

Ralph DeFlorio

Harvard Divinity School

Dear Ralph,

The following is a summary of our findings from the work we conducted of the existing oak tree located in the courtyard, behind the Andover Hall building, at 45 Francis Avenue, Cambridge MA 02138. The purpose of the assessment was to assess the risk posed by the oak tree as well as its general condition, and structural integrity. Based on the assessment, it is my professional judgement that the tree is a **High** risk. We would recommend removing the tree as soon as is feasible to eliminate the potential for failures, and have no residual risk.

Our Methodology:

I performed a *Level 2 Basic visual assessment and a Level 3 advanced assessment* (as defined in the *International Society of Arboriculture's (ISA's) Best Management Practices (BMP) for Tree Risk Assessment and the ANSI A300 Part 9 Standard for Tree Risk Assessment*) using a resistance recording drill.

Our assessment indicates the following:

- The tree health is in irreversible decline.
- The tree has significant decay in the trunk, one central leader and 3 large lateral limbs.
- The likelihood of failure of each part is categorized as **Probable**, meaning that failure may be expected under normal weather conditions within the next 3 years.
- The likelihood of a branch failure impacting people near the tree is medium, the likelihood of a stem failure impacting the building is **High**.
- The consequences of failure and impact could be **Significant**, indicating that the impact may involve significant personal injury, property damage of moderate to high value, or considerable disruption.

Our Conclusion:

The overall tree risk rating for this tree is **High**, based on the likelihood of failure, the likelihood of impacting a target and the consequences of failure.

Regards,

Timothy Armstrong
Board Certified Master Arborist
Tree Risk Assessment Qualified,
Massachusetts Certified Arborist
Certified Treecare Safety Professional

**Bartlett Tree Experts
Tree Risk Assessment and Recommendations**

Prepared for:
Harvard University
Office of the General Counsel
45 Francis Ave
Cambridge, Massachusetts 02138



Assessed by: Timothy Armstrong
The F.A. Bartlett Tree Expert Company

ISA Board Certified Master Arborist Tree
Risk Assessment Qualified NE 7132B



03-Jan-19
Inspection ID: 6273

Tree Risk Assessment and Recommendations for Harvard Divinity

Executive Summary

The Red Oak located over the Andover Library courtyard of the Harvard University property was assessed for risk on December 24, 2018 by Timothy Armstrong. Using the methods outlined in this report and the results of the examination of this tree, it is my professional judgment that this tree is a **High risk**.

Assignment

Arborist representative Andrew Balon was contracted by Harvard University, Office of the General Counsel to assess the risk of the Red Oak located over the Andover Library courtyard. Based on conversation, the following was agreed to:

1. Perform a *Level 2 Basic visual assessment and a Level 3 Advanced assessment* (as defined in the *International Society of Arboriculture's (ISA's) Best Management Practices (BMP) for Tree Risk Assessment* and the *ANSI A300 Part 9 Standard for Tree Risk Assessment*). The limits of the assessment were discussed.
2. Make recommendations to reduce risk where appropriate.
3. Provide a written report that documents the level of risk based on tree and site conditions observed and discussed at the time of the inspection.

Background and Purpose of Report

In accordance with industry standards, tree risk ratings are derived from a combination of three factors: the *likelihood of failure*, the *likelihood of the failed tree part impacting a target*, and the *consequences* of the target being struck. The guidelines used to classify each of these factors are presented in the *ISA's BMP for Tree Risk Assessment* and guidelines developed by the Bartlett Tree Research Laboratories. These factors are then used to categorize tree risk as *Extreme, High, Moderate* or *Low*. The factors used to define your risk rating are identified in this report. An explanation of terms used in this report appears in the glossary located in the appendix. The information provided in this report is based on the conditions identified at the time of inspection. Tree conditions do change over time so reassessment is recommended and after major storm events.

The purpose of this report is to provide information on the assessment of the tree and site conditions at the property of Harvard University, Office of the General Counsel to determine the level of risk of the Red Oak located at 45 Francis Ave, Cambridge, Massachusetts 02138. In addition, mitigation recommendations will be included to reduce risk.

This report is the property of Harvard University, Office of the General Counsel. It may only be used for the purpose of making decisions regarding risk mitigation involving this tree.

Observations

The following observations were made by Timothy Armstrong during the tree inspection conducted on December 24, 2018:

Tree species: Red Oak

Tree trunk diameter (DBH): 52 in.

Only the following high value targets within the target zone were considered: 1. People near the tree, 2. Building. Other targets will be considered upon request.

Tools used in assessment: Resi PD 400, Climbing assessment via rope and saddle.

Tree Part	Defect	Target	Likelihood of Failure	Likelihood of Impact	Consequences	Part Risk Rating
Branch (Eastern 24" Leader)	Decayed	1	Probable	Medium	Significant	Moderate
Branch (East 18")	Decayed	1	Probable	Medium	Significant	Moderate
Branch (North 22")	Decayed	1	Probable	Low	Significant	Low
Trunk	Decay In Trunk	1	Probable	Medium	Significant	Moderate
		2	Probable	High	Significant	High

Photographs of the tree and specific defects may be found in the Appendix.

Results of Risk Assessment

The *overall risk rating* for this tree is considered **High**, indicated by the highest likelihood of failure for the tree parts assessed which is *Probable*, the likelihood of impacting a target listed above is *High* and the consequences of the failure and impact could be *Significant*. Mitigation should be conducted as soon as practical to reduce the risk to an acceptable level.

Mitigation Recommendations and Options

Mitigation is recommended for the tree parts listed below. Except in the case of total tree removal, some residual risk remains after mitigation. Please make sure that *residual risk* of the options you choose is acceptable to you.

Tree Part	Mitigation Options (* indicates Recommendation)	Residual Risk
Branches and Trunk	*Remove tree to eliminate the potential for failures	None

Explanation

I recorded significant decay in three of the large lateral limbs and in the eastern upright leader. Two branches and the leader would impact the hardscaped patio area if they were to fail. I categorized the patio area as a medium likelihood of impacting a human target based on the furniture (tables and chairs) present and the assumption that persons would be occupying the expected impact area for a large portion of any given day. I calculated a probable likelihood of failure in the next three years based on the amount of structurally sound wood present. If the tree parts were to contact a person the consequences would be significant or severe.

I also assessed the risk of the stem in the plane of the cavity at approximately 15 feet above soil line. The resi PD400 resistance drill registered as little as 5" of structurally stable wood in some areas and no more than 15 inches of structurally stable wood in others. The resulting likelihood of failure calculation was probable. Due to the constant occupancy of the building, the high likelihood of tree parts contacting the building, and the significant consequences of an impact, the risk was rated as high when considering a failure of the trunk. I would recommend removing the tree as soon as is feasible.

If the recommended treatments are completed, the *residual risk* of this tree should be considered **None**. I will provide you with more detailed recommendations for specific treatments upon your request.

Summary and Conclusion

Using the methods outlined in this report and the results of the examination of this tree, it is my professional judgment that this tree is High risk. If this level of risk is not acceptable to you, then mitigation actions should be taken as soon as practical to reduce the risk to an acceptable level.

Thank you for the opportunity to provide this information. Please contact me if you wish to review these results or discuss the next steps to take with mitigation, or if I can be of any other service in the management of your landscape.

Certifying Statement

I, Timothy Armstrong, certify that:

- I have personally overseen the inspection of this tree and property referred to in this report, and have stated my findings accurately. The extent of the assessment is stated in the attached report and the terms of assignment.
- I have no current or prospective interest in the vegetation or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.
- The analysis, opinions, and conclusions stated herein are my own.
- My compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party.

Timothy Armstrong

January 3, 2019

Date

Appendix

Limitations of Tree Risk Assessments

It is important for the tree owner or manager to know and understand that all trees pose some degree of risk from failure or other conditions. The information and recommendations within this report have been derived from the level of tree risk assessment identified in this report, using the information and practices outlined in the *International Society of Arboriculture's Best Management Practices for Tree Risk Assessment*, as well as the information available at the time of the inspection. However, the overall risk rating, the mitigation recommendations, or any other conclusions do not preclude the possibility of failure from undetected conditions, weather events, or other acts of man or nature. Trees can unpredictably fail even if no defects or other conditions are present. Tree failure can cause adjacent trees to fail resulting in a “domino effect” that impacts targets outside the foreseeable target zone of this tree. It is the responsibility of the tree owner or manager to schedule repeat or advanced assessments, determine actions, and implement follow up recommendations, monitoring and/or mitigation.

Inspection limitations associated with this assessment: None.

Bartlett Tree Experts can make no warranty or guarantee whatsoever regarding the safety of any tree, trees, or parts of trees, regardless of the level of tree risk assessment provided, the risk rating, or the residual risk rating after mitigation. The information in this report should not be considered as making safety, legal, architectural, engineering, landscape architectural, land surveying advice or other professional advice. This information is solely for the use of the tree owner and manager to assist in the decision making process regarding the management of their tree or trees. Tree risk assessments are simply tools which should be used in conjunction with the owner or tree manager’s knowledge, other information and observations related to the specific tree or trees discussed, and sound decision making.

Photographs

Image of Red Oak near Andover Library courtyard.



Image of cavity opening at ~15' above soil line.



Image of Resi PD400 data of lower stem of the tree, registering little to no decay in the lower stem (100-50 cm above soil line).

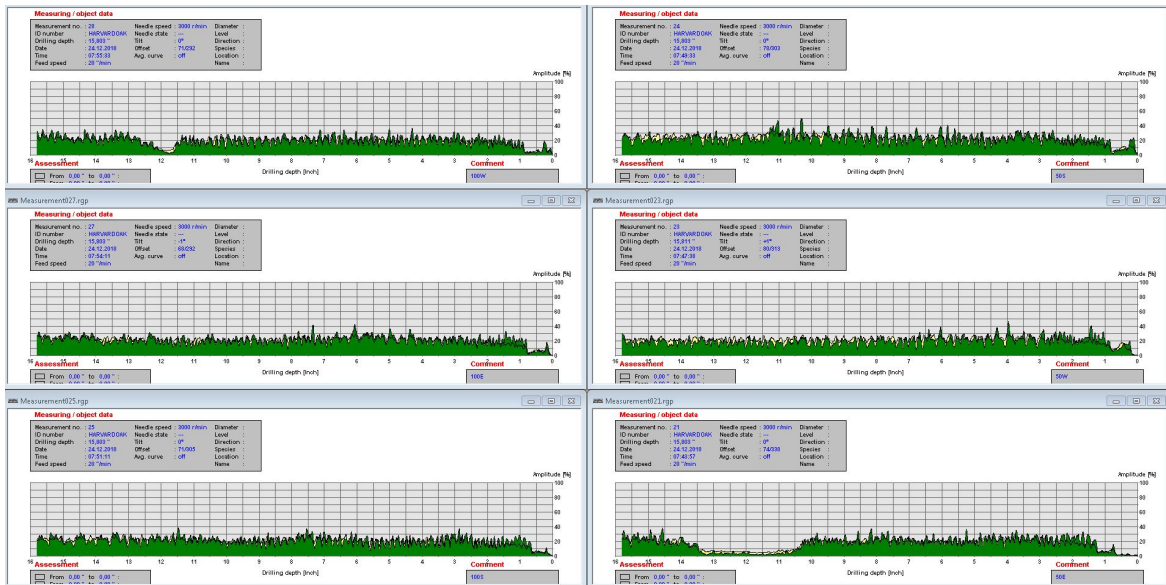


Image of declining eastern leader.



Image of Resi PD400 data from eastern leader.

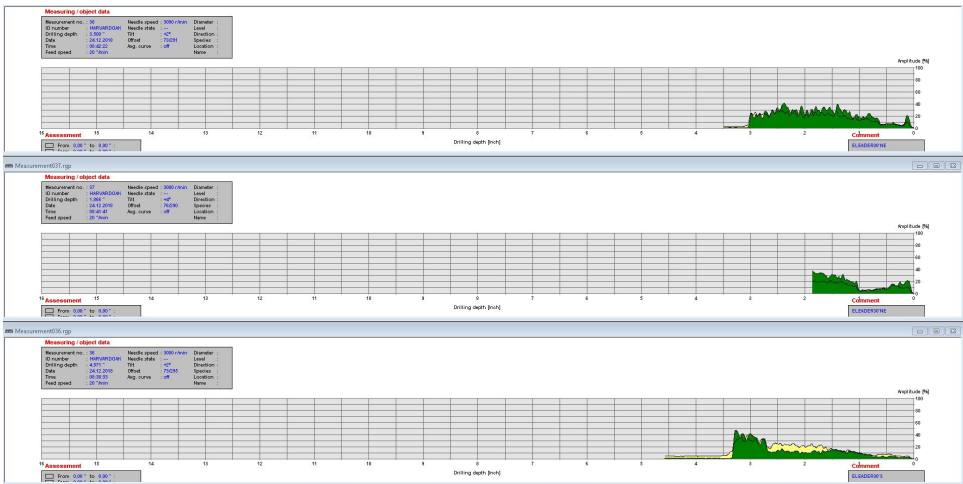
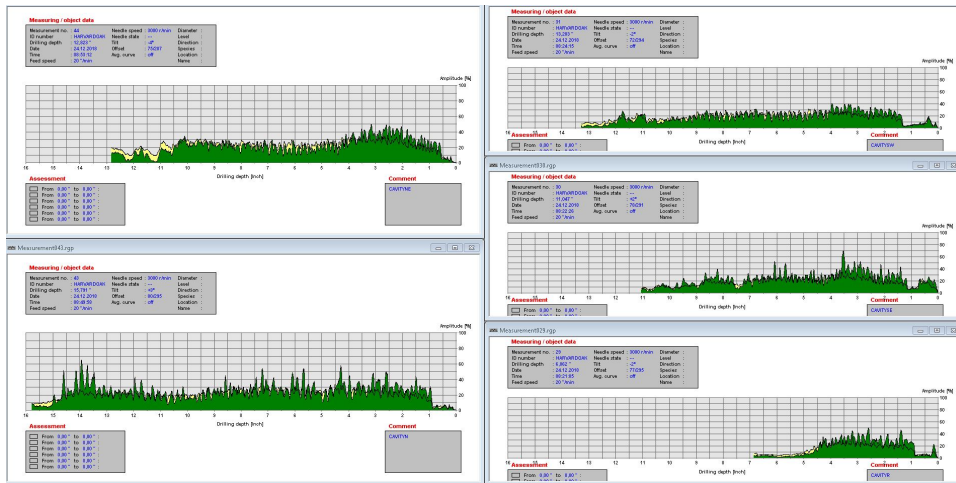


Image of Resi PD 400 data from cavity plane at ~15' above soil line.



Glossary

Tree risk assessment has a unique set of terms with specific meanings. Definitions of all specific terms may be found in the International Society of Arboriculture’s *Best Management Practice for Tree Risk Assessment*. Definitions of some of these terms used in this report are as follows:

The *likelihood of failure* may be categorized as imminent meaning that failure has started or could occur at any time; probable meaning that failure may be expected under normal weather conditions within the next 3 years; possible meaning that failure could occur, but is unlikely under normal weather conditions during that time frame; and improbable meaning that failure is not likely under normal weather conditions, and may not occur in severe weather conditions during that time frame.

The *likelihood of the failed tree part impacting a target* may be categorized as high meaning that a failed tree or tree part will most likely impact a target; medium meaning the failed tree or tree part could impact the target, but is not expected to do so; low meaning that the failed tree or tree part is not likely to impact a target; and very low meaning that the chance of a failed tree or tree part impacting the target is remote.

The *Likelihood of Failure and Impact* is defined by Table 1, the 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

The *consequences* of a known target being struck may be categorized as severe meaning that impact could involve serious personal injury or death, damage to high value property, or disruption to important activities; significant meaning that the impact may involve personal injury, property damage of moderate to high value, or considerable disruption; minor meaning that impact could cause low to moderate property damage, small disruptions to traffic or a communication utility, or minor injury; and negligible meaning that impact may involve low value property damage, disruption that can be replaced or repaired, and do not involve personal injury.

Targets are people, property, or activities that could be injured, damaged or disrupted by a tree failure.

Levels of assessment 1) *Limited visual assessments* are conducted to identify obvious defects. 2) *Basic assessments* are visual inspections done by walking around the tree looking at the site, buttress roots, trunk and branches. It may include the use of simple tools to gain information about the tree or defects. 3) *Advanced assessments* are performed to provide detailed information about specific tree parts, defects, targets of site conditions. Drilling to detect decay is an advanced assessment technique.

Tree Risk Ratings are terms used to communicate the level of risk rating. They are defined in Table 2, the Risk Matrix, as a combination of Likelihood and Consequences:

Likelihood of Failure & Impact	Consequences of Tree 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

Overall tree risk rating is the highest individual risk identified for the tree.

The *residual risk* is the level of risk the tree should pose after the recommended mitigation.