



# Plant Healthcare Consultants

American Society of Consulting Arborist • International Society of Arboriculture  
Massachusetts Arborist Association • Massachusetts Tree Wardens and Foresters Association  
TREE INVENTORIES • APPRAISALS • DIAGNOSIS • TREE RISK ASSESSMENTS



## Site Impact Study - Tree Assessment & Appraisal Beatrice Circle, Belmont, MA 02478

Prepared for:

Timothy Fallon  
63 Beatrice Circle  
Belmont, MA 02478

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July 6, 2020

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## Summary

After performing an inspection and evaluation of the proposed construction site located at 91 Beatrice Circle, Belmont, MA 02478 I have determined that there will be a loss of trees as a result of the project. Based on my training, education and many years of experience it is my opinion that the proposed construction project at 92 Beatrice Circle, Belmont, MA will result in a loss of value of \$123,250.00 to the Group. This does not include any value on the effects of the water run-off as this is hard to determine at this point.

## Introduction

On June 24, 2020 Mr. Timothy Fallon contacted my office inquiring to retain my services as a Consulting Arborist. Mr. Fallon expressed concerns about the effects a proposed building development in his neighborhood will have on the surrounding trees.

I agreed to assist in this project and a meeting was scheduled for June 30, 2020 at 9:00 am with Mr. Fallon and some of the neighbors (the “Group”).

## Background & History

A property on Beatrice Circle, Belmont, MA was recently purchased by a developer that intends to build a multi-unit housing development. The plans indicate that construction will come right up to the property lines of 6 adjoining residences on Beatrice Circle. Excavation and possibly blasting, as the area is all ledge, will be very close to trees on the surrounding properties.

Mr. Fallon and a group of neighbors on Beatrice Circle in Belmont, MA are concerned about the impact the construction will have on the trees on their properties. Additionally, there are concerns that drainage be changed as a result of the construction and that there will be negative impacts on erosion and water run-off.

## Assignment

The scope of this project is to assess the effects of construction on the trees immediately surrounding the proposed construction area, determine if any trees are likely to suffer or die as a result of the construction, appraise the value of the trees that will be impacted and evaluate the environmental effects of the change in water run-off.

## Limits of Assignment

The recommendations and conclusions provided in this report are based on visual observations only. No examinations of the plants interiors were taken nor were and soil or plant tissue were taken and submitted for laboratory testing.

## Purpose and Use of Report

The purpose of this report is to provide the Group with as much information as possible regarding the most likely impact of the trees that about the construction project at 91 Beatrice Circle.

In the event that a tree is likely to die, lose structural integrity or decline an appraisal of the tree is included in this report. This report is the property of the Group and can be shared and used as it deems necessary.

## Observations

On June 30, 2020 at 9:00 am I met with Mr. Fallon at his residence at 63 Beatrice Circle, Belmont, MA. He explained the construction plans and showed me property that recently sold and is slated for development. As we walked around the property line, we were joined by some of the other members of the Group that have properties abutting the construction site.

The neighborhood is on a hill with the elevation at 63 Beatrice Circle being approximately 256' and sloping down towards 11 Beatrice Circle with an elevation of approximately 190'. The slope is tiered with plateaus as you move down the hill. There is a slope at the property line between 91 and 105 Beatrice Circle. The elevation change is an approximate 11' drop over a 12' run. The natural contours of this terrain funnel all run-off out to 11 Beatrice circle and further downline (See Terrain Map, page 8 & Photographs, page 11).

Four properties have trees directly on the property line, with critical root zones (CRZ) that will be impacted by construction.

I have identified the following trees with species and diameter at breast height (DBH) (See Tree Map, page 8 & Photographs, page 10):

House Number	Tree #	DBH	Species
75 Beatrice Circle	1	16"	Quercus rubra (Northern red oak)
43 Beatrice Circle	2	12"	Acer platanoides (Norway maple)
37 Beatrice Circle	3	14"	Carya glabra (Pignut hickory)
	4	5"	Carya glabra
	5	50"	Quercus rubra
29 Beatrice Circle	6	4"	Tsuga canadensis (Canadian hemlock)
	7	4"	Tsuga canadensis
	8	6"	Tsuga canadensis
	9	7"	Tsuga canadensis
	10	8"	Tsuga canadensis
	11	6"	Tsuga canadensis
	12	7"	Tsuga canadensis
	13	12"	Picea abies (Norway spruce)
	14	16"	Acer platanoides
	15	12"	Picea abies

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All of the trees listed above are very close to the property line with CRZ on or over the line. Any construction, excavation or blasting in this this CRZ will have negative effects on these trees.

## Discussion

Damage to trees from construction can occur in many ways. Trees can suffer physical damage from machinery wounding the trunk or branches. Soil around trees can become compacted by equipment traveling over then leaving the roots no area to develop or take in water. Roots can be severed resulting in loss of water and nutrient intake as well as loss of structural stability.

### Soil Compaction

All protected trees in the construction zone are subject to soil compaction from heavy vehicles, and any heavy debris placed in the Critical Root Zone (CRZ).

Soil compaction occurs when the pore space between soil particles is greatly reduced. This causes the reduction of oxygen available to the roots and can lead to decline in trees. Use of equipment, grading, digging, and heavily used walking paths can cause soil compaction in a construction area.

### Mechanical Injury

There will be heavy equipment and vehicles used near the tree that are to be protected. Wounds to the tree's branches and trunk, caused by mechanical damage, may reduce tree stability by decreasing the wood strength, the internal movement of water and nutrients, and the ability to compartmentalize against decay.

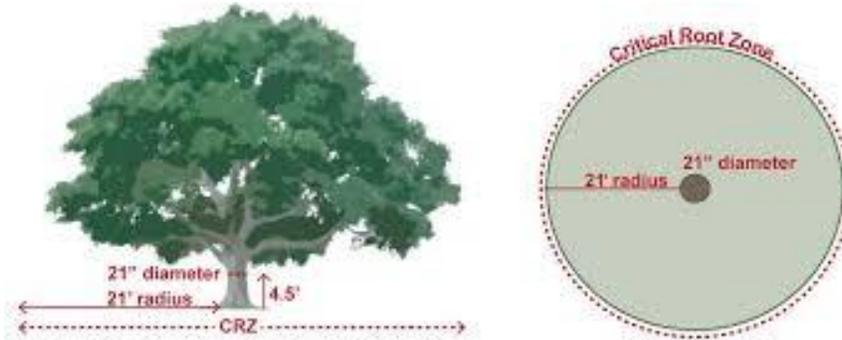
### Change in Grade

Lowering or rising of the grade within the root zone can damage or kill a tree. The normal exchange of moisture and gases within the root zone is disrupted with the change in grade. The original grade should be maintained as far out from the trunk as possible. As little as four inches of soil placed over the root system can kill some species of trees. The change in grade can have either immediate or long-term adverse effects on the tree. (Matheny, et, al, 1998)

### Trenching

A home expansion may require adding a cement foundation to support the additional structure. Trenching within the CRZ can damage the root system of a tree and lead to tree decline or death. Ninety percent of the fine roots that absorb water and minerals are found in the upper few inches of soil. Roots require air space, air, and water, and grow best where these requirements are met, which is usually very near the soil surface. Multiple trenching is destructive because it impacts a greater portion of the root system. (Fite and Smiley, 2008)

A proper and industry accepted practice for tree preservation around construction sites is to protect the critical root zone (CRZ). The CRZ is the area of soil extending from the tree trunk where roots required for future tree health and survival are located. This area can also be defined as a circle with a minimum radius of 1' for every 1" DBH. This is referred to as the tree protection zone.



Within the tree protection zone, trenching, pavement, soil compaction, mechanical injury, and any change in grade should be avoided. Typically, this area is protected by the installation of a fence or other barricade to prevent impact to the root zone.

Construction can cause tree damage or fatality in several ways. Some results are immediate, such as a tree losing its anchorage and falling. Other results happen over time. Damage to a healthy tree's root system may take years to manifest. This is because a healthy tree produces more carbohydrates than it needs to perform its biological functions. This surplus is stored in the root system. If a tree is damaged, stressed or its root system compromised it will draw on its reserved carbohydrates to perform its biological functions. Once this surplus is depleted the tree will decline and eventually may die. This can occur suddenly or over the several years.

Trees anchorage and stability can also be impacted by blasting. Blasting of ledge can send shockwaves through the neighboring ledge and ground loosening the soil and potentially weakening the root plate increasing the risk of wind throw (trees falling when the root system fails).

Based on the proposed construction plans it my professional opinion that the 15 trees I have referenced above are at risk of fatality directly due to the proposed construction project. As such it is reasonable to perform an appraisal for the monetary loss of these trees to the Group.

### Appraisal Method

I followed the procedure and methods outlined in the *Guide for Plant Appraisal, 10<sup>th</sup> Edition*, by the Council of Tree and Landscape Appraisers. Within this industry accepted method, I followed the Trunk Formula Technique (TFT) which is a Cost Approach to damaged or lost trees.

The TFT extrapolates the cost to purchase the largest commonly available (same or similar species) nursery tree to the size of the tree being appraised. The theory being that cost to acquire a large tree is directly proportional to the unit cost of the nursery tree.

To perform the TFT the cross-sectional area of the replacement tree is calculated and a value per square inch is determined. For example, a 3" diameter tree has a cross-sectional area of 7.07 in<sup>2</sup> ( $\pi r^2 = 3.1415 \times 1.5 \times 1.5 = 7.07$ ). If the replacement cost of the tree is \$400 the unit cost is \$56.58 ( $400 / 7.07$ ). If the appraised tree has a diameter of 20" its cross-sectional area is 314 in<sup>2</sup> ( $\pi r^2 = 3.1415 \times 10 \times 10 = 314$ ) so its basic cost is \$17,766 ( $314 \times 56.58$ ).

The basic cost is based on ideal conditions, i.e. the tree is in peak health, contributing great value to its location, providing full benefits, etc. In each appraisal these factors are examined, and the basic cost is depreciated accordingly. The depreciation classes are broken into three categories; Condition – overall assessment of health, structure and form, Functional Limitations – assessment of species-site interaction and External Limitations – assessment of outside factors that influence plant success. Once a depreciation factor is calculated it is applied to the basic cost to yield a final tree/plant cost.

After a final tree/plant cost is determined additional cost are added to calculate the total appraised cost. The additional cost include; removal of the damaged trees, grinding of stumps and preparing the site for planting, delivery and installation costs of the new plants, monitoring and after care to ensure plant establishment and any other costs such as repairing damage to the site or property.

The calculations for the 15 trees I appraised, as well as additional costs can be found on the Appraisal Worksheet (see page #9).

Another area of concern is the paving of the parking area of the proposed construction site. The concern here is drainage. This location is already at the top of a grade. Currently water does run-off, down the slope but there is natural percolation into the soil, limiting run-off. Once this area is paved water will travel more rapidly down the slope, into the swales of 105 Beatrice Circle increasing erosion and funneling the water into 11 Beatrice Circle. It is my opinion that this will cause detriment to the trees at the base of the slope, drowning them, as well as flooding 11 Beatrice Circle and other homes downline.

## Conclusion

Based on my training, education and many years of experience it is my opinion that the proposed construction project at 92 Beatrice Circle, Belmont, MA will result in a loss of value of **\$123,250.00** to the Group. This does not include any value on the effects of the water run-off as this is hard to determine at this point.



Appraisal Worksheet

Tree Appraisal Worksheet

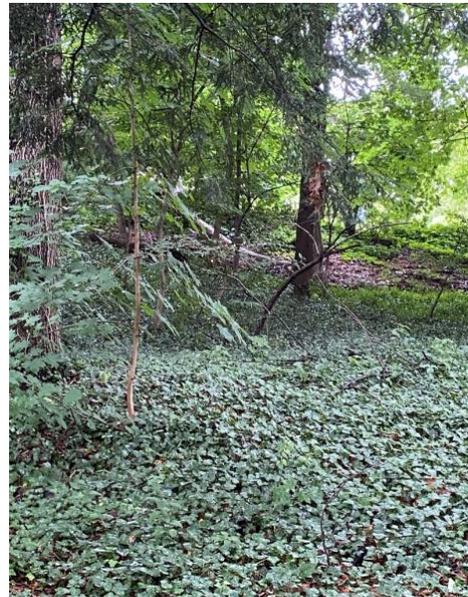
Damaged Tree							Replacement Tree						
Tree #	Species	DBH	Trunk Area	Condition	Functional Limitations	External Limitations	Species	DBH	Trunk Area	Cost	Unit Cost	Basic Tree Cost	Final Tree Cost
1	Red oak	16	201.06	80%	80%	100%	Red oak	3	7.07	390	55.18	10703.33	6850.13
2	Norway maple	12	113.09	80%	80%	100%	Red maple	3	7.07	375	53.05	5625.00	3600.00
3	Hickory	14	153.93	80%	80%	100%	Red oak	3	7.07	390	55.18	8103.33	5186.13
4	Hickory	5	19.63	70%	80%	100%	Red oak	3	7.07	390	55.18	693.33	388.27
5	Red Oak	50	1963.44	80%	80%	100%	Red oak	3	7.07	390	55.18	107943.33	69083.73
6	Hemlock	4	12.57	70%	80%	100%	Hemlock	3	7.07	490	69.32	381.11	213.42
7	Hemlock	4	12.57	70%	80%	100%	Hemlock	3	7.07	490	69.32	381.11	213.42
8	Hemlock	6	28.27	70%	80%	100%	Hemlock	3	7.07	490	69.32	1470.00	823.20
9	Hemlock	7	38.48	70%	80%	100%	Hemlock	3	7.07	490	69.32	2177.78	1219.56
10	Hemlock	8	50.26	70%	80%	100%	Hemlock	3	7.07	490	69.32	2994.44	1676.89
11	Hemlock	6	28.27	70%	80%	100%	Hemlock	3	7.07	490	69.32	1470.00	823.20
12	Hemlock	7	38.48	70%	80%	100%	Hemlock	3	7.07	490	69.32	2177.78	1219.56
13	Norway Spruce	12	113.09	60%	80%	100%	Norway Spruce	3	7.07	375	53.05	5625.00	2700.00
14	Norway maple	16	201.06	80%	80%	100%	Red maple	3	7.07	375	53.05	10291.67	6586.67
15	Norway Spruce	12	113.09	60%	80%	100%	Norway Spruce	3	7.07	375	53.05	5625.00	2700.00
											Final Tree Cost (rounded to nearest \$100) <b>\$ 103,300.00</b>		

ADDITIONAL COSTS

TREE REMOVAL OF TREES	5,000.00
STUMP GRINDING	1,200.00
DELIVERY AND INSTALLATION OF REPLACEMENT TREES	9,750.00
TWO YEARS OF MAINTENANCE TO ESTABLISH REPLACEMENT TREES	4,000.00
	\$19,950.00
<b>TOTAL APPRAISAL</b>	
<b>ADDITIONAL COSTS</b>	19,950.00
<b>FINAL TREE COST</b>	103,300.00
	\$123,250.00

## Photographs





## Glossary of Terms

Absorbing Roots	Fine, fibrous roots that take up water and minerals; most of them are within the top 12 inches of soil
Branch Union	The structural union of a lateral branch to the tree stem.
Caliper	Is measured approximately 6-12" from the root collar. Caliper is an American Nursery Standard measurement. Synonym for trunk diameter used to measure the size of nursery stock; by convention, measured 6" above the ground.
Canopy	The part of the crown composed of leaves and small twigs.
Certified Arborist	A professional arborist possessing current certification issued by the Massachusetts Arborists Association (MAA) and/or the International Society of Arboriculture (ISA)
Clinometer	A device used to measure the height of an object
Co-dominant	equal in size and relative importance usually associated with either the trunk/stems or scaffold limbs/ branches in the crown.
Critical Root Zone (CRZ)	The minimum area beneath the canopy of a tree which must be left undisturbed in order to preserve a sufficient root mass to give a tree a reasonable chance of survival. The CRZ is represented by a concentric circle centering on the tree's trunk and extending outward towards the tree's drip-line. The minimum area of the CRZ shall be dependent on the required minimum radius of the CRZ; the required CRZ shall be determined by multiplying a tree's DBH (in inches) by eighteen (18) inches, with the resulting product constituting the minimum radius of the CRZ.
Compost	Organic matter that has been intentionally subjected to decay processes and is more or less decomposed.
Crown	The upper part of a tree, measured from the lowest branch, including all the branches and foliage
DBH	Stands for Diameter Breast Height. The diameter of a tree measured at 4.5 feet above the ground.
Drip-line	Perimeter of the area under a tree including the branches and leaves
Establishment	The process of a tree becoming acclimated to a new environment, usually correlating the new root development that can sustain normal biological functions of the tree

Monitoring	A holistic approach to plant healthcare that includes inspecting plants for cultural problems, proper soil moisture and nutrient content and insect and disease issues-treating as necessary
Parity	The time, usually in years, that it takes for a replacement tree to provide similar attributes and benefits of a removed tree
Pruning	Systematic removal of branches of a plant usually a woody perennial
Restoration/Maintenance Program	A plan of maintenance and monitoring of trees to maximize survival or recovery rate of damaged or newly planted trees
Root Collar	Area at the base of the tree where the roots and the stem merge
Soil Compaction	Compression of the soil resulting in a reduction of the total air or pore space
Specimen Tree	A tree of high perceived value attributed to location, size, aesthetics, form or function
Stress	Any change in environment conditions that produce a less than ideal plant response
Transplant Shock	The stress a tree undergoes as a result of planting in a new location
Tree Protection Plan	Report to identify and protect trees indicated to remain. Procedures shall include protective measures to be used for both above and below grade.
Tree Protection Zone	An area usually defined by the drip-line of a tree. To protect a tree, no construction should ever occur within this area.

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## Assumptions and Limited Conditions

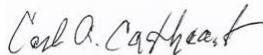
1. It is assumed that any property is not in violation of any applicable codes, ordinances, statutes or other governmental regulations.
2. Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.
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9. Loss or alteration of any part of this report invalidates the entire report.

## Certification of Performance

Plant Healthcare Consultants certify that:

1. We have personally inspected the tree and property referred to in this report and have stated our findings accurately.
2. We have no current or prospective interest in the trees or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.
3. The analysis, opinions and conclusions stated herein are our own and are based on current scientific procedures and facts.
4. Our analysis, opinions and conclusions were developed and this report has been prepared according to commonly accepted arboricultural practices.
5. No one provided significant professional assistance to us, except as indicated within the report.
6. Our compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party or upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.

We further certify that Plant Healthcare Consultants is a member in good standing of the Massachusetts Arborist Association, American Society of Consulting Arborists, the International Society of Arboriculture and Massachusetts Tree Wardens and Foresters Association. We have been involved in the field of Arboriculture for over 60 years



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