

**Environmental Assessment
Trees Technical Memorandum
Appendix D**

Federal Actions In and Adjacent to Jackson Park:
Urban Park and Recreation Recovery Amendment and Transportation
Improvements
Jackson Park, City of Chicago, Illinois

August 2020

National Park Service
Federal Highway Administration

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1.0 Introduction

This memorandum identifies the species, size and health of all trees anticipated to be removed. Nearly 5,000 trees have been identified within a portion (57 percent) of Jackson Park. Many of those trees serve multiple purposes such as contributing to the historic landscape, serving as recreational features, or providing habitat for wildlife. The relevance of trees, and removal of trees, to these characteristics of Jackson Park are discussed separately in the Section 106 Assessment of Effects, the Recreation Technical Memorandum (Appendix G), and the Natural Resource Technical Memorandum (Appendix C), respectively.

This technical memorandum evaluates trees as their own resource and identifies relevant agency definitions and requirements, existing conditions, and anticipated tree impacts associated with each of three action alternatives. For impacts associated with each alternative, minimization measures and mitigation strategies are identified.

2.0 Applicable Regulations

The following outlines various definitions and replacement guidelines for trees from agencies engaged in the Federal Actions in and Adjacent to Jackson Park (Federal Actions) including the Illinois Department of Transportation (IDOT), Chicago Department of Transportation (CDOT) and the Chicago Park District (CPD). For all trees, data collected in tree surveys utilized the direct counting method and included all trees, regardless of their diameter at breast height (DBH). DBH values were taken at 4.5 feet above grade utilizing diameter tapes and calipers. In the case of multi-stem trees, the DBH for each individual stem was measured and recorded. For any new trees proposed for replacement, as their sizes are less than 6 inches in diameter, the measurement for size utilized is caliper, which is the trunk size measured at 6 to 12 inches above the soil line.

The tree memo utilizes the variety of measurements to capture the full impact of the tree removals and replacements for each alternative. To be most conservative, the tree removal calculations were made for trees of any size and denotes quantities for (1) trees greater than 6 inches DBH, (2) trees 4 – 5 inches DBH and (3) trees less than 4 inches DBH. A replacement of 1:1 is assumed for all trees, regardless of size.

2.1 IDOT Definitions and Replacement Guidelines

IDOT definitions and replacement guidelines were used because funding from IDOT will be used for transportation improvements, which will include the replacement of any trees that are required for those transportation improvements. IDOT defines a tree as “a woody perennial plant having a single main stem or trunk, the diameter of which is 6 inches or more at a point 4.5 feet above the highest ground level at the base of the tree.” IDOT defines saplings as woody perennial plants having a single main stem or trunk of less than 6 inches in diameter when such plants have been intentionally planted for landscaping, environmental mitigation, or habitat preservation/enhancement” (IDOT 2017). In general, IDOT recommends the following:

- A minimum ratio of 1:1 of replacement trees to the number of trees to be removed should be provided by bare root or balled and burlapped trees. If seedlings are proposed to be provided, a minimum ratio of 3:1 shall be followed.
- Replacement plantings should be provided within the right-of-way on a project, to the extent practicable. Where not practicable, opportunities for replacement outside of the right-of-way should be pursued to achieve the long term goal of 1:1 replacement ratio.
- Special sensitivity in determining replacement trees in urban areas shall be pursued.

When quantifying trees to be removed and replaced, IDOT does not differentiate between native/non-native/invasive species.

2.2 CDOT Definitions and Replacement Guidelines

The CDOT utilizes IDOT guidance for definition of trees and recommends the following tree replacement requirements in accordance with City municipal code and guidelines (available in full online):

- To replace trees lost due to construction, the City will first “seek to have the largest readily available tree(s) installed based on an ‘inch for inch’ replacement basis” (CBF 2005).
- Trees to be replaced along public right-of-way require spacing of 1 tree per 25 lineal feet (LF) of frontage (Chicago 2000).

2.3 CPD Definitions and Replacement Guidelines

Generally, the CPD quantifies trees as those with a DBH of 4 inches or greater. Distinctions between these sizes of trees are made throughout the memorandum to quantify total tree loss. The CPD recommends the following replacement guidelines, in accordance with their design guidelines and standards (CPD 2010):

- Plant replacement selection should be appropriate and sensitive to the historic palette (where required)
- Plant replacement layout should be aesthetically pleasing
- Landscape plantings in or adjacent to historic landscapes should preserve and enhance the historic design intent

All new plantings should conform to and complement the existing plant palette and landscape style

- The CPD typically does not include dead or invasive species of trees when quantifying the number of trees for replacement.
- CPD has indicated that a 1:1 tree replacement guideline would be appropriate for all trees in Jackson Park.

3.0 Existing Conditions

This memorandum utilizes a number of existing tree surveys as a basis for evaluation. The tree surveys encompass all areas where proposed changes are contemplated. Tree surveys were conducted within the

OPC site, track and field replacement site, and adjacent to proposed transportation improvements. Previous trees surveys conducted for the CPD were also considered. The boundaries of these surveys extended to 57 percent of Jackson Park and identified 4,672 trees. The other 43 percent of Jackson Park, where proposed changes are not contemplated, contains an unknown number of trees. Of the 4,672 trees counted, 17 percent would be affected by this project. The extents of the surveys used can be seen in Figure 1. More details on each of the individual tree surveys are provided below.

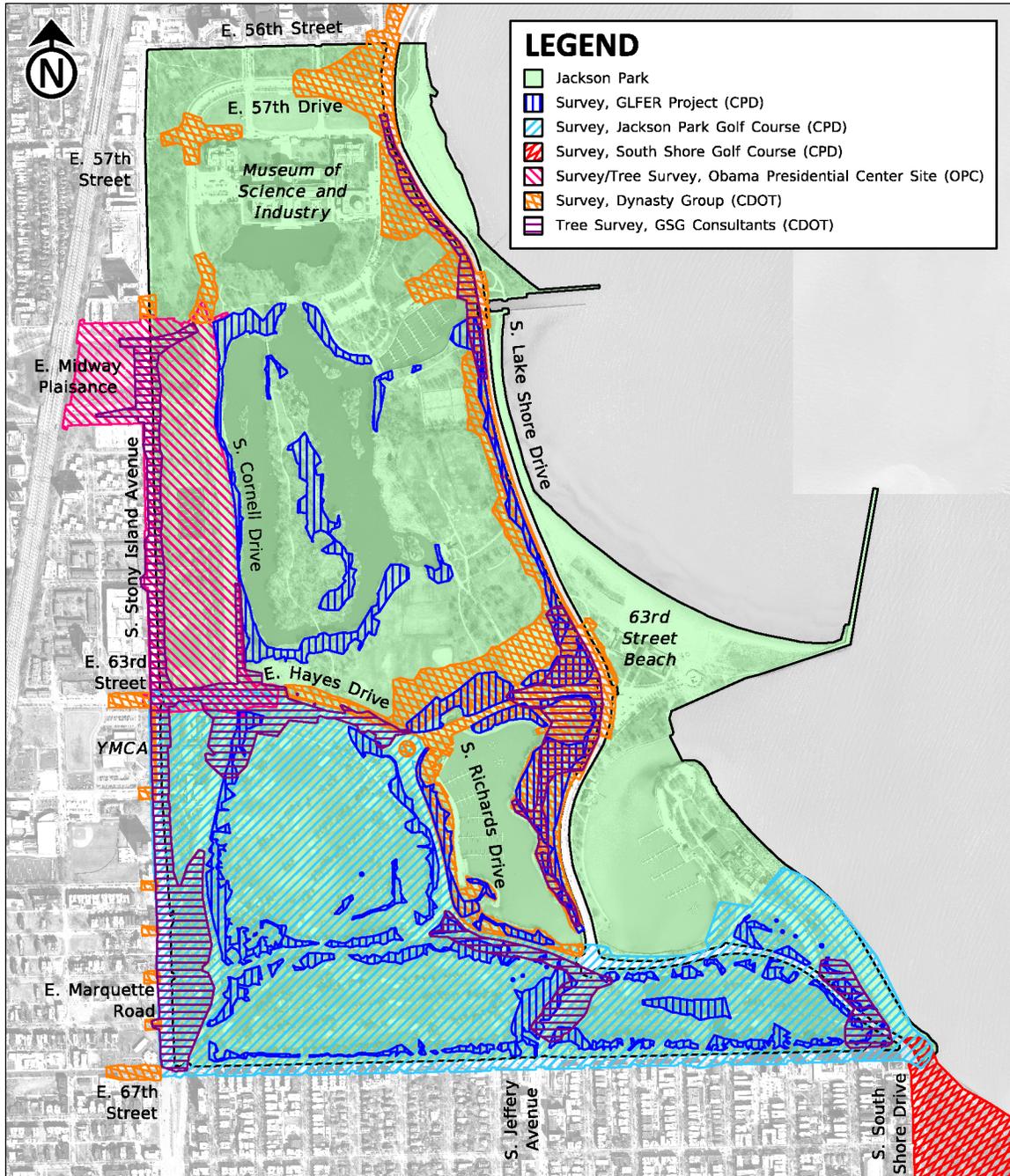


Figure 1 Survey Limits

Within the site limits of the Obama Presidential Center (OPC) and in the area of the relocated track and field, tree assessments were conducted by Bartlett Tree Experts (BTE 2018). Elsewhere, GSG Consultants performed field assessments on trees identified through a number of surveys to create their Tree Survey Report (GSGC 2018). Those surveys were the CPD's Jackson Park Golf Course survey, the CPD's South Shore Golf Course survey, the CPD/United States Army Corps of Engineers' (USACE) Great Lakes Fishery & Ecosystem Restoration (GLFER) Study survey, and CDOT's topographic survey within the vicinity of the intended transportation improvements. Both of these tree assessments are available via the City's Department of Planning and Development website for the Federal Review of Jackson Park Improvements (<https://www.tinyURL.com/JPIImprovements>).

3.1 Existing Tree Species Diversity

The existing tree species within Jackson Park are described in the 2014 GLFER study that documented the existing conditions within Jackson Park. The 2014 GLFER study states that a savanna and open woodland community exists within Jackson Park and notes that these natural communities include a number of invasive tree species such as tree-of-heaven, white poplar, weeping willow, and white mulberry, as well as a number of opportunistic native species such as boxelder, eastern cottonwood, and green ash. The natural communities within Jackson Park also contain non-native tree species including horse chestnut, Norway maple, and amur corktree. There are also more conservative native tree species scattered throughout including American hazelnut, northern white oak, bur oak and pin oak. Cross-referencing the tree inventory created from the other surveys against the Chicago Botanic Garden's *Invasive Plants in the Chicago Region* list identified additional invasive species present in Jackson Park including amur maple, European black alder, amur honeysuckle, Callery pear, black locust, and Siberian elm.

Historically, Jackson Park, like much of the Midwest had large, mature American elm trees contributing to the canopy. The introduction of Dutch Elm Disease in the 1930's quickly decimated the elm population, killing them and leading to their removal. Ash trees were also common landscaping tree, often planted to fill gaps resulting from the removal of dead or dying elm trees. However, the ash tree population was unexpectedly decimated with the introduction of the Emerald Ash Borer (EAB) in 2002. Municipalities with EAB infected ash trees have had to dedicate large amounts of resources to the treatment, removal, and replanting of the canopy. The importance of species diversity is becoming ever more apparent, leading municipalities to plant a wide variety of species since the discovery of EAB.

Jackson Park in particular has seen extensive changes in its canopy, starting with Olmsted's landscaping planting for the Worlds Colombian Exposition in the 1890s. Over the last 12 years Jackson Park has endured the EAB crisis. While replantings are slated to fill the void left by the removals, there is still a reduced number of mature trees in the canopy, leading to an opening for invasive species to establish, reducing the diversity of quality species. Jackson Park's canopy consists of 6.27 percent ash, less than the 10 percent Chicago park-wide ash canopy estimated by CPD, but still showing a need to continue the removal of mature trees.

3.2 GLFER

The CPD GLFER project is an ecological restoration effort that assessed the ecological conditions and developed plans to restore important migratory bird, fish and wildlife habitat within the natural area portions of Jackson Park. One crucial component of this is native plant community richness and structure. Converting small expanses of land into structurally diverse wetlands and buffering plant communities will provide critical habitat for a number of organisms.

To address the ecosystem problems that GLFER identified within Jackson Park, a series of recommendations were made to restore native plant habitats. This restoration is dependent on the removal of some existing tree species which are not compatible with the goals of GLFER. A total of 1,300 trees have been removed as part of the GLFER project. Tree removal associated with GLFER that contributes to ecological restoration included trees that are common street or park trees, but are not typically found in a native ecosystem. In the completed GLFER areas, these trees have been removed and replaced with species that are compatible with the goals of GLFER.

4.0 Impacts Analysis

The following sections present the impact analysis for potential impacts on trees for the three alternatives considered.

Potential impacts can be direct, indirect, or cumulative. Direct impacts occur as a result of the proposed action, at the same time and place of implementation. Indirect impacts occur as a result of the proposed action, but later in time or farther in distance from the action. Cumulative impacts result from the “incremental impact of the action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 1508.7).

The cumulative impacts analysis will assess the synergistic effect of combining the impacts of the Federal Actions, any indirect impacts following the Federal Actions, and the impacts of the following past, present, or reasonably foreseeable actions that are unrelated to the Federal Actions. Section 5.2.1 of the Environmental Assessment (EA) considers certain other past, present, or reasonably foreseeable projects, unrelated to the OPC project, that potentially impact the same resources. Among these, only the Lakefront Trail Separation and Baseball Facilities projects have the potential to impact trees.

Detailed descriptions of the alternatives are provided in the EA and referenced in this technical memorandum.

4.1 Alternative A: No Action

Alternative A assumes that there is no Urban Parks and Recreation Recovery (UPARR) boundary conversion, the OPC is not constructed, and no roads are closed.

4.1.1 Direct Impacts

There are no direct impacts to trees associated with Alternative A.

4.1.2 Indirect Impacts – City Actions

There are no indirect impacts to trees associated with Alternative A.

4.1.3 Cumulative Impacts

Two trees were removed as a result of the Lakefront Trail Separation project and up to five trees are anticipated to be removed as part of the baseball field improvements in Jackson Park. These projects contribute minimal impacts to the overall cumulative impacts. Alternative A would not contribute to any cumulative impacts, as no additional federal action occurs under this alternative. Therefore, the cumulative impacts of Alternative A are minimal.

4.2 Alternative B: NPS Action (FHWA No Build)

Alternative B includes National Park Service (NPS) approval of the partial conversion of recreation due to the construction of OPC and replacement of recreation opportunities on the east end of the Midway Plaisance.

4.2.1 Direct Impacts

The UPARR conversion would not impact trees because the UPARR conversion itself does not have on the ground impacts. Additionally, trees are not proposed for removal within the replacement recreation on the east end of the Midway Plaisance. Therefore, there would be no direct impacts to trees associated with the UPARR conversion and replacement areas under Alternative B.

4.2.2 Indirect Impacts – City Actions

4.2.2.1 Proposed Roadway Closures

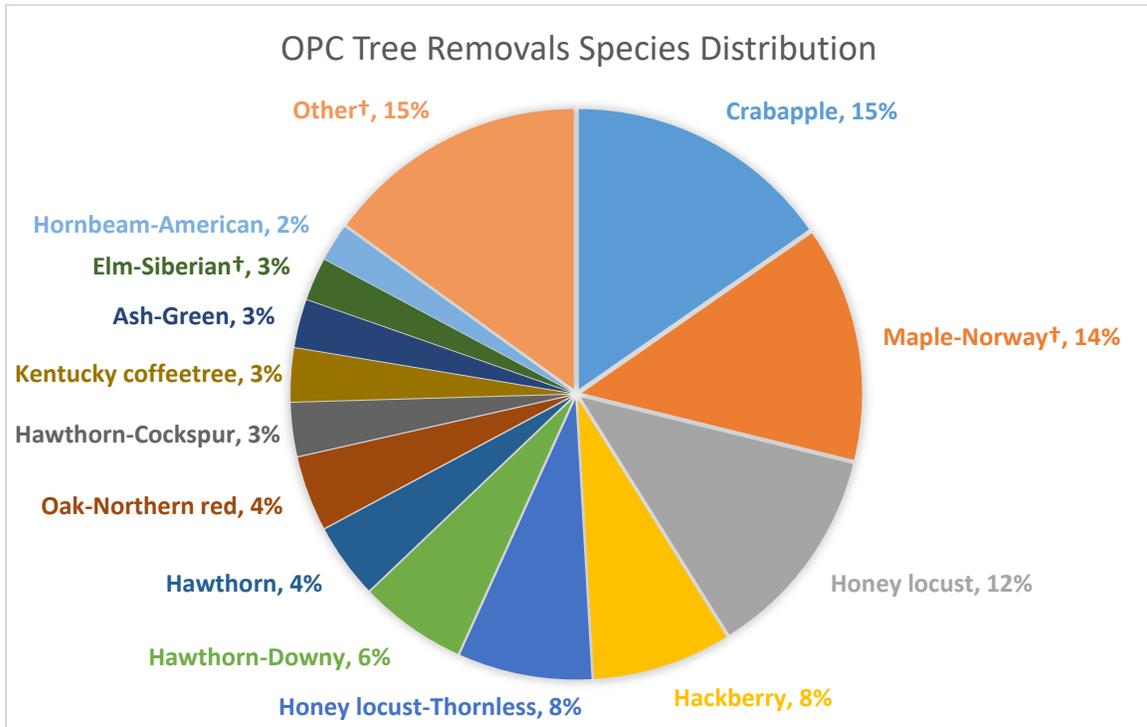
Under Alternative B, the roadway closures would discontinue use of the roadway by vehicular travel. This action does not involve any physical construction to remove the existing roadway network outside of the OPC site boundary. The impacts of the physical removal of Cornell Drive between 62nd Street and 59th Street (funded by the private institution developing the site) is evaluated in Section 4.2.2.2. There are no trees located within the roadway footprint, so the proposed roadway closures would not impact any additional trees.

4.2.2.2 OPC Site Development

This action includes the construction of the OPC site and assumes that all trees identified within the OPC site boundary will be removed to allow for its construction. This results in an anticipated total removal of 326 trees, including 297 single and multi-stem trees equal to or greater than 6 inches, 19 between 4 to 5 inches and 10 single and multi-stem trees smaller than 4 inches. Additionally, of the 326 trees anticipated to be removed, 57 trees are species considered to be invasive. The trees anticipated to be removed are

listed in Attachment D-1, including their type, size, height and age class, and condition. Bartlett Tree Experts describe the methodology used to identify these metrics in their report, *OPC Tree Inventory and Management Plan* (BTE 2018). The trees anticipated to be removed are also shown on Attachment D-2.

The distribution of the species of trees anticipated to be removed is summarized in Figure 2, and a complete list and count of each species anticipated to be removed are listed in Table 1. Figure 3 shows the distribution of tree sizes and Figure 4 shows the distribution of tree condition for trees that are anticipated to be removed.



† Invasive species

Figure 2: OPC Tree Removals Species Distribution

Table 1: OPC Tree Removals by Species

Species Count	Common Name	Genus	Species	Number to be Removed
1	Ash-Green	<i>Fraxinus</i>	<i>pennsylvanica</i>	9
2	Ash-White	<i>Fraxinus</i>	<i>americana</i>	2
3	Birch-River	<i>Betula</i>	<i>nigra</i>	5
4	Catalpa-Northern	<i>Catalpa</i>	<i>speciosa</i>	2
5	Cherry	<i>Prunus</i>	<i>sp.</i>	2
6	Crabapple	<i>Malus</i>	<i>sp.</i>	50

Species Count	Common Name	Genus	Species	Number to be Removed
7	Dogwood-Corneliancherry	<i>Cornus</i>	<i>mas</i>	1
8	Eastern cottonwood	<i>Populus</i>	<i>Deltoides</i>	1
9	Elm-American	<i>Ulmus</i>	<i>americana</i>	1
10	Elm-Hybrid	<i>Ulmus</i>	<i>hyb.</i>	6
11	Elm-Siberian†	<i>Ulmus</i>	<i>pumila</i>	8
12	Hackberry	<i>Celtis</i>	<i>occidentalis</i>	26
13	Hawthorn	<i>Crataegus</i>	<i>sp.</i>	14
14	Hawthorn-Cockspur	<i>Crataegus</i>	<i>crusgalli</i>	10
15	Hawthorn-Downy	<i>Crataegus</i>	<i>mollis</i>	20
16	Honey locust-Common	<i>Gleditsia</i>	<i>triacanthos</i>	40
17	Honey locust-Thornless common	<i>Gleditsia</i>	<i>triacanthos var. inermis</i>	25
18	Honeysuckle-Amur†	<i>Lonicera</i>	<i>maackii</i>	1
19	Hornbeam-American	<i>Carpinus</i>	<i>caroliniana</i>	7
20	Kentucky coffeetree	<i>Gymnocladus</i>	<i>dioicus</i>	10
21	Linden-American	<i>Tilia</i>	<i>americana</i>	4
22	Locust-Black†	<i>Robinia</i>	<i>pseudoacacia</i>	1
23	Maple-Freeman	<i>Acer</i>	<i>x freemanii</i>	1
24	Maple-Norway†	<i>Acer</i>	<i>platanoides</i>	44
25	Maple-Red	<i>Acer</i>	<i>rubrum</i>	2
26	Maple-Silver	<i>Acer</i>	<i>saccharinum</i>	4
27	Maple-Sugar	<i>Acer</i>	<i>saccharum</i>	1
28	Mulberry-White†	<i>Morus</i>	<i>alba</i>	2
29	Oak-Bur	<i>Quercus</i>	<i>macrocarpa</i>	3
30	Oak-Northern red	<i>Quercus</i>	<i>rubra</i>	14
31	Oak-Swamp white	<i>Quercus</i>	<i>bicolor</i>	2
32	Paniced Goldenraintree	<i>Koelreuteria</i>	<i>paniculata</i>	3
33	Redbud-Eastern	<i>Cercis</i>	<i>canadensis</i>	1
34	Sycamore-American	<i>Platanus</i>	<i>occidentalis</i>	3
35	Tree of Heaven†	<i>Ailanthus</i>	<i>altissima</i>	1
Total to be Removed				326

† Invasive species

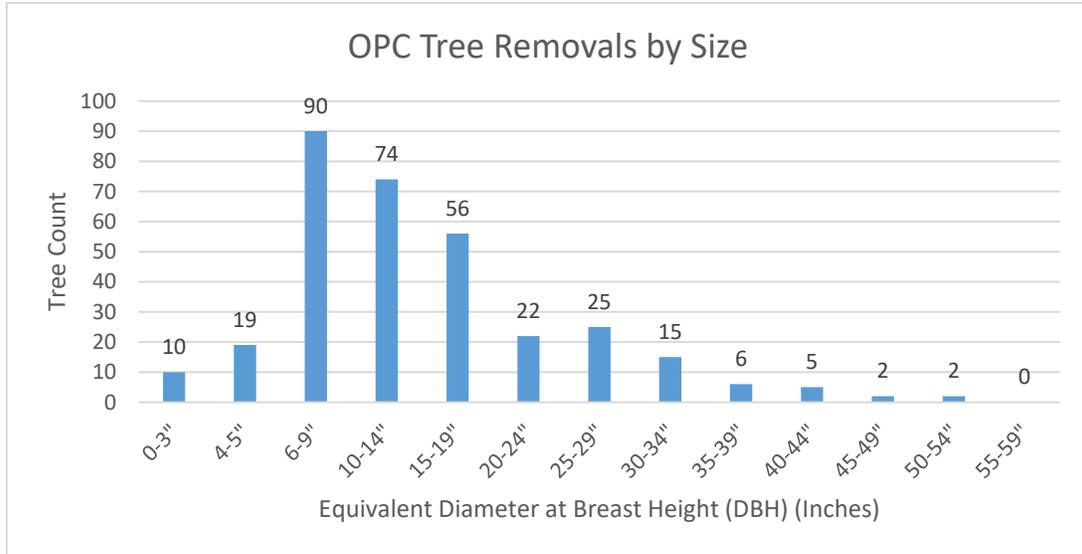


Figure 3: OPC Tree Removals by Size

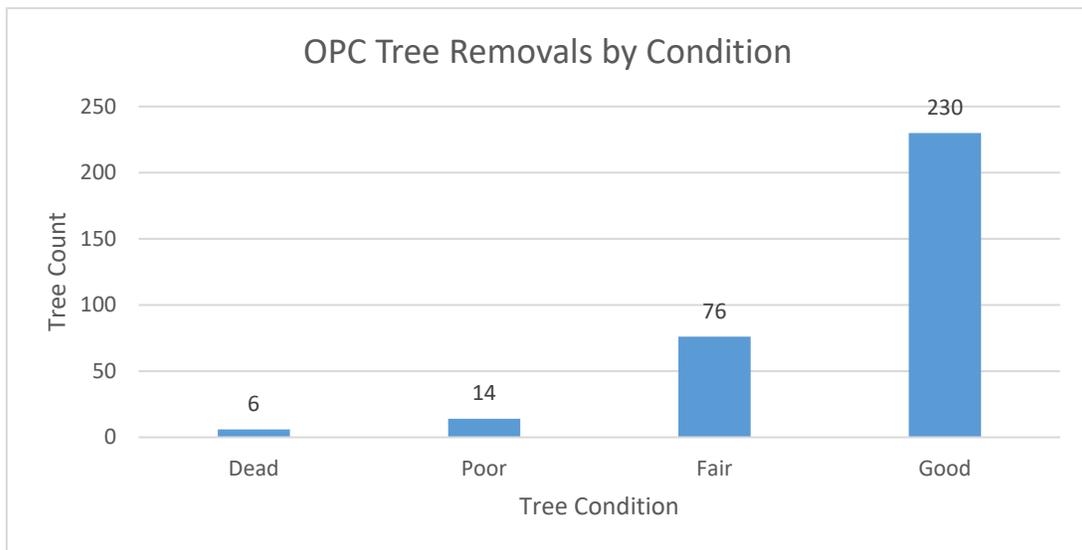


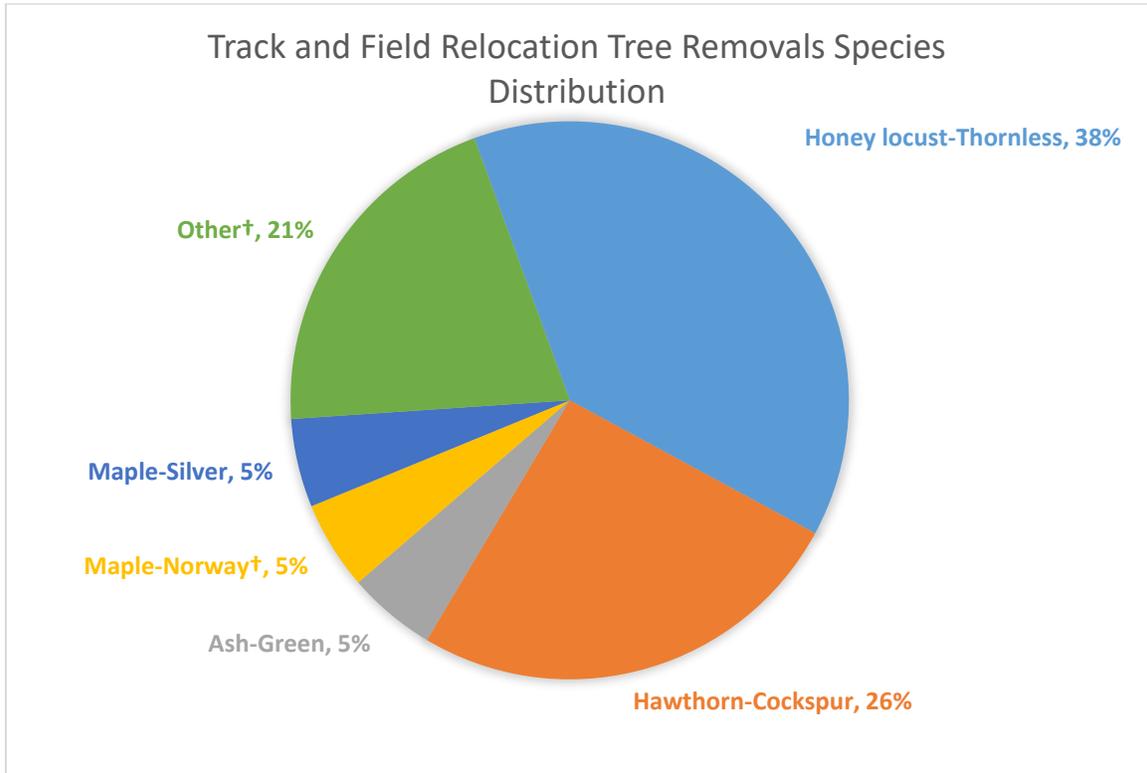
Figure 4: OPC Tree Removals by Condition

There are 35 different species of trees anticipated to be removed within the OPC site boundary. The majority of these anticipated tree removals are between 10 to 14 inches in size and many of the trees anticipated to be removed are in good condition.

4.2.2.3 Track and Field Relocation

Another indirect impact that results from Alternative B is the relocation of the track and field. This action includes the relocation of the track and field which removed a total of 39 trees, with 29 single stem trees equal to or greater than 6 inches. An additional 10 single stem trees between 4 to 5 inches were removed. Additionally, of the 39 trees removed, 2 trees are species considered to be invasive. A detailed list of the trees removed can be found in Attachment D-3, including their type, size, height and age class, and

condition. Bartlett Tree Experts describe the methodology used to identify these metrics in their report, *OPC Tree Inventory and Management Plan* (BTE 2018). The trees that were removed are depicted on the construction plan included as Attachment D-4. The distribution of the species of trees removed is summarized in Figure 5, with a species list and count of each tree removed shown in Table 2. Figure 6 shows the distribution of tree sizes and Figure 7 shows the distribution of tree condition for trees that were removed.



† Invasive species

Figure 5: Track and Field Relocation Tree Removals Species Distribution

Table 2: Track and Field Relocation Tree Removals by Species

Species Count	Common Name	Genus	Species	Number to be Removed
1	Ash-Green	<i>Fraxinus</i>	<i>pennsylvanica</i>	2
2	Beech-European	<i>Fagus</i>	<i>sylvatica</i>	1
3	Crabapple	<i>Malus</i>	<i>sp.</i>	1
4	Hackberry	<i>Celtis</i>	<i>occidentalis</i>	1
5	Hawthorn-Cockspur	<i>Crataegus</i>	<i>crusgalli</i>	10
6	Hawthorn-Downy	<i>Crataegus</i>	<i>mollis</i>	1

Species Count	Common Name	Genus	Species	Number to be Removed
7	Honey locust-Common	<i>Gleditsia</i>	<i>triacanthos</i>	1
8	Honey locust-Thornless common	<i>Gleditsia</i>	<i>triacanthos var. inermis</i>	15
9	Hornbeam-American	<i>Carpinus</i>	<i>caroliniana</i>	1
10	Maple-Norway†	<i>Acer</i>	<i>platanoides</i>	2
11	Maple-Silver	<i>Acer</i>	<i>saccharinum</i>	2
12	Oak-Northern red	<i>Quercus</i>	<i>rubra</i>	1
13	Walnut-Black	<i>Juglans</i>	<i>nigra</i>	1
Total to be Removed				39

† Invasive species

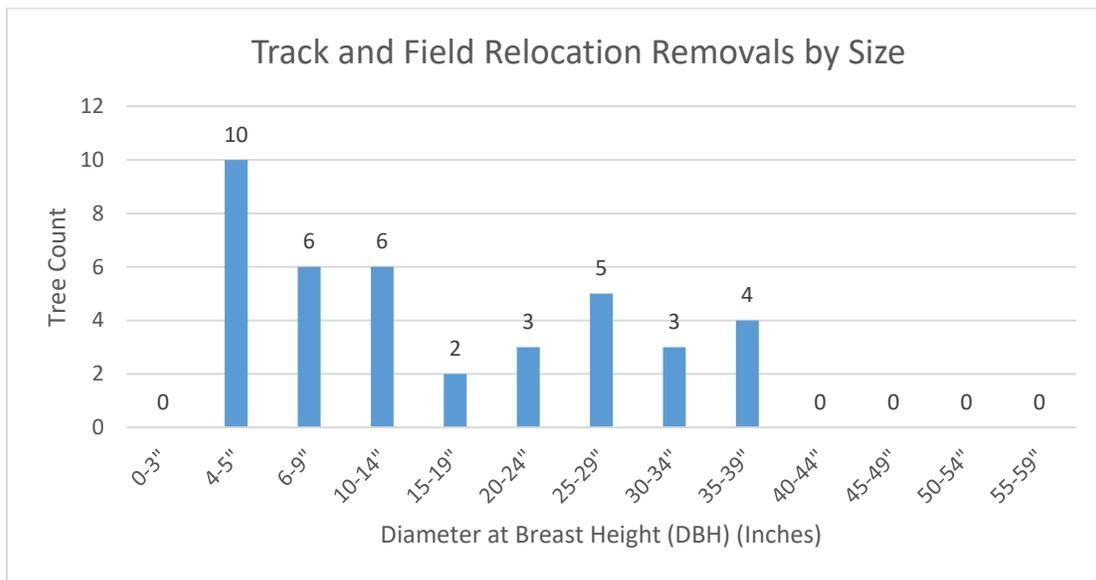


Figure 6: Track and Field Relocation Tree Removals by Size

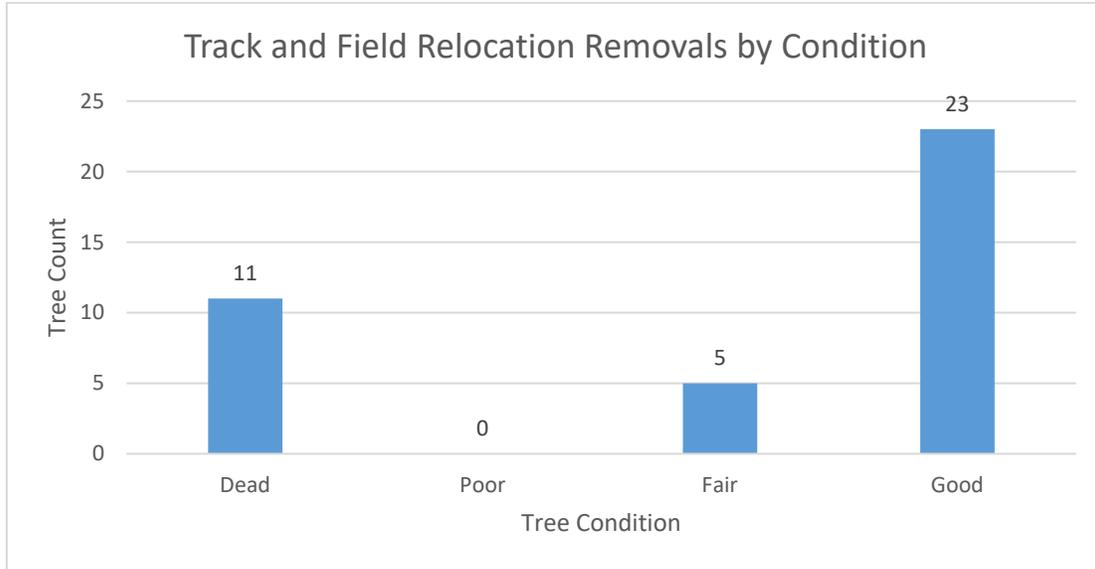


Figure 7: Track and Field Relocation Tree Removals by Condition

There were 13 different species of trees removed by the relocation of the track and field. The majority of these tree removals were between 4 to 5 inches in size and many of the trees removed were in good condition.

4.2.3 Cumulative Impacts

Alternative B would result in short-term negative impacts to the existing tree population and tree canopy upon initial removal; however, the proposed tree replacement plan (discussed further in Section 5.0) would result in long-term beneficial impacts to the overall tree population, tree species diversity, and anticipated tree canopy when the replanted trees reach maturity. As evaluated in Alternative A, the reasonably foreseeable projects would result in minimal impacts to trees. The actions in Alternative B would largely contribute to an overall neutral cumulative impact.

4.3 Alternative C: NPS + FHWA Action

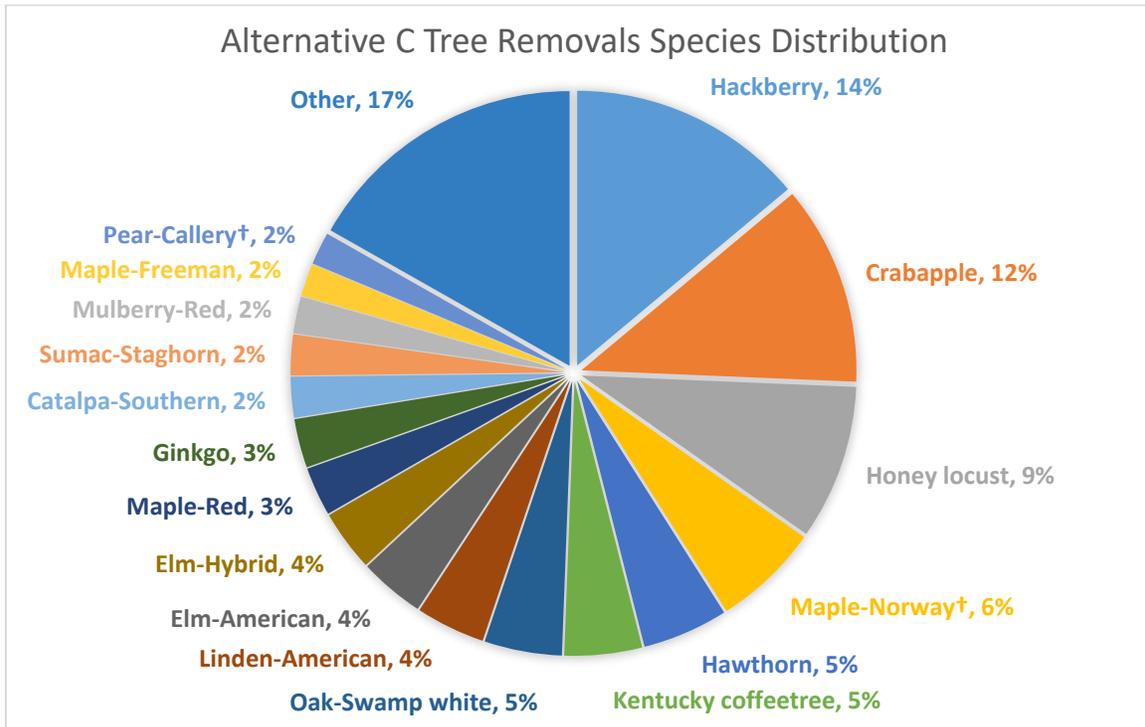
This alternative incorporates impacts associated with Alternative B, in addition to those encountered by improving roadways and bicyclist/pedestrian facilities and additional changes to the UPARR boundary. The analysis of impacts in this section will only discuss the additional impacts associated with Alternative C.

4.3.1 Direct Impacts

The transportation improvements result in a total removal of 417 trees, in addition to Alternative B, including 339 single and multi-stem trees equal to or greater than 6 inches, 56 between 4 to 5 inches and 22 single and multi-stem trees smaller than 4 inches. Additionally, of the 417 trees to be removed, 39 trees are species considered to be invasive. The trees to be removed are listed in Attachment D-5, including their type, size, condition, structure, and function. GSG Consultants describe the methodology

used to identify these metrics in their *Tree Survey Report* (GSGC 2018). The trees to be removed are depicted on Attachments D-6 through D-19.

The distribution of the species of trees to be removed is summarized in Figure 8, and a complete list and count of each species to be removed are listed in Table 3. Figure 9 shows the distribution of tree sizes and Figure 10 shows the distribution of tree condition for trees that will be removed.



† Invasive species

Figure 8: Alternative C Tree Removals Species Distribution

Table 3: Alternative C Additional Tree Removals by Species

Species Count	Common Name	Genus	Species	Number to be Removed
1	Alder-Speckled	<i>Alnus</i>	<i>incana</i>	1
2	Ash-Green	<i>Fraxinus</i>	<i>pennsylvanica</i>	6
3	Birch-River	<i>Betula</i>	<i>nigra</i>	1
4	Catalpa-Southern	<i>Catalpa</i>	<i>bignonioides</i>	13
5	Crabapple	<i>Malus</i>	<i>sp.</i>	49
6	Cypress-Bald	<i>Taxodium</i>	<i>distichum</i>	6
7	Eastern cottonwood	<i>Populus</i>	<i>deltoides</i>	1
8	Elm-American	<i>Ulmus</i>	<i>americana</i>	16

Species Count	Common Name	Genus	Species	Number to be Removed
9	Elm-Hybrid	<i>Ulmus</i>	<i>hyb.</i>	15
10	Elm-Slippery	<i>Ulmus</i>	<i>rubra</i>	1
11	Ginkgo	<i>Ginkgo</i>	<i>biloba</i>	12
12	Hackberry	<i>Celtis</i>	<i>occidentalis</i>	58
13	Hackberry-Dwarf	<i>Celtis</i>	<i>tenuifolia</i>	1
14	Hawthorn	<i>Crataegus</i>	<i>monogyna</i>	21
15	Hawthorn-Downy	<i>Crataegus</i>	<i>mollis</i>	3
16	Hickory-Bitternut	<i>Carya</i>	<i>cordiformis</i>	2
17	Honey locust	<i>Gleditsia</i>	<i>triacanthos</i>	37
18	Horse chestnut	<i>Aesculus</i>	<i>hippocastanum</i>	2
19	Kentucky coffeetree	<i>Gymnocladus</i>	<i>dioicus</i>	19
20	Linden-American	<i>Tilia</i>	<i>americana</i>	17
21	Locust-Black†	<i>Robinia</i>	<i>pseudoacacia</i>	4
22	Maple-Boxelder	<i>Acer</i>	<i>negundo</i>	1
23	Maple-Freeman	<i>Acer</i>	<i>x freemanii</i>	8
24	Maple-Norway†	<i>Acer</i>	<i>platanoides</i>	26
25	Maple-Red	<i>Acer</i>	<i>rubrum</i>	13
26	Maple-Silver	<i>Acer</i>	<i>saccharinum</i>	2
27	Maple-Sugar	<i>Acer</i>	<i>saccharum</i>	6
28	Mulberry-Red	<i>Morus</i>	<i>rubra</i>	9
29	Oak-Black	<i>Quercus</i>	<i>velutina</i>	3
30	Oak-Northern red	<i>Quercus</i>	<i>rubra</i>	4
31	Oak-Swamp white	<i>Quercus</i>	<i>bicolor</i>	14
32	Ohio buckeye	<i>Aesculus</i>	<i>glabra</i>	4
33	Pear-Callery†	<i>Pyrus</i>	<i>calleryana</i>	8
34	Quaking aspen	<i>Populus</i>	<i>tremuloides</i>	1
35	Sumac-Staghorn	<i>Rhus</i>	<i>typhina</i>	10
36	Sycamore-American	<i>Platanus</i>	<i>occidentalis</i>	2
37	Tree lilac	<i>Syringa</i>	<i>vulgaris</i>	5
38	Tree of heaven†	<i>Ailanthus</i>	<i>altissima</i>	1
39	Tuliptree	<i>Liriodendron</i>	<i>tulipifera</i>	1
Total to be Removed				417*

† Invasive species

* Of the total tree removal count (417 trees), 14 trees were dead and unclassified.

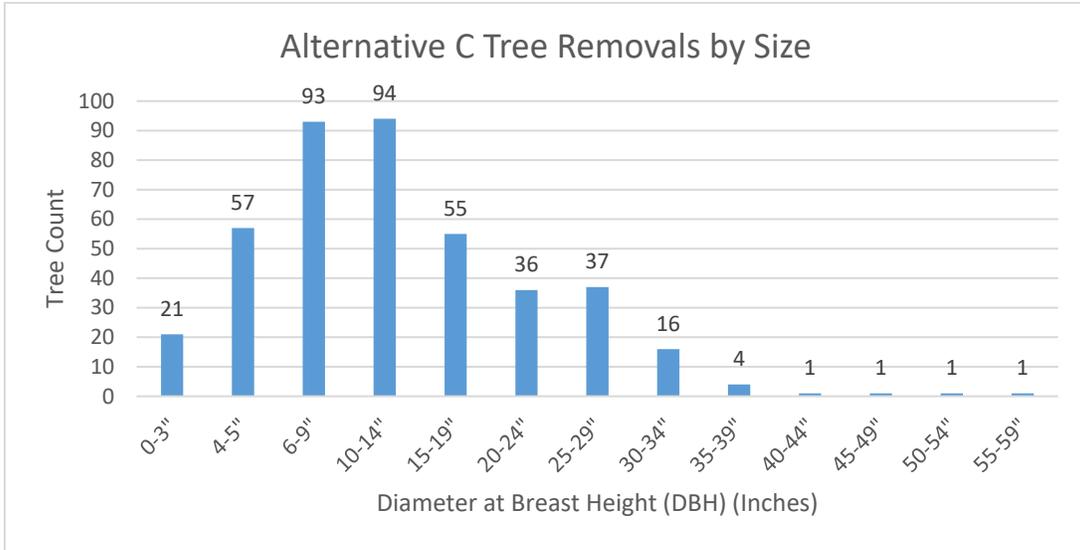


Figure 9: Alternative C Additional Tree Removals by Size

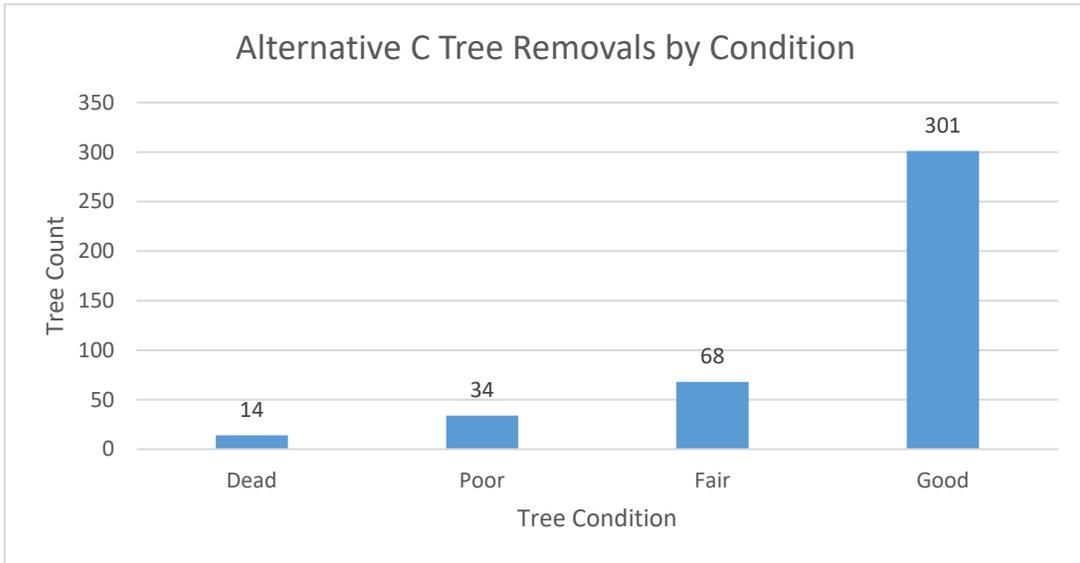


Figure 10: Alternative C Additional Tree Removals by Condition

There are 39 different identified species of additional trees to be removed by Alternative C. The majority of these trees are between 10 to 14 inches in size and in good condition.

4.3.2 Indirect Impacts – City Actions

The indirect impacts of Alternative C are the same as those described in Alternative B. Trees are proposed to be replaced to address the impacts of tree removals associated with both Alternatives B and C, so there are no additional indirect impacts from implementing Alternative C.

4.3.3 Cumulative Impacts

The additional trees to be removed by Alternative C would result in short-term negative impacts to the existing tree population and tree canopy upon initial removal; however, the proposed tree replacement plan (discussed further in Section 5.0) would result in long-term beneficial impacts to the overall tree population, tree species diversity, and anticipated tree canopy when the replanted trees reach maturity. As evaluated in Alternative A, the reasonably foreseeable projects would result in minimal impacts to trees. The actions in Alternative C would largely contribute to an overall neutral cumulative impact.

5.0 Minimization and Mitigation

5.1 Minimization Strategies

The transportation improvements were designed to minimize impacts to historic Jackson Park.

Additional design efforts were made to minimize parkland and tree impacts such as narrowing proposed lane and median widths below desired widths on Lake Shore Drive, Hayes Drive, and Stony Island Avenue in locations of proposed roadway widening. Intersection modifications have also been designed to minimize the roadway footprint to avoid excess capacity while providing sufficient traffic and mobility operations. The curved realignment of Hayes Drive at the reconfigured intersection of Hayes Drive/Cornell Drive/63rd Street has also been optimized to reduce park and tree impacts while providing a safe facility to accommodate through movements for predominant travel.

Tree impact minimization efforts have also been made for new and reconfigured trails that have been designed to be constructed in accordance with the 2018 South Lakefront Framework Plan. Where possible, proposed trails have been aligned within the footprint of existing roadways to be closed to provide safe, comfortable, and convenient biking and walking connectivity through Jackson Park with minimal tree removal.

In all cases, minimization efforts included reviewing the size, species and condition of existing trees, so that the preservation of large native species trees, and in particular oak species, could be prioritized when possible.

Additional minimization strategies are currently being developed and include the following:

- Additional revisions to roadway / pathway / utility alignments to reduce tree impacts
- Incorporation of root oriented treatments to reduce tree impacts and required clear zones for utilities including:
 - Installation of root barriers around utility clear zones

- Supersonic air excavation, selective root pruning and root aeration matting to allow some new pathway installation within driplines as follows
 - If tree size is less than 8 inch caliper, paths must be a minimum of 5 feet from trunk
 - If tree size is between 8 to 15 inch caliper, paths must be a minimum of 10 feet from trunk
 - If tree size is greater than 15 inch caliper, paths must be a minimum of 15 feet from trunk
- Relocation of healthy and desirable species of existing trees less than 6 inch caliper to other areas within Jackson Park, pending the following considerations:
 - Relocation of existing trees will require additional maintenance and warranty considerations. This will also require contractors to monitor relocated trees for a minimum of two growing seasons and provide replacement trees if the relocated trees do not survive.
 - Relocated trees undergo more stress and transplant shock than nursery grown trees because the root zones have not had the same preparation for digging

These strategies will be considered to minimize temporary impacts to trees during construction. Additional efforts to minimize tree impacts are ongoing as detailed design engineering proceeds.

5.2 Mitigation Strategies

Coordination of tree impact mitigation is on-going. Proposed restoration of trees will be proposed first within Jackson Park and along Stony Island Avenue, where tree removals would occur. Direct impacts associated with the federal actions require a 1:1 tree replacement ratio. A minimum 1:1 replacement ratio is recommended for tree impacts associated with indirect impacts. Along Stony Island and within the public parkway, rows of street trees spaced approximately 25 feet on center will be utilized to comply with the requirements the City's Landscape Ordinance. Within Jackson Park, a plan showing exact locations of proposed replacement trees will be developed in coordination with the CPD. Where large existing shade trees are being removed, replacement shade trees will be installed with the intent of providing a comparable functional replacement. Within Jackson Park areas, shade and understory trees will be clustered together in natural groupings. The CPD desires a re-introduction of smaller understory and flowering trees to create layers of planting, which is a trait of Olmsted's picturesque style of design and an original feature of Jackson Park. To the extent possible, understory tree plantings will be utilized in select areas and grouped together to achieve this effect, with appropriate consideration given to maintaining sightlines and park access. Historical planting plans and letters will be reviewed and consulted as a guide for developing a plan for locating replacement trees, as well as guidance on species selection.

New replacement trees will be a mix of 2.5 and 4 inch caliper trees. The preference is to utilize 2.5 inch caliper as much as possible, as this size based on experience by CDOT and CPD has shown to transplant from nurseries better and establish faster than larger trees. In areas that are more heavily trafficked, including areas along Stony Island Avenue, larger 4 inch caliper trees will be used. This larger size ensures

that the tree can be pruned such that limbs will be above head height and also provides more of an instant-landscape effect upon installation.

To the extent possible, the species selected for replacement trees should be similar to notable sized trees and in keeping with Olmsted's design principles which relied on using plants that were already part of the landscape character of the place and could thrive with little care. While Olmsted would add plants that were non-native, his goals were to enrich the natural scenery and add variety without striking the average viewer as unnatural or exotic (Beveridge 2000). Letters written about Jackson Park dating from the Olmsted era that specifically mention tree plantings and species will also be reviewed and used as guidance in species selection.

A desire to address historically valuable landscapes is often at odds with the values of nature/ecology and this tension between the two values often yields an unbalanced outcome, with one aspect dominant over another. The CPD's GLFER project sought to strike a balance between the two by valuing historic and environmental legacies and their potentials, and acting on a shared belief that culture and nature are interdependent and evolving (O'Donnell 2015). The resulting approach to tree mitigation will be an increased emphasis on native species within Jackson Park that will achieve simultaneous goals of rehabilitation of the historic park, and the ecological restoration of habitat (O'Donnell 2015).

Preliminary recommended species of shade trees, in order of percentage proposed (highest percentage of use is listed first) along with expected size at maturity:

- Oak-Swamp white (*Quercus bicolor*), 50 feet height x 50 feet wide
- Oak-Northern red (*Quercus rubra*), 60 feet height x 60 feet wide
- Oak-Bur (*Quercus macrocarpa*), 70 feet height x 70 feet wide
- Oak-Pin (*Quercus palustris*), 60 feet height x 40 feet wide
- Hackberry (*Celtis occidentalis*), 40 feet height x 40 feet wide
- London planetree (*Plantus x acerifolia*), 70 feet height x 65 feet wide
- Oak-White (*Quercus alba*), 50 feet height x 80 feet wide
- Elm-New Horizon/Patriot (*Ulmus* 'New Horizon' and 'Patriot'), 40 feet height x 30 feet wide
- Kentucky coffeetree (*Gymnocladus dioicus*), 60 feet height x 40 feet wide
- Basswood-American (*Tilia americana*), 60 feet height x 30 feet wide
- Black gum (*Nyssa sylvatica*), 25 feet height x 20 feet wide
- Walnut-Black (*Juglans nigra*) – subject to availability, 50 feet height x 30 feet wide
- Hickory-Shagbark (*Carya ovata*) – subject to availability, 60 feet height x 30 feet wide

Preliminary recommended species of understory and ornamental trees, in order of percentage proposed (highest percentage of use is listed first):

- Hawthorn (*Crataegus coccinea*), 20 feet height x 25 feet wide
- Serviceberry-Apple (*Amelanchier grandiflora*), 20 feet height x 20 feet wide
- Serviceberry-Downy (*Amelanchier arborea*), 15 feet height x 15 feet wide

- Serviceberry-Allegheny (*Amelanchier laevis*), 15 feet height x 15 feet wide
- Hornbeam-American (*Carpinus caroliniana*), 20 feet height x 20 feet wide
- Crabapple (*Malus Sp.*), 25 feet height x 15 feet wide
- Hophornbeam (*Ostrya virginiana*), 25 feet height x 15 feet wide
- Ohio buckeye (*Aesculus glabra*) – subject to availability, 20 feet height x 20 feet wide

The plans for the OPC site include new tree plantings at a minimum of a 1:1 ratio for any to be removed, consistent with the overall recommendation.

The CPD values existing park trees and has worked to configure the relocated track and field to minimize the impact as much as possible to the existing vegetation through adjustments to the track layout and the location of field events. Per their standards, 29 new trees will be planted as a part of their project. The plant list is as follows:

- (8x) Maple-Pacific Sunset (*Acer truncatum x platanoides* 'Warrenred'), 2.5 inch caliper
- (2x) Honey locust-Skyline (*Gleditsia tricanthos* 'Skycole'), 2.5 inch caliper
- (9x) Oak-Chinkapin (*Quercus muehlenbergii*), 2.5 inch caliper
- (5x) Elm-Frontier (*Ulmus* 'Frontier'), 2.5 inch caliper
- (5x) Elm-Patriot (*Ulmus* 'Patriot'), 2.5 inch caliper

For the remainder of Jackson Park, the proposed species mix of 417 new trees to mitigate for the transportation improvements will be approximately 65 percent shade trees (271 trees) and 35 percent ornamental trees (146 trees). Below is a list, with assumed quantities of trees based on the list of trees above and 65 percent shade trees and 35 percent ornamental trees.

Shade Trees

- (31) Oak-Swamp white (*Quercus bicolor*), 50 feet wide
- (31) Oak-Northern red (*Quercus rubra*), 60 feet wide
- (31) Oak-Bur (*Quercus macrocarpa*), 70 feet wide
- (31) Oak-Pin (*Quercus palustris*), 40 feet wide
- (27) Hackberry (*Celtis occidentalis*), 40 feet wide
- (18) London planetree (*Plantus x acerifolia*), 65 feet wide
- (18) Oak-White (*Quercus alba*), 80 feet wide
- (18) Elm-New Horizon/Patriot (*Ulmus* 'New Horizon' and 'Patriot'), 30 feet wide
- (18) Kentucky coffeetree (*Gymnocladus dioicus*), 40 feet wide
- (18) Basswood-American (*Tilia americana*), 30 feet wide
- (10) Black Gum (*Nyssa sylvatica*), 20 feet wide
- (10) Walnut-Black (*Juglans nigra*) – subject to availability, 30 feet wide
- (10) Hickory-Shagbark (*Carya ovata*) – subject to availability, 30 feet wide

Ornamental Trees

- (24) Hawthorn (*Crataegus coccinea*), 25 feet wide

- (24) Serviceberry-Apple (*Amelanchier grandiflora*), 20 feet wide
- (24) Serviceberry-Downy (*Amelanchier arborea*), 15 feet wide
- (24) Serviceberry-Allegheny (*Amelanchier laevis*), 15 feet wide
- (18) Hornbeam-American (*Carpinus caroliniana*), 20 feet wide
- (18) Crabapple (*Malus Sp.*), 15 feet wide
- (7) Hophornbeam (*Ostrya virginiana*), 15 feet wide
- (7) Ohio buckeye (*Aesculus glabra*) – subject to availability, 20 feet wide

Many of the listed species recommended for planting are native. The only species considered non-native are the Pacific Sunset maple, the London planetree, and the three elm cultivars (Frontier, New Horizon, and Patriot), which were selected for their resistance to Dutch elm disease.

6.0 Summary

Mitigation associated with each of the Federal actions will involve replacement of trees at a minimum 1:1 ratio and include species that are complementary to the historic landscape of Jackson Park. Replacement trees will also consider other functional elements including aesthetics, shade, sightlines, and access.

Table 4 indicates the direct, indirect and cumulative impacts to trees by alternative. The table summarizes both the incremental and the total impacts associated with Alternative C.

Table 4: Summary of Tree Impacts by Alternative

Alternative	Direct Impacts	Indirect Impacts	Cumulative Impacts	Total Impacts	Mitigation
A	None	None	7 trees	None	N/A
B	None	365 trees		372 trees	1:1 tree replacement
C (Incremental)	417 trees	0 trees		424 trees	1:1 tree replacement, 1 tree/25 LF along Stony Island, tree plantings in keeping with historic designs while fostering ecological restoration
B + C (Total)	417 trees	365 trees		789 trees	1:1 tree replacement within site, 1 tree/25 LF along Stony Island, tree plantings in keeping with historic designs while fostering ecological restoration

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