Trees and Construction

Which Trees Should We Focus on Preserving?

By Ryan Gilpin

Many communities are asking for more and larger trees to be preserved on construction sites. These communities establish permitting agencies to approve construction plans and often require arborists to be involved in project planning. There are many ways for arborists to be involved in construction projects. The greatest success is achieved when arborists are brought in early in the development process and are involved in all phases of the project as part of the planning, design, and construction team.

The 3rd edition of the Best Management Practices (BMP)—*Managing Trees During Site Development and Construction* was published by the International Society of Arboriculture (ISA) early in 2023. This was a major BMP update and significant changes were made throughout the document.

Best Management Practices are not "how-to" guides, rather, they describe best practices we should follow in performing our work and developing recommendations. I hope that the 3rd Edition provides a good framework for arborists who play key roles on design and construction teams, but ultimately arborists will need to use their experience and expertise if they are going to offer the best recommendations possible for their projects. Many readers will have their own practices that they have found effective. If you have a method or system that works for you, use that.

In this article, I focus on how I assess tree suitability for preservation to help identify which trees on a project site are the best candidates for preservation. I will describe how I apply the BMP guidelines to my tree preservation projects, most of which are in the in the United States Pacific Northwest. I hope that some arborists find my practices helpful in working on construction projects and understand and use the new edition of the *Construction* BMP.

The Planning Phase

As described in the 3rd edition of the BMP, the first phase of a project is the planning phase when the arborist conducts a resource evaluation. This is most often a tree inventory in which arborists collect data for each tree, such as species, size, condition, and suitability for preservation.

An important change from the 2nd edition is that the conservation suitability worksheet is no longer included. Instead, we develop ratings for suitability for preservation, which the BMP defines as follows:

> *Suitability for Preservation is a categorization of a tree's potential to be an asset to the project following development. While it is future focused, ratings of suitability for preservation are based on the species, current size, current condition, and species tolerance to construction. It is not based on specific construction plans or anticipated impacts to the tree, which may be unknown in the planning phase.*

One of the main reasons that the BMP authors decided to move on from the conservation suitability worksheet is that it required knowledge of the anticipated impacts to the tree. In the planning phase, however, the project design has yet to be determined. On my most successful projects, I am involved early enough that the team doesn't have any construction plans and we don't know what the impacts will be.

I try to be a good resource for the project team during all phases of development. It can be challenging for arborists to give good advice early in a project when the plans are so uncertain. Early in the project, I try to help the design team answer: Which trees should we focus on preserving? Suitability for Preservation ratings help me advise the design team on which trees are the best candidates to include in the project design.

Before we get started, I want to emphasize that I am not deciding which trees will be removed and preserved when assessing their suitability for preservation. At the end of this article, I discuss ways that I use suitability for preservation ratings. In some cases, trees with high suitability may be removed while trees with low suitability may be preserved depending on other factors. Suitability for preservation ratings can influence decisions around whether trees are likely to survive planned construction, how to design around trees, what is an appropriate tree protection zone, and other important aspects of construction projects.

The Project

ISA BMPs are guidelines and are not intended to provide step-by-step instructions. To see how I apply the guidelines,

let's talk about a project example. The property depicted in the plan drawn in Figure 1 includes a small single-family home located in the back corner of a corner lot in a city near Portland, Oregon, USA. There are two street trees (#1 and #2) and two private property trees (#3 and #4). The municipality has an ordinance that protects all trees 8 inches (20 cm) and greater in trunk diameter and street trees of any size. The property owner is hoping to build a bigger house while preserving them all.

For most of my construction projects, civil engineers or surveyors accurately locate the trees, as well as any existing features on a plan. This is typically called a site plan, plot plan, or topographic map (topo). In this case, the civil engineer used equipment to precisely locate the tree trunks, and roughly approximated the canopy spread on the plan (Figure 1).

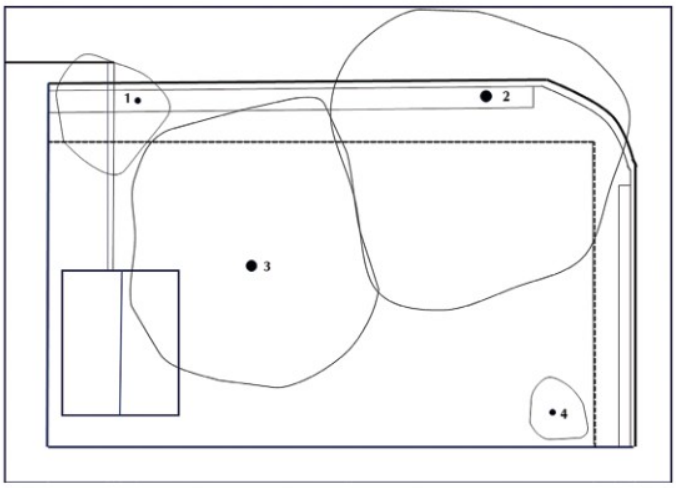

Figure 1. Location of four trees on an example lot.

Condition

Before assessing trees for suitability for preservation, I assess trees for condition.

The 3rd edition states:

> *Condition can be composed of three distinct but often related qualities: health, structure and form (See Council of Tree and Landscape Appraisers 2019).*

I was trained to collect condition as a single rating, similar to how it is described in Table 4.1 in the *Guide for Plant Appraisal* 10th edition (Council of Tree and Landscape Appraisers 2019). I combine the health, structure, and form conditions into a single rating: excellent, good, fair, poor, very poor, or dead. Below is my slightly modified version of Table 4.1 that I use for my work.

Start with Condition, Downgrade if Future Concerns

Many arborists have successfully worked on construction projects using only tree condition for rating trees and not thinking about their future success. The current condition of the tree is a great starting point. I assign three possible ratings for suitability for preservation: High, Moderate, and Low (Table 1). Trees in excellent or good condition start with a high suitability for preservation. Trees in fair condition start with a moderate suitability for preservation. Trees in poor, very poor, or dead condition start with a low suitability for preservation (Figure 2).

	Health	Structure	Form
Excellent	Vigor nearly perfect with little or no twig dieback, discoloration, or defoliation.	Strong branch attachments with few or no features affecting tree or branch stability.	Tree shape highly functional and aesthetic in landscape.
Good	Typical vigor with minor twig dieback, defoliation, or discoloration.	Good branch attachments with minor and correctable features affecting tree or branch stability.	Tree shape functional and aesthetic in landscape.
Fair	Reduced vigor with moderate twig dieback, defoliation, and/or discoloration.	A single feature significantly affecting or multiple features moderately affecting tree or branch stability that would not be practical to correct or would require multiple treatments over several years.	Tree shape compromises function and/or aesthetics in landscape.
Poor	Compromised vigor with extensive twig and/or branch dieback and defoliation.	A single feature seriously affecting or multiple features significantly affecting tree stability that cannot be corrected.	Tree shape significantly detracts from function and/or aesthetics.
Very Poor	Poor vigor with little live foliage or branches.	Multiple features seriously affecting tree stability that cannot be corrected.	Tree shape provides little to no function and is visually unappealing in landscape.
Dead	No live foliage or branches.	Tree failed.	-

However, I want to incorporate information in addition to tree condition. I look for site factors that will someday influence the tree's condition but have not yet. I consider what I know about the tree species and what I have noticed about the success of other trees of this species on construction projects. I consider whether it is an invasive species in the area or how desirable of a species it is. These are considerations that do not influence my condition ratings.

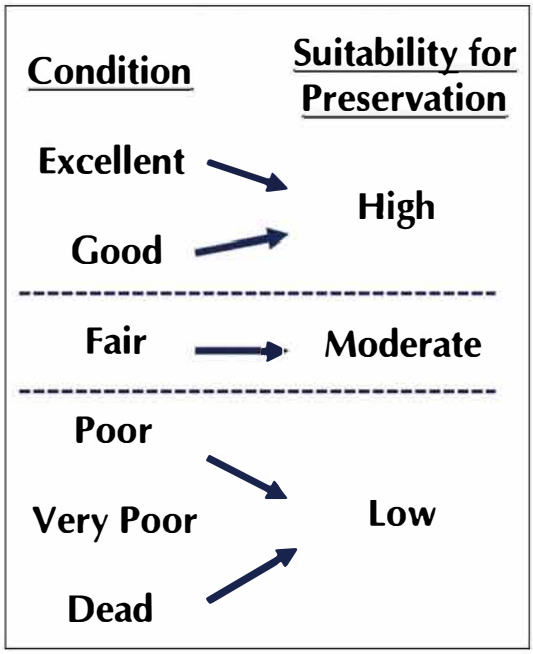

Figure 2.

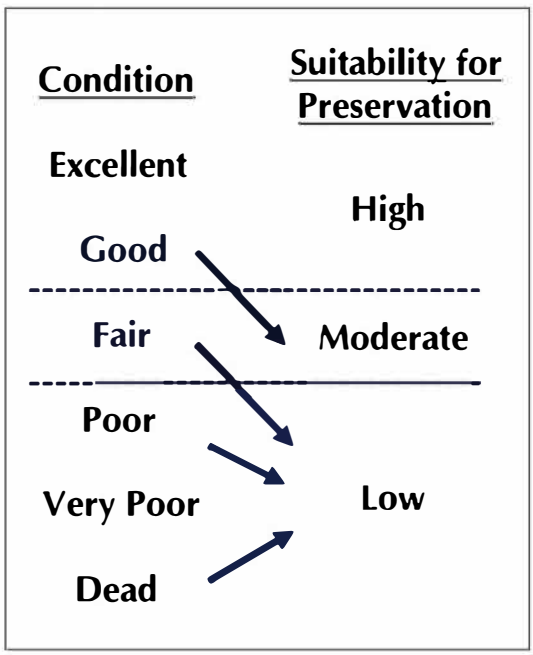

Figure 3.

Next, I adjust the suitability for preservation rating downwards if the tree is growing in an unsuitable location, doesn't tolerate root loss, or is invasive. So, a tree in good condition may by ranked as moderate suitability for preservation when these other factors are considered (Figure 3).

I rarely (if ever) adjust suitability for preservation ratings upward. Occasionally, a tree in fair condition may have high suitability for preservation. But generally, I don't do this.

Let's go back to the four trees in our project.

Tree #1

Tree #1 (Figure 4) is a European white birch (*Betula pendula*) street tree growing near Portland, Oregon. It has two codominant stems with included bark and a dense green crown. Although it appears healthy, I assessed this tree to be in fair condition because of its structure. I rated it as having low suitability for preservation (Figure 5).

> *Trees with low suitability for preservation include those that are in poor condition, have short remaining life spans, have poor aesthetics, are intolerant of construction damage, or are invasive.*

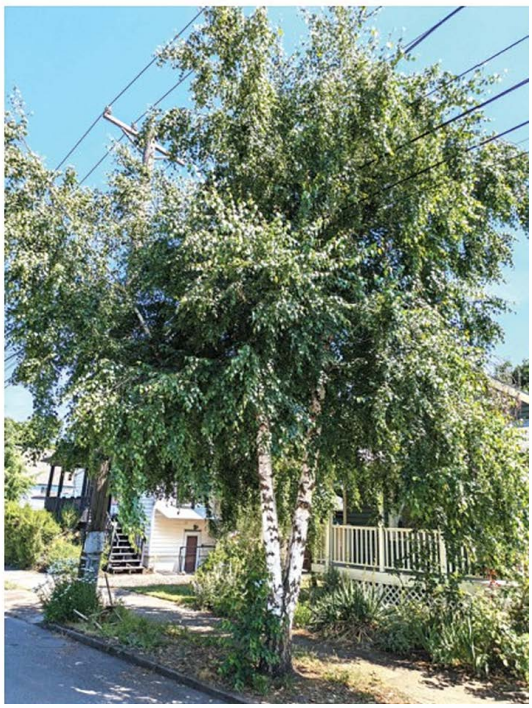

Figure 4. Tree #1. European white birch (*Betula pendula*); DBH: 9,8 in (23,20 cm); Condition: Fair; Suitability for preser-vation: Low.

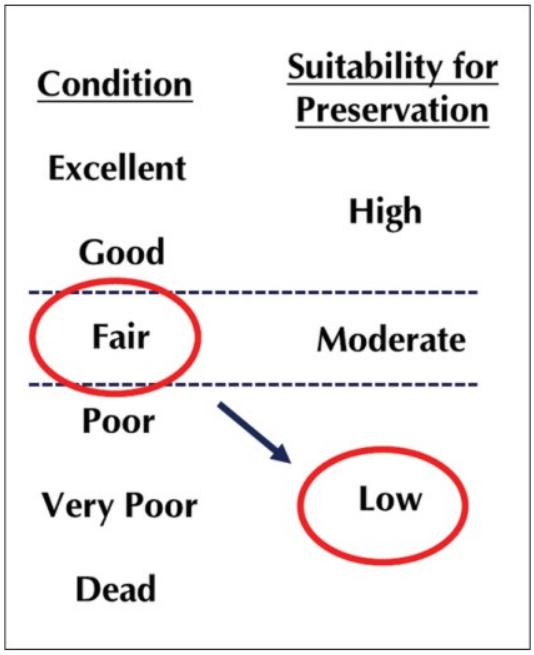

Figure 5.

In Portland, European white birch does not handle construction damage very well. This species tends to have short lives naturally, which is exacerbated by bronze birch borer (*Agrilus anxius*) infestations. I rate trees growing under power lines that are likely to be tall enough to require topping or other small spaces down as well. I think this is a good example of a relatively healthy tree that we should not focus on preserving because of it's placement, poor construction tolerance, poor structure, and expected short lifespan.

Tree #2

Tree #2 (Figure 6) is a London plane (*Platanus* × *hispanica*) street tree. Its trunk divides into three stems at approximately 8 feet (2.4 m) and its crown is relatively dense and green for the species in this area. I assessed this tree to be in good condition and rated it as having high suitability for preservation (Figure 7).

> *…trees with high suitability for preservation are in good condition, have long remaining life spans, are desirable, and are species that tolerate construction damage.*

In Portland, London planes are highly tolerant of root loss during construction. They have long lives and are desirable. I typically rate London planes in good condition growing in desirable locations as having high suitability for preservation. I think this is a good example of a tree to focus on preserving.

Figure 6. Tree #2, London plane (*Platanus* × *hispanica*); DBH: 21 in (53 cm); Condition: Good; Suitability for preservation: High.

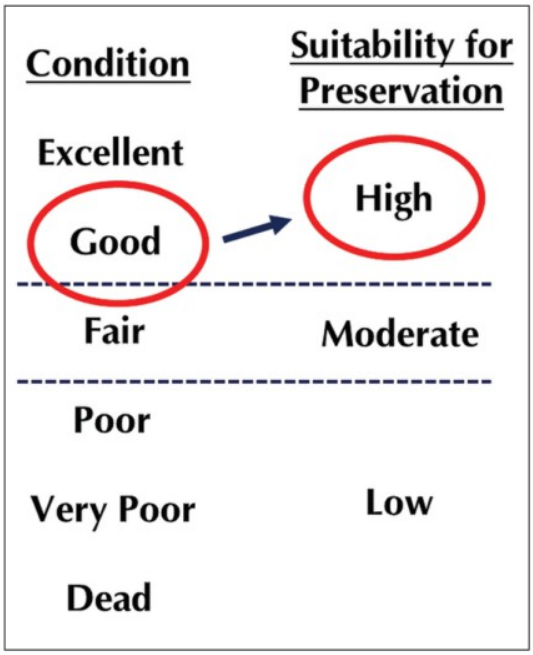

Figure 7.

Figure 8. Tree #3, Southern catalpa (*Catalpa bignonioides*); DBH: 31 in (79 cm); Condition: Fair; Suitability for preservation: Low.

Tree #3

Tree #3 (Figure 8) is a southern catalpa (*Catalpa bignonoides*) tree growing on private property. The large single trunk divides into many trunks/branches at 20 feet (6 m) with a semi-thin crown. I assessed this tree to be in fair condition and rated it as having low suitability for preservation (Figure 9).

> *Trees with low suitability for preservation include those that are in poor condition, have short remaining life spans, have poor aesthetics, are intolerant of construction damage, or are invasive.*

In Portland, I don't see catalpas growing much larger than this. The thin crown and branch architecture make me think that this tree is reaching the end of its life expectancy and is likely to decline in the future whether construction impacts it or not. While I would like to preserve this tree, my experience says that this tree will be difficult to preserve and is a good example of a tree to not focus on preserving.

Tree #4

Tree #4 (Figure 10) is a Raywood ash (*Fraxinus oxycarpa* 'Raywood') growing on private property. It is young and growing vigorously with a dense crown. I assessed this tree to be in excellent condition and rated it as having moderate suitability for preservation (Figure 11).

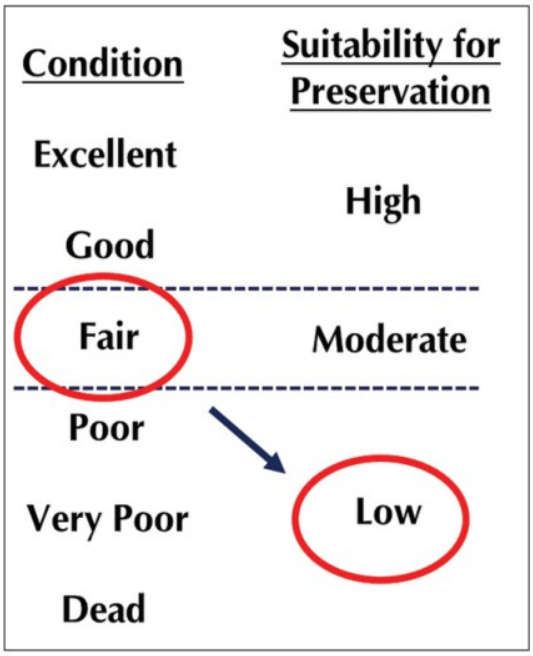

Figure 9.

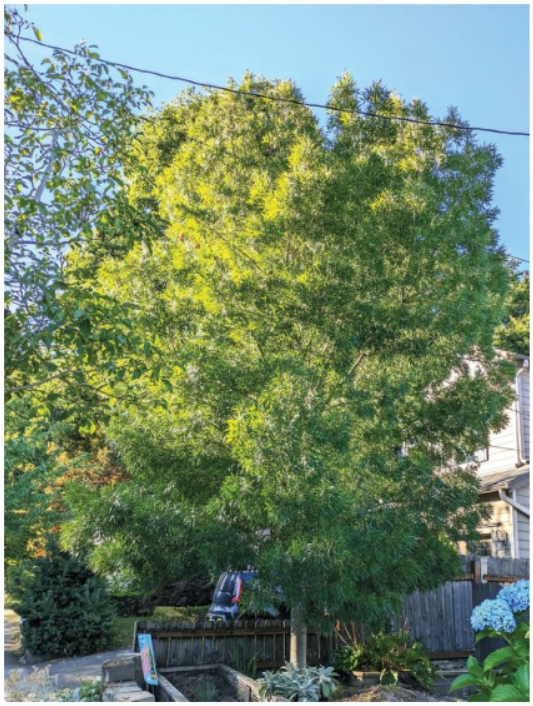

Figure 10. Tree #4, Raywood ash (*Fraxinus oxycarpa* 'Raywood'); DBH: 7 in (18 cm); Condition: Good; Suitability for preservation: Moderate.

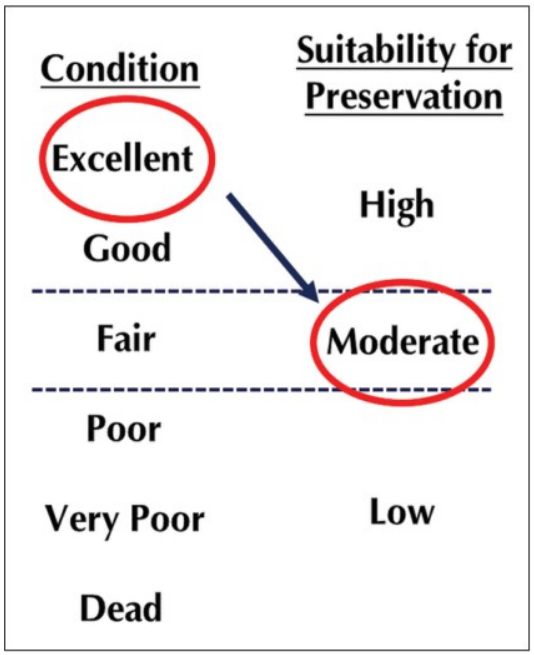

Figure 11.

Trees with moderate suitability for preservation are in between these two categories. They may have conditions or qualities that could be mitigated with arboricultural treatments such as pruning, pest management, soil management, or supplemental irrigation.

In Portland, ash (*Fraxinus* sp.) has been a desirable species. While we haven't planted at high densities, somewhere around 5% of our trees are ashes. Emerald ash borer (EAB)(*Agrilus planipennis*) was detected in Forest Grove, Oregon, USA (approximately 20 miles west of Portland) in 2022. EAB has not been detected yet within the city of this project, but I have started rating down the suitability for preservation of ash trees on construction sites because of shortened expected lifespan/pest management concerns (see Namm and Gilpin 2023). I would like to preserve this tree, but I would not go to great lengths to design around it.

In summary, I ranked the suitability for preservation of these four trees as:

- High: London plane #2
- Moderate: Raywood ash #4
- Low: Birch #1 & Catalpa #3

Next Steps

Once we know each tree's suitability for preservation, there are several options for how to proceed. I will start with what I don't do.

1. ***Recommend which trees to remove.*** I don't typically make removal recommendations based on suitability for preservation. Just because trees #1 and #3 have low suitability for preservation ratings doesn't mean they will be removed. Which trees will be removed will be decided later after I review the project plans and discuss options with my client. However, in rare cases there may be tree(s) that are in such poor condition that I recommend removal at this phase.

Typically, I proceed with one or more of these options depending on the specific details of the project that I am working on.

2. ***Review construction plans.*** While I prefer being involved early (before construction plans are being drawn), often, preliminary construction plans are already complete when I am contacted. In this case, I move straight into reviewing construction plans. Look for another article in the next issue of *Arborist News* (February 2024) about this process.
3. ***Deliver data and wait for plans.*** When I am involved early in a project, often the project team has many decisions to make based on my data. I send my data, description of how I ranked the trees in terms of suitability for preservation, and a tree location map to my client. I often do not hear from them for several months as they work through designs for the project.
4. ***Calculate Tree Protection Zones.*** If I am involved early in the planning process, I may use Table 2 from the *Construction* BMP to calculate the radius of each tree protection zone. These calculations give the design team starting points for designing space around each tree. (There will be more about this method in the next article.) I don't do this very often for a variety of reasons, but I think that it can be helpful for certain projects at certain stages of planning.
5. ***Discuss design options.*** When designing new buildings, the architects and engineers start by considering constraints and options (Figure 12). For this project, they may come back with Option 1 to try to preserve every tree. After doing some of the analysis that I discuss in the next article, I may tell the project partners that I think that they are being too optimistic about the ability to preserve every tree and should focus on giving more space to the best trees.

Many of my projects propose something like Option 1, which often results in many trees being severely impacted and ultimately being removed. Now that I have tree data, I can offer my client the difficult (but in my opinion, correct) recommendation that they consider Option 2. We remove the tree that is nearing the end of its lifespan and is unlikely to survive construction no matter where the building is placed. The benefit of Option 2 is that we can provide an adequate Tree Protection Zone for tree #3, which I have identified as the tree with high suitability for preservation.

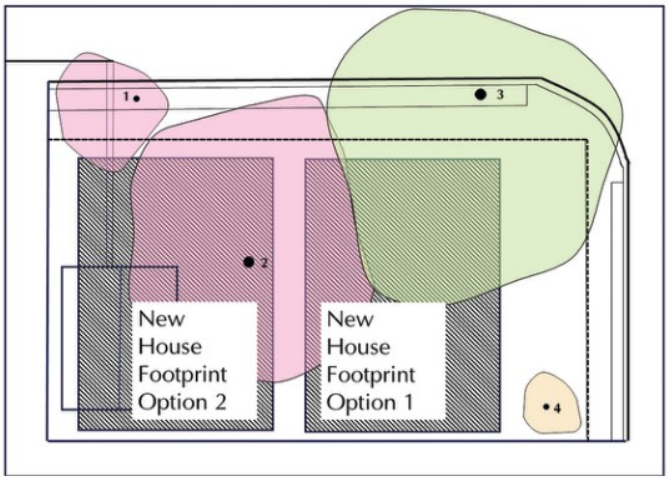

Figure 12.

Not everyone will think this is the correct way to proceed, but what is important is being thoughtful and having the data and a process to make these sorts of decisions. I would like to find a way to preserve tree #2, but my experience on these types of projects is that if we want to construct a building, we will be removing trees. We can make the best decisions possible about which trees to focus on preserving, and suitability for preservation helps me make those decisions.

As my project moves from the planning phase to the design phase, I use my data above to try to answer an even more difficult question. Is this tree likely to survive construction? Look for that article in the February 2024 issue of *Arborist News*.

Literature Cited

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