MID EAST COMMUNITY STREET TREE INVENTORY SUMMARY REPORT

THE CITY OF
COLUMBUS
RECREATION AND PARKS

SPRING 2023

COLUMBUS
RECREATION AND PARKS

MID EAST COMMUNITY

PROJECT OVERVIEW

In 2022, the City of Columbus Recreation and Parks Department commissioned an update to the city's existing street tree inventory in the Mid East neighborhood. This project directly supports the implementation of the recently completed Columbus Urban Forestry Master Plan, which establishes a vision and future goals for Columbus' urban forest.

COMMUNITY OVERVIEW

Mid East has an estimated population of 53,705 residents and contains 198 miles of city-maintained streets. The community encompasses 11.85 square miles of land area and accounts for 5.3% of the City of Columbus' total area. Current canopy cover within Mid East is estimated to be 28%.

VISION FOR THE URBAN FOREST

To prioritize, preserve, and grow the tree canopy in Columbus equitably across neighborhoods, to improve health and quality of life for all residents.
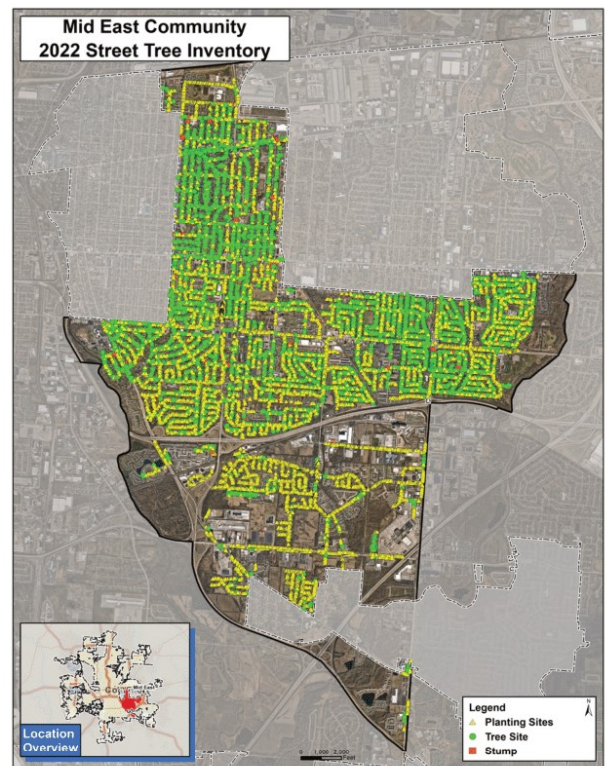
COLUMBUS' URBAN FOREST GOALS

GOAL 1.
40% CITYWIDE CANOPY COVER (BY 2050)

GOAL 2.
STOP NET CANOPY LOSS (BY 2030)

GOAL 3.
EQUITABLE INVESTMENT (BY 2030)

14,915
Sites Inventoried

7,113 Trees

7,588 Planting Sites

214 Stumps

Mid East Community
2022 Street Tree Inventory

Location Overview

Legend
△ Planting Sites
● Tree Site
■ Stump

OVERALL CONDITION OF MID EAST'S INVENTORIED TREES: GOOD

2%	51%	40%	6%	1%
Excellent	Good	Fair	Poor	Dead

THE CITY OF
COLUMBUS
RECREATION AND PARKS

Contact Info
City of Columbus Recreation & Parks Dept.
1111 East Broad Street
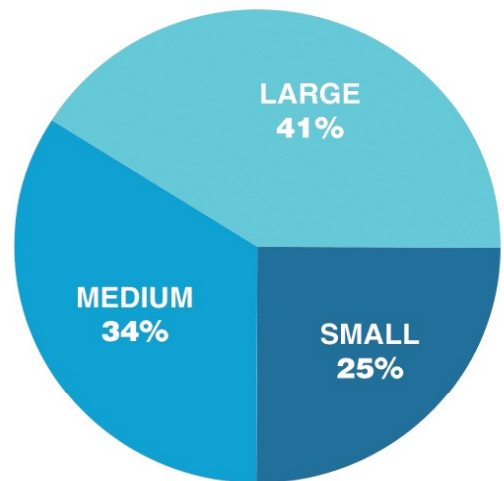Columbus, Ohio 43205

DAVEY
Resource Group

Inventory Details
DRG's team of ISA Certified Arborists completed the tree inventory in 2022.

TREES BY MAINTENANCE RECOMMENDATION

YOUNG TREE TRAINING
23%

REMOVAL
6%

TREE CLEANING
71%
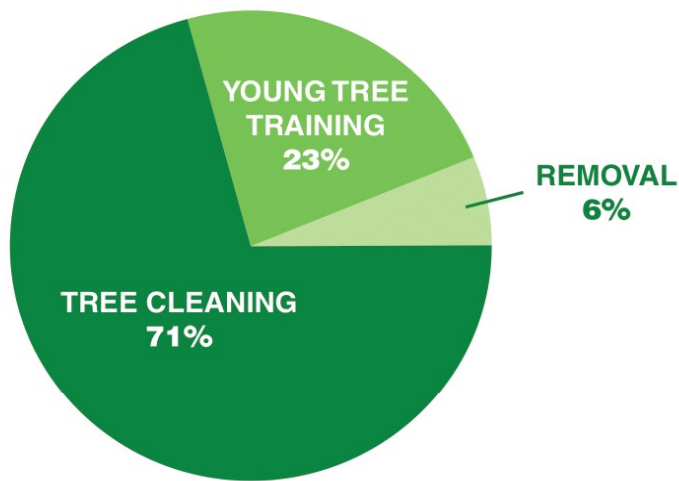
PLANTING SITES BY TREE SIZE

LARGE
41%

MEDIUM
34%

SMALL
25%

$22 million

Estimated value of Mid East's inventoried street trees.

60 metric tons
Annual CO_2 captured

2.4 tons
Annual air pollutants removed

1.6 million gallons
Annual stormwater runoff intercepted

CREATING EQUITABLE CANOPY COVER

Implementation of the following action steps will significantly increase canopy cover over time, provide greater value and more benefits to Mid East's residents, and help the city realize its vision and achieve its goals for the urban forest.

THE WAY FORWARD: ACTION STEPS

1. Preserve and maintain existing canopy.

2. Prioritize planting of large- and medium-size planting sites.

3. Develop neighborhood tree planting initiatives and community outreach focused on planting trees on private property.

4. Explore retrofitting existing street infrastructure and updating design standards to expand and improve available tree growing spaces.

Goal: 40% Citywide Canopy Cover

Mid East: 28%
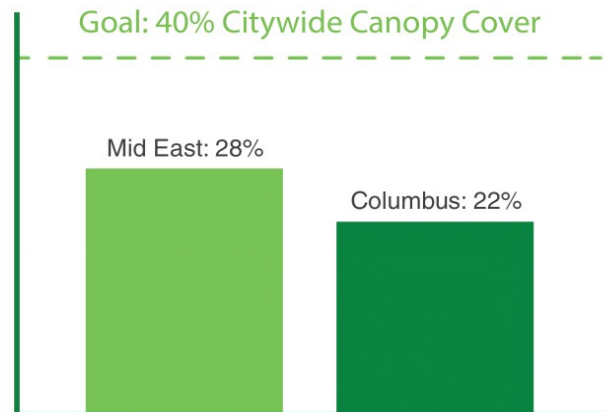
Columbus: 22%

Current levels of community and citywide canopy coverage compared to the city's 2050 canopy goal.

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DAVEY Resource Group

THE CITY OF COLUMBUS RECREATION AND PARKS

Contact Info
City of Columbus
Recreation & Parks Department
1111 East Broad Street
Columbus, Ohio 43205

DAVEY Resource Group

Inventory Details
DRG completed the tree inventory in 2022

SECTION 1: STRUCTURE, COMPOSITION, AND MAINTENANCE

The City of Columbus Recreation and Parks Department (CRPD) designated the street rights-of-way (ROW) within the Mid East community as an area of interest for an on-going update to the city's existing GIS-based public tree inventory. The Mid East community street tree inventory supports the *Columbus Urban Forestry Master Plan* (CUFMP).

14,915 SITES INVENTORIED

In 2022, DRG arborists performed field data collection and catalogued new data on potential viable planting sites, existing trees, and tree stumps located within the ROW of the Mid East community (Figure 1 and Map 1).

Of the 14,915 total inventoried sites:

> *48%* = **Existing street trees**
>
> *51%* = **Potential planting sites**
>
> *1%* = **Existing stumps**

Inventoried Sites

7,113 (48%) 7,588 (51%) 214 (1%)

(Number of Sites, axis 0–8,000)
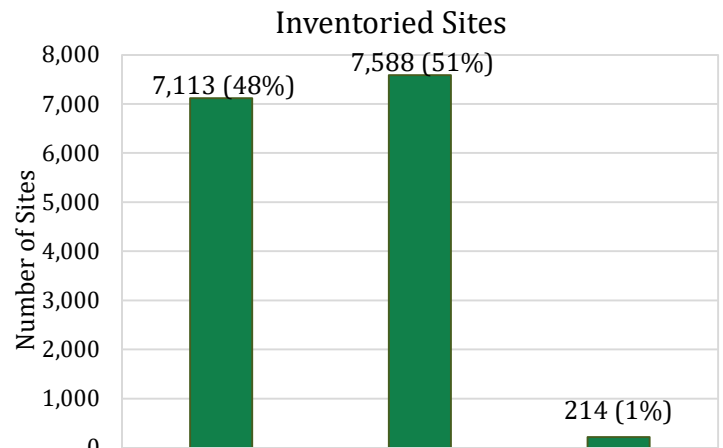
Figure 1. Quantity of inventoried sites by site type.

A wealth of vacant planting sites is an opportunity to increase tree canopy cover

Stocking level is a forestry term used to report the ratio of existing street trees to the total number of suitable tree locations within the street ROW, which includes trees, stumps, and vacant planting locations.

The stocking level of the Mid East right-of-way is currently 48%. The positive news is that the street ROW contains plenty of room and opportunity for canopy growth through future targeted planting efforts, which will be driven by the results of the inventory update and analysis.

> DRG arborists identified vacant potential planting sites within Mid East's street rights-of-way (ROW), such as the one pictured here. Stocking the ROW with new tree plantings will help improve canopy coverage and increase the quantity of benefits trees provide to the community.
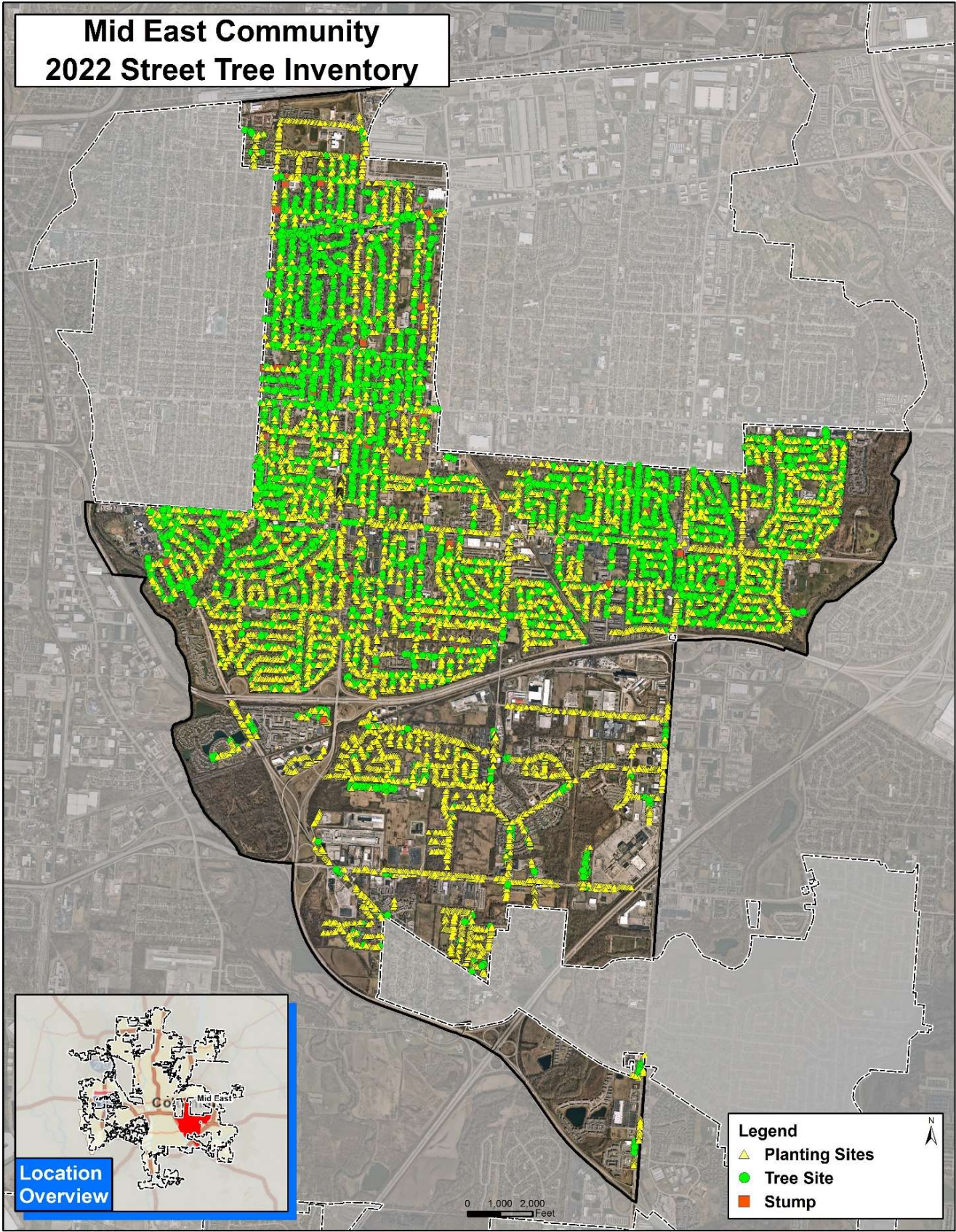
Map 1. Approximate locations of sites inventoried during the 2022 Mid East community street tree inventory.

IMPROVE TREE POPULATION DIVERSITY

Urban forest resiliency is positively correlated with tree population diversity; greater diversity helps reduce exposure to harmful pests and disease which can target individual tree species, groups of species, or even entire tree genera.

Species and genus diversity distributions offer a critical measure of a tree population's resiliency to such attacks and help managers to identify and remedy potential areas of overexposure.

When assessing tree population diversity, it is widely accepted that **no more than 10% of an urban tree population should be composed of a single species and no greater than 20% from a single genus.**

Species Distribution is Good

A total of 155 unique tree species were catalogued. Of the five most abundant tree species recorded during the inventory, no single species exceeded the 10% threshold (Figure 2). Three of the top five species are maple species. Sugar maple (*Acer saccharum*) is the most abundant species found within the community's street ROW, accounting for 7% of all inventoried trees.
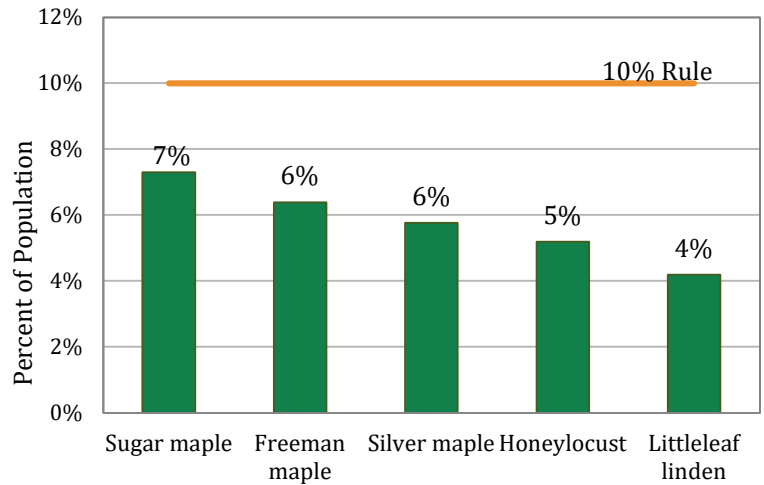
Figure 2. Species distribution of inventoried trees.

Genus Distribution is Skewed

Mid East has 60 unique tree genera, or groups of tree species, that are closely related (Figure 3).

The genus *Acer*, which is composed of maple trees, accounts for 30% of the entire inventoried popul ation—much higher than the suggested threshold of 20%.

Maple Trees are Overrepresented

Future planting initiatives should minimize the installation of additional maple within Mid East until representation of the genus *Acer* falls within the recommended 20% threshold.

Maple trees are susceptible to a variety of harmful pests and disease, including the fungal pathogen Verticillium wilt (*Verticillium* spp.) and the invasive Asian longhorned beetle (ALB, *Anoplophora glabripennis*). Improved genus diversity will reduce the potential for tree loss and help ensure long-term urban forest health and viability.

Figure 3. Genus distribution of inventoried trees.

Above: Asian Longhorned Beetle. Photo: Jeff Tessner, DRG.

Left: Sugar maple with Verticillium wilt. Photo: Jerry Weiland, USDA-ARS.

OVERALL TREE CONDITION IS GOOD

The condition of each inventoried tree was evaluated and rated as good, fair, poor, or dead. Several factors affecting condition were considered for each tree, including root characteristics, branch structure, trunk, canopy, foliage condition, and the presence of pests.

The general health of the inventoried tree population is characterized by the median average condition rating. Overall, **Mid East's street trees are in good condition** (Figure 4).

Routine Inspections Are Key

Proactive monitoring helps identify, prevent, and mitigate concerns. Routine tree inspections are necessary to monitor for changes in tree condition, the presence of pests and/or disease, or the worsening of existing defects – particularly among trees rated in poor condition.

Poor condition ratings are generally due to visible signs of decline and stress, such as decay, dead limbs, or discolored foliage. If retained, these trees will likely require corrective pruning and intensive plant health care to improve their vigor. Dead trees and trees with defects that cannot be remedied should be removed as soon as possible.

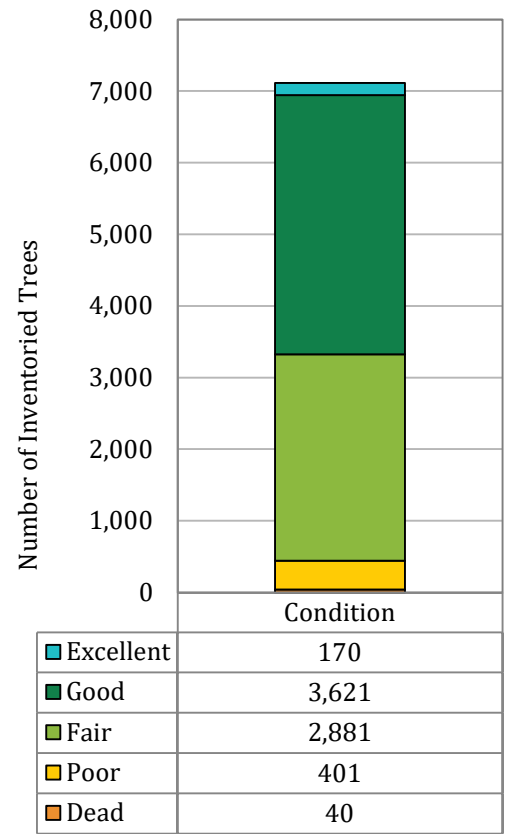|	Condition
Excellent	170
Good	3,621
Fair	2,881
Poor	401
Dead	40

Figure 4. Condition of inventoried trees.

Routine inspection helps keep trees healthy, like this mature street tree pictured here in the Mid East neighborhood.

TREE DIAMETER-AGE DISTRIBUTION

Understanding the relative age of a tree population can help planners align future management strategies with current policy goals. To determine relative tree age, DRG first categorized Mid East's inventoried tree population by small- and large-growing trees and then assigned each tree to an age grouping based on the tree diameter measured at breast height (DBH) as outlined in Table 1.[1]

Table 1. Tree age by growing size-at-maturity and diameter at breast height (DBH)

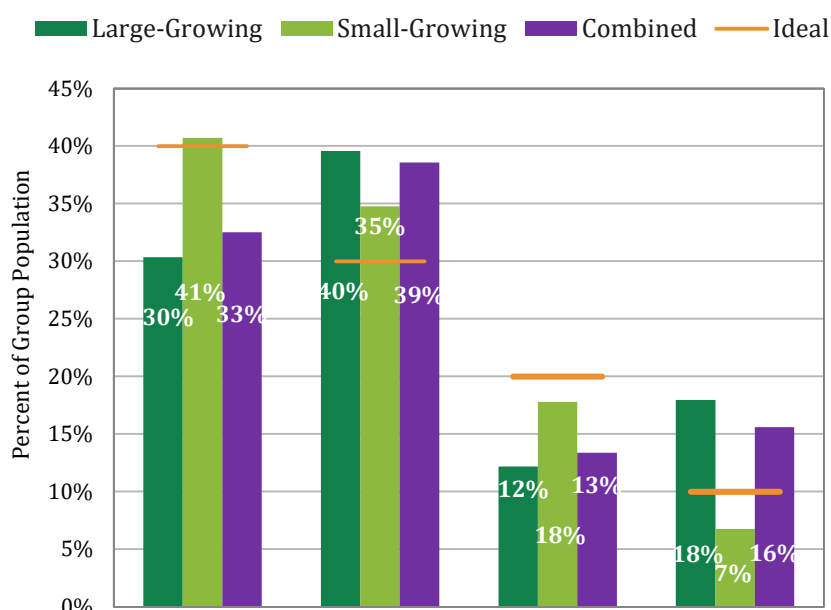| Relative Tree Age	Large-Growing		Small-Growing		Combined
	DBH	Quantity	DBH	Quantity	Quantity
Young	0–8"	1,702	0–4"	609	2,311
Established	9–17"	2,221	5–8"	520	2,741
Maturing	18–24"	683	9–12"	266	949
Mature	> 24"	1,007	>12"	101	1,108

The relative age distribution of Mid East's inventoried tree population was then compared to an ideal distribution for an expanding urban forest, which suggests the tree population composition be equivalent to 40% young trees, 30% establishing, 20% maturing, and 10% mature trees (Figure 5).

A Need for Young Trees

Overall, 33% of Mid East's inventoried trees are classified as young, compared to an ideal level of 40%, and 39% of inventoried trees are in the established size class, which is above threshold of 30%. There are more young trees that will mature to a small size than there are large trees. Increasing planting efforts can raise the population of young trees, so that as old trees age out of the urban forest, they are replaced at an appropriate rate.

Mature Trees are Overrepresented

There is good representation of mature and maturing trees from both large and small size classes in Mid East, with 16% of trees falling into the mature size class compared to an ideal threshold of 10%. Proactive maintenance will help ensure

Figure 5. Distribution of relative age by diameter size class.

these trees continue to provide canopy. As these trees age and require increased maintenance or removal at the end of their life spans, they should be replaced with the largest site-appropriate option. However, only 14% of inventoried trees were classified as maturing compared to the ideal level of 20%. Therefore, maintenance and preservation of existing trees in this age group is essential to ensure uninterrupted canopy expansion and succession of the urban forest.

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[1] Tree size is only a rough approximation of tree age; tree size alone is not a definitive or appropriate measure of tree age. In the urban environment in particular, numerous factors play a role in determining tree size, including the availability of water, soil, and sunlight, proper tree care and planting techniques, the presence of pests and pathogens, etc.

TREE MAINTENANCE RECOMMENDATIONS

During the inventory, DRG arborists assigned a primary recommended maintenance activity to each of the 7,113 inventoried trees (Figure 6).

City managers generally prioritize maintenance activities by risk. For example, a large dead tree by a busy intersection should be removed before a small dead tree at the end of a little-used secondary street.

PRIMARY MAINTENANCE CATEGORIES

Tree Cleaning = 5,047 Trees

Tree cleaning describes pruning to remove dead, dying, broken, decayed, and/or crossing limbs. Trees in this category are recommended for inclusion in a regularly scheduled, routine maintenance program. Over time, routine pruning minimizes the occurrence of reactive maintenance.

Tree Removal = 399 Trees

Within Mid East, 399 trees are designated for removal. City Forestry only removes trees that are hazardous: either dead, dying, or dangerous to public safety.

Young Tree Training = 1,667 Trees

Younger trees can have branch structures that lead to potential problems as the tree ages. These trees should be pruned to train future growth patterns and correct or eliminate weak, interfering, or objectionable branches to minimize future maintenance requirements.
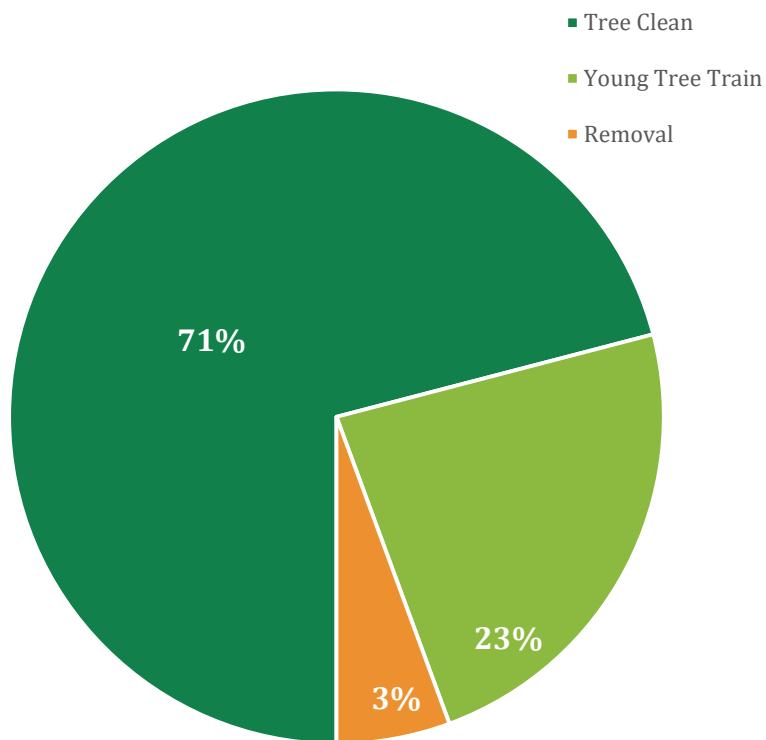
Figure 6. Primary maintenance recommendations for 7,113 trees in the Mid East neighborhood, by type.

SECTION 2: TREE BENEFITS
STRUCTURAL VALUE OF MID EAST'S STREET TREES: $22 MILLION

Trees are critical to public health and contribute significantly to quality of life for every community resident. In addition to improving air quality, water quality, and alleviating heat stress, trees provide significant social benefits such as reducing mental stress, encouraging greater neighborhood-level involvement, and fulfilling spiritual and aesthetic needs. **Structural value calculates the cost it takes to replace trees, meaning that all of the street trees in Mid East are estimated at $22 million.**

Because of the significant value of these benefits, cities across the country now recognize trees are critical infrastructure. In fact, they are the only type of infrastructure that increases in value over time and have been proven to pay for themselves. Urban trees in the Midwest consistently provide benefits value three times more than the cost to maintain them.[2]

Table 2. Estimated benefits provided by Mid East's street trees

Category	Value
Ecosystem Services	$822,207.82
Structural Value	$22,018,295.47
Combined Value	**$22,840,503.29**
Per Tree Average	**$3,211.09**

The 7,113 street trees inventoried within the Mid East community provide an ecosystem value of $822,208 through air filtration, water quality improvements, and carbon storage–and those are just the benefits quantified by this analysis (Table 2). Trees also boost property values, reduce energy costs, lower crime rates, and help create more successful business districts.[3]

ECOSYSTEM SERVICES

Annual Carbon Captured – 132,211 pounds

As the primary greenhouse gas driving climate change, carbon dioxide (CO_2) impacts people, property, and the environment. Trees are carbon sinks—constantly absorbing CO_2 from the atmosphere and storing it within tree tissue. Over the course of their lifetime, Mid East's inventoried trees have captured over 4,059 metric tons of carbon. Using trees to sequester CO_2 is a key part of the *Columbus Climate Adaptation Plan*'s goal to make the city more resilient.

Annual Air Pollution Removed – 5,357 pounds

Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term chronic health problems. Trees absorb gaseous pollutants such as ozone during respiration and intercept particulate pollutants, such as $PM_{2.5}s$, from entering the atmosphere by trapping them on plant surfaces.

Annual Rainwater Intercepted – 1,576,151 gallons

As cities grow, land that naturally absorbs rainwater (i.e., lawns, parks, fields) tends to be replaced by hard surfaces that cause rain to runoff (i.e., roads, buildings, parking lots). Rainwater flowing over these hard surfaces accumulates pollutants, and the contaminated stormwater flows into overloaded sewers, ultimately reaching the local lakes and streams. Polluted water is a major cause of human health issues and degrades the local ecology. Tree leaves intercept rainwater as it falls, which slows the rate at which stormwater enters sewer systems.

Structural Value – $22 million

Structural value represents the cost to replace a given tree with an identical one. Structural value increases over time as more trees are planted and existing trees mature. The total value of the Mid East community forest will grow considerably in future years as more trees are planted, existing trees are maintained and become healthier, and the city works toward achieving the goals of the *Columbus Urban Forestry Master Plan*.

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[2] Peper, Paula J.; McPherson, E. Gregory; Simpson, James R.; Vargas, Kelaine E.; Xiao, Qingfu. 2009. Lower Midwest community tree guide: benefits, costs, and strategic planting. Gen. Tech. Rep. PSW-GTR-219. Albany, CA: U.S. Forest Service, Pacific Southwest Research Station. 115 p.

[3] See the Columbus Urban Forestry Master Plan for in-depth discussion on tree benefits and their impact on the city's residents.

SECTION 3: FUTURE CONSIDERATIONS

Every neighborhood deserves access to the benefits trees provide. With an estimated 28% canopy cover in Mid East, retaining and growing canopy cover in the neighborhood is crucial for achieving citywide urban tree canopy goals. Realizing the vision and achieving the goals of the *Columbus Urban Forestry Master Plan* will take planned strategic effort guided, in part, by data analysis and application.

7,588 POTENTIAL PLANTING SITES

A key objective of the tree inventory update is to catalog and analyze growing spaces along the neighborhood's street ROW. Analysis results will inform future planting initiatives and help ensure the selection of the most appropriate tree species given the available growing spaces within the neighborhood.

DRG arborists found a total of 7,588 vacant sites suitable for planting trees.[4] Vacant planting sites were evaluated for suitability for trees and characterized by size and type. DRG considered the presence of existing utilities, overhead lines, and distances from stop signs, fire hydrants, driveways, and other existing infrastructure in the evaluation of planting sites. Three quarters of these sites (75%) could accommodate trees species that are large or medium-sized at maturity (Figure 7).

1,929 Small Planting Sites

- Best suited for small-maturing trees.
- Minimum width of 3 to 5 feet.
- Located at least 20 feet from another tree.
- Includes all sites with overhead utilities, regardless of site width.

2,559 Medium Planting Sites

- Best suited for medium-maturing trees.
- Minimum width of 5 to 7 feet.
- Located at least 30 feet from another tree.

3,100 Large Planting Sites

- Best suited for large-maturing trees.
- Minimum width of greater than 7 feet.
- Located at least 40 feet from another tree.
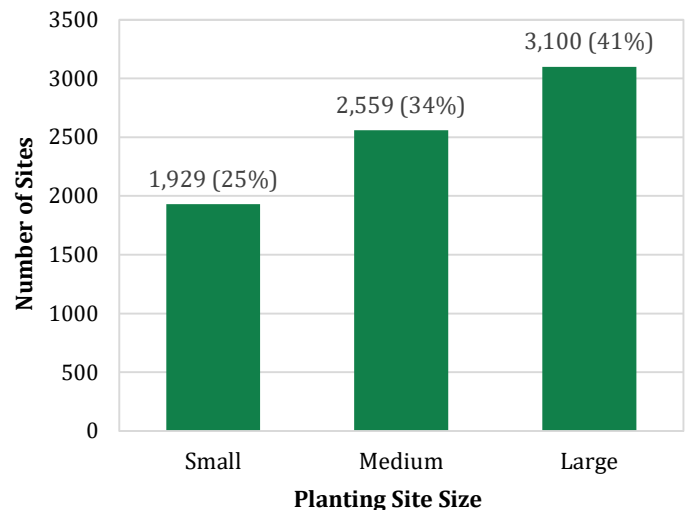- The highest quality potential planting site.

Figure 7. Vacant planting sites by size.

PLANTING CONSIDERATIONS

Site Selection: Urban environments constrain what tree species are appropriate. Existing infrastructure such as utilities and sidewalks, growing space size, and other trees all impact what tree is appropriate for a site.

Tree Selection: Tree species should be resilient to the urban environment, diverse, and the appropriate height and width for the growing space.

Blocking an unsightly view or creating shade may be a priority, but the impact of a tree on its environment – and vice versa – must be considered. Sustainable and successful planting initiatives select tree species that thrive and flourish in the chosen planting location in a way that harmonizes with the surrounding urban environment.

AN ABUNDANCE OF PLANTING SITES

The good news: Planting sites are readily available. With 7,588 potential planting locations, the neighborhood's street ROW is currently at just over half of its maximum capacity for trees. The quickest way to improve canopy cover is to plant more trees.

The better news: The majority of available sites, 75%, are suitable for medium and large trees (Figure 7). Larger-maturing trees provide more environmental benefits and canopy cover over the course of their lifetime than small trees. Planting medium and large trees is more impactful to improving canopy cover.

THE WAY FORWARD: ACTION STEPS

Investing in equitable canopy does not just entail increasing overall tree canopy cover through planting, but also addressing the quality of the trees, caring for the existing trees, planning for trees within the different land uses and infrastructure, and reaching out to residents about the importance of trees.

In Mid East, we know that existing canopy cover is in line with the city's canopy goals, and the community will benefit from equitable investment to maintain and grow that canopy. there is an abundance of available planting locations, and most of them are suitable for medium or large trees. Given this set of facts, what can be done in Mid East to maximize growth of the neighborhood forest for the benefit of its residents, stakeholders, and the entire City of Columbus?

Maintain and Preserve Existing Trees (Near-Term)

It takes a long time for a young tree to become a large, stately mature shade tree. Preserving what is already there is a major component of an urban forest growth strategy.

Prioritize Planting of Large and Medium Sites (Short-Term)

Larger trees provide residents with greater benefits. Within Mid East, 3,100 large and 2,559 medium sites were identified. Planting in these locations will increase the amount of street trees by 80% and provide a solid foundation for maintaining and improving community canopy cover.

Explore Planting Beyond the Right-of-Way (Intermediate-Term)

Where insufficient space or overhead utilities restrict available planting options, planting on private property can allow for the selection of more desirable tree species. Urban forestry stewardship on private property will require education and outreach initiatives, as well as easy and low-cost access to trees.

Expand Right-of-Way Growing Spaces (Intermediate to Long-Term)

Future policy initiatives should consider options to improve available grow space, including retrofitting existing infrastructure and implementing design standards that provide adequate grow space for trees within street rights-of-way. Examples include the addition of bump-outs, expanding the size of tree lawns during utility or development projects, and exploring the use of green infrastructure technologies (e.g., silva cells, structural soils). Ensuring canopy equity requires sufficient growing space for trees to survive and thrive in an urban setting.