TREE MANAGEMENT PLAN

Youngstown Neighborhood Development Corporation
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ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

This plan was developed for the Crandall Park and Boulevard Park Neighborhoods by Davey Resource Group with a focus on addressing short-term and long-term maintenance needs for inventoried public trees. Davey Resource Group completed a tree inventory to gain an understanding of the needs of the existing urban forest and to project a recommended maintenance schedule for tree care. Analysis of inventory data and information about the Youngstown Neighborhood Development Corporation (YNDC) and the City of Youngstown's existing program and vision for the urban forest were utilized to develop this *Tree Management Plan*.

## State of the Existing Urban Forest

The October 2016 inventory included trees, stumps, and planting sites along public street rights-of-way (ROW) in two neighborhoods in Youngstown: Crandall Park and Boulevard Park. In Crandall Park, a total of 2,467 sites were recorded during the inventory: 1,382 trees, 50 stumps, and 1,035 planting sites. In Boulevard Park, a total of 808 sites were recorded during the inventory: 498 trees, 17 stumps, and 293 planting sites. Analysis of the tree inventory data found the following:

- Two species in Crandall Park, *Acer platanoides* (Norway maple) and *A. saccharinum* (silver maple), comprise such a large percentage of the street tree population (26% and 12%, respectively) that they threaten biodiversity.
- Two species in Boulevard Park, *Acer saccharinum* (silver maple) and *A. rubrum* (red maple), comprise such a large percentage of the street tree population (16% and 13%, respectively) that they threaten biodiversity.
- On the street ROW in Crandall Park, *Acer* (maple) was found in abundance (52%), which is a concern for the neighborhood's biodiversity.
- On the street ROW in Boulevard Park, *Acer* (maple) was found in abundance (50%), which is a concern for the neighborhood's biodiversity.
- The diameter size class distribution of the inventoried tree population in Crandall Park is poor. The trend in Crandall Park is far from ideal, with more mature or maturing trees than any other size class category.
- The diameter size class distribution of the inventoried tree population in Boulevard Park trends towards the ideal, with more young trees than establishing, maturing, and mature trees.
- The overall condition of the inventoried tree population is rated Good in both Crandall Park and Boulevard Park.
- Approximately 26% of the inventoried trees in Crandall Park had cavities or decay.
- Approximately 16% of the inventoried trees in Boulevard Park had cavities or decay.
- Of potential threats from pests, Granulate ambrosia beetle (*Xylosandrus crassiusculus*) and Asian longhorned beetle *(Anoplophora glabripennis)* pose the biggest threats to the health of the inventoried population in Crandall Park.
- Granulate ambrosia beetle (*Xylosandrus crassiusculus*) and Asian longhorned beetle (*Anoplophora glabripennis*) pose the biggest threats to the health of the inventoried population in Crandall Park.

Tree Maintenance and Planting Needs

Trees provide many environmental and economic benefits that justify the time and money invested in planting and maintenance. For Crandall Park, recommended maintenance needs include: Tree Removal (16%); Stump Removal (2%); Tree Clean (Routing Pruning) (36%); Young Tree Train (4%); and Plant Tree (42%). For Boulevard Park, recommended maintenance needs include: Tree Removal (9%); Stump Removal (2%); Tree Clean (Routing Pruning) (33%); Young Tree Train (20%); and Plant Tree (36%). Maintenance should be prioritized by addressing trees with the highest risk first.

The inventory noted that 2% of all trees in Crandall Park and 3% of all trees in Boulevard Park are considered High Risk trees. These High Risk trees should be removed or pruned immediately to promote public safety. Low and Moderate Risk trees should be addressed after all High Risk tree maintenance has been completed. Trees should be planted to mitigate removals and replace lost canopy cover.

CRANDALL PARK

REMOVAL
- Total = 398 trees
- Extreme Risk = 0 trees
- High Risk = 22 trees
- Moderate Risk = 210 trees
- Low Risk = 166 trees
- Stumps = 50

HIGH RISK PRUNING
- Total = 11 trees
- Extreme Risk = 0 trees
- High Risk = 11 trees

ROUTINE PRUNING CYCLE
- Total = 882 trees
- Number of trees in cycle each year = approximately 127

YOUNG TREE TRAINING CYCLE
- Total = 91 trees
- Number of trees in cycle each year = at least 30

TREE PLANTING
- Number of trees each year = at least 120

BOULEVARD PARK

REMOVAL
- Total = 74 trees
- Extreme Risk = 0 trees
- High Risk = 10 trees
- Moderate Risk = 40 trees
- Low Risk = 24 trees
- Stumps = 17

HIGH RISK PRUNING
- Total = 4 trees
- Extreme Risk = 0 trees
- High Risk = 4 trees

ROUTINE PRUNING CYCLE
- Total = 259 trees
- Number of trees in cycle each year = approximately 37

YOUNG TREE TRAINING CYCLE
- Total = 161 trees
- Number of trees in cycle each year = at least 53

TREE PLANTING
- Number of trees each year = at least 33

Crandall Park and Boulevard Park's urban forest will benefit greatly from a three-year young tree training cycle and a seven-year routine pruning cycle. Proactive pruning cycles improve the overall health of the tree population and may eventually reduce program costs. In most cases, pruning cycles will correct defects in trees before they worsen, which will avoid costly problems. Based on inventory data, at least 30 young trees in Crandall Park and 53 young trees in Boulevard Park should be structurally pruned each year during the young tree training cycle. Approximately 127 trees in Crandall Park and 37 trees in Boulevard Park should be cleaned each year during the routine pruning cycle.

Planting trees is necessary to maintain and increase canopy cover, and to replace trees that have been removed or lost to natural mortality (expected to be 1–3% per year) or other threats (for example, construction, invasive pests, or impacts from weather events such as drought, flooding, ice, snow, storms, and wind). Davey Resource Group recommends planting at least 120 trees per year in Crandall Park and 33 trees per year in Boulevard Park to achieve 90% stocking level within the proposed 7-year budget for each neighborhood (Tables 3a, 3b). Various tree species should be planted; however, the planting of maple (*Acer*) should be limited until the species distribution normalizes. Due to the species distribution and impending threats from emerald ash borer (EAB, *Agrilus planipennis*), all *Fraxinus* spp. (ash) trees should be temporarily removed from the planting list or planted only when a landscape plan is in place.

Urban Forest Program Needs

Adequate funding will be needed for Crandall Park and Boulevard Park to implement an effective management program that will provide short-term and long-term public benefits, ensure that priority maintenance is performed expediently, and establish proactive maintenance cycles. The estimated total cost for the first year of this seven-year program is $237,445 for Crandall Park and $63,895 for Boulevard Park. By Year 3 of the program, this total will decrease to approximately $63,000 per year in Crandall Park and $19,125 in Boulevard Park. High-priority removal and pruning is costly; since most of this work is scheduled during the first year of the program, the budget is higher for that year. After high-priority work has been completed, the urban forestry program will mostly involve proactive maintenance, which is generally less costly. Budgets for later years are thus projected to be lower and ultimately stabilize in Year 4.

Over the long term, supporting proactive management of trees through funding will reduce municipal tree care management costs and potentially minimize the costs to build, manage, and support certain Crandall Park and Boulevard Park infrastructure.

The City of Youngstown and its urban forestry partners have many opportunities to improve its urban forest. Planned tree planting and a systematic approach to tree maintenance will help ensure a cost-effective, proactive program. Investing in this tree management program will promote public safety, improve tree care efficiency, and increase the economic and environmental benefits the community receives from its trees.

Table 1a. Estimated Total Cost of Management Program Per Year for Crandall Park

Year	Estimated Total Cost
1	$237,445.00
2	$142,514.00
3	$63,000.00
4	$62,310.00
5	$62,310.00
6	$62,310.00
7	$62,310.00

Table 1b. Estimated Total Cost of Management Program Per Year for Boulevard Park

Year	Estimated Total Cost
1	$63,895.00
2	$41,015.00
3	$19,125.00
4	$17,995.00
5	$17,995.00
6	$17,995.00
7	$17,995.00

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INTRODUCTION

Youngstown is home to more than 66,000 full-time residents who enjoy the beauty and benefits of their urban forest. The city staff manages and maintains trees on public property, including trees, stumps, and planting sites in specified parks, public facilities, and along the street ROW.

The City of Youngstown has a tree ordinance, maintains a budget of more than $2 per capita for tree-related expenses, celebrates Arbor Day, and has been a Tree City USA member for 9 years. Past urban forestry and neighborhood beautification projects have demonstrated a desire to improve the environment through higher levels of tree care and may be eligible to win a Tree City USA Growth Award. Funding for this project comes from a grant received by YNDC. Davey Resource Group conducted an inventory of public trees in October 2016.

Approach to Tree Management

The best approach to managing an urban forest is to develop an organized, proactive program using tools (such as a tree inventory and tree management plan) to set goals and measure progress. These tools can be utilized to establish tree care priorities, generate strategic planting plans, draft cost-effective budgets based on projected needs, and ultimately minimize the need for costly, reactive solutions to crises or urgent hazards.

In October 2016, YNDC and the City of Youngstown worked with Davey Resource Group to inventory trees and develop a management plan for two separate neighborhoods: Crandall Park and Boulevard Park. This plan considers the diversity, distribution, and general condition of the inventoried trees, but also provides a prioritized system for managing public trees. The following tasks were completed:

- Inventory of trees, stumps, and planting sites along the street ROW.
- Analysis of tree inventory data.
- Development of a plan that prioritizes the recommended tree maintenance.

This plan is divided into three sections:

- *Section 1: Tree Inventory Analysis* summarizes the tree inventory data and presents trends, results, and observations.
- *Section 2: Benefits of the Urban Forest* summarizes the economic, environmental, and social benefits that trees provide to the community.
- *Section 3: Tree Management Program* utilizes the inventory data to develop a prioritized maintenance schedule and projected budget for the recommended tree maintenance over a seven-year period.

SECTION 1: TREE INVENTORY ANALYSIS

In October 2016, Davey Resource Group arborists assessed and inventoried trees, stumps, and planting sites along the street ROW in two separate neighborhoods: Crandall Park and Boulevard Park. In Crandall Park, a total of 2,467 sites were collected during the inventory: 1,382 trees, 50 stumps, and 1,035 planting sites. In Boulevard Park, a total of 808 sites were collected during the inventory: 498 trees, 17 stumps, and 293 planting sites. Table 1a (Crandall Park) and Table 1b (Boulevard Park) provide a detailed breakdown of the number and type of sites inventoried.

Two project areas—Crandall Park in the North Neighborhood District, and Boulevard Park in the South Neighborhood District—were selected by YNDC and the City of Youngstown for the tree inventory.

This map shows the inventoried sites in Crandall Park.
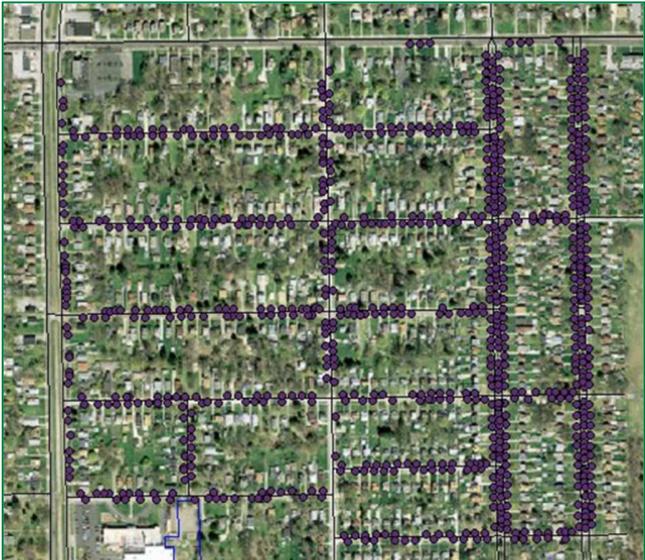
This map shows the inventoried sites in Boulevard Park.

Number of Sites	Trees	Stumps	Vacant Sites
Number of Sites	1,382	50	1,035
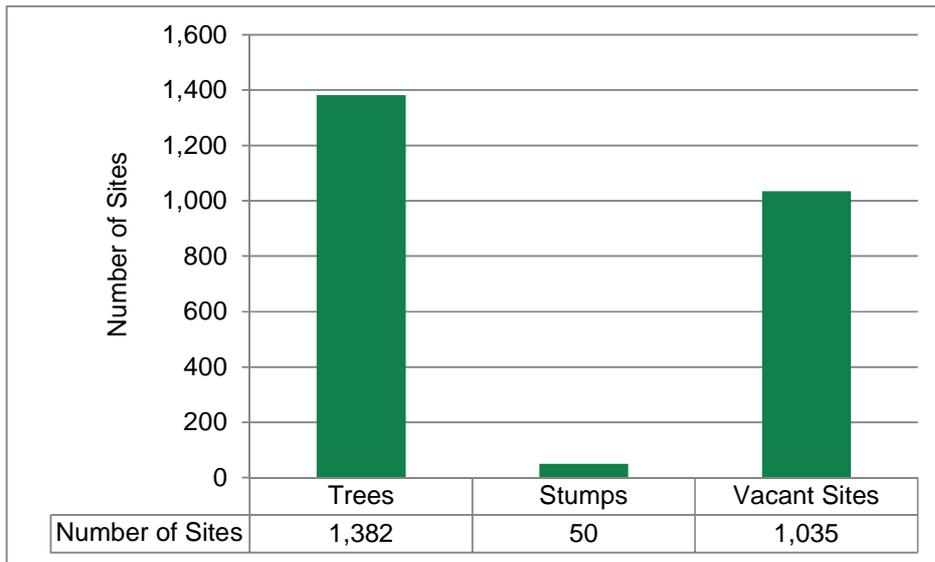
Figure 1a. Sites collected during the 2016 inventory of Crandall Park.

| Number of Sites	Trees	Stumps	Vacant Sites
Number of Sites	498	17	293
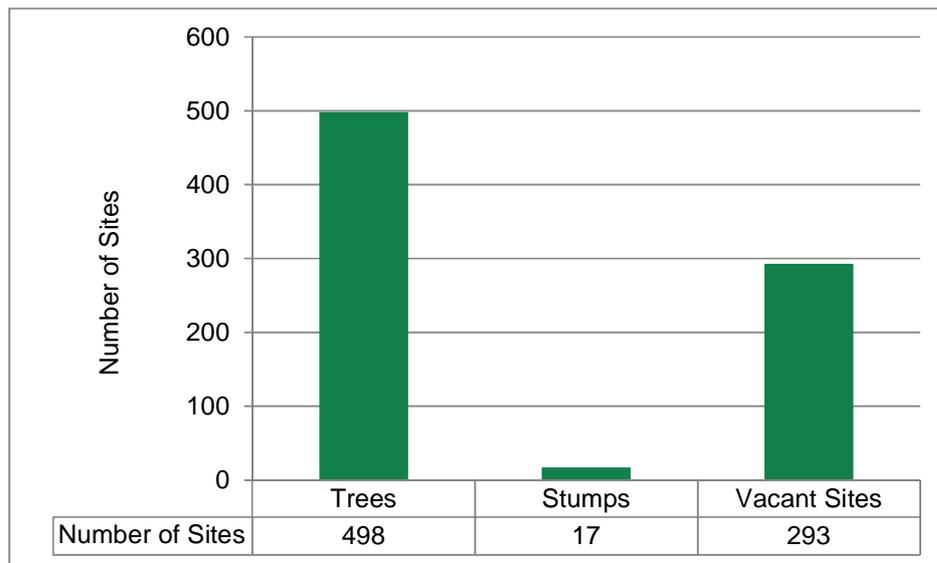
Figure 1b. Sites collected during the 2016 inventory of Boulevard Park.

Assessment of Tree Inventory Data

Data analysis and professional judgment are used to make generalizations about the state of the inventoried tree population. Recognizing trends in the data can help guide short-term and long-term management decisions. In this plan, the following criteria and indicators of the inventoried tree population were assessed:

Photograph 1. *Davey's ISA-Certified Arborists inventoried trees along street ROW to collect information about trees that could be used to assess the state of the urban forest.*

- *Species Diversity*, the variety of species in a specific population, affects the population's ability to withstand threats from invasive pests and diseases. Species diversity also impacts tree maintenance needs and costs, tree planting goals, and canopy continuity.

- *Diameter Size Class Distribution Data*, the statistical distribution of a given tree population's trunk-size class, is used to indicate the relative age of a tree population. The diameter size class distribution affects the valuation of tree-related benefits as well as the projection of maintenance needs and costs, planting goals, and canopy continuity.

- *Condition*, the general health of a tree population, indicates how well trees are performing given their site-specific conditions. General health affects both short-term and long-term maintenance needs and costs as well as canopy continuity.

- *Stocking Level* is the proportion of existing street ROW trees compared to the total number of potential street ROW trees (number of inventoried trees plus the number of potential planting spaces); stocking level can help determine tree planting needs and budgets.

- *Other Observations* include inventory data analysis that provides insight into past maintenance practices and growing conditions; such observations may affect future management decisions.

Species Diversity

Species diversity affects maintenance costs, planting goals, canopy continuity, and the forestry program's ability to respond to threats from invasive pests or diseases. Low species diversity (large number of trees of the same species) can lead to severe losses in the event of species-specific epidemics such as the devastating results of Dutch elm disease (*Ophiostoma novo-ulmi*) throughout New England and the Midwest. Due to the spread of Dutch elm disease in the 1930s, combined with the disease's prevalence today, massive numbers of *Ulmus americana* (American elm), a popular street tree in Midwestern cities and towns, have perished (Karnosky 1979). Several Midwestern communities were stripped of most of their mature shade trees, creating a drastic void in canopy cover. Many of these communities have replanted to replace the lost elm trees. Ash and maple trees were popular replacements for American elm in the wake of Dutch elm disease. Unfortunately, some of the replacement species for American elm trees are now overabundant, which is a biodiversity concern. EAB and Asian longhorned beetle (ALB, *Anoplophora glabripennis*) are non-native insect pests that attack some of the most prevalent urban shade trees and certain agricultural trees throughout the country.

The composition of a tree population should follow the 10-20-30 Rule for species diversity: a single species should represent no more than 10% of the urban forest, a single genus no more than 20%, and a single family no more than 30%.

Findings

Analysis of the tree inventory data indicated that the inventoried tree population had relatively fair diversity, with 37 genera and 58 species represented in Crandall Park, and 24 genera and 34 species represented in Boulevard Park.

Figures 2a and 2b use the 10% Rule to compare the percentages of the most common species identified during the inventory to the ideal street tree populations. In Crandall Park, Norway maple (*Acer platanoides*) far exceeds the recommended 10% maximum for a single species in a population, comprising 26% of the inventoried tree population. In Boulevard Park, silver maple (*Acer saccharinum*) exceeds the recommended 10% maximum for a single species in a population, comprising 16% of the inventoried tree population

Crandall Park	Norway maple	silver maple	London planetree	pin oak	red maple
Crandall Park	26%	12%	10%	9%	8%
10% Rule	10%	10%	10%	10%	10%
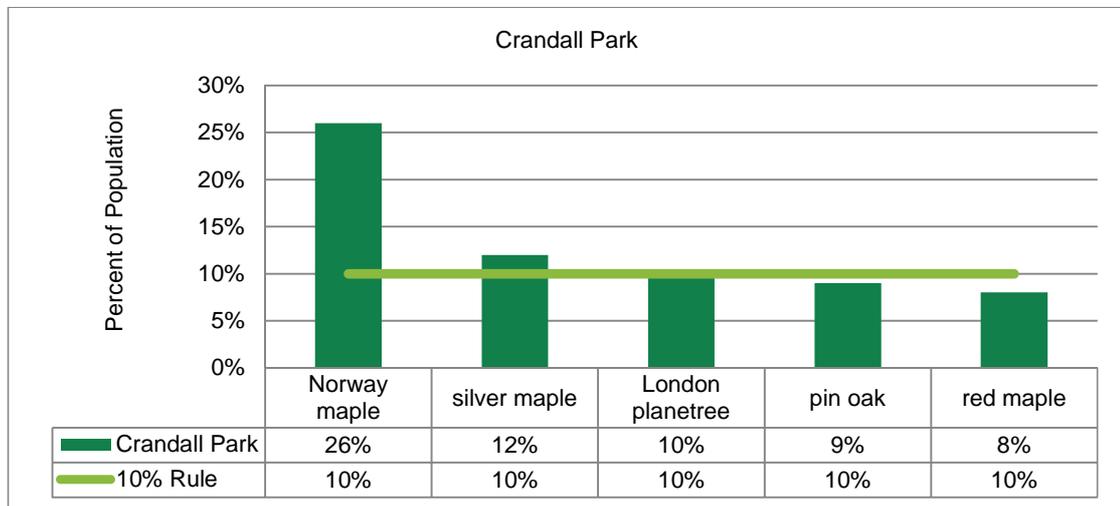
Figure 2a. Five most abundant species of the inventoried population compared to the 10% Rule for Crandall Park.

Boulevard Park	silver maple	red maple	sugar maple	flowering crabapple	Norway maple
CLIENT	16%	13%	11%	11%	9%
10% Rule	10%	10%	10%	10%	10%
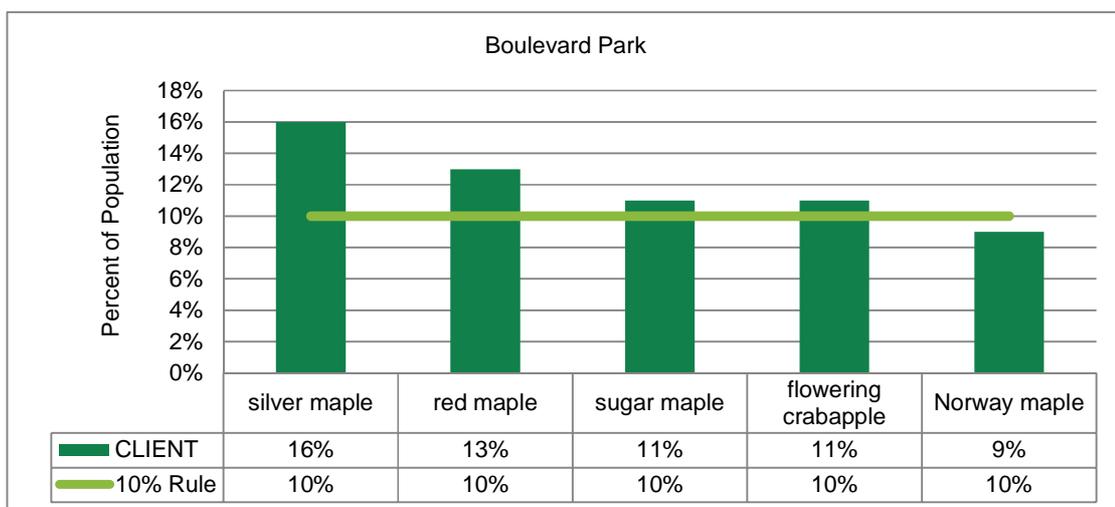
Figure 2b. Five most abundant species of the inventoried population compared to the 10% Rule for Boulevard Park.

Figures 3a and 3b use the 20% Rule to compare the percentages of the most common genera identified during the inventory to the ideal street tree populations. Maple (*Acer*) far exceeds the recommended 20% maximum for a single genus in a population for both Crandall Park and Boulevard Park, comprising 52% and 50% of the inventoried tree populations, respectively.

	maple	planetree	oak	linden	apple/crabapple
Crandall Park	52%	11%	11%	5%	4%
20% Rule	20%	20%	20%	20%	20%
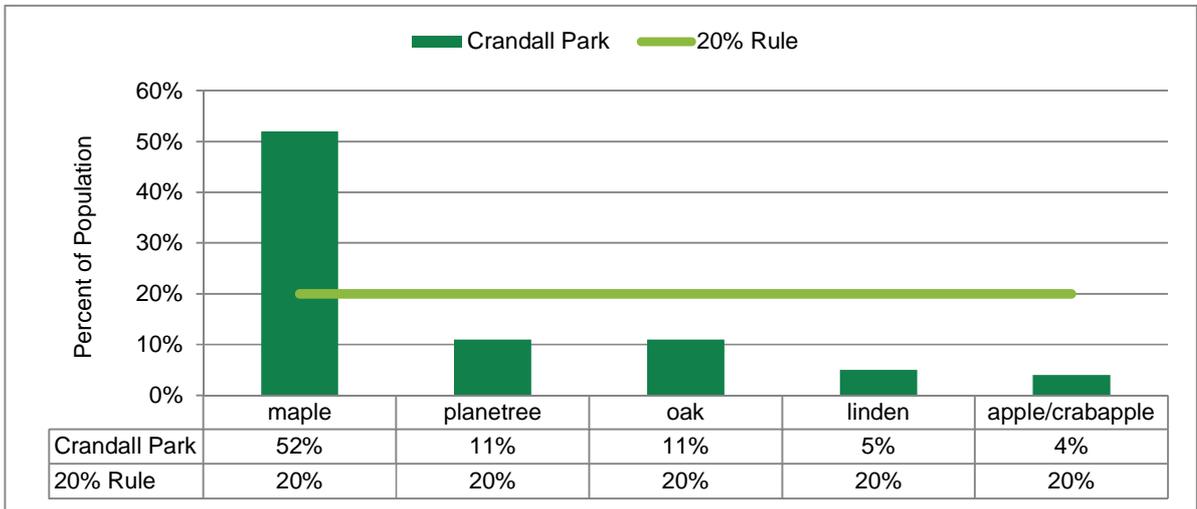
Figure 3a. Five most abundant genera of the inventoried population compared to the 20% Rule for Crandall Park.

|	maple	apple/crabapple	serviceberry	buckeye	spruce
Boulevard Park	50%	11%	5%	5%	5%
20% Rule	20%	20%	20%	20%	20%
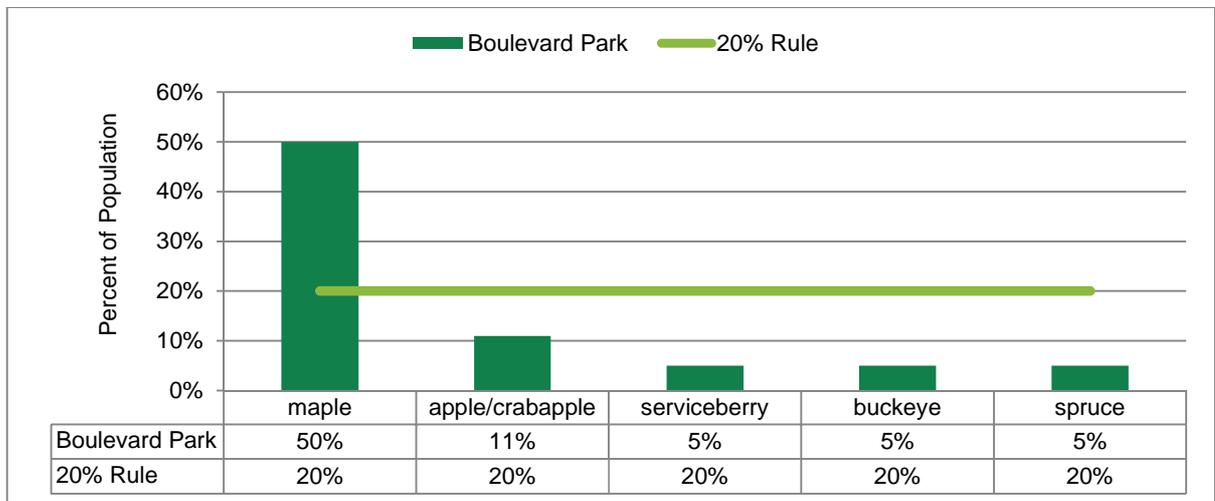
Figure 3b. Five most abundant genera of the inventoried population compared to the 20% Rule for Boulevard Park.

Discussion/Recommendations

Norway maple dominates Crandall Park's streets, and silver maple dominates Boulevard Park's street. This is a biodiversity concern because their abundance in the landscape makes them limiting species. Continued diversity of tree species is an important objective that will ensure Crandall Park's and Boulevard Park's urban forest is sustainable and resilient to future invasive pest infestations.

Considering the large quantity of *Acer* (maple) in both Crandall Park's and Boulevard Park's population, along with maple's susceptibility to granulate ambrosia beetle and Asian longhorned beetle, the planting of maple should be limited to minimize the potential for loss in the event that granulate ambrosia beetle or Asian longhorned beetle threatens these urban tree populations. See Appendix C for a recommended tree species list for planting.

Diameter Size Class Distribution

Analyzing the diameter size class distribution provides an estimate of the relative age of a tree population and offers insight into maintenance practices and needs.

The inventoried trees were categorized into the following diameter size classes: young trees (0–8 inches DBH), established (9–17 inches DBH), maturing (18–24 inches DBH), and mature trees (greater than 24 inches DBH). These categories were chosen so that the population could be analyzed according to Richards' ideal distribution (1983). Richards proposed an ideal diameter size class distribution for street trees based on observations of well-adapted trees in Syracuse, New York. Richards' ideal distribution suggests that the largest fraction of trees (approximately 40% of the population) should be young (less than 8 inches DBH), while a smaller fraction (approximately 10%) should be in the large-diameter size class (greater than 24 inches DBH). A tree population with an ideal distribution would have an abundance of newly planted and young trees, and lower numbers of established, maturing, and mature trees.

Findings

Figures 4a and 4b compare Crandall Park's and Boulevard Park's tree diameter size class distribution of the inventoried tree population to the ideal proposed by Richards (1983). Crandall Park's distribution trend is far from ideal. Only 14% of the trees are young; this distribution of young trees falls short of the ideal by approximately 26%. Larger diameter size classes, however, exceed the ideal. Boulevard Park's diameter size class distribution trends towards the ideal; however, mature trees exceed the ideal by 17%.
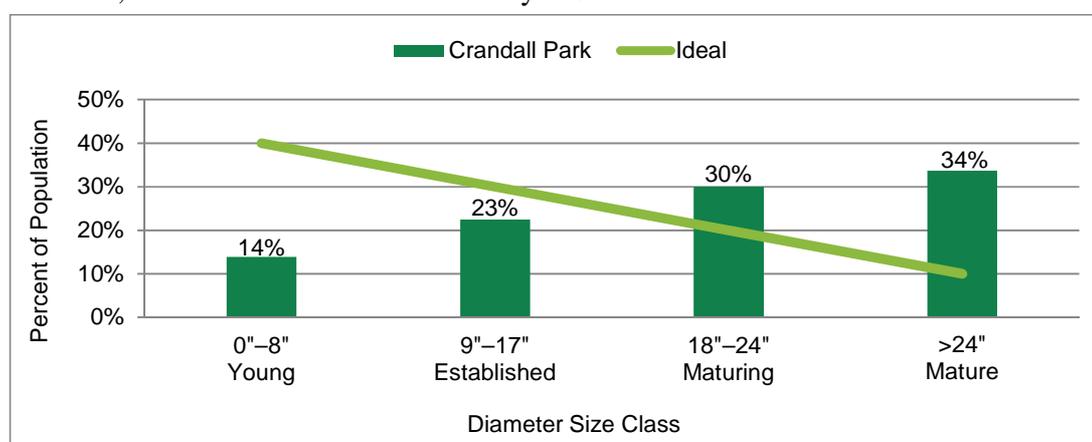
Figure 4a. Comparison of diameter size class distribution for inventoried trees to the ideal distribution for Crandall Park.
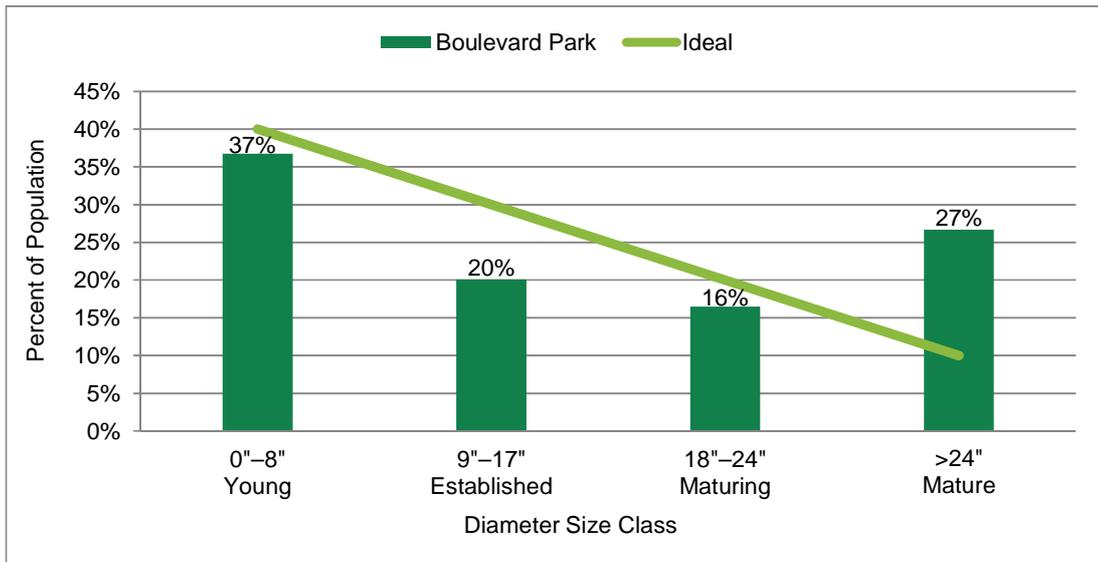
Figure 4b. Comparison of diameter size class distribution for inventoried trees to the ideal distribution for Boulevard Park.

Discussion/Recommendations

The diameter size class distribution in Crandall Park is far from ideal, as illustrated in Figure 4a. Young tree planting should be increased in Crandall Park to correct the trend over time as mature trees decline and die. The Boulevard Park diameter size class trend is much closer to the ideal, as illustrated in Figure 4b. Davey Resource Group recommends that Crandall Park and Boulevard Park support a strong planting and maintenance program to ensure that young, healthy trees are in place to fill in gaps in tree canopy and replace older declining trees. The YNDC and the City of Youngstown must promote tree preservation and proactive tree care to ensure the long-term survival of older trees. Tree planting and tree care will allow the distribution to normalize over time.
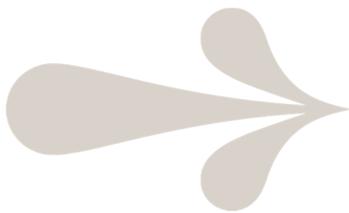
Planting trees is necessary to increase canopy cover and replace trees lost to natural mortality (expected to be 1%–3% per year) and other threats (for example, invasive pests or impacts from weather events such as storms, wind, ice, snow, flooding, and drought). Planning for the replacement of existing trees and identifying the best places to create new canopy is critical.

Condition

Davey Resource Group assessed the condition of individual trees based on methods defined by International Society of Arboriculture (ISA). Several factors were considered for each tree, including: root characteristics, branch structure, trunk, canopy, foliage condition, and the presence of pests. The condition of each inventoried tree was rated Excellent, Very Good, Good, Fair, Poor, Critical, or Dead.

In this plan, the general health of the inventoried tree population was characterized by the most prevalent condition assigned during the inventory.

Comparing the condition of the inventoried tree population with relative tree age (or size class distribution) can provide insight into the stability of the population. Since tree species have different lifespans and mature at different diameters, heights, and crown spreads, actual tree age cannot be determined from diameter size class alone. However, general classifications of size can be extrapolated into relative age classes. The following categories are used to describe the relative age of a tree: young (0–8 inches DBH), established (9–17 inches DBH), maturing (18–24 inches DBH), and mature (greater than 24 inches DBH).

Figures 5a and 5b illustrate the general health and distribution of young, established, mature, and maturing trees relative to their condition.

Crandall Park — Condition Rating	Number of Trees
Excellent	0
Very Good	138
Good	548
Fair	405
Poor	209
Critical	27
Dead	55
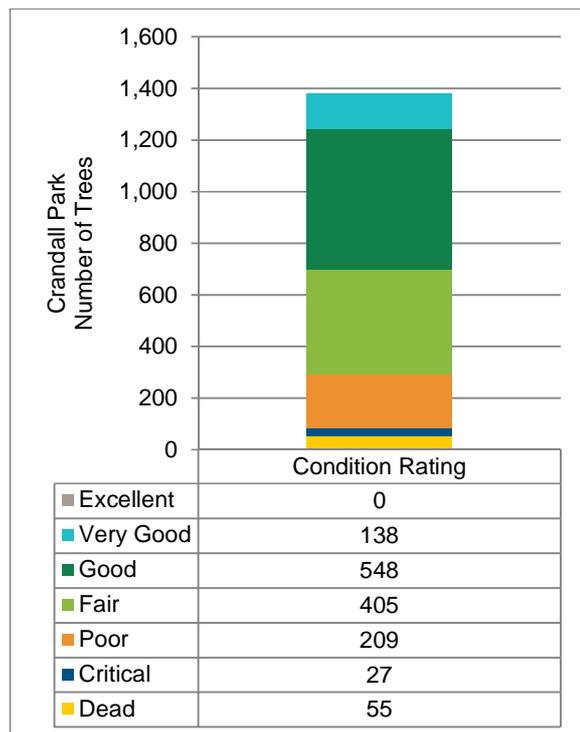
Figure 5a. Conditions of inventoried trees for Crandall Park.

Boulevard Park — Condition Rating	Number of Trees
Excellent	0
Very Good	79
Good	258
Fair	103
Poor	44
Critical	4
Dead	10
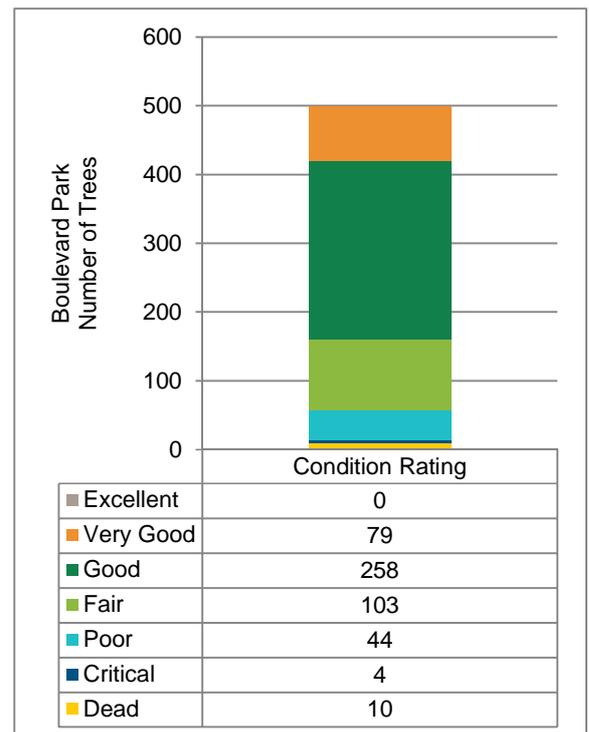
Figure 5b. Conditions of inventoried trees for Boulevard Park.

Findings

Most of the inventoried trees in both Crandall Park and Boulevard Park were recorded to be in Good condition, 40% and 52%, respectively (Figures 5a and 5b). Based on these data, the general health of the overall inventoried tree population is rated Good. Figures 6a and 6b illustrate that most of the young, established, and maturing trees were rated to be in Good to Excellent condition, and that most of the mature trees were rated to be in Good to Excellent condition.
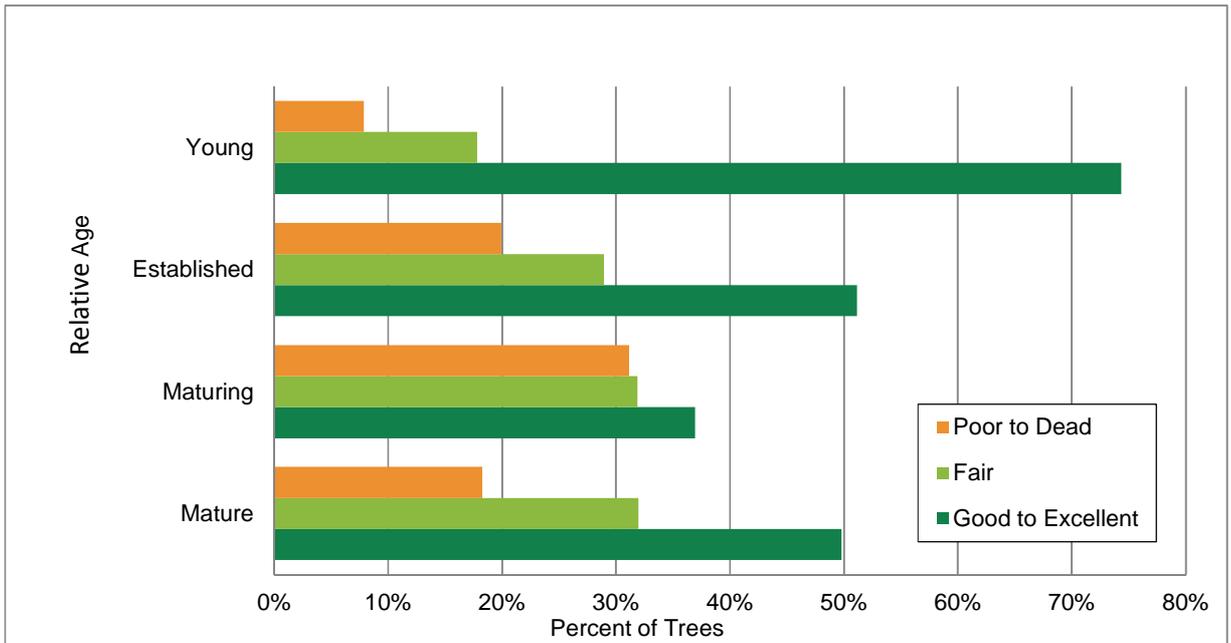
Figure 6a. Tree condition by relative age during the 2016 inventory for Crandall Park.
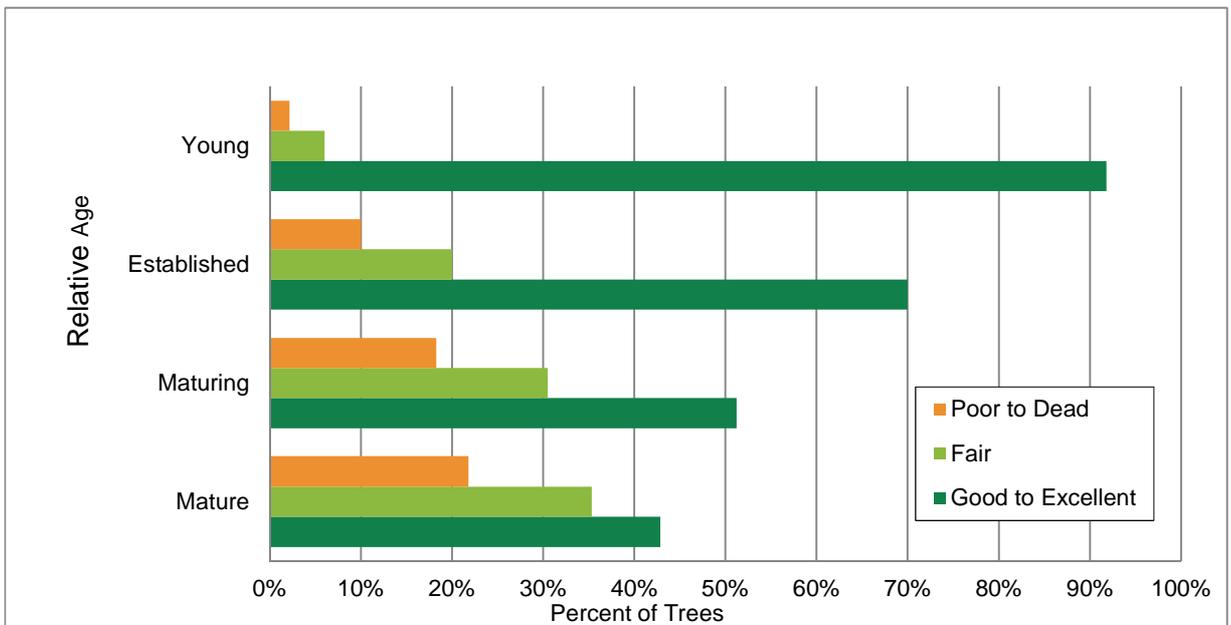
Figure 6b. Tree condition by relative age during the 2016 inventory for Boulevard Park.

Discussion/Recommendations

Even though the condition of Crandall Park and Boulevard Park's inventoried tree population is mostly good, data analysis has provided the following insight into maintenance needs and historical maintenance practices:

- Dead trees and trees in Critical condition should be removed because of their failed health; these trees will likely not recover, even with increased care.

- Poor condition ratings among mature trees were generally due to visible signs of decline and stress, including decay, dead limbs, sparse branching, or poor structure. These trees will require corrective pruning, regular inspections, and possible intensive plant health care to improve their vigor.

- Younger trees rated in Fair or Poor condition may benefit from improvements in structure that may improve their health over time. Pruning should follow *ANSI A300 (Part 1)* (ANSI 2008).

- Proper tree care practices are needed for the long-term general health of the urban forest. Following guidelines developed by ISA and those recommended by *ANSI A300 (Part 6)* (ANSI 2012) will ensure that tree maintenance practices ultimately improve the health of the urban forest.

Street ROW Stocking Level

Stocking is a traditional forestry term used to measure the density and distribution of trees. For an urban/community forest such as Crandall Park or Boulevard Park, stocking level is used to estimate the total number of sites along the street ROW that could contain trees. Park trees and public property trees are excluded from this measurement.

Stocking level is the ratio of street ROW spaces occupied by trees to the total street ROW spaces suitable for trees. For example, a street ROW tree inventory of 1,000 total sites with 750 existing trees and 250 planting sites would have a stocking level of 75%.

For an urban area, Davey Resource Group recommends that the street ROW stocking level be at least 90% so that no more than 10% of the potential planting sites along the street ROW are vacant.

Street ROW stocking levels may be estimated using information about the community, tree inventory data, and common street tree planting practices. Inventory data that contain the number of existing trees and planting sites along the street ROW will increase the accuracy of the projection.

Findings

In Crandall Park, the inventory found 1,035 planting sites. Of the inventoried vacant sites, 360 were potential planting sites for large-size trees (8-foot-wide and greater growing space size); 80 were potential sites for medium-size trees (6- to 7-foot-wide growing space sizes); and 595 were potential sites for small-size trees (4- to 5-foot-wide growing space sizes). Based on the data collected during this inventory, Crandall Park's current street ROW tree stocking level is 56%.

In Boulevard Park, the inventory found 293 planting sites. Of the inventoried vacant sites, 20 were potential planting sites for large-size trees (8-foot-wide and greater growing space size); 23 were potential sites for medium-size trees (6- to 7-foot-wide growing space sizes); and 250 were potential sites for small-size trees (4- to 5-foot-wide growing space sizes). Based on the data collected during this inventory, Boulevard Park's current street ROW tree stocking level is 62%.

Discussion/Recommendation

Fully stocking the street ROW with trees is an excellent goal. Inadequate tree planting and maintenance budgets, along with tree mortality, will result in lower stocking levels. Nevertheless, working to attain a fully stocked street ROW is important to promote canopy continuity and environmental sustainability. Each neighborhood should consider improving its street ROW population's stocking level and working towards achieving the ideal of 90% or better. Generally, this entails a planned program of planting, care, and maintenance for Crandall Park and Boulevard Park street ROW trees.

The city of Youngstown is comprised of over 100 neighborhoods in five Neighborhood Districts. The city estimates that it plants 100 trees per year, or on average of less than 1 tree per neighborhood per year. The tree inventory identified a total of 1,093 planting sites in Crandall Park and 293 planting sites in Boulevard Park alone. These neighborhoods may never achieve 90% stocking level if Crandall Park and Boulevard Park only had one tree per year planted. If budgets allow, Davey Resource Group recommends that the city accomplish 90% stocking level in both Crandall Park and Boulevard Park neighborhoods within the 7-year budget timeframe. Tables 3a and 3b both support the 7-year, 90% stocking goal. At the very least, the City of Youngstown should increase the number of trees planted to 250–500 per year or 50–100 trees per year for each Neighborhood District: Central, North, East, South, and West. If possible, exceed this recommendation to account for 1–3% tree mortality per year and better prepare for impending threats. Planting more trees will also increase the benefits provided by the Youngstown urban forest.

Other Observations

Observations were recorded during the inventory to further describe a tree's health, structure, or location when more detail was needed.

Findings

Cavity or decay was most frequently observed in Crandall Park and Boulevard Park trees (26% and 16%, respectively). In Crandall Park, 216 of these trees were recommended for removal, and 7 were rated High or Extreme Risk trees. In Boulevard Park, 37 of these were recommended for removal, and 3 were rated to be High or Extreme Risk trees.
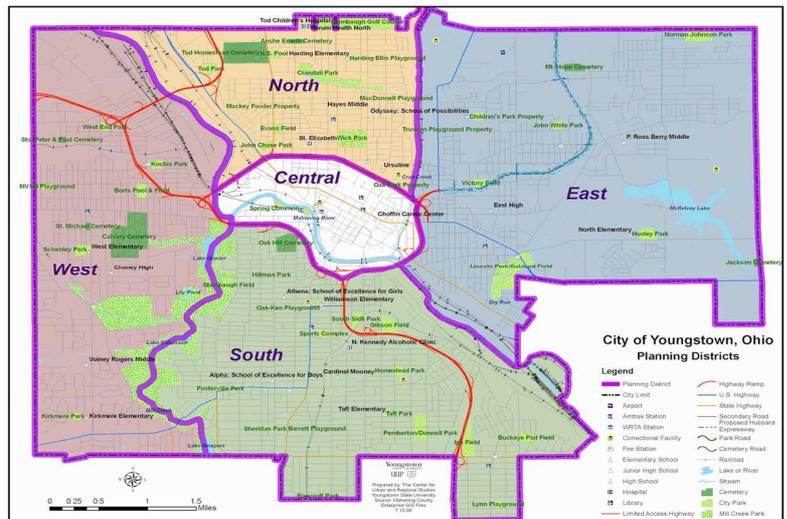
This map is from the City of Youngstown website.

The City of Youngstown has over 100 neighborhoods within 5 Neighborhood Districts: Central, North, East, South, and West.

Table 2a. Observations Recorded During the Street Tree Inventory for Crandall Park

Observation	Number Inventoried	Percent
Cavity or Decay	363	26.27%
Poor Roots	114	8.25%
Poor Location	89	6.44%
Remove Hardware	19	1.37%
Mechanical Damage	11	0.80%
Grate/Guard	8	0.58%
Pest Problem	3	0.22%
Trimmed Improperly	1	0.07%
Planted Improperly	1	0.07%
None	773	55.93%
Total	**1,382**	**100%**

Table 2b. Observations Recorded During the Street Tree Inventory for Boulevard Park

Observation	Number Inventoried	Percent
Cavity/Decay	79	15.86%
Remove Hardware	52	10.44%
Poor Location	27	5.42%
Planted Improperly	25	5.02%
Poor Roots	24	4.82%
Mechanical Damage	10	2.01%
None	281	56.43%
Total	**498**	**100%**

Discussion/Recommendations

Trees in either neighborhood noted as having cavity or decay should be regularly inspected. Corrective actions should be taken when warranted. If their condition worsens, removal may be required. Of the 363 trees noted with cavity or decay in Crandall Park, 216 were recommended for removal. Of the 79 trees noted with cavity or decay in Crandall Park, 37 were recommended for removal.

Staking should only be installed when necessary to keep trees from leaning (windy sites) or to prevent damage from pedestrians and/or vandals. Stakes should only be attached to trees with a loose, flexible material. Installed hardware that has been attached to any tree for more than one year, and hardware that may no longer be needed for its intended purposes, should be inspected and removed as appropriate.

Infrastructure Conflicts

In an urban setting, space is limited both above and below ground. Trees in this environment may conflict with infrastructure such as buildings, sidewalks, and utility wires and pipes, which may pose risks to public health and safety. Existing or possible conflicts between trees and infrastructure recorded during the inventory include:

- *Overhead Utilities*—The presence of overhead utility lines above a tree or planting site was noted and determined to be conflicting or not conflicting. It is important to consider these data when planning pruning activities and selecting tree species for planting.

Findings

In Crandall Park, 781 trees (57%) have utilities directly above, or passing through, the tree canopy. Of the trees with overhead utilities, 615 trees are in conflict with those overhead utilities and 166 are not conflicting. In Boulevard Park, 145 trees (29%) have utilities directly above, or passing through, the tree canopy. Of the trees with overhead utilities, 100 trees are in conflict with those overhead utilities, and 45 trees are not conflicting.

Discussion/Recommendations

Tree canopy should not interfere with vehicular or pedestrian traffic, nor should it rest on buildings or block signs, signals, or lights. Pruning to avoid clearance issues and raise tree crowns should be completed in accordance with *ANSI A300 (Part 9)* (2011). Davey Resource Group's clearance distance guidelines are as follows: 14 feet over streets; 8 feet over sidewalks; and 5 feet from buildings, signs, signals, or lights.

Planting only small-growing trees within 20 feet of overhead utilities, medium-size trees within 20–40 feet, and large-growing trees outside 40 feet will help improve future tree conditions, minimize future utility line conflicts, and reduce the costs of maintaining trees under utility lines.

When planting around hardscape, it is important to give the tree enough growing room above ground. Guidelines for planting trees among hardscape features are as follows: give small-growing trees 4–5 feet, medium-growing trees 6–7 feet, and large-growing trees 8 feet or more between hardscape features. In most cases, this will allow for the spread of a tree's trunk taper, root collar, and immediate larger-diameter structural roots.

Growing Space

Information about the type and size of the growing space was recorded. Growing space size was recorded as the minimum width of the growing space needed for root development. Growing space types are categorized as follows:

- Island—surrounded by pavement or hardscape (for example, parking lot divider)
- Median—located between opposing lanes of traffic
- Open/Unrestricted—open sites with unrestricted growing space on at least three sides
- Raised Planter—in an above-grade or elevated planter
- Tree Lawn/Parkway—located between the street curb and the public sidewalk
- Well/Pit—at grade level and completely surrounded by sidewalk

Findings

Most (93%) of the Crandall Park tree population is located in tree lawns that range between 4 feet and 16 feet wide, with the greatest percentage (44%) being in 8-foot tree lawns. Suggested planting sites are split between tree lawns (92%) and open/unrestricted areas (7%).

Most (71%) of the Boulevard Park tree population is located in tree lawns that range between 4 feet and 18 feet wide, with the greatest percentage (45%) being in 12-foot tree lawns. Suggested planting sites are split between tree lawns (80%) and median areas (19%).

Discussion/Recommendations

To prolong the useful life of street trees, small-growing tree species should be planted in tree lawns 4–5 feet wide, medium-size tree species in tree lawns 6–7 feet wide, and large-growing tree species in tree lawns at least 8 feet wide. The useful life of a public tree ends when the cost of maintenance exceeds the value contributed by the tree. This can be due to increased maintenance required by a tree in decline, or it can be due to the costs of repairing damage caused by the tree's presence in a restricted site.

Further Inspection

This data field indicates whether a particular tree requires further inspection, such as a Level III risk inspection in accordance with ANSI A300, Part 9 (ANSI, 2011), or periodic inspection due to particular conditions that may cause it to be a safety risk and, therefore, hazardous. If a tree was noted for further inspection, city staff should investigate as soon as possible to determine corrective actions.

Findings

In Crandall Park, Davey Resource Group recommended 52 trees for further inspection. Of those trees, 6 were recommended for a multi-year annual inspection, and 46 trees were recommended for a level 3 assessment.

In Boulevard Park, Davey Resource Group recommended 6 trees for further inspection. Of those trees, all 6 were recommended for a multi-year annual inspection.

Discussion/Recommendations

An ISA-Certified Arborist should perform additional inspections of the trees recommended for further inspection. If it is determined that these trees exceed the threshold for acceptable risk, the defective part(s) of the trees should be corrected or removed, or the entire tree may need to be removed.

The 15 inventoried ash trees in Crandall Park and 6 ash trees in Boulevard Park showed possible symptoms of EAB and should be monitored. If signs of EAB manifest, the tree should be removed, and the site should be inspected for potential replacement.

Potential Threats from Pests

Insects and diseases pose serious threats to tree health. Awareness and early diagnosis are essential to ensuring the health and continuity of street and park trees. Appendix E provides information about some of the current potential threats to Crandall Park's and Boulevard Park's trees and includes websites where more detailed information can be found.

Many pests target a single species or an entire genus. The inventory data were analyzed to provide a general estimate of the percentage of trees susceptible to some of the known pests in Ohio (see Figures 7a and 7b). It is important to note that the figure only presents data collected from the inventory. Many more trees throughout The City of Youngstown neighborhoods, including those on public and private property, may be susceptible to these invasive pests.

Findings

Granulate ambrosia beetle (*Xylosandrus crassiusculus*) and Asian longhorned beetle (ALB or *Anoplophora glabripennis*) are known threats to a large percentage of the inventoried street trees (71% and 63%, respectively in Crandall Park, and 63% and 58%, respectively in Boulevard Park). These pests were not detected during the inventory, but if they were detected, these neighborhoods could see severe losses in their tree population.
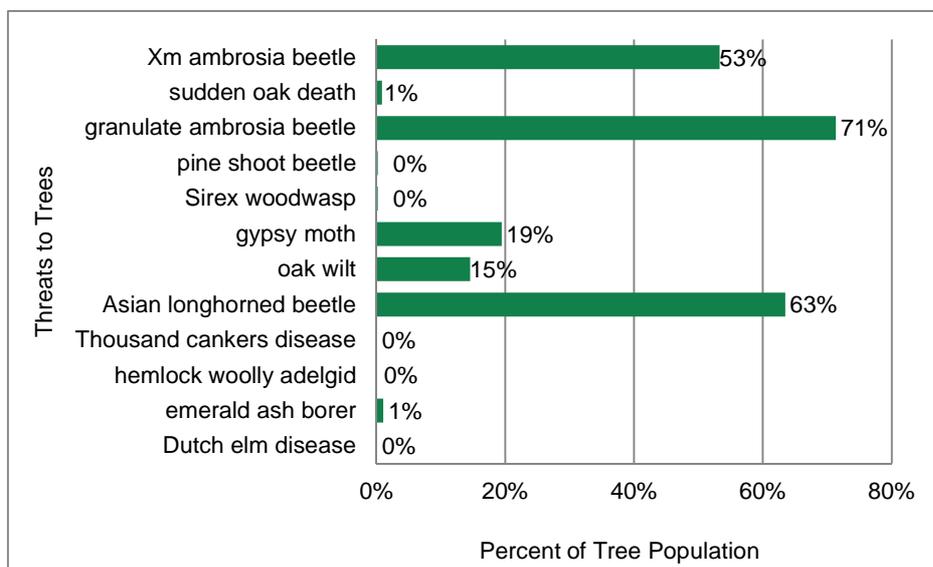
Figure 7a. Potential impact of insect and disease threats noted during the 2016 inventory for Crandall Park.
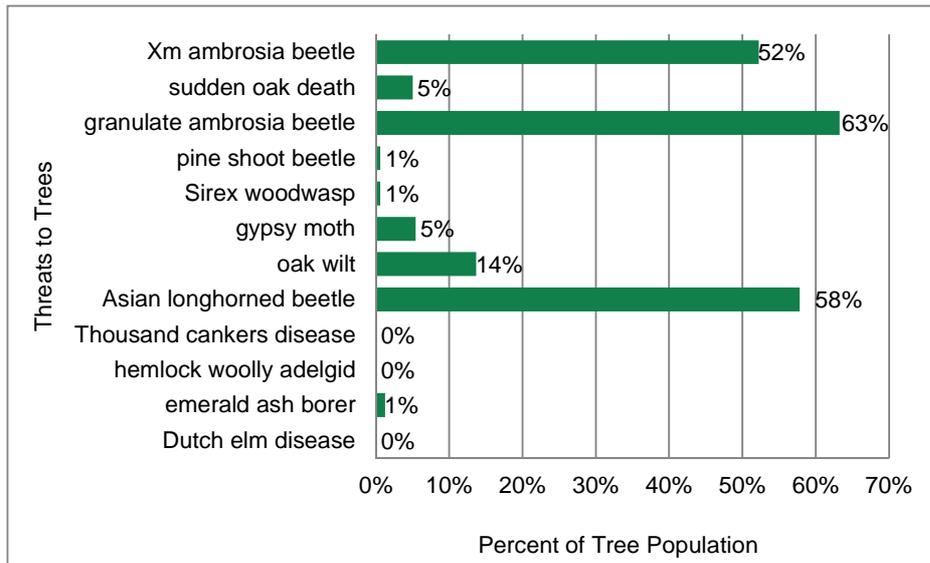
Figure 7b. Potential impact of insect and disease threats noted during the 2016 inventory for Boulevard Park.

Discussion/Recommendations

The City of Youngstown's Crandall Park and Boulevard Park neighborhoods should be aware of the signs and symptoms of potential infestations and should be prepared to act if a significant threat is observed in its tree population or a nearby community. An integrated pest management plan should be established. The plan should focus on identifying and monitoring threats, understanding the economic threshold, selecting the correct treatment, properly timing management strategies, recordkeeping, and evaluating results.

SECTION 2: BENEFITS OF THE URBAN FOREST

The urban forest plays an important role in supporting and improving the quality of life in urban areas. A tree's shade and beauty contributes to a community's quality of life and softens the often hard appearance of urban landscapes and streetscapes. When properly maintained, trees provide communities abundant environmental, economic, and social benefits that far exceed the time and money invested in planting, pruning, protection, and removal.

Environmental Benefits

- Trees decrease energy consumption and moderate local climates by providing shade and acting as windbreaks.
- Trees act as mini-reservoirs, helping to slow and reduce the amount of stormwater runoff that reaches storm drains, rivers, and lakes. One hundred mature tree crowns intercept roughly 100,000 gallons of rainfall per year (U.S. Forest Service 2003a).
- Trees help reduce noise levels, cleanse atmospheric pollutants, produce oxygen, and absorb carbon dioxide.
- Trees can reduce street-level air pollution by up to 60% (Coder 1996). Lovasi (2008) suggested that children who live on tree-lined streets have lower rates of asthma.
- Trees stabilize soil and provide a habitat for wildlife.

Economic Benefits

- Trees in a yard or neighborhood increase residential property values by an average of 7%.
- Commercial property rental rates are 7% higher when trees are on the property (Wolf 2007).
- Trees moderate temperatures in the summer and winter, saving on heating and cooling expenses (North Carolina State University 2012, Heisler 1986).
- On average, consumers will pay about 11% more for goods in landscaped areas, with this figure being as high as 50% for convenience goods (Wolf 1998b, Wolf 1999, and Wolf 2003).
- Consumers also feel that the quality of products is better in business districts surrounded by trees than those considered barren (Wolf 1998b).
- The quality of landscaping along the routes leading to business districts had a positive influence on consumers' perceptions of the area (Wolf 2000).

Social Benefits

- Tree-lined streets are safer; traffic speeds and the amount of stress drivers feel are reduced, which likely reduces road rage/aggressive driving (Wolf 1998a, Kuo and Sullivan 2001a).
- Chicago apartment buildings with medium amounts of greenery had 42% fewer crimes than those without any trees (Kuo and Sullivan 2001b).
- Chicago apartment buildings with high levels of greenery had 52% fewer crimes than those without any trees (Kuo and Sullivan 2001a).
- Employees who see trees from their desks experience 23% less sick time and report greater job satisfaction than those who do not (Wolf 1998a).
- Hospital patients recovering from surgery who had a view of a grove of trees through their windows required fewer pain relievers, experienced fewer complications, and left the hospital sooner than similar patients who had a view of a brick wall (Ulrich 1984, 1986).
- When surrounded by trees, physical signs of personal stress, such as muscle tension and pulse rate, were measurably reduced within three to four minutes (Ulrich 1991).

The trees growing along the public streets constitute a valuable community resource. They provide numerous tangible and intangible benefits, such as pollution control, energy reduction, stormwater management, property value increases, wildlife habitat, education, and aesthetics.

The results of the tree inventories provide insight into the overall health of the Crandall Park's and Boulevard Park's public trees and the management activities needed for the City of Youngstown to maintain and increase the benefits of trees into the future.

Photograph 2. *Trees provide significant aesthetic value to the community. Additionally, the tangible services of trees provide quantifiable benefits that justify the time and money invested in planting and maintenance.*

SECTION 3: TREE MANAGEMENT PROGRAM

This tree management plan was developed as a comprehensive seven-year program for each neighborhood based on the tree inventory data. The program was designed to reduce risk through prioritized tree removal and pruning, and to improve tree health and structure through proactive pruning cycles. Tree planting to mitigate removals and increase canopy cover by planting new trees and public outreach are important parts of these programs as well.

While implementing a tree care program is an ongoing process, tree work must always be prioritized to reduce public safety risks. Davey Resource Group recommends completing the work identified during the inventory based on the assigned risk rating; however, it is also essential to routinely monitor the tree population to identify other Extreme or High Risk trees so that they may be systematically addressed. While regular pruning cycles and tree planting is important, priority work (especially for Extreme or High Risk trees) must sometimes take precedence to ensure that risk is expediently managed.

Priority and Proactive Maintenance

In this plan, the recommended tree maintenance work was divided into either priority or proactive maintenance. Priority maintenance includes tree removals and pruning of trees with an assessed risk rating of High and Extreme Risk. Proactive tree maintenance includes pruning of trees with an assessed risk of Moderate or Low Risk and trees that are young. Tree planting, inspections, and community outreach are also considered proactive maintenance.

Extreme Risk
- Perform tree maintenance immediately to reduce hazards
- Includes tree removal and pruning
- Mostly high-use areas

High Risk
- Perform tree maintenance immediately to reduce hazards and improve tree health
- Includes tree removal and pruning
- Generally high-use areas

Moderate Risk
- Perform tree maintenance as soon as possible to improve tree health
- Includes tree removal and pruning
- May be high- or low-use areas

Low Risk
- Perform tree maintenance when convenient to improve aesthetics and eliminate nuisance trees and stumps
- Includes tree removals and pruning
- Mostly low-use areas but may be high-use areas as well

Routine Pruning
- Perform tree maintenance when convenient to improve aesthetics and eliminate nuisance trees

Training Prune
- Perform corrective pruning to young trees to increase structural integrity and develop a strong architecture of branches before serious problems develop

Tree and Stump Removal

Although tree removal is usually considered a last resort and may sometimes influence a reaction from the community, there are circumstances in which removal is necessary. Trees fail from natural causes, such as diseases, insects, and weather conditions, and from physical injury due to vehicles, vandalism, and root disturbances. Davey Resource Group recommends that trees be removed when corrective pruning will not adequately eliminate the hazard or when correcting problems would be cost-prohibitive. Trees that cause obstructions or interfere with power lines or other infrastructure should be removed when their defects cannot be corrected through pruning or other maintenance practices. Diseased and nuisance trees also warrant removal.

Even though large short-term expenditures may be required, it is important to secure the funding needed to complete priority tree removals. Expedient removal reduces risk and promotes public safety.

Figures 9a and 9b present tree removals by risk rating and diameter size class. The following sections briefly summarize the recommended removals identified during the inventory.


	1″–3″	4″–6″	7″–12″	13″–18″	19″–24″	25″–30″	31″–36″	37″–42″	≥43″
Extreme	0	0	0	0	0	0	0	0	0
High	0	0	0	2	7	3	6	4	0
Moderate	0	0	7	39	86	44	16	15	3
Low	8	10	22	51	42	19	8	3	3

Diameter Size Class
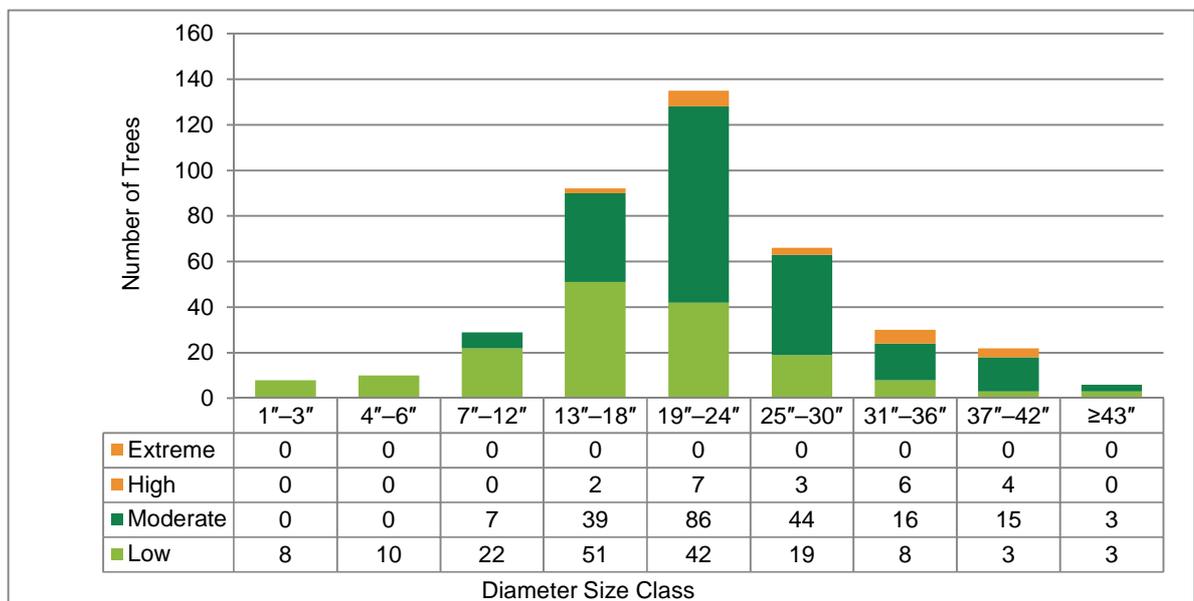
Figure 8a. Tree removals by risk rating and diameter size class for Crandall Park.
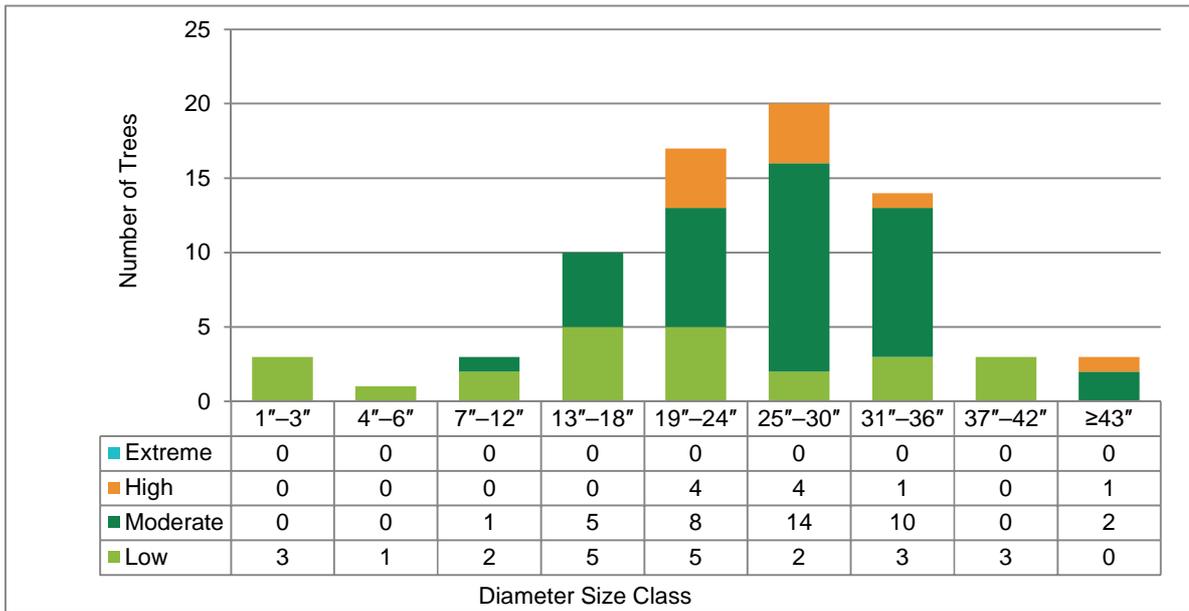
Figure 8b. Tree removals by risk rating and diameter size class for Boulevard Park.

	1″–3″	4″–6″	7″–12″	13″–18″	19″–24″	25″–30″	31″–36″	37″–42″	≥43″
Extreme	0	0	0	0	0	0	0	0	0
High	0	0	0	0	4	4	1	0	1
Moderate	0	0	1	5	8	14	10	0	2
Low	3	1	2	5	5	2	3	3	0

Diameter Size Class

Findings

The Crandall Park inventory identified 0 Extreme Risk trees, 22 High Risk trees, 210 Moderate Risk trees, and 166 Low Risk trees that are recommended for removal. The Boulevard Park inventory identified 0 Extreme Risk trees, 10 High Risk trees, 40 Moderate Risk trees, and 24 Low Risk trees that are recommended for removal.

In Crandall Park, the diameter size classes for High Risk trees ranged between 13–18 inches diameter at breast height (DBH) and 37-42 inches DBH. In Boulevard Park, the diameter size classes for High Risk trees ranged between 19–24 inches diameter at breast height (DBH) and greater than 43 inches DBH. These trees should be removed immediately based on their assigned risk. Extreme and High Risk removals and pruning should be performed concurrently.

In Crandall Park, Moderate Risk trees identified for removal were smaller than 43 inches DBH. In Boulevard Park, Moderate Risk trees identified for removal were smaller than 43 inches DBH. These trees should be removed as soon as possible after all Extreme and High Risk removals and pruning have been completed.

Low Risk removals pose the least risk and include small, dead, invasive, or poorly-formed trees that need to be removed. Eliminating these trees will reduce breeding site locations for insects and diseases and will increase the aesthetic value of the area. Healthy trees growing in poor locations or undesirable species are also included in this category. All Low Risk trees should be removed when convenient and after all High and Moderate Risk removals have been completed. The inventory identified 166 Low Risk Removals in Crandall Park and 24 Low Risk Removals in Boulevard Park. In the 7-year budget table created for each neighborhood, Moderate Risk and Low Risk Tree Removals were grouped together. They can be addressed on their own or can be addressed concurrently with the Routine Prune (RP) cycle.

The inventory identified 10 ash trees recommended for removal in Crandall Park and 4 ash trees recommended for removal in Boulevard Park.

The inventory identified 50 stumps recommended for removal in Crandall Park and 17 stumps recommended for removal in Boulevard Park. Almost all of these stumps were larger than 10 inches in diameter. Stump removals should occur when funding and priorities allow.

Discussion/Recommendations

Trees noted as having cavity or decay (363 Crandall Park trees, 79 Boulevard Park Trees) should be inspected on a regular basis. Corrective action should be taken when warranted. If their condition worsens, tree removal may be required. Proactive tree maintenance that actively mitigates elevated-risk situations will promote public safety. As tree work is completed the inventory should be updated to reflect those changes. When trees are removed, the inventory data should be changed to change the site to stump; and when stumps are ground, the inventory data should be changed to manage vacant planting sites. Updating the tree inventory data can streamline work load management and lend insight into setting accurate budgets and staffing levels. Inventory updates should be made electronically and can be implemented using *TreeKeeper 7.7* or similar computer software.

Tree Pruning

Extreme and High Risk pruning generally requires the removal of large defects in the tree canopy such as dead and/or broken branches. The elevated level of risk associated with these trees can usually be reduced by pruning or removing the defective branch or branches. Mitigating this risk by removing the defective part of the tree allows them to be included in future proactive, routine pruning cycles. In some cases, these trees are marked for further inspection because the extent of concern relating to tree defects may not be discernible from the ground.

Figures 10a and 10b present the number of High Risk trees recommended for pruning by size class. The following sections briefly summarize the recommended pruning maintenance identified during the inventory.

	1″–3″	4″–6″	7″– 12″	13″–18″	19″– 24″	25″–30″	31″– 36″	37″– 42″	≥43″
■Extreme	0	0	0	0	0	0	0	0	0
■High	0	0	0	0	0	2	7	2	0

Diameter Size Class (inches)
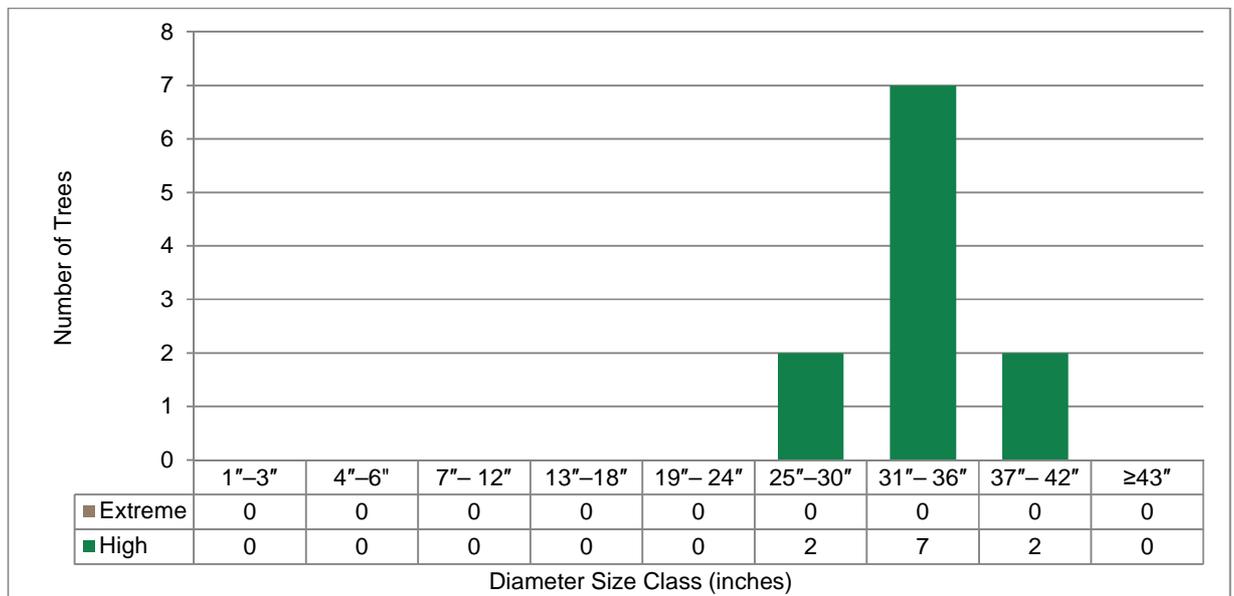
Figure 9a. Extreme and High Risk pruning by diameter size class for Crandall Park.

Figure 9b. Extreme and High Risk pruning by diameter size class for Boulevard Park.

Findings

The Crandall Park inventory identified 11 High Risk trees, and Boulevard Park inventory identified 4 High Risk trees Risk trees recommended for pruning.

High Risk trees ranged in diameter size classes from 25–28 inches DBH to 37–42 inches DBH in Crandall Park and from 7–12 inches DBH to 31–36 inches DBH in Boulevard Park. This pruning should be performed immediately based on assigned risk and should be performed concurrently with other Extreme and High Risk removals and pruning. Moderate and Low Risk trees recommended for pruning should be included in a proactive, routine pruning cycle after all the higher risk trees are addressed.


$$Y = 76.7 + 0.196X - 0.074X^2$$
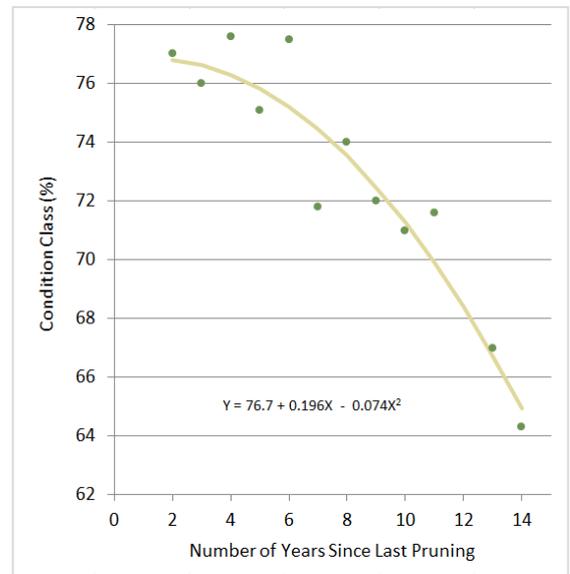
Figure 10. Relationship between average tree condition class and the number of years since the most recent pruning (adapted from Miller and Sylvester 1981).

Pruning Cycles

The goals of pruning cycles are to visit, assess, and prune trees on a regular schedule to improve health and reduce risk. Davey Resource Group recommends that pruning cycles begin after all Extreme and High Risk trees are corrected through removal or pruning. However, due to the long-term benefits of pruning cycles, Davey Resource Group recommends that the cycles be implemented as soon as possible. To ensure that all trees receive the type of pruning they need to mature with better structure and lower associated risk, two pruning cycles are recommended: the young tree training cycle (YTT Cycle) and the routine pruning cycle (RP Cycle). The cycles differ in the type of pruning, the general age of the target tree, and length.

The recommended number of trees in the pruning cycles will need to be modified to reflect changes in the tree population as trees are planted, age, and die. Newly planted trees will enter the YTT Cycle once they become established. As young trees reach maturity, they will be shifted from the YTT Cycle into the RP Cycle. When a tree reaches the end of its useful life, it should be removed and eliminated from the RP Cycle.

For many communities, a proactive tree management program is considered unfeasible. An on-demand response to urgent situations is the norm. Research has shown that a proactive program that includes a routine pruning cycle will improve the overall health of a tree population (Miller and Sylvester 1981). Proactive tree maintenance has many advantages over on-demand maintenance, the most significant of which is reduced risk. In a proactive program, trees are regularly assessed and pruned, which helps detect and eliminate most defects before they escalate to a hazardous situation with an unacceptable level of risk. Other advantages of a proactive program include: increased environmental and economic benefits from trees, more predictable budgets and projectable workloads, and reduced long-term tree maintenance costs.
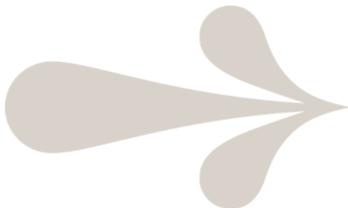
Why Prune Trees on a Cycle?

Miller and Sylvester (1981) examined the frequency of pruning for 40,000 street and boulevard trees in Milwaukee, Wisconsin. They documented a decline in tree health as the length of the pruning cycle increased. When pruning was not completed for more than 10 years, the average tree condition was rated 10% lower than when trees had been pruned within the last several years. Miller and Sylvester suggested that a pruning cycle of five years is optimal for urban trees.

Young Tree Training Cycle

Trees included in the YTT Cycle are generally less than 8 inches DBH. These younger trees may have form or structural defects that can be corrected with pruning from the ground with hand tools. Tree form or structural concerns include codominant leaders, poor branch spacing, or crossing/interfering limbs. Correcting these issues with a YTT program is a cost effective approach to reducing tree related risk by managing structural issues before the trees age and become more costly to manage defects. The objective is to promote a healthy and structurally sound tree by pruning for one dominant leader and strong branch architecture before the tree ages and requires aerial equipment.

Most trees get a YTT prune two times before moving up in size class and entering the RP Cycle. Young trees tend to grow at faster rates (on average) than more mature trees; therefore, the recommended length of a YTT Cycle is three years. The YTT Cycle differs from the RP Cycle in that young trees generally can be pruned from the ground with a pole pruner or pruning shear.

Recommendations

Davey Resource Group recommends that the City of Youngstown implement a three-year YTT Cycle in both Crandall Park and Boulevard Park neighborhoods. During the inventory, 161 trees smaller than 8 inches DBH in Crandall Park and 91 trees smaller than 8 inches DBH in Boulevard Park were inventoried and recommended for young tree training. Since the number of existing young trees is relatively small, and the benefit of beginning the YTT Cycle is substantial, Davey Resource Group recommends that an average of 30 trees in Crandall Park and 53 trees in Boulevard be structurally pruned each year over three years, beginning in Year One of the management program.

If new trees are planted, they will need to enter the YTT Cycle. Wait 1–3 years after planting before pruning to allow the tree to recover from the stress of transplanting.

In future years, the number of trees in the YTT Cycle will be based on tree planting efforts and growth rates of young trees. The City of Youngstown should strive to prune approximately one-third of all its young trees each year.


Figure 11a. Trees recommended for the YTT Cycle by diameter size class for Crandall Park.
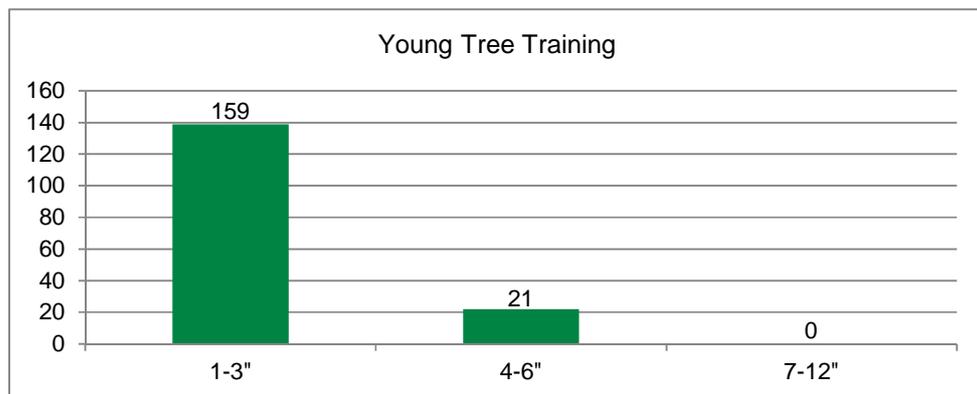

Figure 11b. Trees recommended for the YTT Cycle by diameter size class for Boulevard Park.

Routine Pruning Cycle

The RP Cycle includes established, maturing, and mature trees (mostly greater than 8 inches DBH) that need cleaning, crown raising, and reducing to remove deadwood and improve structure. Over time, routine pruning can reduce reactive maintenance, minimize instances of elevated risk, and provide the basis for a more defensible risk management program. Included in this cycle are Moderate and Low Risk trees that require pruning and pose some risk but have a smaller size of defect and/or less potential for target impact. The defects found within these trees can usually be remediated during the RP Cycle.

The length of the RP Cycle is based on the size of the tree population and what was assumed to be a reasonable number of trees for a program to prune per year based on budget. Generally, the RP Cycle recommended for a tree population is seven years but was extended to seven years for the City of Youngstown due to unaccounted trees and limited budget.


Risk Rating	1″–3″	4″–6″	7″–12″	13″–18″	19″–24″	25″–30″	31″–36″	37″–42″	≥43″
Moderate	0	0	0	15	37	31	42	20	11
Low	12	32	125	149	181	113	74	30	10
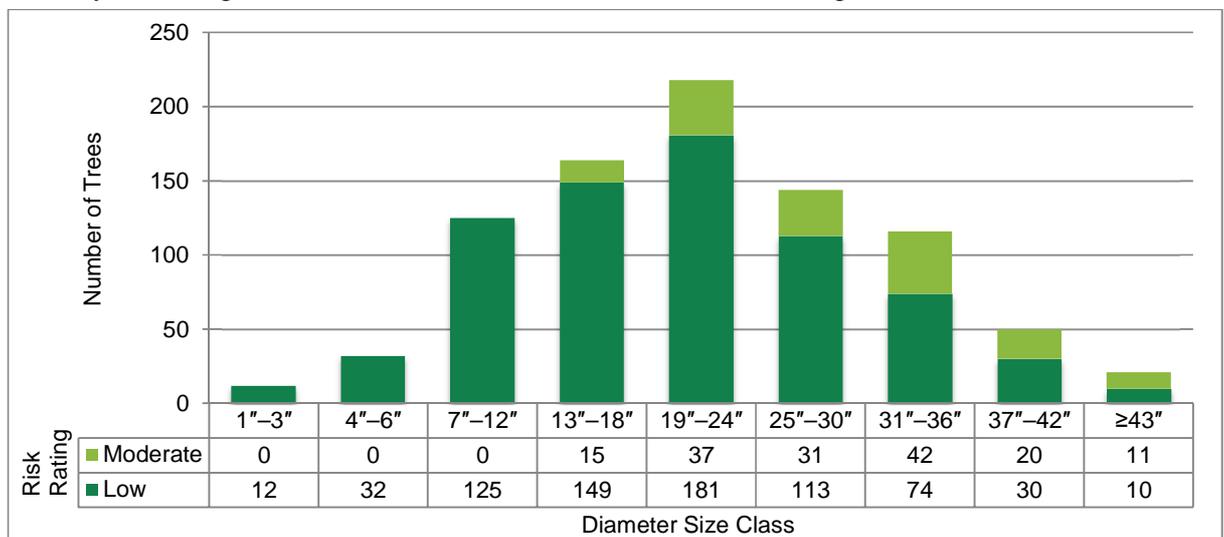
Figure 12a. Trees recommended for the RP Cycle by diameter size class for Crandall Park.

| Risk Rating	1″–3″	4″–6″	7″–12″	13″–18″	19″–24″	25″–30″	31″–36″	37″–42″	≥43″
Moderate	0	0	0	0	4	2	10	7	5
Low	0	7	38	66	53	31	23	7	6
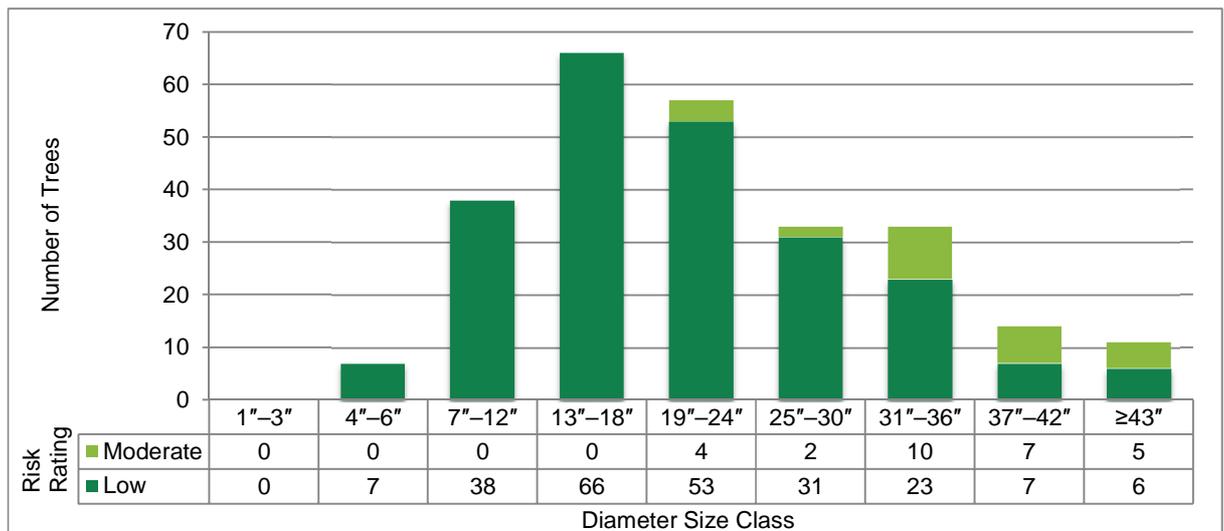
Figure 12b. Trees recommended for the RP Cycle by diameter size class for Boulevard Park.

Recommendations

Davey Resource Group recommends that the City of Youngstown helps the Crandall Park and Boulevard Park neighborhoods establish a seven-year RP Cycle. The 2016 tree inventory identified approximately 882 trees in Crandall Park and 259 trees in Boulevard Park that should be pruned each year over a seven-year RP Cycle. An average of 127 trees in Crandall Park and 37 trees in Boulevard Park should be pruned each year over the course of the cycle. Davey Resource Group recommends that the RP Cycle begin in Year One of this seven-year plan, after all Extreme and High Risk trees are pruned.

The inventory found that most trees (64% in Crandall Park and 52% in Boulevard Park) on the street ROW needed routine pruning. Figures 12a and 12b show a breakdown of the size classes for moderate and low risk trees that requires a Tree Clean pruning.

Crandall Park Maintenance Schedule

Utilizing data from the 2016 Crandall Park tree inventory, an annual maintenance schedule was developed that details the number and type of tasks recommended for completion each year. Davey Resource Group made budget projections using industry knowledge and public bid tabulations. A summary of the maintenance schedule is presented (right); a complete table of estimated costs for Crandall Park's seven-year tree management program is presented in Table 3a.

FY 2017   **$237,445**
- 22 Extreme or High Risk Removals
- 11 Extreme or High Risk Prunes
- 210 Moderate Risk Removals
- 50 Stump Removals
- RP Cycle: 1/7 of Public Trees Cleaned
- YTT Cycle: 30 Trees
- 120 Trees Recommended for Planting and Follow-Up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY 2018   **$142,514**
- 166 Low Risk Removals
- RP Cycle: 1/7 of Public Trees Cleaned
- YTT Cycle: 30 Trees
- 120 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY 2019   **$63,000**
- RP Cycle 1/7 of Public Trees Cleaned
- YTT Cycle: 30 Trees
- 120 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY 2020   **$62,310**
- RP Cycle: 1/7 of Public Trees Cleaned
- 120 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY 2021   **$62,310**
- RP Cycle: 1/7 of Public Trees Cleaned
- 120 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY2022   **$62,310**
- RP Cycle: 1/7 of Public Trees Cleaned - 127 Trees
- 120 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY2023   **$62,310**
- RP Cycle: 1/7 of Public Trees Cleaned - 127 Trees
- 120 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

The schedule provides a framework for completing the inventory maintenance recommendations over the next seven years. Following this schedule can shift tree care activities from an on-demand system to a more proactive tree care program.

To implement the maintenance schedule, The City of Youngstown's budget for Crandall Park's tree maintenance should be no less than $237,445 for the first year of implementation, no less than $142,514 for the second year, no less than $63,000 for the third year, and no less than $62,310 for the final four years of the maintenance schedule. Annual budget funds are needed to ensure that extreme and high risk trees are remediated and that crucial YTT and RP Cycles can begin. With proper professional tree care, the safety, health, and beauty of the urban forest will improve.

If routing efficiencies and/or contract specifications allow for the completion of more tree work, or if the schedule requires modification to meet budgetary or other needs, then the schedule should be modified accordingly. Unforeseen situations such as severe weather events may arise and change the maintenance needs of trees. Should conditions or maintenance needs change, budgets and equipment will need to be adjusted to meet the new demands.

Table 3a. Estimated Costs for Seven-Year Urban Forestry Management Program for Crandall Park

Estimated Costs for Each Activity			Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Five-Year Cost
Activity	Diameter	Cost/Tree	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	
Extreme or High-Risk Removal	1-3"	$28	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	4-6"	$28	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	7-12"	$138	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	13-18"	$314	2	$627	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$627
	19-24"	$605	7	$4,235	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$4,235
	25-30"	$825	3	$2,475	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$2,475
	31-36"	$1,045	6	$6,270	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$6,270
	37-42"	$1,485	4	$5,940	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$5,940
	43"+	$2,035	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Activity Total(s)			**22**	**$19,547**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$19,547**
Moderate and Low-Risk Removal	1-3"	$28	0	$0	8	$220	0	$0	0	$0	0	$0	0	$0	0	$0	$220
	4-6"	$28	0	$0	10	$275	0	$0	0	$0	0	$0	0	$0	0	$0	$275
	7-12"	$138	7	$963	22	$3,025	0	$0	0	$0	0	$0	0	$0	0	$0	$3,988
	13-18"	$314	39	$12,227	51	$15,989	0	$0	0	$0	0	$0	0	$0	0	$0	$28,215
	19-24"	$605	86	$52,030	42	$25,410	0	$0	0	$0	0	$0	0	$0	0	$0	$77,440
	25-30"	$825	44	$36,300	19	$15,675	0	$0	0	$0	0	$0	0	$0	0	$0	$51,975
	31-36"	$1,045	16	$16,720	8	$8,360	0	$0	0	$0	0	$0	0	$0	0	$0	$25,080
	37-42"	$1,485	15	$22,275	3	$4,455	0	$0	0	$0	0	$0	0	$0	0	$0	$26,730
	43"+	$2,035	3	$6,105	3	$6,105	0	$0	0	$0	0	$0	0	$0	0	$0	$12,210
Activity Total(s)			**210**	**$146,619**	**166**	**$79,514**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$226,133**
Stump Removal	1-3"	$28	2	$55	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$55
	4-6"	$28	1	$28	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$28
	7-12"	$44	5	$220	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$220
	13-18"	$72	10	$715	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$715
	19-24"	$94	7	$655	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$655
	25-30"	$110	12	$1,320	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$1,320
	31-36"	$138	9	$1,238	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$1,238
	37-42"	$160	1	$160	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$160
	43"+	$182	3	$545	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$545
Activity Total(s)			**50**	**$4,934**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$4,934**
Extreme or High-Risk Prune	1-3"	$20	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	4-6"	$30	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	7-12"	$75	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	13-18"	$120	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	19-24"	$170	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	25-30"	$225	2	$450	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$450
	31-36"	$305	7	$2,135	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$2,135
	37-42"	$380	2	$760	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$760
	43"+	$590	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Activity Total(s)			**11**	**$3,345**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$3,345**
Routine Pruning (7-year cycle)	1-3"	$20	2	$40	2	$40	2	$40	2	$40	2	$40	2	$40	2	$40	$200
	4-6"	$30	5	$150	5	$150	5	$150	5	$150	5	$150	5	$150	5	$150	$750
	7-12"	$75	18	$1,350	18	$1,350	18	$1,350	18	$1,350	18	$1,350	18	$1,350	18	$1,350	$6,750
	13-18"	$120	23	$2,760	23	$2,760	23	$2,760	23	$2,760	23	$2,760	23	$2,760	23	$2,760	$13,800
	19-24"	$170	31	$5,270	31	$5,270	31	$5,270	31	$5,270	31	$5,270	31	$5,270	31	$5,270	$26,350
	25-30"	$225	21	$4,725	21	$4,725	21	$4,725	21	$4,725	21	$4,725	21	$4,725	21	$4,725	$23,625
	31-36"	$305	17	$5,185	17	$5,185	17	$5,185	17	$5,185	17	$5,185	17	$5,185	17	$5,185	$25,925
	37-42"	$380	7	$2,660	7	$2,660	7	$2,660	7	$2,660	7	$2,660	7	$2,660	7	$2,660	$13,300
	43"+	$590	3	$1,770	3	$1,770	3	$1,770	3	$1,770	3	$1,770	3	$1,770	3	$1,770	$8,850
Activity Total(s)			**127**	**$23,910**	**127**	**$23,910**	**127**	**$23,910**	**127**	**$23,910**	**127**	**$23,910**	**127**	**$23,910**	**127**	**$23,910**	**$119,550**
Young Tree Training Pruning (3-year cycle)	1-3"	$20	21	$420	21	$420	21	$420	0	$0	0	$0	0	$0	0	$0	$1,260
	4-8"	$30	9	$270	9	$270	9	$270	0	$0	0	$0	0	$0	0	$0	$810
Activity Total(s)			**30**	**$690**	**30**	**$690**	**30**	**$690**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$2,070**
Replacement Tree Planting	Purchasing	$110	120	$13,200	120	$13,200	120	$13,200	120	$13,200	120	$13,200	120	$13,200	120	$13,200	$66,000
	Planting	$110	120	$13,200	120	$13,200	120	$13,200	120	$13,200	120	$13,200	120	$13,200	120	$13,200	$66,000
Activity Total(s)			**240**	**$26,400**	**240**	**$26,400**	**240**	**$26,400**	**240**	**$26,400**	**240**	**$26,400**	**240**	**$26,400**	**240**	**$26,400**	**$132,000**
Replacement Young Tree Maintenance	Mulching	$100	120	$12,000	120	$12,000	120	$12,000	120	$12,000	120	$12,000	120	$12,000	120	$12,000	$60,000
	Watering	$100	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Activity Total(s)			**120**	**$12,000**	**120**	**$12,000**	**120**	**$12,000**	**120**	**$12,000**	**120**	**$12,000**	**120**	**$12,000**	**120**	**$12,000**	**$60,000**
Activity Grand Total			**690**		**563**		**397**		**367**		**367**		**367**		**367**		**2,384**
Cost Grand Total				**$237,445**		**$142,514**		**$63,000**		**$62,310**		**$62,310**		**$62,310**		**$62,310**	**$567,578**

Boulevard Park Maintenance Schedule

Utilizing data from the 2016 Boulevard Park tree inventory, an annual maintenance schedule was developed that details the number and type of tasks recommended for completion each year. Davey Resource Group made budget projections using industry knowledge and public bid tabulations. A summary of the maintenance schedule is presented (right); a complete table of estimated costs for Boulevard Park's seven-year tree management program is presented in Table 3b.

The schedule provides a framework for completing the inventory maintenance recommendations over the next seven years. Following this schedule can shift tree care activities from an on-demand system to a more proactive tree care program.

To implement the maintenance schedule, the neighborhood's tree maintenance budget should be no less than $63,895 for the first year of implementation, no less than $41,015 for the second year, no less than $19,125 for year three, and no less than $17,995 for the remaining four years of the maintenance schedule. Annual budget funds are needed to ensure that extreme and high risk trees are remediated and that crucial YTT and RP Cycles can begin. With proper professional tree care, the safety, health, and beauty of the urban forest will improve.

If routing efficiencies and/or contract specifications allow for the completion of more tree work, or if the schedule requires modification to meet budgetary or other needs, then the schedule should be modified accordingly. Unforeseen situations such as severe weather events may arise and change the maintenance needs of trees. Should conditions or maintenance needs change, budgets and equipment will need to be adjusted to meet the new demands.

FY 2017 $63,895
- 10 Extreme or High Risk Removals
- 4 Extreme or High Risk Prunes
- 38 Moderate or Low Risk Removals
- 17 Stump Removals
- RP Cycle: 1/7 of Public Trees Cleaned
- YTT Cycle: 53 Trees
- 33 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY 2018 $41,015
- 36 Moderate or Low Risk Removals
- RP Cycle: 1/7 of Public Trees Cleaned
- YTT Cycle: 53 Trees
- 33 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY 2019 $19,125
- RP Cycle 1/7 of Public Trees Cleaned
- YTT Cycle: 53 Trees
- 33 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs TBD

FY 2020 $17,995
- RP Cycle: 1/7 of Public Trees Cleaned
- 33 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs To Be Determined

FY 2021 $17,995
- RP Cycle: 1/7 of Public Trees Cleaned
- 33 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs To Be Determined

FY2022 $17,995
- RP Cycle: 1/7 of Public Trees Cleaned
- 33 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs To Be Determined

FY2023 $17,995
- RP Cycle: 1/7 of Public Trees Cleaned
- 33 Trees Recommended for Planting and Follow-up Care
- Newly Found Priority Tree Work (Removal or Pruning): Costs To Be Determined

Table 3b. Estimated Costs for Seven-year Urban Forestry Management Program for Boulevard Park

Estimated Costs for Each Activity			Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Five-Year Cost
Activity	Diameter	Cost/Tree	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	Five-Year Cost
Extreme or High-Risk Removal	1-3"	$28	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	4-6"	$28	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	7-12"	$138	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	13-18"	$314	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	19-24"	$605	4	$2,420	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$2,420
	25-30"	$825	4	$3,300	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$3,300
	31-36"	$1,045	1	$1,045	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$1,045
	37-42"	$1,485	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	43"+	$2,035	1	$2,035	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$2,035
Activity Total(s)			**10**	**$8,800**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$8,800**
Moderate and Low-Risk Removal	1-3"	$28	0	$0	3	$83	0	$0	0	$0	0	$0	0	$0	0	$0	$83
	4-6"	$28	0	$0	1	$28	0	$0	0	$0	0	$0	0	$0	0	$0	$28
	7-12"	$138	0	$0	3	$413	0	$0	0	$0	0	$0	0	$0	0	$0	$413
	13-18"	$314	5	$1,568	5	$1,568	0	$0	0	$0	0	$0	0	$0	0	$0	$3,135
	19-24"	$605	10	$6,050	7	$4,235	0	$0	0	$0	0	$0	0	$0	0	$0	$10,285
	25-30"	$825	10	$8,250	10	$8,250	0	$0	0	$0	0	$0	0	$0	0	$0	$16,500
	31-36"	$1,045	7	$7,315	7	$7,315	0	$0	0	$0	0	$0	0	$0	0	$0	$14,630
	37-42"	$1,485	3	$4,455	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$4,455
	43"+	$2,035	3	$6,105	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$6,105
Activity Total(s)			**38**	**$33,743**	**36**	**$21,890**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$55,633**
Stump Removal	1-3"	$28	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	4-6"	$28	1	$28	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$28
	7-12"	$44	4	$176	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$176
	13-18"	$72	6	$429	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$429
	19-24"	$94	2	$187	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$187
	25-30"	$110	1	$110	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$110
	31-36"	$138	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	37-42"	$160	1	$160	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$160
	43"+	$182	2	$363	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$363
Activity Total(s)			**17**	**$1,452**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$1,452**
Extreme or High-Risk Prune	1-3"	$20	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	4-6"	$30	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	7-12"	$75	1	$75	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$75
	13-18"	$120	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	19-24"	$170	1	$170	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$170
	25-30"	$225	1	$225	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$225
	31-36"	$305	1	$305	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$305
	37-42"	$380	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	43"+	$590	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Activity Total(s)			**4**	**$775**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$775**
Routine Pruning (5-year cycle)	1-3"	$20	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	4-6"	$30	1	$30	1	$30	1	$30	1	$30	1	$30	1	$30	1	$30	$150
	7-12"	$75	5	$375	5	$375	5	$375	5	$375	5	$375	5	$375	5	$375	$1,875
	13-18"	$120	9	$1,080	9	$1,080	9	$1,080	9	$1,080	9	$1,080	9	$1,080	9	$1,080	$5,400
	19-24"	$170	8	$1,360	8	$1,360	8	$1,360	8	$1,360	8	$1,360	8	$1,360	8	$1,360	$6,800
	25-30"	$225	5	$1,125	5	$1,125	5	$1,125	5	$1,125	5	$1,125	5	$1,125	5	$1,125	$5,625
	31-36"	$305	5	$1,525	5	$1,525	5	$1,525	5	$1,525	5	$1,525	5	$1,525	5	$1,525	$7,625
	37-42"	$380	2	$760	2	$760	2	$760	2	$760	2	$760	2	$760	2	$760	$3,800
	43"+	$590	2	$1,180	2	$1,180	2	$1,180	2	$1,180	2	$1,180	2	$1,180	2	$1,180	$5,900
Activity Total(s)			**37**	**$7,435**	**37**	**$7,435**	**37**	**$7,435**	**37**	**$7,435**	**37**	**$7,435**	**37**	**$7,435**	**37**	**$7,435**	**$37,175**
Young Tree Training Pruning (3-year cycle)	1-3"	$20	46	$920	46	$920	46	$920	0	$0	0	$0	0	$0	0	$0	$2,760
	4-8"	$30	7	$210	7	$210	7	$210	0	$0	0	$0	0	$0	0	$0	$630
Activity Total(s)			**53**	**$1,130**	**53**	**$1,130**	**53**	**$1,130**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$3,390**
Replacement Tree Planting	Purchasing	$110	33	$3,630	33	$3,630	33	$3,630	33	$3,630	33	$3,630	33	$3,630	33	$3,630	$18,150
	Planting	$110	33	$3,630	33	$3,630	33	$3,630	33	$3,630	33	$3,630	33	$3,630	33	$3,630	$18,150
Activity Total(s)			**66**	**$7,260**	**66**	**$7,260**	**66**	**$7,260**	**66**	**$7,260**	**66**	**$7,260**	**66**	**$7,260**	**66**	**$7,260**	**$36,300**
Replacement Young Tree Maintenance	Mulching	$100	33	$3,300	33	$3,300	33	$3,300	33	$3,300	33	$3,300	33	$3,300	33	$3,300	$16,500
	Watering	$100	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Activity Total(s)			**33**	**$3,300**	**33**	**$3,300**	**33**	**$3,300**	**33**	**$3,300**	**33**	**$3,300**	**33**	**$3,300**	**33**	**$3,300**	**$16,500**
Activity Grand Total			**225**		**192**		**156**		**103**		**103**		**103**		**103**		**$779**
Cost Grand Total				**$63,895**		**$41,015**		**$19,125**		**$17,995**		**$17,995**		**$17,995**		**$17,995**	**$160,025**

Community Outreach

The data collected and analyzed to develop this plan contribute significant information about the tree population and can be utilized to guide the proactive management of that resource. These data can also be utilized to promote the value of the urban forest and the tree management program in the following ways:

- Tree inventory data can be used to justify necessary priority and proactive tree maintenance activities as well as tree planting and preservation initiatives.
- Species data can be used to guide tree species selection for planting projects with the goals of improving species diversity and limiting the introduction of invasive pests and diseases.
- Information in this plan can be used to advise citizens about threats to urban trees (such as granulate ambrosia beetle, Asian longhorned beetle, and gypsy moth).

There are various avenues for outreach. Maps can be created and posted on websites, in parks, or in business areas. Public service announcements can be developed. Articles can be written and programs about trees and the benefits they provide can be developed. Arbor Day and Earth Day celebrations can become community traditions. Signs can be hung from trees to highlight the contributions trees make to the community. Contests can even be created to increase awareness of the importance of trees. Trees provide oxygen we need to breathe, shade to cool our neighborhoods, and canopies to stand under when it rains.

The City of Youngstown and YNDC can use tree inventory data and this Management Plan to provide tangible and meaningful outreach about the urban forest.

Inspections

Inspections are essential to uncovering potential problems with trees. They should be performed by a qualified arborist who is trained in the art and science of planting, caring for, and maintaining individual trees. Arborists are knowledgeable about the needs of trees and are trained and equipped to provide proper care.

Trees along the street ROW should be regularly inspected and attended to as needed based on the inspection findings. When trees need additional or new work, they should be added to the maintenance schedule and budgeted as appropriate. Use appropriate computer management software such as *TreeKeeper® 7.7* to update inventory data and work records. In addition to locating potential new hazards, inspections are an opportunity to look for signs and symptoms of pests and diseases. The City of Youngstown has a large population of trees that are susceptible to pests and diseases, such as ash, oak, and maple.

Inventory and Plan Updates

Davey Resource Group recommends that the inventory and management plan be updated using an appropriate computer software program so that The City of Youngstown or the YNDC can sustain its program and accurately project future program and budget needs:

- Conduct inspections of trees after all severe weather events. Record changes in tree condition, maintenance needs, and risk rating in the inventory database. Update the tree maintenance schedule and acquire the funds needed to promote public safety. Schedule and prioritize work based on risk.
- Perform routine inspections of public trees as needed. Windshield surveys (inspections performed from a vehicle) in line with *ANSI A300 (Part 9)* (ANSI 2011) will help Youngstown City and YNDC staff stay apprised of changing conditions. Update the tree maintenance schedule and the budget as needed so that identified tree work may be efficiently performed. Schedule and prioritize work based on risk.

- If the recommended work cannot be completed as suggested in this plan, modify maintenance schedules and budgets accordingly.
- Update the inventory database using *TreeKeeper® 7.7* as work is performed. Add new tree work to the schedule when work is identified through inspections or a citizen call process.
- Re-inventory the street ROW, and update all data fields in seven years.
- Revise the *Tree Management Plan* after seven years when the re-inventory has been completed.

CONCLUSIONS

Every hour of every day, public trees in The City of Youngstown are supporting and improving the quality of life. When properly maintained, trees provide numerous environmental, economic, and social benefits that far exceed the time and money invested in planting, pruning, protection, and removal.

Managing trees in urban areas and neighborhood districts is often complicated. Navigating the recommendations of experts, the needs of residents, the pressures of local economics and politics, concerns for public safety and liability, physical components of trees, forces of nature and severe weather events, and the expectation that these issues are resolved all at once is a considerable challenge. The city should prepare and implement an EAB Management Plan as soon as possible.

The City of Youngstown and its urban forestry partners must carefully consider these challenges to fully understand the needs of maintaining an urban forest. Having a tree inventory done for two separate neighborhoods in two separate neighborhood districts may provide insight into the overall city tree population, but projecting information from this small data sample is reliant on assumptions that the tree population that is unaccounted for is similar to Crandall Park and Boulevard Park tree populations. Without a full tree inventory for the entire city, the understanding of risk management and maintenance priorities is tempered and may not contribute to urban forestry improvement outside the neighborhoods of Crandall Park and Boulevard Park. If the management program is successfully implemented in these neighborhoods, the success of that program should be used to justify future management activities. That directive will benefit The City of Youngstown visitors and residents for years to come.

GLOSSARY

aboveground utilities (data field): Shows the presence or absence of overhead utilities at the tree site.

address number (data field): The address number was recorded based on the visual observation by the Davey Resource Group arborist at the time of the inventory of the actual address number posted on a building at the inventoried site. In instances where there was no posted address number on a building or sites were located by vacant lots with no GIS parcel addressing data available, the address number assigned was matched as closely as possible to opposite or adjacent addresses by the arborist(s) and an "X" was added to the number in the database to indicate that the address number was assigned.

American National Standards Institute (ANSI): ANSI is a private, nonprofit organization that facilitates the standardization work of its members in the United States. ANSI's goals are to promote and facilitate voluntary consensus standards and conformity assessment systems, and to maintain their integrity.

ANSI A300: Tree care performance parameters established by ANSI that can be used to develop specifications for tree maintenance.

arboriculture: The art, science, technology, and business of commercial, public, and utility tree care.

area (data fields): A collection of data fields collected during the inventory to aid in finding trees, including park section number.

block side (data field): Address information for a site that includes the *on street*, *from street*, and *to street*. The *on street* is the street on which the site is actually located. The *from street* is the cross street from which one moves away when heading in the direction of traffic flow. The *to street* is the cross street from which one moves towards when heading in the direction of traffic flow.

canopy: Branches and foliage that make up a tree's crown.

canopy cover: As seen from above, it is the area of land surface that is covered by tree canopy.

community forest: see **urban forest**.

condition (data field): The general condition of each tree rated during the inventory according to the following categories adapted from the International Society of Arboriculture's rating system: Excellent (100%), Very Good (90%), Good (80%), Fair (60%), Poor, (40%), Critical (20%), Dead (0%).

cycle: Planned length of time between vegetation maintenance activities.

defect: See **structural defect**.

diameter: See **tree size**.

diameter at breast height (DBH): See **tree size**.

Extreme Risk tree: Applies in situations where tree failure is imminent, there is a high likelihood of impacting the target, and the consequences of the failure are "severe." In some cases, this may mean immediate restriction of access to the target zone area in order to prevent injury.

failure: In terms of tree management, failure is the breakage of stem or branches, or loss of mechanical support of the tree's root system.

further inspection (data field): Notes that a specific tree may require an annual inspection for several years to make certain of its maintenance needs. A healthy tree obviously impacted by

recent construction serves as a prime example. This tree will need annual evaluations to assess the impact of construction on its root system. Another example would be a tree with a defect requiring additional equipment for investigation.

genus: A taxonomic category ranking below a family and above a species and generally consisting of a group of species exhibiting similar characteristics. In taxonomic nomenclature, the genus name is used, either alone or followed by a Latin adjective or epithet, to form the name of a species.

geographic information system (GIS): A technology that is used to view and analyze data from a geographic perspective. The technology is a piece of an organization's overall information system framework. GIS links location to information (such as people to addresses, buildings to parcels, or streets within a network) and layers that information to provide a better understanding of how it all interrelates.

global positioning system (GPS): GPS is a system of earth-orbiting satellites that make it possible for people with ground receivers to pinpoint their geographic location.

grow space size (data field): Identifies the minimum width of the tree grow space for root development.

grow space type (data field): Best identifies the type of location where a tree is growing. During the inventory, grow space types were categorized as island, median, open/restricted, open/unrestricted, raised planter, tree lawn/parkway, unmaintained/natural area, or well/pit.

hardscape damage (data field): Indicates trees damaged by hardscape or hardscape damaged by trees (for example, damage to curbs, cracking, lifting of sidewalk pavement 1 inch or more).

High Risk tree: The High Risk category applies when consequences are "significant" and likelihood is "very likely" or "likely," or consequences are "severe" and likelihood is "likely." In a population of trees, the priority of High Risk trees is second only to Extreme Risk trees.

invasive, exotic tree: A tree species that is out of its original biological community. Its introduction into an area causes or is likely to cause economic or environmental harm, or harm to human health. An invasive, exotic tree has the ability to thrive and spread aggressively outside its natural range. An invasive species that colonizes a new area may gain an ecological edge since the insects, diseases, and foraging animals that naturally keep its growth in check in its native range are not present in its new habitat.

inventory: See **tree inventory**.

i-Tree Streets: i-Tree Streets is a street tree management and analysis tool that uses tree inventory data to quantify the dollar value of annual environmental and aesthetic benefits: energy conservation, air quality improvement, CO_2 reduction, stormwater control, and property value increase.

location (data fields): A collection of data fields collected during the inventory to aid in finding trees, including address number, street name, site number, side, and block side.

location rating (data field): Describes/rates the position of a tree based on existing land use of the site, the functional and aesthetic contributions of the tree to the site, and surrounding structures or landscapes. Categories for location value include: Excellent, Good, Fair, and Poor. The location rating, along with species, size, and condition ratings, is used in determining a tree's value.

Low Risk tree: The Low Risk category applies when consequences are "negligible" and likelihood is "unlikely"; or consequences are "minor" and likelihood is "somewhat likely." Some trees with this level of risk may benefit from mitigation or maintenance measures, but immediate action is not usually required.

mapping coordinate (data field): Helps to locate a tree; X and Y coordinates were generated for each tree using GPS.

Moderate Risk tree: The Moderate Risk category applies when consequences are "minor" and likelihood is "very likely" or "likely"; or likelihood is "somewhat likely" and consequences are "significant" or "severe." In populations of trees, Moderate Risk trees represent a lower priority than High or Extreme Risk trees.

monoculture: A population dominated by one single species or very few species.

None (risk rating): Equal to zero. It is used only for planting sites and stumps.

None (Secondary Maintenance Need): Used to show that no secondary maintenance is recommended for the tree. Usually a vacant planting site or stump will have a secondary maintenance need of *none*.

notes (data field): Describes additional pertinent information.

observations (data field): When conditions with a specific tree warrant recognition, it was described in this data field. Observations include cavity decay, grate guard, improperly installed, improperly mulched, improperly pruned, mechanical damage, memorial tree, nutrient deficiency, pest problem, poor location, poor root system, poor structure, remove hardware, serious decline, and signs of stress.

ordinance: See **tree ordinance**.

overhead utilities (data field): The presence of overhead utility lines above a tree or planting site.

Plant Tree (Primary Maintenance Need): If collected during an inventory, this data field identifies planting sites as small, medium, or large (indicating the ultimate size that the tree will attain), depending on the growspace available and the presence of overhead wires.

Primary Maintenance Need (data field): The type of tree work needed to reduce immediate risk.

pruning: The selective removal of plant parts to meet specific goals and objectives.

Raise (Secondary Maintenance Need): Signifies a maintenance need for a tree. Raising the crown is characterized by pruning to remove low branches that interfere with sight and/or traffic. It is based on *ANSI A300 (Part 1)*.

Reduce (Secondary Maintenance Need): Signifies a maintenance need for a tree. Reducing the crown is characterized by selective pruning to decrease height and/or spread of the crown in order to provide clearance for electric utilities and lighting.

Removal (Primary Maintenance Need): Data field collected during the inventory identifying the need to remove a tree. Trees designated for removal have defects that cannot be cost-effectively or practically treated. Most of the trees in this category have a large percentage of dead crown.

Restore (Secondary Maintenance Need): Signifies a maintenance need for a tree. Restoring is selective pruning to improve the structure, form, and appearance of trees that have been severely headed, vandalized, or damaged.

right-of-way (ROW): See **street right-of-way**.

risk: Combination of the probability of an event occurring and its consequence.

risk assessment (data fields): The risk assessment is a point-based assessment of each tree by an arborist using a protocol based on the U.S. Forest Service Community Tree Risk Rating System. In the field, the probability of tree or tree part failure is assigned 1–4 points (identifies the most likely failure and rates the likelihood that the structural defect(s) will result in failure

based on observed, current conditions), the size of the defective tree part is assigned 1–3 points (rates the size of the part most likely to fail), the probability of target impact by the tree or tree part is assigned 1–3 points (rates the use and occupancy of the area that would be struck by the defective part), and other risk factors are assigned 0–2 points (used if professional judgment suggests the need to increase the risk rating). The data from the risk assessment is used to calculate the risk rating that is ultimately assigned to the tree.

risk rating: Level 2 qualitative risk assessment will be performed on the ANSI A300 (Part 9) and the companion publication *Best Management Practices: Tree Risk Assessment*, published by International Society of Arboriculture (2011). Trees can have multiple failure modes with various risk ratings. One risk rating per tree will be assigned during the inventory. The failure mode having the greatest risk will serve as the overall tree risk rating. The specified time period for the risk assessment is one year.

Secondary Maintenance Need (data field): Recommended maintenance for a tree, which may be risk oriented, such as raising the crown for clearance, but generally was geared toward improving the structure of the tree and enhancing aesthetics.

side value (data field): Each site is assigned a side value to aid in locating the site. Side values include: *front*, *side to*, *side away*, *median* (includes islands), and *rear* based on the site's location in relation to the lot's street frontage. The *front* side is the side that faces the address street. *Side to* is the name of the street the arborist is walking towards as data are being collected. The *side from* is the name of the street the arborist is walking away from while collecting data. *Median* indicates a median or island. The *rear* is the side of the lot opposite the front.

site number (data field): All sites at an address are assigned a *site number*. Sites numbers are not unique; they are sequential to the side of the address only (the only unique number is the tree identification number assigned to each site). Site numbers are collected in the direction of vehicular traffic flow. The only exception is a one-way street. Site numbers along a one-way street are collected as if the street were actually a two-way street, so some site numbers will oppose traffic.

species: Fundamental category of taxonomic classification, ranking below a genus or subgenus, and consisting of related organisms capable of interbreeding.

stem: A woody structure bearing buds and foliage, and giving rise to other stems.

stems (data field): Identifies the number of stems or trunks splitting less than 1 foot above ground level.

street name (data field): The name of a street right-of-way or road identified using posted signage or parcel information.

street right-of-way (ROW): A strip of land generally owned by a public entity over which facilities, such as highways, railroads, or power lines, are built.

street tree: A street tree is defined as a tree within the right-of-way.

structural defect: A feature, condition, or deformity of a tree or tree part that indicates weak structure and contributes to the likelihood of failure.

Stump Removal (Primary Maintenance Need): Indicates a stump that should be removed.

Thin (Secondary Maintenance Need): Signifies a maintenance need for a tree. Thinning the crown is the selective removal of water sprouts, epicormic branches, and live branches to reduce density.

topping: Characterized by reducing tree size using internodal cuts without regard to tree health or structural integrity; this is not an acceptable pruning practice.

tree: A tree is defined as a perennial woody plant that may grow more than 20 feet tall. Characteristically, it has one main stem, although many species may grow as multi-stemmed forms.

tree benefit: An economic, environmental, or social improvement that benefits the community and results mainly from the presence of a tree. The benefit received has real or intrinsic value associated with it.

Tree Clean (Primary Maintenance Need): Based on *ANSI A300 Standards*, these trees require selective removal of dead, dying, broken, and/or diseased wood to minimize potential risk.

tree height (data field): If collected during the inventory, the height of the tree is estimated by the arborist and recorded in 10-foot increments.

tree inventory: Comprehensive database containing information or records about individual trees typically collected by an arborist.

tree ordinance: Tree ordinances are policy tools used by communities striving to attain a healthy, vigorous, and well-managed urban forest. Tree ordinances simply provide the authorization and standards for management activities.

tree size (data field): A tree's diameter measured to the nearest inch in 1-inch size classes at 4.5 feet above ground, also known as diameter at breast height (DBH) or diameter.

urban forest: All of the trees within a municipality or a community. This can include the trees along streets or rights-of-way, in parks and greenspaces, in forests, and on private property.

urban tree canopy (UTC) assessment: A study performed of land cover classes to gain an understanding of the tree canopy coverage, particularly as it relates to the amount of tree canopy that currently exists and the amount of tree canopy that could exist. Typically performed using aerial photographs, GIS data, or Lidar.

Utility (Secondary Maintenance Need): Selective pruning to prevent the loss of service, comply with mandated clearance laws, prevent damage to equipment, avoid access impairment, and uphold the intended usage of the facility/utility space.

Vista Prune (Secondary Maintenance Need): Pruning to enhance a specific view without jeopardizing the health of the tree.

Young Tree Train (Primary Maintenance Need): Data field based on *ANSI A300* standards, this maintenance activity is characterized by pruning of young trees to correct or eliminate weak, interfering, or objectionable branches to improve structure. These trees can be up to 20 feet tall and can be worked with a pole pruner by a person standing on the ground.

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