Missing bark—check box if a stem or codominant stem is dead or if areas of dead cambium are present where new wood will not be produced.

Abnormal bark texture/color—may indicate a fungal or structural problem with the trunk. Check box, if present, and add notes if it is a concern.

Codominant stems—stems of nearly equal diameter arising from a common junction and lacking a normal branch union. Note the size, location, and number, if relevant, under Condition(s) of concern.

Included bark—bark that becomes embedded in a union between branch and trunk, or between codominant stems, causing a weak structure. Check box if present.

Cracks—separation in the wood in either a longitudinal (radial, in the plane of ray cells) or transverse (across the stem) direction. Check box if present and describe under Condition(s) of concern.

Sapwood damage/decay—check box if there is mechanical or fungal damage in the sapwood that may weaken the trunk. If checked, you may circle "damage" or "decay" to indicate which one is present.

Cankers/Galls/Burls—may or may not affect the structural strength of the tree. Check box if present and circle which one(s):

- **Canker**—localized diseased area on the branch; often sunken or discolored.
- **Gall**—abnormal swelling of tissue caused by pests; may or may not be a defect.
- **Burl**—outgrowth on the trunk, branch, or roots; not usually considered a defect.

Sap ooze—oozing of liquid that may result from infections or infestations under the bark. May or may not affect structure or stability. Check box if present.

Lightning damage—often evidenced by a centrally located line of sapwood damage and bark removal on either side in a spiral pattern on the trunk or branch. Check box if present.

Heartwood decay—check box if present and identify/describe under Condition(s) of concern.

Conks/Mushrooms—fungal fruiting structures; common, definite indicators of decay when on the trunk. Check box if present and identify/describe under Condition(s) of concern.

Cavity/Nest hole—openings from the outside into the heartwood area of the tree. Record the percentage of the trunk circumference that has missing wood, and the depth of the cavity.

Poor taper—change in diameter over the length of the trunk, important for even distribution of mechanical stress. Check box if trunk has poor taper.

Lean—angle of the trunk measured from vertical. Record the degree of lean.

Corrected?—the tree may have been able to correct the lean with new growth in the younger portions of the tree. Note conditions related to lean in the space provided.

Response growth—reaction wood or additional wood grown to increase the structural strength of the trunk. Note location and extent.

Condition(s) of concern—conditions in the trunk that may affect likelihood of failure. Note the main concern(s); if there are no concerns, write "none."

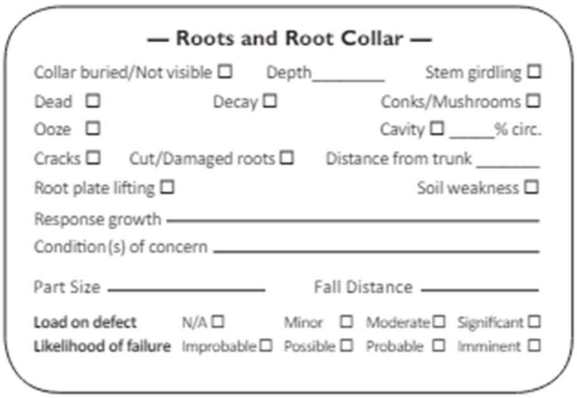
Part Size—a characterization of the part of the tree that may fail toward the target. Usually this is the diameter of the branch that can fall or the dbh of the tree. It may be appropriate to indicate the size of the part that could impact the target. Include units of measurement.

Fall Distance—if applicable, record the distance that the tree or tree part will fall before hitting a target; this may be relevant to the consequences of failure.

Load on defect—a consideration of how much loading is expected on the tree part of concern. Record as N/A (not applicable), minor, moderate, or significant, and/or note the cause of loading.

Likelihood of failure—the rating (*improbable*, *possible*, *probable*, or *imminent*) for the trunk. If there is a main concern, this information should be transferred to the Risk Categorization chart.

Appendix 3: Using The Basic Tree Risk Assessment Form



— Roots and Root Collar —

Collar buried/Not visible ☐ Depth_____ Stem girdling ☐

Dead ☐ Decay ☐ Conks/Mushrooms ☐

Ooze ☐ Cavity ☐ ____% circ.

Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____

Root plate lifting ☐ Soil weakness ☐

Response growth _____

Condition(s) of concern _____

Part Size _____ Fall Distance _____

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Roots and Root Collar

Collar buried/Not visible—check box if the root collar is not visible. If possible, determine and note the depth belowground.

Stem girdling—restriction or destruction of the trunk or buttress roots. Check box if it is a failure concern.

Dead—check box if one or more structural support roots are dead.

Decay—check box if present and identify/describe under Condition(s) of concern.

Conks/Mushrooms—fungal fruiting structures; common, definite indicators of decay. Fungal fruiting structures away from the trunk in the turf or mulch may be due to the presence of a mycorrhizal fungus and, if so, do not pose a threat to the tree. Check box if present and identify/describe under Condition(s) of concern.

Ooze—seeping or exudation that can result from pest infestations or infections under the bark. Check box if present and describe.

Cavity—definite indicators of heartwood decay. Measure the size of the opening and record the percentage of the tree's circumference affected.

Cracks—separation in the wood in either a longitudinal (radial, in the plane of ray cells) or transverse (across the stem) direction. Check box if present and describe.

Cut/Damaged roots—check box if present. Measure and record the distance from the trunk to the cut.

Root plate lifting—soil cracking or lifting indicates the tree has been rocking, usually in high winds. Check box if present, and note under Condition(s) of concern.

Soil weakness—check box if there is a soil condition affecting the anchorage of the tree's root system. Note under Condition(s) of concern if significant.

Response growth—reaction wood or additional wood grown to increase the structural strength of the roots or root collar. Note location and extent.

Condition(s) of concern—conditions in the trunk that may affect likelihood of failure. Note the main concern(s); if there are no concerns, write "none."

Part Size—a characterization of the part of the tree that may fail toward the target. Usually this is the diameter of the branch that can fall or the dbh of the tree. It may be appropriate to indicate the size of the part that could impact the target. Include units of measurement.

Fall Distance—if applicable, record the distance that the tree or tree part will fall before hitting a target; this may be relevant to the consequences of failure.

Load on defect—a consideration of how much loading is expected on the tree part of concern. Record as N/A (not applicable), minor, moderate, or significant, and/or note the cause of loading.

Likelihood of failure—the rating (*improbable*, *possible*, *probable*, or *imminent*) for the roots or root collar. If there is a main concern, this information should be transferred to the Risk Categorization chart.

Appendix 3: Using The Basic Tree Risk Assessment Form

PAGE 2—RISK CATEGORIZATION AND MITIGATION

The second page of the form focuses on categorizing the risk the tree poses and describing how the risk should be mitigated. It also provides space for additional notes or comments regarding any section from the first page. Use a separate sheet of paper if more space is needed.

Section 7—Risk Categorization

Risk Categorization

Target (Target number or description)	Tree part	Condition(s) of concern	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Likelihood: Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Likelihood: Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating (from Matrix 2)

Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impact: Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure: Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

This form uses the risk categorization methodologies presented in ISA's *Best Management Practices: Tree Risk Assessment*. The chart provided on the form is a tool to tie the data collected on the front of the form to the risk categorization process. You can rate the risk for up to four different conditions that may be found in the tree being assessed. Additional ratings may be made on an additional form. If there is only one condition of concern, only one line needs to be completed.

Target (Target number or description)—specify target number or a brief description from the first page of this form.

Tree part—specify the branch, trunk, or root of concern. For example, Condition Number 1 may be the broken branch over the house, and Condition Number 2 may be a branch over the driveway. The entries in the Tree part column would both be "branch." Other options for this column include "trunk" and "roots."

Condition(s) of concern—identify the concern(s) with the tree part listed. An example would be "large, dead branch over the house."

Appendix 3: Using The Basic Tree Risk Assessment Form

Tree risk has two components: (1) the likelihood of a tree failure striking a target, which is divided into the likelihood of failure and the likelihood of impact, and (2) the consequences of failure. Use your best judgment and the data available to assess the likelihood of failure (*improbable*, *possible*, *probable*, *imminent*) and the likelihood of impact (*very low*, *low*, *medium*, *high*). After these two decisions are made, use Matrix 1 (likelihood matrix) to determine the likelihood of failure and impact category (*unlikely*, *somewhat likely*, *likely*, *very likely*) based on your assessment.

The likelihood of failure can be categorized using the following guidelines:

Improbable—the tree or tree part is not likely to fail during normal weather conditions and may not fail in extreme weather conditions within the specified time frame.

Possible—failure may be expected in extreme weather conditions, 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 an infrequent occurrence for a risk assessor to encounter, and it may require immediate action to protect people from harm. The imminent category overrides the stated time frame.

Since these categories are time dependent, the time frame must be considered. The time frame is recorded on the first page.

The likelihood of impacting a target can be categorized using the following guidelines:

Very low—the chance of the failed tree or tree part impacting the specified target is remote. Likelihood of impact could be *very low* if the target is outside the anticipated target zone or if occupancy rates are rare. Another example of *very low* likelihood of impact is people in an occasionally used area with protection against being struck by the tree failure due to the presence of other trees or structures between the tree being assessed and the targets.

Low—there is a slight chance that the failed tree or tree part will impact the target. This is the case for people in an occasionally used area with no protection factors and no predictable direction of fall, a frequently used area that is partially protected, or a constant target that is well protected from the assessed tree. Examples are vehicles on an occasionally used service road next to the assessed tree, or a frequently used street that has a large tree providing protection between vehicles on the street and the assessed tree.

Medium—the failed tree or tree part could impact the target, but is not expected to do so. This is the case for people in a frequently used area when the direction of fall may or may not be toward the target. An example of a *medium* likelihood of impacting people could be passengers in a car traveling on an arterial street (frequent occupancy) next to the assessed tree with a large, dead branch over the street.

High—the failed tree or tree part is likely to impact the target. This is the case when there is a constant target with no protection factors, and the direction of fall is toward the target.

Matrix 1 (likelihood matrix) is used to determine the combined likelihood of failure and impact in a given time frame. The resulting terms (*unlikely*, *somewhat likely*, *likely*, *very likely*) are defined by their use within the matrix and are used to represent this combination of occurrences in Matrix 2 (risk rating matrix).

In the Consequences section, one category should be selected (*negligible*, *minor*, *significant*, *severe*). Consequences of failure are estimated based on the amount of harm or damage that will be done to a target. The consequences depend on the part size, fall characteristics, fall distance, and any factors that may protect the risk target from harm. The significance of target values—both monetary and otherwise—are subjective and relative to the client.

The consequences of failure can be categorized using the following guidelines:

Negligible—no personal injury, low-value property damage, or disruptions that can be replaced or repaired.

Minor—minor personal injury, low-to-moderate value property damage, or small disruption of activities.

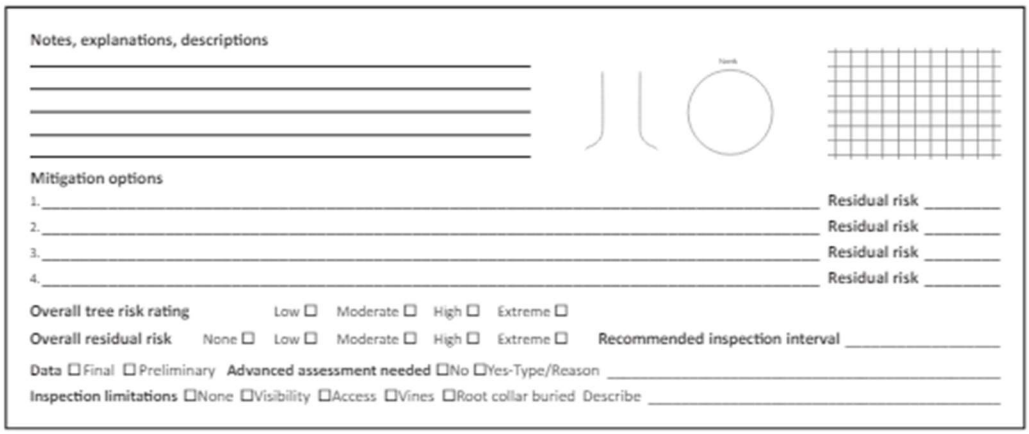
Significant—substantial personal injury, moderate- to high-value property damage, or considerable disruption of activities.

Severe—serious personal injury or death, high-value property damage, or major disruption of important activities.

Risk rating—the risk rating of the individual part for a specified target. The risk rating is categorized using Matrix 2. Risk rating terms are *low*, *moderate*, *high*, and *extreme*.

Appendix 3: Using The Basic Tree Risk Assessment Form

Section 8—Notes, Mitigation, and Limitations


Notes, explanations, descriptions

Mitigation options

1. _____ Residual risk _____
2. _____ Residual risk _____
3. _____ Residual risk _____
4. _____ Residual risk _____

Overall tree risk rating Low ☐ Moderate ☐ High ☐ Extreme ☐

Overall residual risk None ☐ Low ☐ Moderate ☐ High ☐ Extreme ☐ Recommended inspection interval _____

Data ☐ Final ☐ Preliminary Advanced assessment needed ☐ No ☐ Yes-Type/Reason _____

Inspection limitations ☐ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe _____

Upon completion of the assessment, use this section to illustrate potential areas of concern and to offer mitigation options. Any further recommendations or notes should be included in this section.

Notes, explanations, descriptions—describe any conditions or factors that are not well described elsewhere on the form. Include notes on anything you need to take into consideration for making ratings or recommendations.

The grid, stem, and circle templates are provided for sketching any applicable details related to the tree or site.

Mitigation options—list options for mitigating each risk described. List your preferred recommendation on the first line.

Residual risk—the residual risk is for the risk remaining after the mitigation you are recommending. Residual risk can be *low*, *moderate*, *high*, or *extreme*.

Overall tree risk rating—the highest risk determined for the tree and target of concern. If there is more than one part or target rating, the tree risk rating is the highest of the group.

Overall residual risk—risk remaining if the highest-risk tree part is mitigated.

The shaded rows in the Risk Categorization chart may be used to assess residual risk after proposed mitigation. For each mitigation action, rate the expected risk remaining after treatment using the same methodology for categorizing risk as before.

Recommended inspection interval—recommended time for reinspection or inspection frequency.

Data—use these boxes to indicate whether this assessment is final or preliminary.

Advanced assessment needed—note the reason for any advanced assessment recommended.

Inspection limitations—factors that limited your ability to inspect the tree. Check all that apply and describe briefly.