Prospect Heights Park District

Urban Forest Management Plan

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OVERVIEW OF PHPD's URBAN FORESTRY MANAGEMENT PLAN

A recent inventory and assessment of Prospect Heights Park District (PHPD) resulted in the inventory of 1,821 individual trees throughout its park system. An additional component of this tree inventory included the assessment of natural and unmanaged areas where we identified both the higher quality or significant trees that likely should be retained along with the lower quality and poor condition trees that require maintenance or removal. The remaining unmanaged trees not inventoried on a stem-by-stem basis were assessed and enumerated using a polygon sampling method, where the number of each tree species were counted in each area, but were not assessed individually for health, condition or other such factors. There is a reasonable amount of room in the parks for future tree planting, which represents potential for growth of the park district's urban forest. PHPD's trees were inventoried as part of a project this past year culminating in this Urban Forestry Management Plan, which will detail how these trees will be managed for the benefit of the District and its residents and patrons over the next 10 years, with a focus which begins in 2022, and projects out to 2032.

In terms of the condition of the Urban Forest in PHPD, there are both strengths and opportunities for improvement. In terms of strengths, the park district has a smaller tree population to contend with, and has been managing that resource satisfactorily in the past, however there is work to do in terms of near term maintenance. Once the necessary maintenance is complete, PHPD will be able to focus on enhancements rather than remedial action. In terms of opportunities, the diversity level and overall number of species could be higher. This will be examined in further detail below.

There is also a great deal of natural and unmanaged areas on PHPD properties, and this Urban Forestry Management Plan includes a proposed stewardship plan that aims to better manage these areas in an ecologically beneficial manner. Also, there is currently no formal budget for forestry related expenses, and they are handled on an *ad hoc* basis. We have created a budget that starts at a manageable $20,000 per year, and can slowly ramp up over the years to the point where PHPD will have a highly functional forestry program.

In order to enhance the Urban Forestry program so it will create long term benefits to the community while reducing costs, the following Urban Forest Management Plan will address each one of these strengths and opportunities, and create goals and milestones for each. Further detail is given in the body of the Plan, with separate sections detailing specific Urban Forestry activities, and how we propose they are achieved, along with standards and Best Management Practices (BMPs) for each.

An urban forestry program has been created in this Plan which attempts to achieve the greatest benefit for the community, based on the available data we have from the inventory, as well as input from stakeholders and residents of the PHPD. However, all plans are subject to change based on new information, budgets, or other unforeseen circumstances. For this reason, it is asked that readers consider this plan to be an evolving document, and goals and strategies will be updated as necessary.

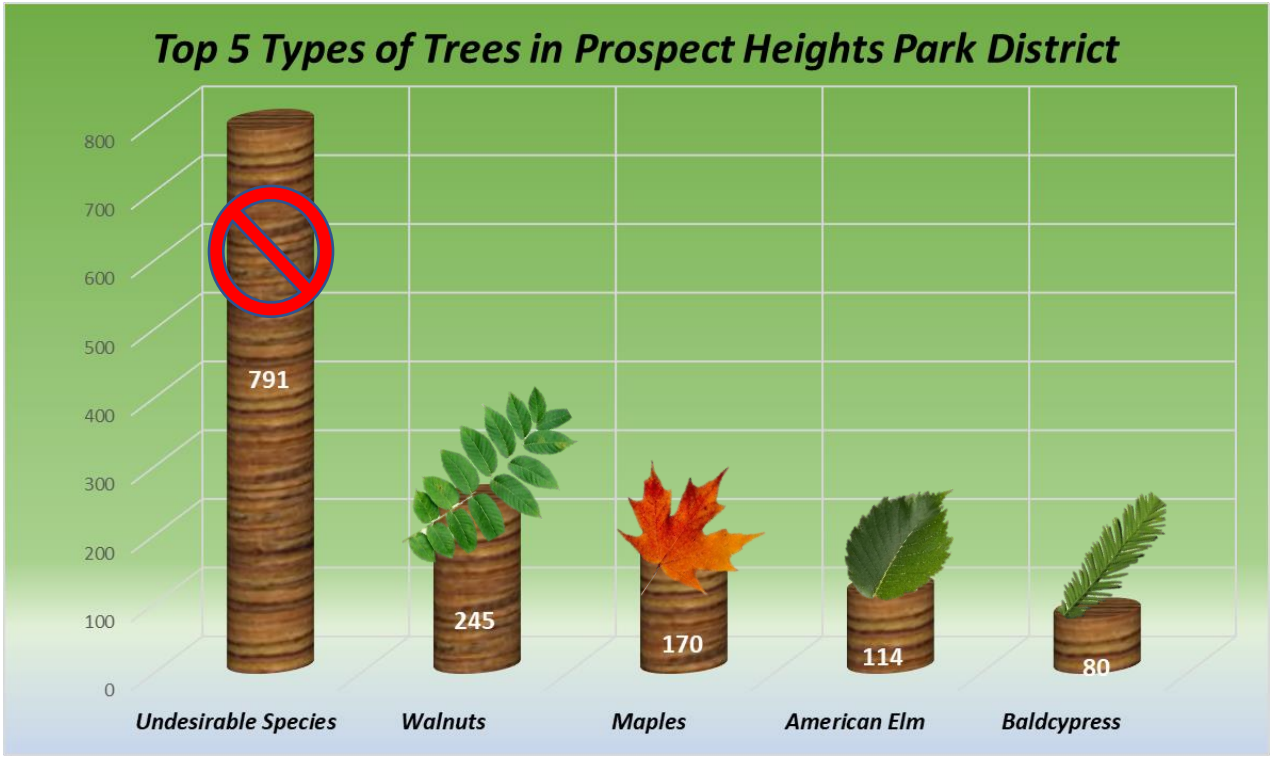
This Urban Forestry Management Plan should be reviewed periodically, at which point the park district, and its residents, business owners, and other stakeholders will have an opportunity to provide input and help improve the Plan during those reviews. These strategies and goals are not absolute, but rather serve as guideposts to mark the road to success.

MISSION STATEMENT

It shall be the mission of this Urban Forest Management Plan to outline goals, budgets, and Arboricultural Best Management Practices for the management of the Urban Forest for Prospect Heights Park District.

PHPD's URBAN FOREST: AT A GLANCE…

Total Number of Trees	*1,821*
Total Number of Species	*62*
Annual Benefits Provided	*$287,259/yr*
Standing Value	*$4,157,316*



DIRECT GOALS

Listed below are the direct goals of this Urban Forest Management Plan (herein referred to as "UFMP", or "the Plan"), as well as a brief discussion of how they shall be met. Direct goals are those which this plan addresses explicitly in describing pruning, removal, planting, and other activities. Every attempt was made to make these goals realistic and achievable, so they do not place an undue burden on PHPD, its residents and patrons, or its resources. Instead, the direct goals of this UFMP are to save money and provide greater benefits over time through proactive, as opposed to reactive, management. The Plan is also meant to be adaptive: New concepts, the introduction of new pests or pathogens, or changing climate (both social and meteorological) may all change the way the Urban Forest is viewed.

The Plan is intended to be reviewed periodically by the PHPD, its Board of Commissioners, and any additional stakeholders. The review process should include evaluation of progress made towards these goals. Goals may be altered after the review as conditions warrant. This UFMP is written with the understanding that organizations, stakeholders, and residents change over time, and therefore its goals require a degree of flexibility. Since trees represent a long term (50-80 year) commitment, this UFMP is intended to provide guidance and continuity through those changes, while also adapting to them as the need arises. A table of these direct goals is below:

Create a Needs Analysis	**Establish Goals and Milestones**	**Maintain Tree Planting Standards**
Enhance Annual Tree Pruning Program	**Increase Overall Diversity by 2032**	**Update PHPD Policies and Procedures**
Manage Tree Removals	**Maintain Accurate Tree Inventory**	**Properly Mulch New Plantings**
Incorporate BMPs into Tree Care	**Create Tree Risk Management Policy**	**Increase Urban Tree Canopy**
Create Strategic Partnerships	**Enhance Tree Protection Standards**	**Consider Natural Areas in Planning**
Engage the Community	**Provide Education and Outreach**	**Climate and Stormwater Abatement**

Create a Needs Analysis for the Current Tree Population

Every tree population today is the result of decades of past management decisions. Over time, we increase our overall level of knowledge, skill, and efficiency in managing trees. Based on that new knowledge, we sometimes discover that decisions made decades ago may be outdated practices. It is the goal of this Plan to assess the current state of the District's Urban Forest and examine its overall strengths and benefits, as well as look for opportunities for improvement to inform future decisions.

Each aspect of the park district's tree data has been analyzed: How many trees, what condition they are in, how old they are, what needs do they have, and more were all examined to create goals to improve the tree population for the benefit of the organization, its residents and patrons, and other stakeholders. Specific goals in terms of planting, removals, pruning, budgets, personnel, and maintenance are all addressed by acknowledging both strengths and opportunities, and suggesting how they might be used to the park district's advantage. These strengths and opportunities will be the guiding principles for the management strategies and specific goals outlined in each section below. The Plan will also attempt to allow for adaptive management, so it may be changed when appropriate.

Establish Goals in Order to Enhance Strengths and Realize Opportunities

In order to accomplish anything, goals are necessary to help guide organizations through the process. Establishing or enhancing a forestry program will require a series of attainable goals to be effectively achieved. This UFMP seeks to accomplish those goals within a realistic budget and attainable timespan. As stated previously, goals are intended to change over time as PHPD's capacity to manage the resource may increase or be reduced.

In each section of the Plan related to direct goals, language has been included which incorporates both a budget and time frame in which those goals can be accomplished. The overarching goal will be to have the District have a sustainable and adaptable forestry program within a 10-year period, a time period determined by the granting organization funding this work.

This program will include tree planting, tree maintenance, and tree removal for the District's Urban Forest, so that the tree population will be healthy, and provide the greatest benefits to the community while maximizing benefits and minimizing risk. To learn more about the budgets, see the individual goals in each section below, or turn to the budget table on page 62.

Update Language for Enforcement of Tree Policies

A review was performed with our forestry consultant, working in tandem with Prospect Heights District staff, the Morton Arboretum, and relevant community stakeholders to implement an ordinance governing trees in PHPD. Though as a park district, PHPD does not have traditional municipal ordinances, this internal ordinance is meant to reinforce proper tree care practices while discouraging improper practices and care. It is intended to encourage the staff and community to become engaged with the urban forest in PHPD. This ordinance is composed of common industry regulations, such as enforcing rules about what trees cannot be planted because they are unsafe trees, or defining exactly what trees are the PHPD's and the resident's responsibility for border trees, among other things. The goal of this ordinance is to create a tree population which is diverse, healthy, and improving, providing the greatest benefit to the District and its residents and patrons over the long term.

Increase Overall Diversity by 2032 Through Tree Planting

Tree species diversity is one of the most important concepts in Urban Forestry today. Part of the reason pests and diseases like Emerald Ash Borer (EAB) and Dutch Elm Disease were so devastating is that there were too many Ash and Elm trees. When EAB arrived, many communities' Ash population was 20% or more, resulting in mass tree loss. This can be avoided by planting a greater diversity of tree species, so that when new pests or pathogens are introduced, we only lose small amounts of specific tree species. Diversity leads to stability, and stability leads to reduced costs and increased benefits over time.

An achievable "Diversity Vision" has been created for 2032 which will see the tree population become far more diverse than it is at present. Currently, the tree population in PHPD is composed predominantly of undesirable species such as Boxelder, Siberian Elm, Cottonwood, Mulberry, Buckthorn, Willow, Black Cherry, Black Locust, and White Poplar. These trees are primarily those inventoried on an individual basis in the natural and unmanaged areas. This Plan seeks to lower the numbers of undesirable species and introduce more diversity and create a more robust and resilient tree population overall.

For this Plan, trees will be planted which are underrepresented or not present in the current population and planted in a manner that selects the right tree for the right site. A direct goal will be to create a tree planting program where trees are matched to existing sites for the next 10+ years. Currently, the Park District plants approximately 10 trees each year, and this plan seeks to increase that number from 10 to approximately 100 trees per year, to be able to replace older declining trees, as well as to grow the tree population by nearly 300 trees overall by 2032.

Ideas such as contract growing, community partnerships, and others will be explored. To learn more about tree planting and reforestation, turn to page 45.

Maintain an Acceptable / Unacceptable Species List

The urban environment is a difficult place for a tree to live. Between road salts, urban pollutants, limited soil, and other challenges, not all trees will thrive in the urban environment. Fortunately, parks are much more forgiving than street tree sites. That said, trees which have very weak wood, which are known invasive species, which produce messy or foul-smelling fruits, or which create a public nuisance should also be avoided. Acceptable species are those which are adapted to our Midwest climate, are not invasive, and meet diversity goals. Included in this Plan is an "acceptable and unacceptable" species list which will detail specific trees which may be planted in the parks. The Park District and Board of Commissioners will review the list periodically to ensure that it is maintained in accordance with the latest information on specific trees. For more information on what species can and cannot be planted, see the Acceptable Species list in Appendix A.

Manage Tree Removals

For public safety, or to prevent the spread of tree pests and pathogens, sometimes tree removal is unavoidable. During the inventory, 542 trees were located in which removal is recommended. A tree removal program has been created in this Plan which budgets for the removal of all these trees over an approximately 10 years after adoption of this plan in order to maintain public safety. Cost projections for tree removals have been made based on the number, age, and condition of trees in PHPD's parks for the next 10 years, so that long term budgeting projections can be made. Also included are ANSI and ISA safety standards, as well as suggested staff and contractor qualifications to ensure the park district is hiring staff and contractors who will be held to the highest industry standards. For more information on PHPD's proposed tree removal program, turn to page 41.

Create a Cycle Pruning Program

Properly pruned trees establish faster, grow quicker, and live longer lives than trees which are not pruned, or improperly pruned. Since large trees provide the greatest benefits to the community, pruning is a critical part of the Urban Forestry program in PHPD. Pruning is planned to be performed by PHPD staff, Certified Arborist contractors, and for some of the newer trees to be planted, potentially by local well-trained volunteers. As with tree removals, pruning work is performed on an *ad hoc* basis right now with no formal budget. The initial goal will be to prune the 165 trees which were identified in the inventory as being in the greatest need of pruning, and slowly increase this up to the point where 200 trees are being pruned each year.

With slight annual budget increases over the next 10 years, we hope to develop a cyclical pruning program. This program will ensure that all trees on park district property are pruned at a minimum every 6 years, increasing tree health and vigor while reducing costs associated with storm damage and tree failure. We also propose that a volunteer group be trained in proper pruning and maintenance of young trees, so that the community can assist in caring for this important Urban Forest resource. This group may assist in other tasks as well, such as watering, and monitoring for new insects and diseases. For more information on tree pruning and maintenance, turn to page 49.

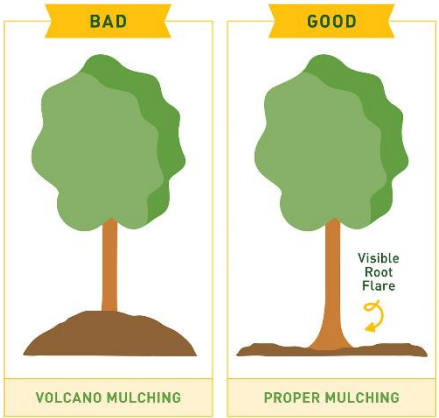
Maintain an Accurate Tree Inventory on an Annual Basis

Managing an urban forest requires a clear understanding of the trees, their ages, conditions, and maintenance needs, so that park district crews and contractors can perform work on these trees. A stem-by-stem tree inventory was completed in February of 2021. This inventory and consulting resulted in an unbiased assessment of all trees in PHPD's parks and will serve as the data which will guide the forestry program throughout the next 10 years.

All inventories are a snapshot in time. With 1,821 inventoried trees in the District's parks, the tree inventory should be maintained at a high level of accuracy so that it does not become out of date. The tree inventory and UFMP are the standard guides for tree maintenance, care, and replacement. The inventory, housed in an online GIS system, will be updated for all planned removals and plantings, and used to respond to all unforeseen events where tress were negatively impacted. However, we also recommend that the inventory be updated periodically by a Forestry Consultant, to keep the information at its most current on a District-wide scale. Maintaining this tree data at a high level is vital in the execution of this Management Plan.

Proper Mulching of All New Plantings

The urban environment is a difficult place for a tree to become established and to live a long, healthy life. Proper mulching can significantly increase a tree's ability to do this. Mulch helps to conserve water during the summer by preventing it from evaporating from the soil. It also helps prevent weeds from growing around the tree and competing for water and nutrients, and keeps lawn equipment such as weed whips away from the trunk where they can damage the tree. All new contracted PHPD plantings should be properly mulched at the time of planting by the planting contractor.



Another intended outcome of this initiative will be to educate neighbors and volunteers about proper mulching care, and ensure proper techniques are being used. Of particular concern is the practice known as "Volcano Mulching" which has the opposite effect of proper mulching and can severely damage a tree over time. For more information on proper mulching, turn to page 56.

Incorporation of Best Management Practices in Tree Care Operations

"Best Management Practices" is a term which means being on the cutting edge of your industry. All contractors working for the park district should be compliant with the latest industry Best Management Practices, based on the appendices in this report. The ANSI and ISA Best Management Practices should be integral parts of any Request for Proposal (RFP) or bid documents when seeking qualified contractors. Full text of all referenced standards will be made available to all park district employees and contractors performing tree care operations. Public outreach and education will be performed by the park district's staff or community partners, assisting residents to understand these practices as well. This UFMP will be placed in the public domain for residents to use as a reference.

Creation, Utilization, and Maintenance of a Tree Risk Assessment Policy

Trees create great benefits, but they may also pose various degrees of risk. Tree limb failure can have catastrophic effects on people or property, and trees need to be well-managed and healthy to avoid that risk. A risk assessment policy has been created for PHPD as part of this Plan. This policy will aid in identifying, documenting, and designating for removal or mitigation trees which may pose a threat to public safety in a timely manner. This will reduce the overall level of risk posed by trees, as well as exposure to liability from tree related incidents. Basic risk assessment language is included in this document, and a basic Tree Risk Assessment Policy is discussed starting on page 57, and ISA Basic Risk Assessment Forms are in Appendix H.

Increase Urban Tree Canopy from 40% to 41%

Tree canopy is important to the community because more and larger trees provide greater benefits such as decreased heating and cooling costs, pollution reduction, and increased storm water uptake. Tree lined parks and streets are more attractive to homebuyers and potential new businesses, which increases home values, home ownership, and tax revenue. All of these factors benefit the community, so a direct goal will be to increase tree canopy in the District service area. Currently, the District's footprint contains 40% tree canopy coverage, compared to other land cover types. Increases in tree canopy also come with increases in total benefits provided to the community.

Based on data from the Chicago Region Trees Initiatives, we believe that an increase to 41% canopy cover is a realistic goal for the District's service area by 2032. This will be accomplished by increasing the number of trees on PHPD owned property, as well as improving tree care practices, allowing trees to live longer, become larger, and create more canopy cover. Ideally, a larger increase would be better, but as will be detailed below, PHPD is facing the removal of many poor quality or underperforming trees, which will reduce the overall canopy cover before it can be increased. So taking that into account, it is believed that a modest increase to 41% is realistic.

Tree planting on private property will also be encouraged by staff when communicating with residents within the district's service area, and at events such as Arbor Day celebrations. As we will show in the detailed portions of this Plan, these are real benefits that will help District residents save money. For more information on Urban Tree Canopy, tree benefits, and other such information, turn to pages 29-33.

Tree Preservation / Invasive Species Management

Sometimes trees can become damaged by construction activities, costing the park district money, and eliminating the benefit the tree had to the community. A basic tree survey and assessment should be conducted prior to any construction activities on park district owned land. A tree protection zone must be established and maintained during construction. The District should also confer with the various cities within its service area when removing trees to ensure compliance with local ordinances. The removal of invasive species such as European Buckthorn is also strongly encouraged. This increases the amount of usable land in the parks by eliminating thickets of such invasives, but also increases public safety. A direct goal of this Urban Forestry Management plan is to preserve trees during construction and reduce the amount of invasive species within the District's parks.

Increase Awareness of the Urban Forest in Prospect Heights Park District, and Engage Stakeholders

The reason for the establishment and enhancement of an Urban Forestry program in PHPD is to improve the lives of the residents, business owners, and other stakeholders to create a healthier, happier community. The District is looking for partners in the community to provide support for this program. PHPD staff should reach out to the Prospect Heights Parks Foundation, the Prospect Heights Natural Resource Commission, local garden clubs, philanthropic organization, residents, and business owners to make the forestry program innovative and community based. In this manner, residents and business owners within the District can take ownership of this important and beneficial resource, and allow it to work for them, their families, businesses, and the good of the District and the communities it serves. For more on these innovative programs, and how you can get involved, turn to pages 13-14.

Increase Tree Count from 1,821 to 2,110 Trees

Currently, the stocking density of PHPD's parks is moderate to high in some areas, however this plan seeks to increase the overall number of trees by creating a multilayered canopy, consisting of large canopy trees with medium sized trees and smaller ornamentals growing beneath them. By using this approach, and finding areas where new trees of any size would be welcome in the landscape, the number of trees in PHPD's parks can be increased by about 12%, which will correspond with an increase in overall benefits of these trees to the community, and aid in growing the overall canopy in the District.

Additional Goals

There are no strategic timelines set forth here for these programs. As the direct goals of the Urban Forestry program in PHPD are met or exceeded, these are goals to be discussed by District staff and the Board of Commissioners as time and budgets become available. We believe that many of these programs represent some of the most progressive Urban Forestry policies currently, and that they should all be considered for implementation.

Volunteer Labor (TreeKeepers/Local Organizations)

The ability to use well-trained residents as volunteer labor for pruning of young trees and planting of smaller sized nursery stock may benefit the District's bottom line, as well as be a phenomenal public outreach tool. Several training sessions would be required for these volunteers to be confident enough to perform these activities with minimal supervision. Community partners and the Forestry Consultant, working in tandem with park district staff and local organizations, can educate residents on the proper way to prune young trees, as well as how to plant container-grown trees, water and mulch trees, identify trees, and other basic tree knowledge.

PHPD has Partnered with Open Lands with a July 2021 Memorandum of Understanding. This organization is a non-profit which assist in educating people about trees, how to prune, plant, and manage them, and their benefits to society. There are other local organizations with which PHPD could partner with as well, please see pages 13-14 for more details. This Open Lands partnership will expand the TreeKeepers program and provide local, voluntary involvement in long-term tree care throughout the the District, and create further interest in forestry in the community!

It is also recommended that PHPD hold several annual tree education sessions. These sessions could be taught by District staff, community partners, the Forestry Consultant, or other such qualified parties, and cover tree watering, fertilization, pruning, and the basics of how to spot insects and diseases. An Arbor Day celebration is an example of one such outreach event where trees could be planted and education sessions run.

Contract Growing Program

One of the keys to a successful Tree Planting Program is the availability of high-quality nursery stock from local sources. Incorporated with the UFMP for PHPD is a diversity vision for 2032 that includes a great variety and diversity of different trees. A new approved species list has also been developed, as well as a list of species that are prohibited on public property. Having this information is an advantage for the District, in that the future of the urban forest's species composition has already been considered. It is believed that a comprehensive tree planting plan will be an important part of this process as well.

This knowledge, however, does not guarantee the availability of those specific trees. One way to assure the availability of nursery stock each year is to have trees contract grown by local nurseries and reserved specifically for PHPD. This way, the District will not have to compete with other organizations responsible for tree planting. The way contract growing works is trees are ordered in annual increments. Each year, PHPD could purchase the trees previously ordered for that year and place an order for the following year. This gives the supplying nursery time to procure, plant, and bring the agreed upon trees to the size and branching habit specified.

In agreement with the nursery, the park district could reserve the right to increase orders when needed or decrease them as necessary. These contract growing agreements help to create the diversity that is being sought in this plan.

Tree For Life Program Expansion

Seeing as park trees belong to PHPD, and not the residents, the District should ultimately make the decisions on what trees will be planted at specific sites. However, if residents are interested in planting a specific species of tree in a park location to memorialize a loved one or group, a cost-share program is available. With the Tree For Life Program, donated trees are planted in one of the Park District's fourteen parks.

A PHPD staff member consults with the resident to choose an appropriate tree and park location. All tree donations are acknowledged with a personalized engraved Gold Leaf. Gold leaves are displayed on a plaque at the Recreation Center. Expanding this program will help tremendously when it comes to increasing tree plantings in the PHPD system, and also creating buy-in from the community when it comes to urban forestry initiatives and volunteerism.

Encouraging Private Property Tree Planting

Tree planting on private property is a direct goal of this Urban Forestry Management Plan. Though the park district has no formal jurisdiction or programmatic ability to plant trees on private property, the benefits of tree planting on private property are substantial in terms of energy savings, storm water benefits, and other benefits, and helps meet the canopy cover goals described above. The district should encourage residents and business owners to plant trees on their property.

One of the ways this could be accomplished ties in with the volunteer programs outlined above. When holding educational sessions, Arbor Day events, or other such programs, the park district could notify residents of the importance of increasing tree canopy at their homes or places of business. This would encourage residents to plant at home, while also educating them on how to care for their new tree.

Strategic Partnerships

Strategic partnerships are a very effective means of getting forestry projects funded when tax funding may present a shortfall, or when additional volunteer labor is needed. These typically involve either public-private partnerships or partnering with other public entities. The organizations PHPD has recommend participate in these programs are listed below, and we hope to see this list grow as time goes on.

Prospect Heights Parks Foundation

The Prospect Heights Parks Foundation's mission is to build strong community relationships and secure philanthropic funding to support the mission of the PHPD.

Forest Preserve District of Cook County

The Forest Preserve District of Cook County is an organization which manages 70,000 acres of natural areas, trails, and other projects in Cook County. Several preserves are located very close to Prospect Heights.

Prospect Heights Public Library

The library is a place where people congregate and learn. As such this could be a location to advertise opportunities for volunteerism and learning about urban forestry, as well as stocking and showcasing books related to urban forestry and its related disciplines.

Metropolitan Water Reclamation District

MWRD strives to protect businesses, homes and neighborhoods from flood damages, clean wastewater entering our plants and manage water as a vital resource for the area. They also give away Oak and other seedling trees every year as part of their efforts.

OpenLands

OpenLands is a highly diverse NPO in the Chicagoland area which focuses on many aspects of ecology in the urban and suburban environment such as natural areas, urban forestry, wetland conservation, and other such topics. They also offer trainings and volunteerism efforts, such as the TreeKeepers program, which educates residents on the care of young trees, tree biology, and the like.

Illinois Department of Natural Resources

The Illinois Department of Natural Resources mission is to protect, perpetuate, restore, conserve, and manage the forest and related resources of Illinois, both public and private..

Chicago Region Trees Initiative

CRTI is actually an amalgamation of many of the above groups acting together as a driving force for establishing the importance of urban forestry in the Chicagoland area and abroad. CRTI has several working groups which handle topics such as forest composition, risk management, communications, etc. They partner with local organizations to get tasks accomplished and publicized.

City of Prospect Heights / Natural Resources Commission

The City of Prospect Heights is also committed to the quality of its urban forest, and maintains a tree inventory, much the same as the park district. Being able to share resources, ideas, and emergency management resources with the City, and vice versa, will be a very important partnership.

Northwest Special Recreation Association

Northwest Special Recreation Association (NWSRA) provides outstanding opportunities through recreation for children and adults with disabilities. NWSRA provides thousands of recreational programs and receives more than 14,000 registrations annually. Though it focuses mainly on sports activities, there is tremendous potential for programs having to do with learning about trees and the outdoors. Programs such as these have been shown to have many health benefits, as well as feelings of well-being, community and happiness!

Personnel

In order to streamline Urban Forestry Operations, tasks will be assigned to various staff and contractors/consultants. Below is a representation of tasks, and which of the below parties is responsible for these tasks.

Superintendent of Facilities and Parks

The Superintendent of Facilities and Parks is responsible for overseeing and coordinating the activities of in-house staff, outside contractors, and volunteers when it comes to maintaining the parks. The Superintendent will manage field staff, and deal with daily operations related to trees, and is the decision makers when it comes to the planting, maintenance, and removal of trees in the parks.

Superintendent of Finance

Assists with the creation of Requests for Proposals and upkeep of the GIS system which houses the District's tree inventory. The Superintendent of Finance takes direction from the Executive Director.

Board of Commissioners

The Board of Commissioners is responsible for the allocation of funds to specific Urban Forestry initiatives. They take direction from their constituents, are informed by the Executive Director and Superintendent of Facilities and Parks and are tasked with reviewing this information to make sound decisions about program funding. The Board of Commissioners will also be tasked with reviewing this Plan on a periodic basis to make recommendations for edits to help adaptively manage the Urban Forestry program for the district.

Executive Director

The Executive Director oversees all operations and planning related to urban forestry management.

Urban Forestry Consultant

The Forestry Consultant is responsible for impartially assessing the tree population on a periodic basis, at the discretion of the Executive Director and the Superintendent. The Forestry Consultant communicates the needs of the trees to various PHPD staff members so that needs in terms of tree planting, removal, and maintenance can be performed. The Forestry Consultant may also function as the Park District Arborist during periods of PHPD staff absence at the request of the park district.

Tree Care Contractors

Tree Care Contractors are responsible for performing work identified by the Executive Director, Forestry Consultant, and PHPD staff in a timely, safe, and expeditious manner. The Tree Care Contractor should have at least one International Society of Arboriculture Certified Arborist on staff. The contractors will also guide and participate in the performance of Tree Trimming, Pruning, Removal, and Plant Health Care operations. Other operations, such as Tree Planting, Tree Watering, and Tree Mulching do not have to be performed under the direct supervision of a Certified Arborist.

State of the Urban Forest

On January 25, 2021, Certified Arborists from Great Lakes Urban Forestry Management began collecting data for a comprehensive tree inventory of the PHPD system. All trees in mowed and managed areas were inventoried on a stem-by-stem basis and an additional component of this tree inventory project included the assessment of natural and unmanaged areas where we identified both the higher quality or significant trees that likely should be retained along with the lower quality and poor condition trees that require maintenance or removal.

The remaining unmanaged trees not inventoried on a stem-by-stem basis were assessed and enumerated using a polygon sampling method. What this means is that instead of each tree having detailed data recorded on it, a virtual "line" was drawn around a given area on an electronic (GIS) map, and all the trees of each species were counted in each of these areas. This resulted in the District knowing the number of each species of tree in each of these areas, but no specifics as to individual trees conditions, sizes, or other such data that was taken in the managed areas. Please see the additional document which deals with these natural areas and the polygon sampling outside of the context of the management plan.

This inventory resulted in a total count of 1,821 individual trees as well as sampling in 30 polygons. The charts and statistics in this portion of the Management Plan illustrate that the tree population in PHPD can be characterized as middle aged, in overall below average condition, and the stocking density is relatively high in some areas. The species diversity in PHPD is fairly low, but this leaves room for improvement. Based on the following data in the Management Plan, PHPD will be equipped to use this valuable information to address short term concerns, long term management considerations, and overall planning objectives.

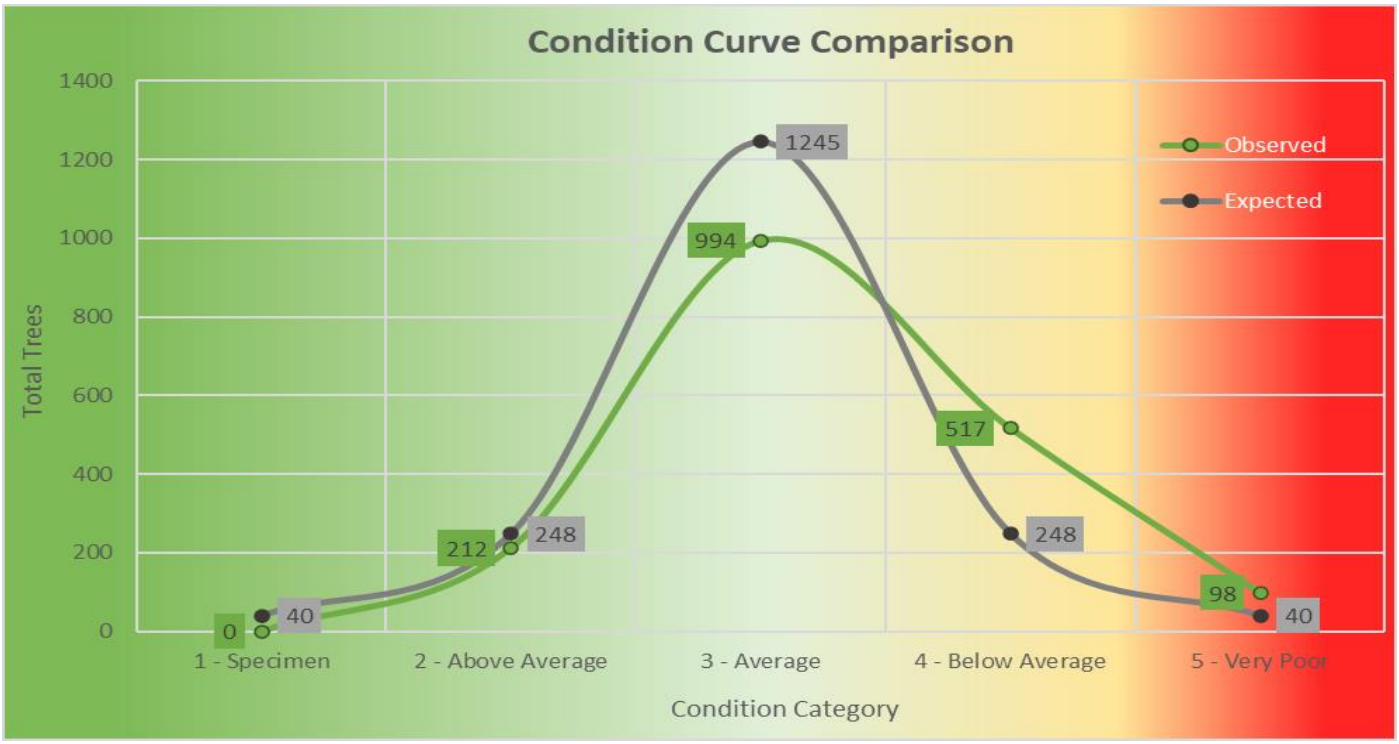
Basic Statistics

Total Number of Individual Trees Inventoried	1,821
Total Number of Polygon Samples Taken	30
Total Number of Species	62
Total Diameter Inches	24,277"
Average Tree Diameter	13.33"
Average Tree Condition	3.28 (Well Below Average)

Condition Curve

During the tree inventory, the Forestry Consultant rated the condition of each tree using a 1-5 rating system. The rating criteria is as follows:

Condition 1	**Specimen –** Tree has no observable defects, wounds, diseases, and has perfect form for the species. Since younger trees are generally trouble free, a condition 1 tree must by the Forestry Consultant's definition be greater than 16" DBH. These are legacy trees, and as such are rare.
Condition 2	**Above Average –** Tree may have a small amount of deadwood, or a very limited number of minor defects. The overall form of the tree must be good, and consistent for the species. These trees, by the Forestry Consultant's definition, must be larger than 8" DBH.
Condition 3	**Average –** Tree has moderate amounts of deadwood, wounds, or other defects, but is generally healthy. A wide variety of forms is acceptable for this group, which is meant to define the middle ground around which better or worse trees can be defined.
Condition 4	**Below Average –** Tree has defects, deadwood, wounds, disease, etc. which are likely to cause a need for removal. Very poor form or architecture can put an otherwise healthy tree in this category as well.
Condition 5	**Very Poor –** Tree must be removed. Defects are too far advanced for the tree to be reasonably saved. Like condition 1 trees, these are rare, as generally trees approaching this level are removed before they deteriorate to this level.



The chart above represents the distribution of trees in each of the 5 categories. Deviations from the expected normal standard distribution can serve as a useful tool in analyzing the overall health of a tree population, and for this reason, we have included a theoretical curve representing a normal distribution so that comparisons can readily be made. The green line with green labels represents what we observed in the field, and the grey line with grey labels is the predicted normal distribution.

The condition curve for the PHPD inventory indicates a tree population that is in overall well below average condition. It is important to mention that this condition curve is certainly heavily skewed to the right (below average) since many trees that were inventoried on an individual basis were lower quality species found in natural and unmanaged areas of PHPD properties. The remaining natural and unmanaged areas were also assessed for species composition and ecological value using a sampling polygon method in which the 3 most dominant species were assessed and enumerated by approximate stem counts in each sampling area (digital polygon on a map).

There were no Condition 1, or specimen trees, identified in the PHPD population. It is often expected that the specimen trees will come in lower than their statistical norm because of their rarity. A Condition 1 tree, according to the collection parameters for this project, must be at least 16" DBH (and generally much larger), have textbook perfect architecture for the species, and have no observable defects. Over 71% of PHPD trees have a DBH less than 16" and are not eligible for the Condition 1 category. As younger trees are planted in sites with adequate growing space, and if they are properly pruned and maintained, they should develop with good structure and may mature to become Condition 2 and eventually Condition 1 trees.

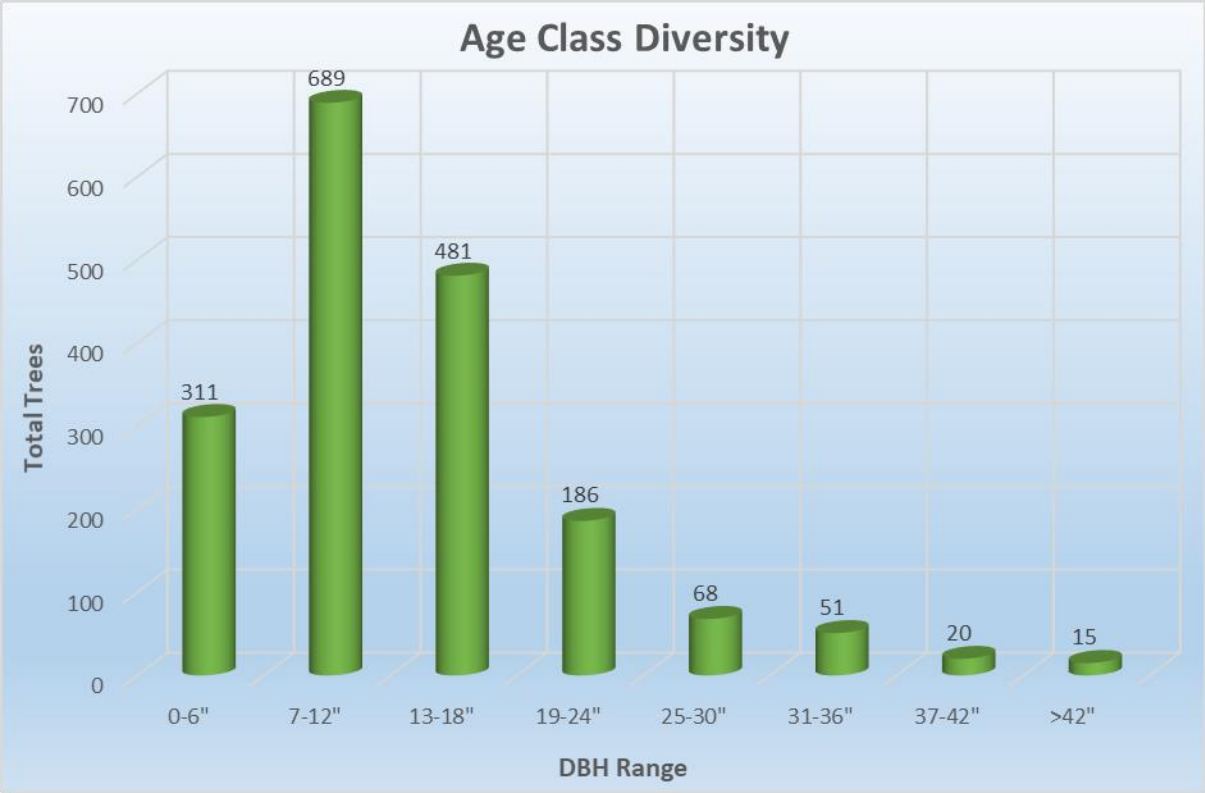
The Condition 5, or very poor trees, came in more than 50% above the expected norm. The 98 trees in this category are made up of a significant number of low quality species that were found in the natural or unmanaged areas of PHPD properties. It is recommended that Condition 5 trees be prioritized and removed in a timely manner.

The Condition 2, or above average trees, are lower than what statistical analysis would predict. Similar to the Condition 1 category, Condition 2 trees need to have good structure that is consistent with the species in question and also be over 8" DBH. Looking toward the future, PHPD has an opportunity to increase the number of trees in the Condition 2 category. In general, if trees are properly mulched and maintained, newly installed trees are done so correctly and cared for well, and site selection for the trees is well matched to the species, trees will often mature with good form and without significant defects. These trees can eventually become Condition 2 trees.

The Condition 4, or below average trees, came in considerably higher than what would be statistically expected. This statistic represents the significant number of low-quality trees in natural and unmanaged areas that have developed structural defects, decay, and deadwood. PHPD can use the data from this inventory to locate Condition 4 trees and prioritize them for maintenance or removal.

The number of trees in the Condition 3, or average, category is significantly lower than the expected norm and this is primarily because trees that normally would be assigned this category are in the Condition 4 or 5 category instead. According to our collection parameters, all trees less than 8" DBH are always assigned this category, unless they happen to be in worse condition. As the condition 4 and 5 trees are removed and replaced, this condition curve will certainly shift more toward the average or above.

Age Class Analysis



In terms of the ages of trees in Prospect Heights Park District, the tree population was split into 8 classes of 6" diameter each. This shows how many trees are in each "age class". Because trees are measured by trunk diameter, this breakdown can help show where trees are in their life cycles. Some trees like Cottonwood and Silver Maple grow in diameter very quickly, up to 1" per year or possibly more. Other slower growing trees such as Oak and Hickory may only add ¼" or less every year. As a broad generalization, it can be said that most trees on average grow at around ½" per year.

This age class analysis chart illustrates a somewhat typical trend in the overall age spread of a tree population seen in a park district setting. Often, we see many trees being younger to middle aged and a relatively lower number of trees in the older age categories. As shown above, the middle-age class trees make up a significant percentage of the overall tree population, however only 311 of PHPD's total 1,821 trees (17%) have a DBH of 6" or less which we generally consider to be less than about 15 years old. It is assumed that most trees grow on average approximately ½" per year, although that figure varies significantly depending on the species in question.

Almost 38% (689 of 1,821) of PHPD's trees have a DBH of 7-12" which are generally considered to be about 15-25 years old. The 13-18" DBH category makes up over 26% (481 of 1,821) of the population and is considered to be approximately 25-35 years old. The 186 trees (10%) in the 19-24" DBH category are generally mature trees over 35-45 years old.

The 154 trees in the 25"+ DBH categories are considered to be about 45-50+ years old. Some of these are still in good to fair condition, however some of these may be nearing the end of their natural life. It should be mentioned that the number of trees in the 30"+ categories are often lower due to the natural senescence and ensuing decline of trees in urban settings, though park district trees can be frequently longer lived due to the fact they often have unrestricted growing space, both above and below ground.

A fairly equal number of trees in each age classification is, within reason, desirable and indicative of a consistent focus on tree planting and tree maintenance in PHPD over the years and shows that the right trees are being planted in the correct locations. Going forward, PHPD has an opportunity, over time, to bring the tree age classes to a more balanced level.

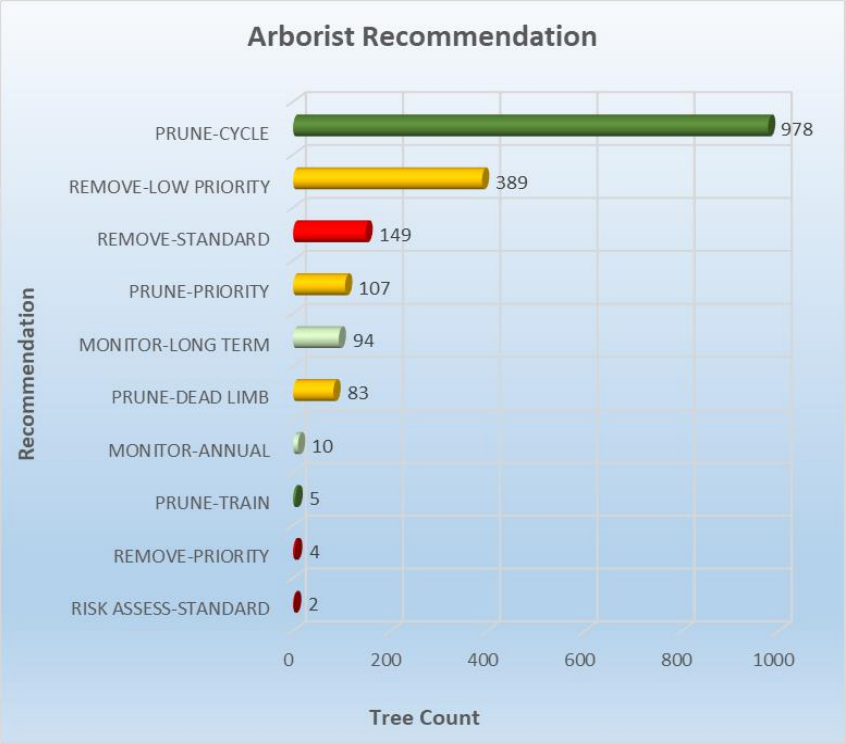
The table of Prospect Heights population growth since 1920 is shown at the right, and it is apparent that the growth in the number of trees in the PHPD system increases around the same time as the population of the City was increasing dramatically. For the City, population growth spiked between 1960 and 1970. For the trees, there is a significant number of trees in in the area of 18" DBH mark, which at ½" growth per year on average, corresponds to around 40-50 years ago, or right around 1970.

A goal of this plan will be to increase tree plantings in coming years to not only replace removed trees, but grow the population as well by approximately 10%

Year	Population
1920	25 (Est)
1930	50 (Est)
1940	100 (Est)
1950	1000 (Est)
1960	2400 (Est)
1970	7500 (Est)
1980	11823
1990	15239
2000	17081
2010	16256
2020	15887

Arborist Recommendation / Maintenance

During the inventory, the Forestry Consultant's staff recorded an Arborist Recommendation for each tree which outlines what maintenance work needs to be performed in the coming years.



In terms of maintenance needs in the PHPD tree population, the table above shows that nearly 46% of the population is recommended for an action other than cycle prune. Significantly, over 29% of the population was recommended for removal. This is almost entirely due to the polygon sampling in natural areas. The managed areas of the parks have far fewer removals in general. The 542 trees in the "Remove" sets include a variety of tree species which have declined or developed structural defects and are beyond the point of salvaging. All of the trees in the Remove category should be prioritized and removed over the term of this management plan in order to mitigate risk.

Overall, the statistics displayed above show a fairly positive trend. The majority of trees require only Cyclical Pruning on a regular basis, which is an overall desirable trait in a tree population. It is recommended to develop a 3-7 year pruning cycle, ensuring every tree in the PHPD population is pruned every 3-7 years, which could raise many trees to the next condition level. The remaining categories, other than removals, were used to indicate trees in need of maintenance which should be prioritized over those in the Cyclical Prune category and will be discussed briefly below.

The 104 total trees in the two "Monitor" categories can be viewed as being in a transitional phase. For the most part, the tree has an indiscernible defect, or shows signs of developing issues or general decline which must be observed. These trees should be reassessed periodically, and their maintenance status updated.

The 107 trees in the "Prune-Priority" group and the 83 trees in the "Prune-Dead Limb" group are trees which are simply overgrown, or have parts which need to be removed promptly, and should have pruning prioritized over the trees in the cyclical prune set. Generally, we consider this to be a "within 1-3 years" level of pruning.

Trees categorized as "Prune-Train" are typically trees smaller than 6" DBH and have structural issues or are overgrown and require selective pruning to establish better architecture in the future. Establishment pruning, or the pruning of young trees to establish proper branching habit and structure, is one of the least expensive yet most effective maintenance items that can be performed on a young tree.

The 2 trees which received a "Risk Assessment" status were in a location where they could pose an elevated risk to PHPD patrons. These are trees which have developed defects and require a more in-depth inspection and analysis to determine PHPD's risk tolerance threshold and the need for mitigation efforts. It is recommended that a Level 2 Basic Risk Assessment or a Level 3 Advanced Risk Assessment be performed on these trees (per TRAQ or ANSI A300 Pt 9 Standards), or equivalent (ISA Tree Risk BMP methodology, Matheny and Clark, etc).

Due to the high number of trees which require priority pruning and removal, the 10 year timespan outlined in the grant program which funded this plan will not be sufficient to accomplish all work that the inventory identified. For that reason, we are recommending that the goals and milestones be reassessed after the 5 year mark to see if there is room for updating these goals and milestones.

Tree Risk Category

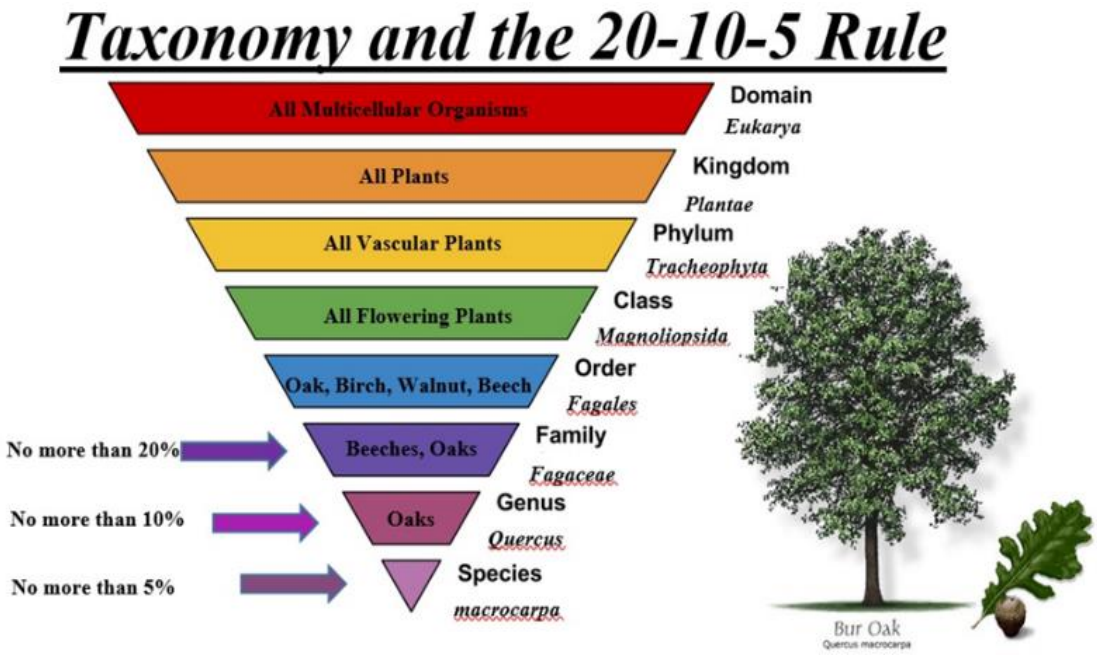
Each tree inventoried was subject to a rapid tree risk assessment. The International Society of Arboriculture has a professional qualification program called "TRAQ" (Tree Risk Assessment Qualification) which uses specific information for assessing how much risk a tree poses. The Forestry Consultant's staff used a rapid tree risk assessment based on this protocol. Such rapid assessments are used in applications such as disaster relief assessments after extreme weather events where tree risk must be documented, but time frames are very short. For this reason, it must be stated unequivocally that these assessments are NOT meant to be legally binding, and do not represent a full TRAQ evaluation of the level of risk individual trees may pose.

As illustrated in the chart above, the majority of PHPD trees were found to have no observable risk level. Going forward, any tree that falls into the critical risk level category should receive immediate mitigating actions. Any trees that fall into the critical or substantial risk level categories should receive some type of formal risk assessment and/or prompt mitigating action. Any tree found to pose an elevated risk level should be monitored and/or inspected by PHPD and a threshold of risk tolerance be established.

Only 2 trees were recommended for a standard risk assessment and no trees were found to need any form of advanced risk assessment, which is positive overall.

Diversity Analysis

Taxonomy is the method by which scientists classify plants, animals, and other life forms into distinct categories. A species is unique. There is only one type in that category, such as Burr Oak (*Quercus macrocarpa*), which refers to only one specific type of tree. A genus, however, is a group that may contain multiple species. All Oak trees, for instance, are in the genus *Quercus*. The further down the taxonomic ladder you go, the more similar things become.



The more similar tree species are to each other, the higher the likelihood that an insect or pathogen can exploit every species of that genus. Emerald Ash Borer is a classic example of this, as it affected every tree species in the Ash genus. The most effective prevention of tree loss we have is to limit the number of trees planted that a new pest or pathogen can affect. While diversity at the species level is important, it is also important to achieve diversity on the genus and family levels.

The "20-10-5" rule for PHPD's future tree plantings is recommended, which states that no more than 20% of any one family, 10% of any one genus, and 5% of any one species shall be planted during any one planting cycle. It will also be a long-term direct goal of the forestry program to have the tree population as a whole in compliance with the 20-10-5 Rule, although it may not be possible by the 2032 date used in this document. This level of taxonomic diversity is consistent with today's arboricultural industry standards (see above graphic).

The old paradigm of urban forestry was to create landscapes in which every tree was the same type, shape, age, and height. This was thought to produce a uniform appearance. Urban foresters have since learned that once a pest or pathogen is introduced into a monoculture planting, an epicenter of infestation is created that may cause serious damage, both ecologically and financially. Diversity in the urban forest helps to prevent and reduce the impacts of pests and pathogens. There are three aspects of diversity in the urban forest. We will examine these in detail below.

Taxonomic (Species) Diversity

Why is it important to plant a diverse set of trees at the species, Genus, and Family levels? Simply put, it is to ensure that communities will not fall victim to mass tree loss from pests and pathogens in the future. The reason Emerald Ash Borer (EAB) was such a devastating expense for many organizations was because their tree populations were composed of over 20% Ash trees. When these trees died and had to be removed, those organizations lost 20% of their trees.

This comes with the obvious expenses of having to remove these trees and replace them. But it also comes with hidden expenses as well, namely the loss of the ecological services that those trees provided: Homes cost more to heat and cool, storm water infrastructure falls under heavier pressure, and increases in pollutants and greenhouse gases may be observed. For all these reasons, a more diverse group of trees needs to be planted, such that we are never at risk of losing more than 5-10% of our trees at any given time due to a pest or pathogen.

The diversity in PHPD's parks overall is low for a tree population its size, and dominated by undesirable species.

Spatial Diversity

Spatial diversity is the concept of mixing tree species over the whole geographic area. The easiest way to slow the spread of any new pest or pathogen is to increase the distance between potential host trees. Every pest or disease, such as EAB or Dutch Elm Disease (DED), has a limited area to which it can spread in a given time frame. The more difficult it is to get to the next host tree, the less of a problem the pest or pathogen becomes, and the easier quarantine becomes.

In addition to the functional benefits provided by increasing spatial diversity, organizations which have implemented diverse planting over the past several decades have demonstrated that such diversity yields an arboretum-like landscape that is both functional and aesthetically pleasing. At present, the Spatial Diversity in PHPD is moderate. During the tree planting planning phase, care should be taken to ensure that new plantings are done in a manner that yields a spatially diverse tree population, and creation of areas of low spatial diversity (monocultures) will be avoided. The creation of the multilayered canopy discussed throughout is one such strategy.

Age-Class Diversity

Age-class diversity is also an important consideration. A healthy natural forest has trees of many ages. Young, intermediate and mature trees allow for regeneration, replacement and vigor in the overall forest community. A mixture of tree species, locations, and ages will lead to great diversity, which insulates a natural forest against pest and pathogen outbreaks. The Urban Forest is no different. The old urban forestry paradigm promoted even-aged tree plantings, so that all trees were approximately the same size and age. However, once these trees begin to decline, most will require removal and replanting simultaneously. This can leave an entire park without shade and aesthetics for a long time.

The current approach of the urban forestry community is to strategically plant trees in parks or other public spaces over a longer timeframe. With this strategy, trees will grow to maturity in different stages, and decline at different times. When declining trees are eventually removed, there will always be a variety of age classes and tree sizes in each park. This reduces the pressure to plant trees in an area immediately after tree removal, helping to manage costs. A mixed age-class planting ensures that mature trees are always present in parks. It also will allow for strategic planting of smaller or medium sized trees.

An additional benefit of mixed-age plantings is the ability to plant shade-loving trees as well as sun-loving trees. When a park is newly planted with trees of the same age, all the trees are essentially in full sun. This reduces the ability to plant shade loving trees, as they tend to dry out in the summer sun. With mixed-age stands, shade-tolerant, trees may be planted underneath the canopy of larger, mature trees. This approach will be used for future tree removal and replacement and help to create an Urban Forest that has mature trees, middle aged trees, and young trees in similar quantities.

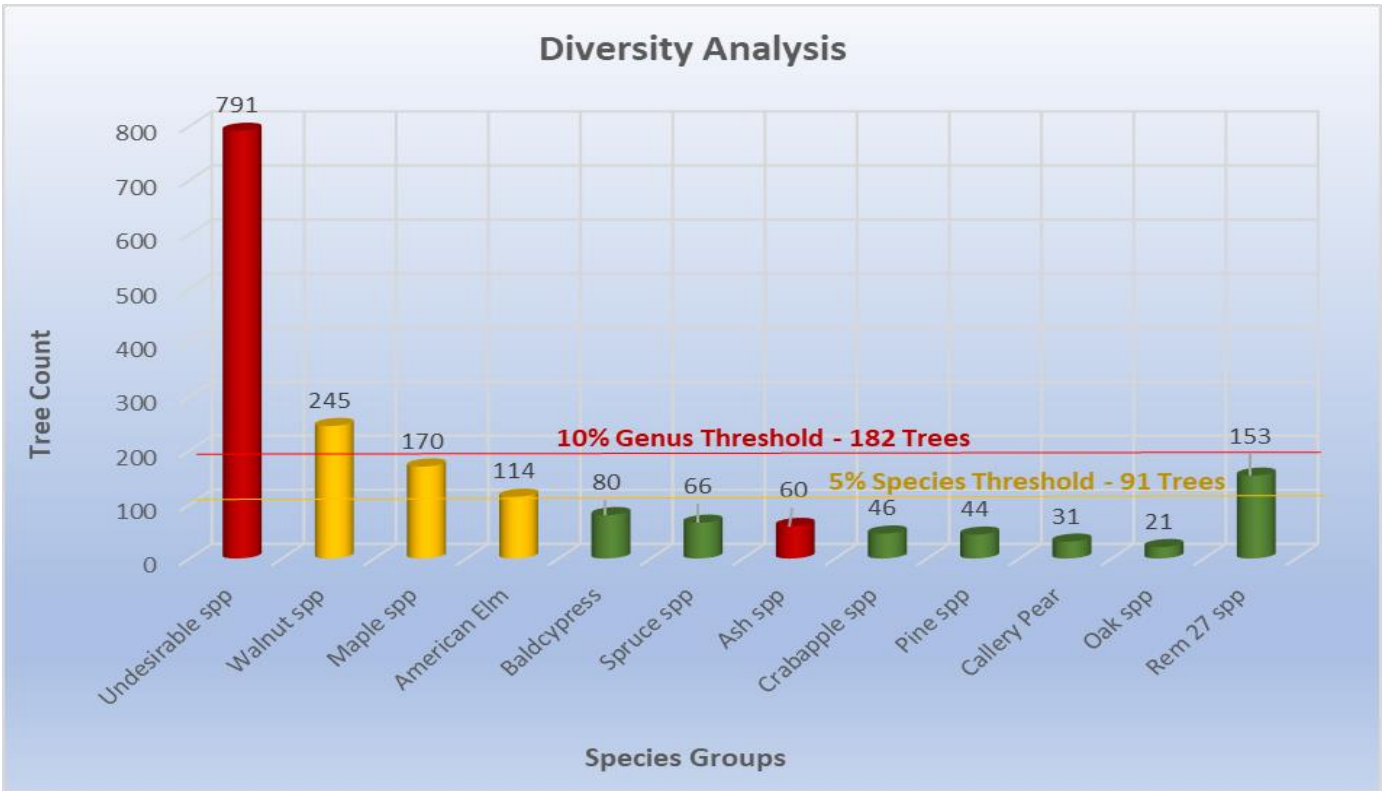
Current Tree Population

SPECIES	COUNT	% OF TOTAL	AVG DBH	AVG COND
BOXELDER	311	17.08%	14.16	3.46
WALNUT-BLACK	245	13.45%	9.30	3.10
ELM-SIBERIAN	174	9.56%	15.74	3.66
COTTONWOOD	118	6.48%	26.58	2.84
ELM-AMERICAN	114	6.26%	13.57	3.26
MAPLE-SILVER	109	5.99%	18.42	3.09
BALDCYPRESS	80	4.39%	10.65	2.89

SPECIES	COUNT	% OF TOTAL	AVG DBH	AVG COND
MULBERRY-SPP	67	3.68%	13.01	3.34
SPRUCE-BLUE	50	2.75%	9.16	3.34
APPLE-CRAB SPP	46	2.53%	10.89	3.17
BUCKTHORN	46	2.53%	9.80	3.72
ASH-GREEN	41	2.25%	10.00	4.46
WILLOW-SPP	35	1.92%	26.20	3.51
PEAR-CALLERY	31	1.70%	9.58	3.00
MAPLE-RED	27	1.48%	5.96	3.19
PINE-AUSTRIAN	23	1.26%	11.00	3.30
PINE-WHITE	21	1.15%	7.52	3.14
ASH-WHITE	19	1.04%	9.11	3.84
DOUGLAS FIR	18	0.99%	10.78	3.22
VIBURNUM	16	0.88%	7.19	3.06
MAPLE-AUTUMN BLAZE	15	0.82%	9.53	2.80
CHERRY-BLACK	14	0.77%	13.07	3.57
HACKBERRY	14	0.77%	9.14	2.93
HONEYLOCUST	14	0.77%	12.00	2.93
MAPLE-NORWAY	14	0.77%	14.64	3.07
BIRCH-RIVER	13	0.71%	12.15	2.77
BLACK LOCUST	13	0.71%	11.38	3.15
SPRUCE-NORWAY	12	0.66%	11.08	3.00
POPLAR-WHITE	11	0.60%	8.73	3.36
OAK-SWAMP WHITE	10	0.55%	5.60	3.00
YEW	10	0.55%	13.90	3.00
SERVICEBERRY-SPP	8	0.44%	9.88	3.13
LINDEN-LITTLELEAF	7	0.38%	11.29	2.86
ARBOR VITAE	6	0.33%	10.83	3.00
ELM-HYBRID	5	0.27%	7.20	3.00
HAWTHORN-SPP	5	0.27%	6.40	3.40
JUNIPER-COMMON	5	0.27%	8.20	3.00
ROSE OF SHARON	5	0.27%	2.80	3.00
CATALPA	4	0.22%	11.25	2.75
OAK-BURR	4	0.22%	2.25	3.00
SPRUCE-WHITE	4	0.22%	5.00	3.00
AMERICAN HORNBEAM	3	0.16%	6.33	3.67
AMERICAN REDBUD	3	0.16%	8.00	3.33
FIR-CONCOLOR	3	0.16%	10.33	3.00
FIR-SPP	3	0.16%	3.00	3.00
MAPLE-AMUR	3	0.16%	21.67	3.33
OAK-RED	3	0.16%	18.67	3.00
MAPLE-SUGAR	2	0.11%	10.50	2.50

SPECIES	COUNT	% OF TOTAL	AVG DBH	AVG COND
OAK-WHITE	2	0.11%	2.50	3.00
UNKNOWN	2	0.11%	10.00	3.00
YELLOWWOOD	2	0.11%	10.50	3.00
AILANTHUS	1	0.05%	11.00	4.00
ALDER-SPP	1	0.05%	10.00	3.00
BEECH-AMERICAN	1	0.05%	2.00	3.00
EASTERN REDCEDAR	1	0.05%	9.00	3.00
HICKORY-SHAGBARK	1	0.05%	8.00	3.00
HORSECHESTNUT	1	0.05%	14.00	2.00
MAGNOLIA-SPP	1	0.05%	6.00	3.00
OAK-PIN	1	0.05%	2.00	3.00
OAK-SCARLET	1	0.05%	1.00	3.00
SUMAC	1	0.05%	7.00	3.00
WILLOW-WEEPING	1	0.05%	35.00	4.00

The PHPD tree population consists of 62 distinct tree species, accounting for 1,821 individually inventoried trees. The above table shows the percent of the total population each species makes up, as well as the percent of the total population each represents, average Condition, and average Trunk Diameter. To see which trees are performing well, we would look for trees with a Condition rating of less than 3, with a large DBH. This population is shown graphically below:



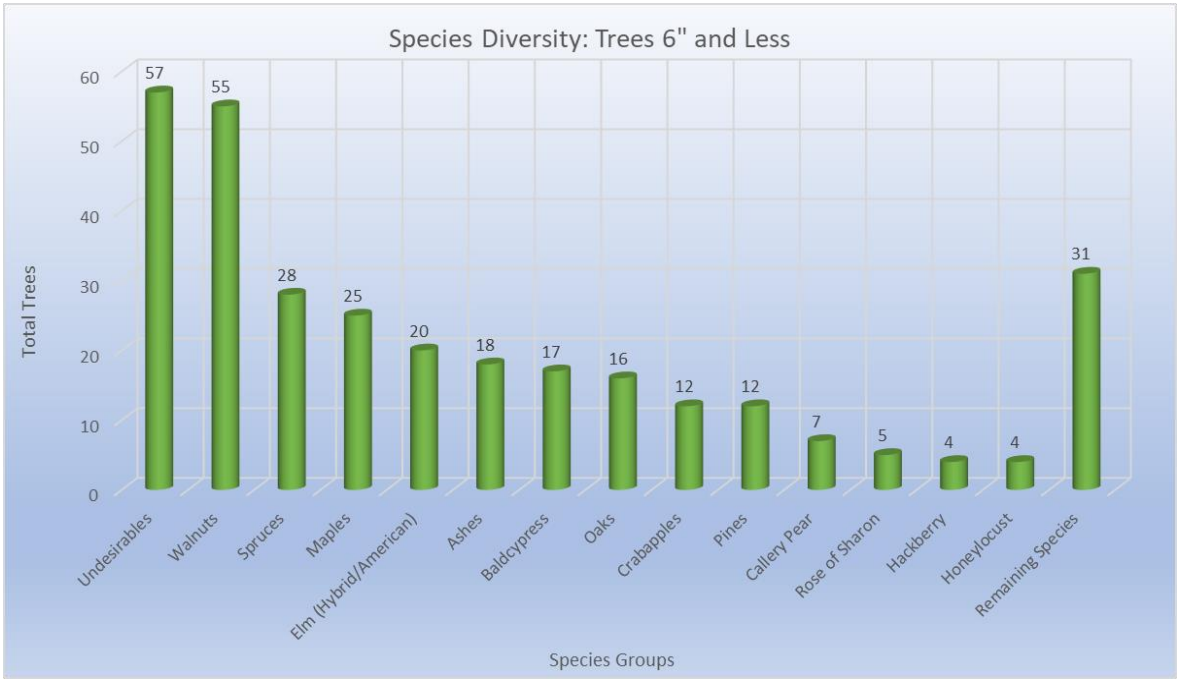
Because this inventory included a considerable number of trees in natural and unmanaged areas of PHPD properties, a significantly high number of trees were classified in the "Undesirable" category. The "Undesirable" species group consists of tree species such as Mulberry, Boxelder, Cottonwood, Willow, Black Cherry, Buckthorn, Siberian Elm, and White Poplar. These trees are known for either being invasive or weak-wooded trees that often develop structural defects as they mature.

For safety, aesthetic, and ecological reasons, it is recommended that PHPD set a goal of gradually reducing the number of undesirable trees in its parks and replanting them with a diverse set of tree species to increase overall diversity and resilience. Proper planning will help PHPD protect the investment in each new tree, and help to accomplish this goal. Going forward, PHPD should take a more targeted approach comes to choosing new species to plant in its parks and focus on planting a wider variety of quality tree species and genera.

A long term tree planting plan would be an invaluable tool for PHPD to pursue in the future. Such a plan would not only further improve overall diversity, but also maximize the lifespan of trees in the parks by carefully matching tree species requirements and tolerances with each individual planting site. Trees that are well adapted to their growing conditions will establish more quickly, require less maintenance, be healthier overall, and more resistant to disease and insect problems. By matching the right trees with the right planting spaces using a tree planting plan, PHPD can help protect its investment in each new tree.

The District has many species to choose from which are commercially available and currently underrepresented or not present in their population. As mentioned above, the Urban Forest Management Plan will lay out strategies to correct this imbalance, and we will examine the specific species recommended in the "Future of the Urban Forest" Section below.

Young Tree Diversity



As can be seen from the above chart, and has been referenced throughout this document, there are an abundance of both low quality species in many of the unmanaged areas of the parks, as well as an abundance of Walnuts at several parks as well. These, along with the Ash species noted in this chart, are not trees which the district has been intentionally planting, but rather what we call "volunteer trees", or those which occur naturally through forest regeneration.

Those trees being factored out, however, shows that there are still too many of the overplanted species and genera currently still being planted. Species groups such as Spruce, Maple, Crabapples, and Pines still appear in this chart, and planting of these species should really be curtailed in favor of a more diverse group of plantings. That said, there are some welcome portions of this chart as well! Particularly the Oaks, Baldcypress, and Hackberries. These are all trees which are underrepresented in the tree population, and should have more planted. As mentioned above, a long term tree planting plan would be a welcome addition to this UFMP.

iTree Report / Urban Tree Canopy Assessment

iTree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides Urban Forestry analysis and benefits assessment tools. The iTree tools help communities of all sizes to strengthen their forest management and advocacy efforts by quantifying the structure of trees and forests, and the environmental services that trees provide.

The iTree suite calculates hard dollar values that trees provide to communities. Trees provide "ecological services" that saves the district money, such as in heating and cooling costs, where large trees help shade facilities in the summer, saving on air conditioning and electricity bills, and provide windbreaks during the winter, saving on heating and natural gas costs. They also provide CO2 uptake, reducing the effects of climate change, as well as air quality improvements by the absorption of urban pollutants. Trees also absorb stormwater, which reduces strain on stormwater infrastructure, and saves money in replacement costs. Finally, trees contribute up to 15% of the total value of a property, so they have monetary aesthetic benefits as well.

Using the data from the tree inventory, several iTree reports has been prepared PHPD. Below you will find reports on the net annual benefits of the tree population, replacement values, and breakdown of benefits per species. We performed both the iTree Streets analysis which looks primarily at energy savings, and an iTree Eco analysis which focuses more on ecological benefits such as Carbon Storage and Sequestration. The results of these analyses are below, and full tables and iTree Reports are appended.

iTree Streets Analysis Results

Prospect Heights

Total Annual Benefits, Net Benefits, and Costs for Public Trees

3/27/2021

Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	15,748	(N/A)	8.65	(N/A)	0.97	(N/A)
CO2	3,218	(N/A)	1.77	(N/A)	0.20	(N/A)
Air Quality	3,524	(N/A)	1.94	(N/A)	0.22	(N/A)
Stormwater	146,348	(N/A)	80.37	(N/A)	9.00	(N/A)
Aesthetic/Other	98,170	(N/A)	53.91	(N/A)	6.04	(N/A)
Total Benefits	267,009	(N/A)	146.63	(N/A)	16.43	(N/A)

Total Standing Value of PHPD's Tree Population

$1,807,316

(Per CTLA's 9th Guide to Plant Appraisal)

iTree Eco Analysis Results

- Number of trees: 1,821
- Tree Cover: 23.05 acres
- Most common species of trees: Boxelder, Black walnut, Siberian elm
- Percentage of trees less than 6" (15.2 cm) diameter: 17.1%
- Pollution Removal: 1072 pounds/year ($8.71 thousand/year)
- Carbon Storage: 1055 tons ($180 thousand)
- Carbon Sequestration: 16.54 tons ($2.82 thousand/year)
- Oxygen Production: 44.11 tons/year
- Avoided Runoff: 52.65 thousand cubic feet/year ($3.52 thousand/year)
- Building energy savings: N/A – data not collected
- Avoided carbon emissions: N/A – data not collected
- Structural values: $2.17 million

Total Standing Eco Value of PHPD Trees $2,350,000

Total Annual Eco Value of PHPD Trees $20,250/year

To summarize these values together, we have created the following summary table

Annual Values	
Benefits to Residents	$267,009/year
Benefits to Environment	$20,250/year
SUBTOTAL (Each Year)	**$287,259**
Standing Values	
As a Commodity	$1,807,316
As an Ecological Resource	$2,350,000
SUBTOTAL	**$4,157,316**

As can be seen from the above tables, the tree population in PHPD currently provides approximately $287,259 in benefits every year, directly related to trees and their effect on facilities and the environment. It should be noted that the annual budget for all forestry activities recommended in this plan range from $21,000 in the first year to $55,000 by the 10th year, so the benefits from the tree population are worth over 4x what the cost is. We will examine this further below. In addition, the total standing value as a commodity and an ecological resource of the whole tree population is $4,157,316.

These benefits can be viewed as income to PHPD, and so long as the trees are well maintained, they will continue to provide these benefits, and more as the tree population grows in size. As trees grow, they also increase their benefits! For example, a 3" diameter tree provides less than $50/year in benefits, whereas as 20" tree can provide up to $500 per year. The goal is to increase benefits even more, where the tree population pays for itself and even yields "profits"!

The replacement value of trees was also calculated. Currently, the standing value of all trees in PHPD population is $1,807,316. This value is calculated using the industry standard reference, the *9th Edition Guide to Tree and Landscape Appraisal*, which is published by the Council of Tree and Landscape Appraisers.

The iTree Eco data looks at the value of the trees in the absence of the effect of homes or businesses, and looks at trees more from an ecological perspective, mostly what the tree's value is in sequestering and storing Carbon. These numbers are based on peer reviewed science in both Arboriculture as well as Climatology and other disciplines.

The goal of this Plan is to create a tree population which maximizes all of these ecological services to District residents by increasing the number of trees in the parks, and how long they live, while minimizing costs in order to create a healthy, well maintained, and vibrant tree population.

Urban Tree Canopy Assessment

Based on data available from the USDA Forest Service and Morton Arboretum, the total Urban Tree Canopy of PHPD's service area can be determined. This is expressed as the percent of the service area covered by tree canopy from an aerial view. This assessment included 7 total land cover types, including trees, grass and shrub, bare soil, water, buildings, roads/railroads, and other paved surfaces. The result of this tree canopy assessment was that the District's service area contains 40% total tree canopy. The map of the canopy assessment appears on the next page.

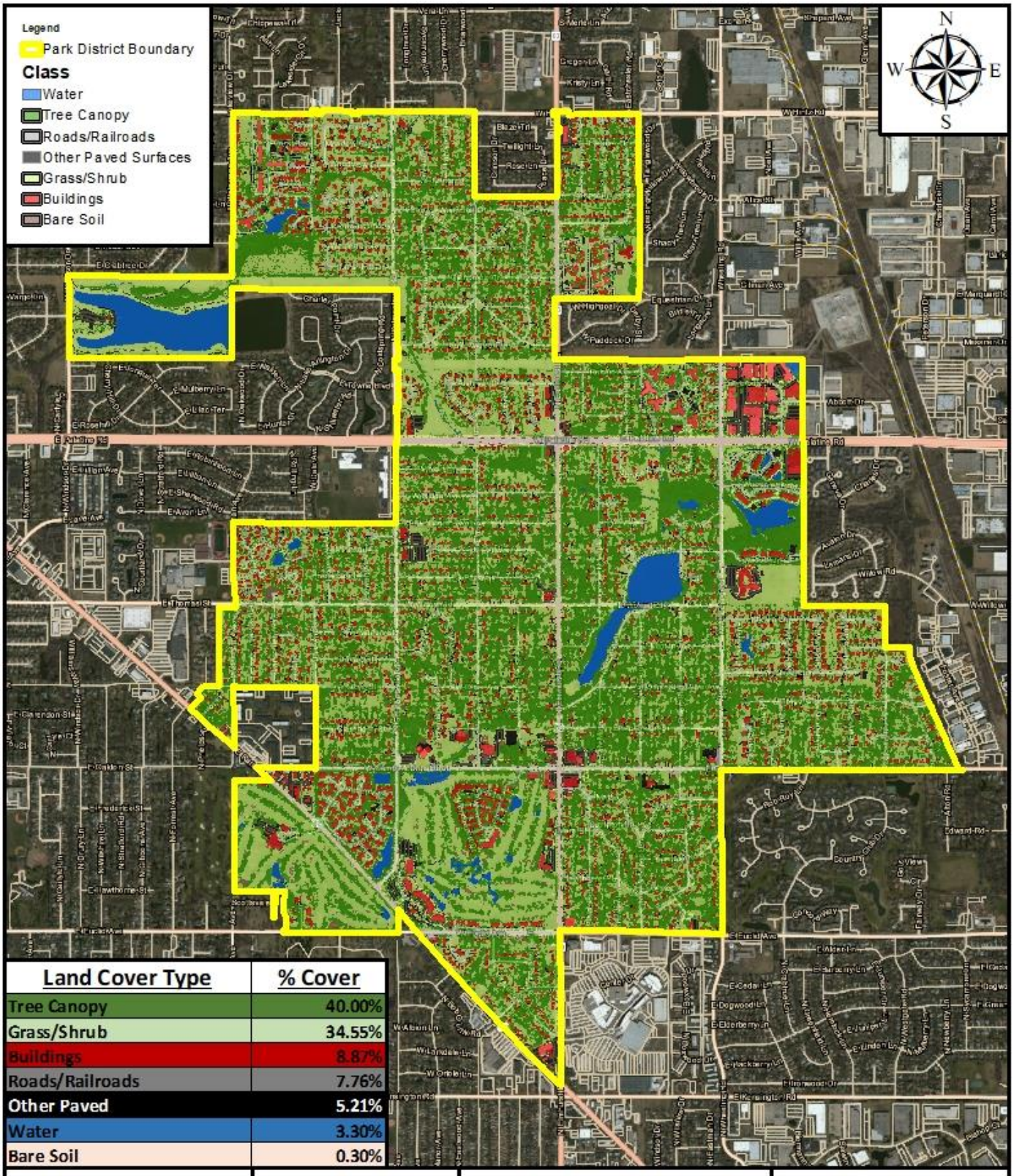
Land Cover Type	% Cover
Tree Canopy	40.00%
Grass/Shrub	34.55%
Buildings	8.87%
Roads/Railroads	7.76%
Other Paved	5.21%
Water	3.30%
Bare Soil	0.30%

The stem-by-stem tree inventory itself was only conducted on publicly owned land in the park properties themselves. For the canopy cover analysis presented here, detailed information on each tree was not included, only total coverage. Aerial images were used to estimate how much tree and other land cover types were in the PHPD service area using a software, similar to Google Earth.

The goal is to increase the total tree canopy in PHPD's service area to 41% by 2032. This goal has been estimated by analyzing data from many different urban tree populations in the Chicago and Northwest Indiana regions, and is based on preliminary data from the Chicago Region Trees Initiative's (CRTI) Forest Composition Workgroup. We believe this is an attainable goal over this time period. PHPD's service area has a very high amount of tree canopy comparable to other urban communities in the northeast Illinois region. However, PHPD will lose tree canopy before it gains any back, due to the many removals discussed earlier, hence the modest increase in overall canopy by 2032.

This will be accomplished through increasing the number of trees in the parks, municipal campuses, schools, and on the parkways. It will also be accomplished by maintaining the existing tree population in a proactive fashion, by enhancing the Urban Forestry program in PHPD. This will ensure that existing trees will live longer as they are given appropriate care. Tree planting and maintenance will also be encouraged on private property, by informing residents about the benefits that trees provide to the community.

Outreach and education will also be provided to residents through events such as Arbor Day and Earth Day celebrations. This goal will be monitored by using aerial imagery analysis like the analysis presented below. Every 10 years, it is recommended that the imagery be reassessed, and a new canopy cover percentage will be calculated for Prospect Heights.



Land Cover Type	% Cover
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Roads/Railroads	7.76%
Other Paved	5.21%
Water	3.30%
Bare Soil	0.30%

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LAND COVER TYPES PROSPECT HEIGHTS PARK DISTRICT

1 inch = 2,000 feet

0 475950 1,900 2,850 Feet

Created On : 11/18/2021

The Future of the Urban Forest

In this section, a diversity vision of what the tree population of PHPD could become by 2032 was created, and compared with the current population. Using the tree data, and the diversity vision, we will then define how PHPD can move to where it is envisioned it could be.

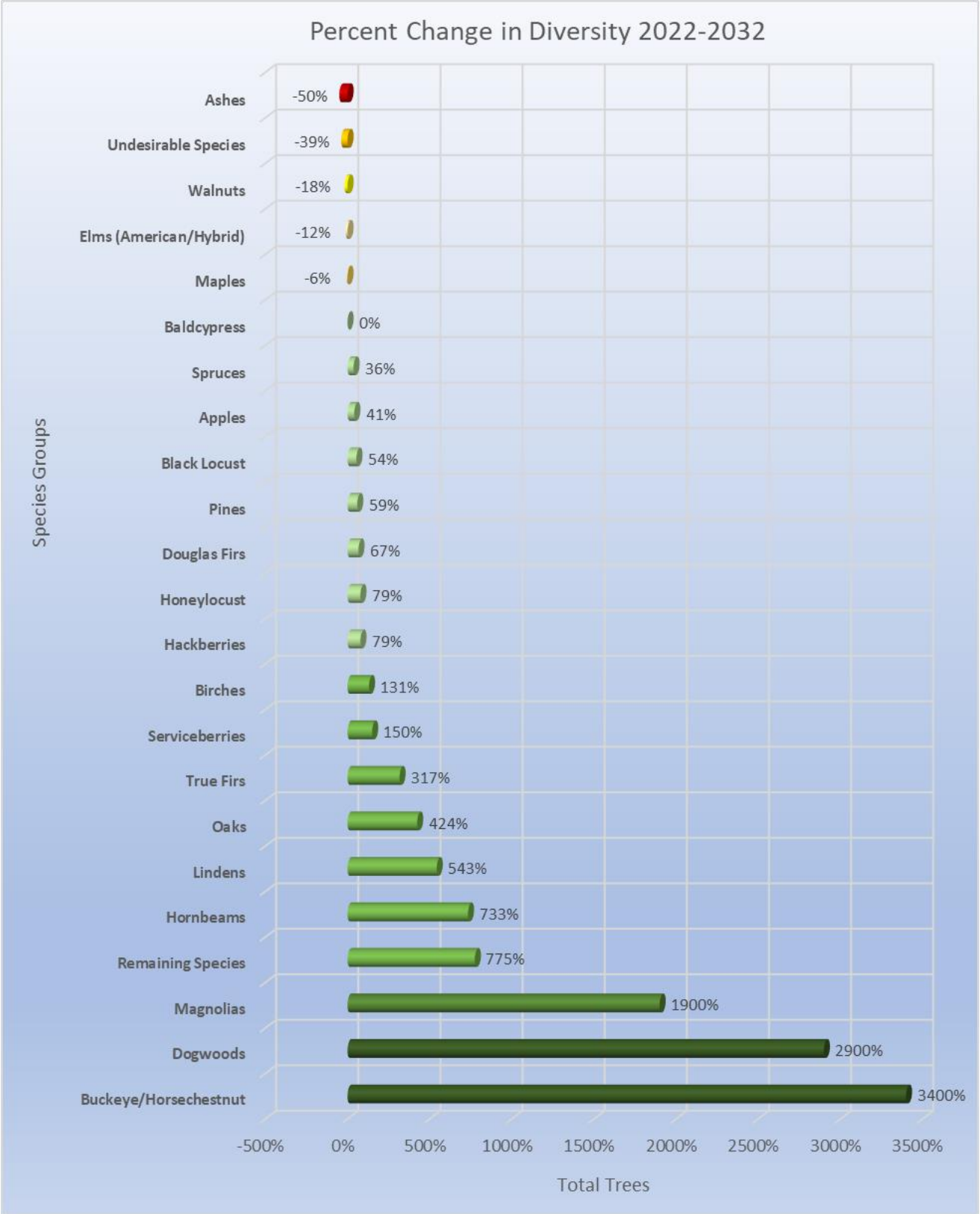
Change in Species Composition 2022 – 2032

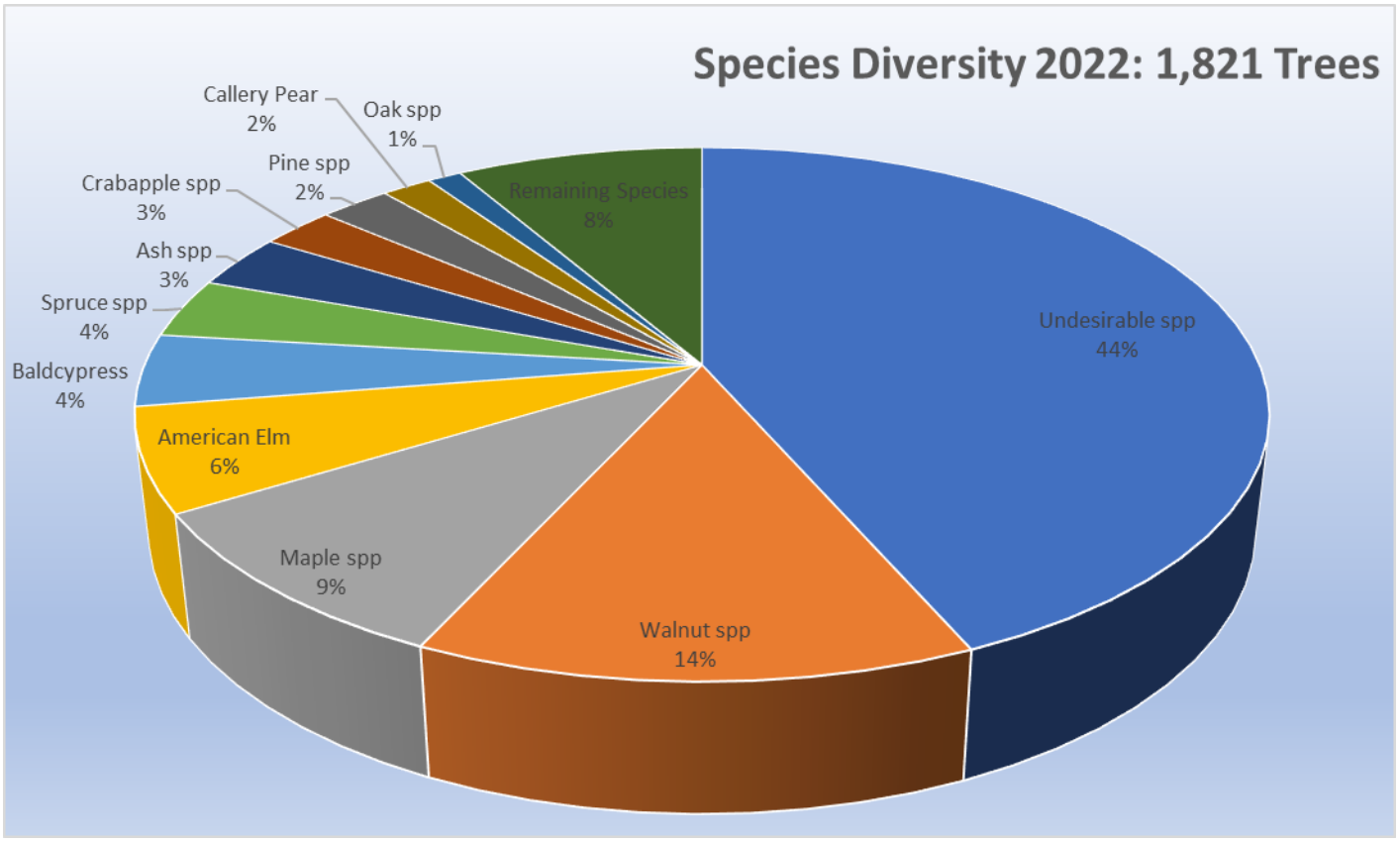
The full calculations for this change in diversity were performed by hand, not using automated software. Local knowledge of the trees, their conditions, what is growing well and what isn't were all used, and yielded this very customized forest composition change list. These goals are meant as general guideposts, and not absolutes. Please be aware that this plan, and particularly the species composition goals, are meant to be adaptively managed over time, and as new information becomes available.

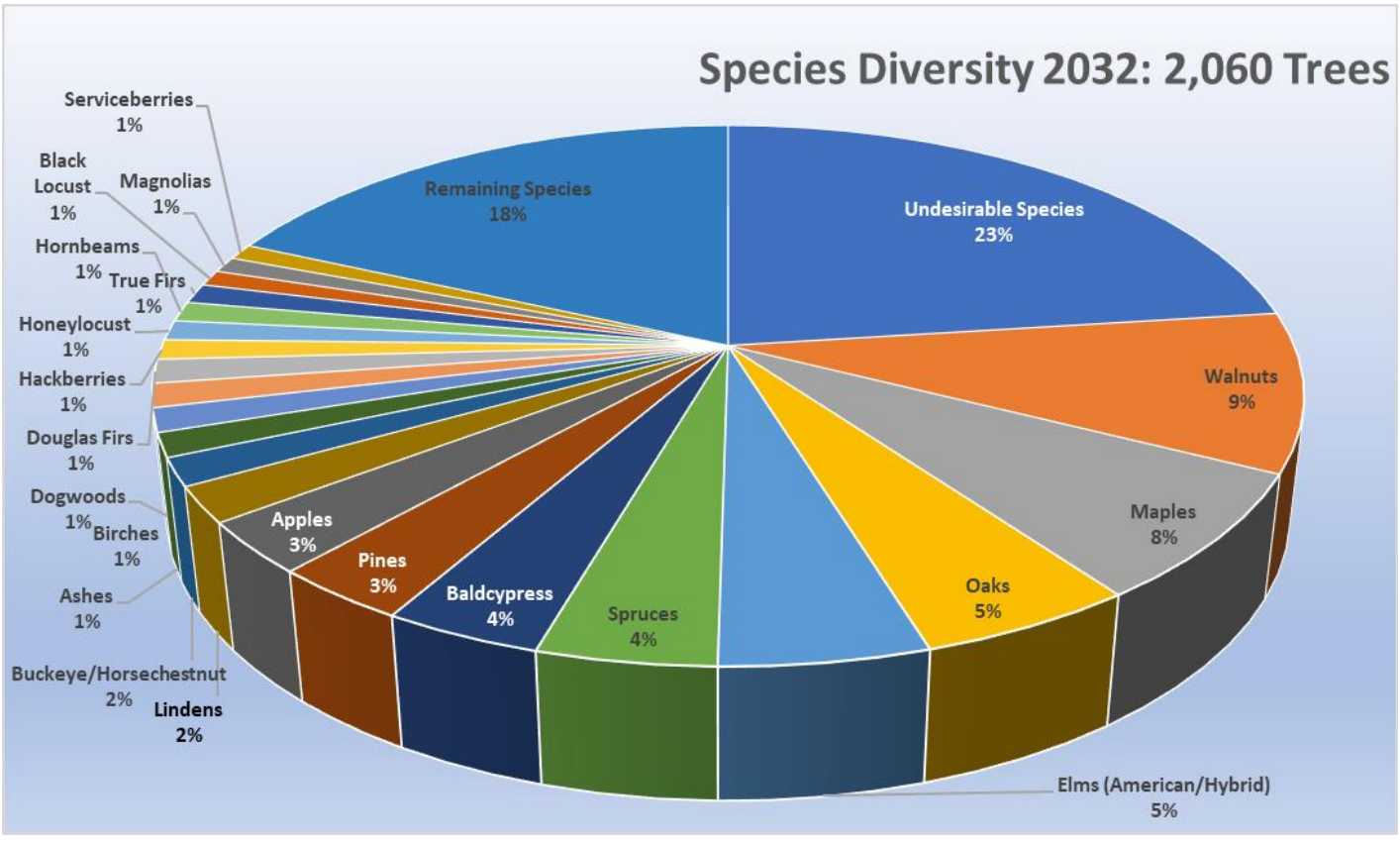
SPECIES	COUNT 2022	COUNT 2032	SPECIES	COUNT 2022	COUNT 2032	SPECIES	COUNT 2022	COUNT 2032
BOXELDER	311	225	EASTERN REDCEDAR	6	15	BUCKEYE-RED	0	10
WALNUT-BLACK	245	200	ELM-HYBRID	5	25	BUCKEYE-YELLOW	0	5
ELM-SIBERIAN	174	125	HAWTHORN-SPP	5	15	DAWN REDWOOD	0	5
COTTONWOOD	118	80	ROSE OF SHARON	5	10	DOGWOOD-CORNELIAN	0	10
ELM-AMERICAN	114	80	CATALPA	4	15	DOGWOOD-PAGODA	0	10
MAPLE-SILVER	109	75	OAK-BURR	4	15	DOGWOOD-SPP	0	10
BALDCYPRESS	80	80	SPRUCE-WHITE	4	15	HORNBEAM-EUROPEAN	0	10
MULBERRY-SPP	67	35	HORNBEAM-AMERICAN	3	15	GINKGO	0	20
SPRUCE-BLUE	50	50	AMERICAN REDBUD	3	15	HICKORY-SHELLBARK	0	10
APPLE-CRAB SPP	46	55	FIR-CONCOLOR	3	15	IRONWOOD	0	10
BUCKTHORN	46	0	FIR-SPP	3	10	KATSURATREE	0	5
ASH-GREEN	41	20	MAPLE-AMUR	3	0	KENTUCKY COFFEETREE	0	20
WILLOW-SPP	35	10	OAK-RED	3	15	LARCH	0	5
PEAR-CALLERY	31	20	MAPLE-SUGAR	2	15	LILAC-TREE	0	20
MAPLE-RED	27	35	OAK-WHITE	2	10	LINDEN-AMERICAN	0	20
PINE-AUSTRIAN	23	30	UNKNOWN	2	0	LINDEN-SILVER	0	5
PINE-WHITE	21	30	YELLOWWOOD	2	10	LONDON PLANETREE	0	20
ASH-WHITE	19	10	AILANTHUS	1	0	MAGNOLIA-CUCUMBER	0	5
DOUGLAS FIR	18	30	ALDER-SPP	1	10	MAGNOLIA-SAUCER	0	5
VIBURNUM	16	15	BEECH-AMERICAN	1	5	MAPLE-PAPERBARK	0	5
MAPLE-AUTUMN BLAZE	15	25	HICKORY-SHAGBARK	1	10	OAK-CHINQUAPIN	0	10
CHERRY-BLACK	14	5	HORSECHESTNUT	1	10	OAK-ENGLISH	0	10
HACKBERRY	14	25	MAGNOLIA-SPP	1	10	OAK-SHINGLE	0	10
HONEYLOCUST	14	25	OAK-PIN	1	5	PAGODATREE	0	5
MAPLE-NORWAY	14	5	OAK-SCARLET	1	5	PAWPAW	0	10
BIRCH-RIVER	13	20	SUMAC	1	5	PEACH	0	5
BLACK LOCUST	13	20	WILLOW-WEEPING	1	0	PERSIAN IRONWOOD	0	5
SPRUCE-NORWAY	12	25	AMUR MAACKIA	0	5	PINE-LIMBER	0	10
POPLAR-WHITE	11	5	APPLE-EDIBLE	0	10	PLUM-AMERICAN	0	5
OAK-SWAMP WHITE	10	30	BEECH-EUROPEAN	0	10	SEVEN SON FLOWER	0	5
YEW	10	10	BIRCH-WHITE	0	10	SWEETGUM	0	10
SERVICEBERRY-SPP	8	20	BLACKGUM	0	10	TULIPTREE	0	10
LINDEN-LITTLELEAF	7	20	BUCKEYE-OHIO	0	10	WITCH HAZEL	0	10
ARBOR VITAE	6	15				ZELKOVA	0	10

	Plant in Abundance
	Plant in Limited Quantities
	Maintain Existing Population
	Reduce Population Size

Percent Change in Species Composition 2020 – 2032



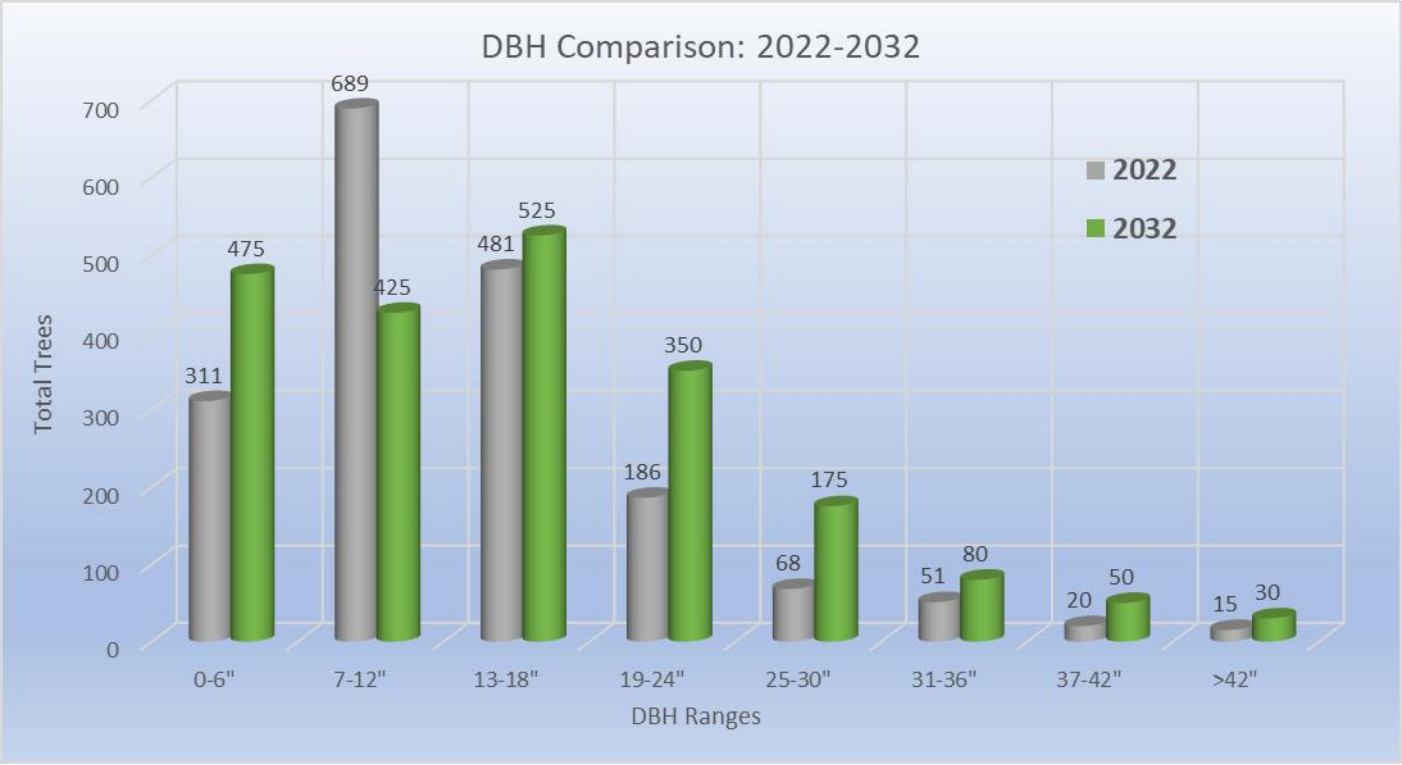

Species Diversity 2022: 1,821 Trees
Undesirable spp 44%
Walnut spp 14%
Maple spp 9%
American Elm 6%
Baldcypress 4%
Spruce spp 4%
Ash spp 3%
Crabapple spp 3%
Pine spp 2%
Callery Pear 2%
Oak spp 1%
Remaining Species 8%


Species Diversity 2032: 2,060 Trees
Undesirable Species 23%
Walnuts 9%
Maples 8%
Oaks 5%
Elms (American/Hybrid) 5%
Spruces 4%
Baldcypress 4%
Pines 3%
Apples 3%
Remaining Species 18%
Serviceberries 1%
Black Locust 1%
Magnolias 1%
Hornbeams 1%
True Firs 1%
Honeylocust 1%
Hackberries 1%
Douglas Firs 1%
Dogwoods 1%
Birches 1%
Ashes 1%
Buckeye/Horsechestnut 2%
Lindens 2%

As can be seen from the above several pages of charts showing the change in species composition over the next 10 years, there will broadly be a move away from the undesirable and overrepresented species discussed above, and instead a move towards a variety of new species, and those which are underrepresented in the current population. This will lead to an increase from 1,821 to 2,060 trees total in the parks by creating a multilayered canopy, as well as an increase from the current total of 62 species up to a total of 97 species, or an increase of approximately 36% in overall species diversity. This will also create a more diverse Urban Forest which is resistant to pest and pathogen outbreaks by not relying on only a few species with which to fill the parks.

The Benefits of Larger, Healthier Trees

Larger trees provide greater benefits to the community: They create more shade to offset cooling costs, absorb more storm water, create greater buffers against cool winter winds for heating costs, and absorb and sequester more carbon than smaller trees do. For the 2032 vision of the tree population, a variety of methods were used to arrive at a reasonable age-class distribution. We used the current population structure, and anticipated high rates of survival based on new planting practices which would involve a "right tree/right site" approach, as well as increased survivorship of existing trees due to better management and care practices. Predicted growth, survivorship, and eventual tree losses are based on current species composition and future plantings and removals. This allowed the creation of a vision of what the tree population will look like 30 years from now.



It can be seen from the above chart that the existing tree population (grey bars) shows what was described as a young tree population with all trees less than 18" making up over 80% of the population. The projected age class chart shows not only an uptick in the number of young trees in the population, but also more trees surviving into the older age classes, where they will provide the greatest benefits in terms of ecological services to the community.

	2022	2027	2032
0-6"	311	400	475
7-12"	689	475	425
13-18"	481	550	525
19-24"	186	300	350
25-30"	68	130	175
31-36"	51	60	80
37-42"	20	35	50
>42"	15	25	30

This is because increased levels of care for existing trees will enable them to survive longer. The table in the upper right of this page shows a general expectation of how the changes in tree diameters might change over the next 10 years based on the methods to be applied in this Urban Forestry Management Plan. These numbers were projected by hand, based on our prior experience, and the methods detailed below. If these projections hold, PHPD could see a 29% increase in annual benefits of $83,725 for a total of $370,985. Standing values of the tree population could increase nearly 19% from their current level of $4,157,316 to approximately $4,984,813.

For projections of future age classes of trees, a ½" per year average growth rate was roughly estimated by assuming that it would take an average tree 10 years to go from one age class to the next (6" = appx 10 years growth). Also used were the number of trees to be planted and removed annually, as calculated below in the Tree Planting and Tree Removal sections. These numbers were arrived at based on all the above, as well as the best professional opinion of the Forestry Consultant. As time goes by, these projections will likely change.

The overall increase in size of the tree population and diameters of the individual trees will yield a much greater dollar figure when it comes to the ecological services provided, and provide park patrons with a greater sense of being in a more arboretum like setting when they are enjoying the parks. Below are several examples of Ecological Services provided by trees:

Energy Savings: During the summer when temperatures are warm, trees create shade, and temperatures are cooler in the shade. Cooler temperatures cause air conditioners to have to work less, which reduces the amount of energy a household uses. During the winter when temperatures are cold, winter winds cool your home quickly. Trees act as windbreaks, causing heating systems to use less natural gas, saving energy and money.

Carbon Dioxide (CO2): The amount of CO2 which is put into the atmosphere each year has a direct correlation with global climate change. That change causes more severe storms, greater drought conditions, and many other costly outcomes. Reducing CO2 from our atmosphere lessens these effects. Trees uptake CO2 and act as a carbon sink, putting carbon into long term storage in its woody tissues, removing it from our atmosphere, creating a net benefit to society, and saving money.

Air Quality: Industrial processes and vehicle emissions put pollutants into our air. These pollutants can cause or worsen health conditions such as heart disease, asthma, and lung disease. In addition, these pollutants can mix with water in the atmosphere and create nitric and sulfuric acid, causing acid rain, which can destroy fisheries and contaminate water supplies. Trees absorb these compounds with their leaves and other tissues, and prevent them from remaining in the atmosphere. Reductions in these pollutants results in overall better health, reducing the cost of healthcare to society, and saving communities money.

Storm water: The cost of delivering fresh water to homes, as well as removing and treating wastewater and storm water is considerable. One of the greatest costs comes when these systems are overwhelmed, such as during flooding, which can cause millions of dollars of damage to homes and vehicles, or when these systems need to be replaced. Fortunately, trees take water from the soil and put it back into the atmosphere through the process of transpiration. Therefore, the more trees an organization has, the less flooding is an issue, and the less strain is put on storm water infrastructure, resulting in fewer repairs and replacements. In addition, tree canopy slows rainfall's effects on flooding by "intercepting" it with leaves and branches, delaying how quickly rainfall can become floodwater. All of this adds up to savings for an organization.

Aesthetic/Other: up to 15% of the value of a property can be attributed to its trees and other landscaping. Tree lined streets are much more appealing to homebuyers than streets devoid of trees, resulting in increased home sales, and therefore increased tax revenue, or increased tax revenue with which to fund initiatives relating to trees, attract new businesses, etc.

Return on Investment

Return On Investment (ROI) for an individual tree is strongly favorable over the life of a tree in terms of investment in planting, care, and removal versus the ecological benefits the tree provides. As we strive to justify the expenditures on trees and tree care, it is important that organizations and their staff are aware of this.

On the following page, we have provided an ROI calculation sheet. This sheet breaks the tree's lifetime down into three phases, based on the anticipated costs of pruning in the budgets sections below. These phases are the young (3-12" DBH), mature (13-24" DBH), and full grown (25-36") ranges shown below.

Data was taken from the iTree algorithm, and applied towards the average benefits provided by a tree at each of these life stages, and multiplies it out over the 20 year period each phase accounts for. We also looked at costs for planting, watering, routine maintenance, emergency maintenance, and eventual removal of that tree over 60 years. The results are pictured below, with the calculations on the following page.

Total Investment	**$3,610.00**
Total Return	**$10,819.60**
Total ROI Over 60 Years	**199.71%**

Return on Investment: Years 1-20 (3-12" Diameter)

Costs

Initial Purchase and Installation	$300.00
Watering for 2 Years	$100.00
Pruning - 4x @ $40/prune	$160.00
TOTAL INVESTMENT	**$560.00**

Benefits	Avg/Year	Over 20 Years
Electricty	$6.08	$121.60
Natural Gas	$11.27	$225.40
Property Value	$27.55	$551.00
Stormwater	$13.85	$277.00
Air Quality	$2.52	$50.40
CO2 Reduction	$2.31	$46.20
TOTAL RETURN		**$1,271.60**

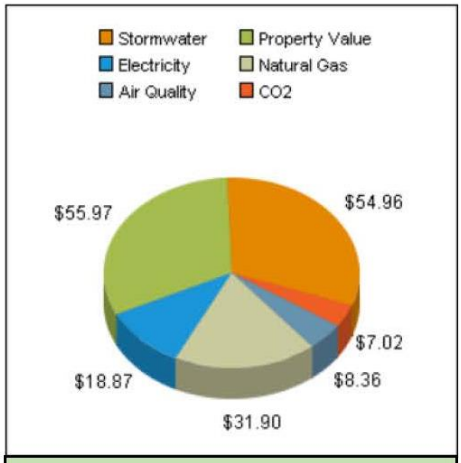
ROI Years 1-20: 127.07%

Return on Investment: Years 21-40 (13-24" Diameter)

Costs

Pruning - 4x @ $75/prune	$300.00
Emergency Maintenance (2x)	$500.00
TOTAL INVESTMENT	**$800.00**

Benefits	Avg/Year	Over 20 Years
Electricty	$18.87	$377.40
Natural Gas	$31.90	$638.00
Property Value	$55.97	$1,119.40
Stormwater	$54.96	$1,099.20
Air Quality	$8.36	$167.20
CO2 Reduction	$7.02	$140.40
TOTAL RETURN		**$3,541.60**



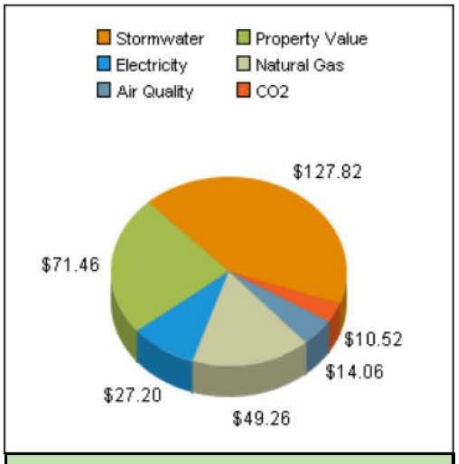
ROI Years 21-40: 342.70%

Return on Investment: Years 41-60 (25-36" Diameter)

Costs

Pruning - 4x @ $150/prune	$600.00
Emergency Maintenance (2x)	$650.00
Eventual Cost of Removal	$1,000.00
TOTAL INVESTMENT	**$2,250.00**

Benefits	Avg/Year	Over 20 Years
Electricty	$27.20	$544.00
Natural Gas	$49.26	$985.20
Property Value	$71.46	$1,429.20
Stormwater	$127.82	$2,556.40
Air Quality	$14.06	$281.20
CO2 Reduction	$10.52	$210.40
TOTAL RETURN		**$6,006.40**



ROI Years 41-60: 166.95%

Tree Removals

The first step towards attaining PHPD's forestry goals will be to remove trees which are diseased, dying, or present a hazard. At present, there are 542 trees which have been called for removal during the inventory. Of these, 4 are listed as a Priority Removal, 149 are listed as Standard Removals, and 389 are listed as Low Priority Removals based on the tree inventory data. A direct goal of this Urban Forestry Management Plan is to begin the process of budgeting for and removing these trees.

By percentage, this number of removals is very significant in terms of comparably sized park districts, with removals representing 29% of the total inventoried population. Typically, park district inventories reveal between 3-5% of the tree population requiring some form of removal. For this reason, as mentioned above, the 10-year period addressed in this plan will still not be enough to remove all these trees given current and projected future budgets. But the important part is that the Park District is acting on the tree inventory data and has begun a prioritization that shows a steady move towards getting these removals performed.

After this initial 10-year period to begin addressing the removals identified in the inventory, and in order to attain the goals set forth in the Diversity Standards, it is anticipated that the background rate of tree removal will be approximately 40 trees per year. From 2032 forward, reevaluation of the tree population on an annual or semiannual basis by PHPD staff or the Forestry Consultant will specify which trees require removal. These numbers, detailed below, are meant to be placeholders for budget calculations and diversity standards. This does not require that this number of trees be removed each year, this is simply a projection based on the existing inventory data.

For purposes of projection, costs have been estimated using a rate of $25/diameter inch for tree removal and stump grinding, which is a conservative estimate based on current market pricing. Rates could certainly be found lower than this in a competitive bid process or using in-house labor. As is the case with all cost projections for this Plan, no cost increase is assumed for the first 5 years, and a 3% annual cost increase is assumed thereafter. This is also a conservative estimate based on the Consumer Price Index, and actual costs are likely to be lower than projected.

Milestones	2022	2023	2024	2025	2026	2027-2032
Trees Removed	7	12	21	25	30	40/year avg
Diameter Inches	221"	255"	375"	371"	373"	400"
Notes	Priority Removals 24" and Larger	Priority Removals from 20-24"	Priority Removals 17-19"	Prioirity Removals 14-18"	Priority Removals 12-13"	Prioritize Remaining Removals
Removal Cost (2022)	$5,525	$6,375	$9,375	$9,275	$9,325	$10,500
Removal Cost (CPI)	$5,525	$6,375	$9,375	$9,275	$9,325	$10,500

The number of removals, based on the data, will remain relatively steady based on projections at 40 trees per year, and bear in mind that many of these removals will be smaller trees, and not all large trees. Some may even be failed new plantings which require very few resources to remove. Continual reevaluation of this plan and the efforts made towards its goals will be crucial in defining next steps. Using this data, cost estimates were prepared for the long-term removals, based on the tree inventory data. As this is a program to be adaptively managed, these budget tables can be updated periodically to reflect actual costs being paid. We believe at the 5 and 10 year marks, these budget and production numbers should be reevaluated.

Tree Removal Activities

Safe Removal of a Tree to an Appropriate Flush Cut

Tree removal can be dangerous, but when performed by professionals is very safe. Therefore, all tree removal activities on PHPD's property should be performed under the guidance of a Certified Arborist or Arborist Trainee. This may be the supervision of PHPD staff or the Forestry Consultant alongside a contractor. The safe removal of a tree involves the safe removal and lowering of all portions of the tree according to all relevant ANSI standards and Best Management Practices. The stump should be flush cut such that the highest portion of the cut is no greater than two inches from the highest part of the ground surface to prevent a tripping hazard on public property.

Stump Grinding

Within a reasonable amount of time following the removal, stumps and surface roots should be removed using an approved stump grinding machine, such that the stump is ground to a minimum depth of 6 inches, and no surface roots are visible. If the site is to be planted with a new tree, that depth should be increased to 12 inches below the soil surface. This will ensure that a new tree may be successfully planted, and that no re-sprouting will occur from the old stump. The depths to which the stump must be ground may be altered by the PHPD depending on needs for specific circumstances or contracts. Until the planting space is fully restored, the stump hole should be filled and compacted to ground level using the debris resulting from the stump removal.

Planting Site Restoration

Once the tree has been safely removed and the stump has been ground out, the open planting space must be fully restored if a tree is not scheduled to be planted in or adjacent to the old hole. Site restoration consists of removing the stump chips from the hole, filling it with a quality mineral topsoil, tamping down to match the surrounding grade, spreading grass seed over the top of the topsoil, and securing green turf blanket over the topsoil. This will ensure that grass grows to restore the aesthetics and function of the old site and prevents tripping hazards from the removal scar.

Reasons for Tree Removal

Removal of trees on public spaces is an unavoidable reality of managing large tree populations. When the trunk, branches or roots fail, a standing tree can cause personal injury or property damage, and even small dead trees can be an eyesore. Old trees can hold great sentimental value, and many people become attached to them. However, there are times when their presence creates a public hazard, and it is at those times that action must be taken to ensure public safety. It is also important to remember that the removal of a tree today is the promise of a new tree for tomorrow!

Removal of trees on PHPD property shall always be at the discretion of District staff and/or the Forestry Consultant. Trees will never be removed without a sound reason from the staff or Forestry Consultant. Neighboring residents and concerned park patrons may request a tree to be removed for reasons NOT detailed below, and these requests will be reviewed by PHPD staff, Executive Director, or the Forestry Consultant.

Generally speaking, trees with a greater need for removal based on public safety will always hold a higher priority. Under no circumstances will PHPD be responsible for trees which are not on park property, with the exception of pruning potentially hazardous limbs overhanging park property.

Dead or Dying

If a tree is biologically dead or nearly dead, it will require removal. Trees which are standing dead, have approximately 50% dead crown or greater, or have less than approximately 40% structurally sound wood in the cross-section of the trunk shall be removed as expediently as practical. These determinations shall be at the discretion of park district staff or the Forestry Consultant.

Diseased or Infested

Diseases are caused by viral, fungal, or bacterial pathogens. Infestations are caused by insects or other small animals. Dutch Elm Disease and Oak Wilt, for example, are fungal diseases that kill Elm and Oak trees when they are infected. Emerald Ash Borer is an insect which kills Ash trees by infesting them. The prompt removal of diseased or infested trees limits the exposure of other nearby trees. The removal of 1 tree may save dozens of others. Trees deemed to be diseased or infested by park district staff or the Forestry Consultant shall be removed as expediently as possible in order to slow the spread of such insects and diseases.

High or Extreme Risk

"Tree Risk" is the potential of a tree or tree part to impact a nearby person or piece of property and cause property damage or personal injury. This topic is of great interest in Arboriculture today, and the insurance industry is becoming increasingly involved in the process of assessing and managing the risk posed by trees. Litigation involving trees is a perennial concern for public entities.

All trees in PHPD were assessed for a basic level of risk during the initial inventory, and several trees were found to be at elevated risk levels. If such risk can only be safely mitigated by tree removal, as opposed to pruning or other measures, then timely removal is critical because of potential exposure of the public or property to potential harm.

District staff, the Forestry Consultant or another TRAQ Qualified Risk Assessor should assess the tree and prepare a report to document the details of the situation prior to removal. Often, risk can be mitigated by removing a portion of the tree, or other corrective measures. If the entire tree is deemed to be at high or extreme risk of failure, however, the entire tree should be removed as a means of reducing its residual risk to zero.

Emergency / Storm Damage Removals

A tree should be removed if it has been severely damaged and/or compromised by lightning, wind, or other such weather event. "Storm-damaged" is generally defined as a tree which has lost 33% or more of its crown, has a large crack or other wound in the trunk, has a lean of greater than ten degrees from vertical resulting directly from strong winds, has sustained a lightning strike, or other such issues directly related to storm events. Park district staff or the Forestry Consultant shall determine the need for removal of a tree in these cases. Though in emergency situations such as a tree impacting a person, vehicle, power lines, or other such emergency, PHPD may perform any actions necessary to abate public hazards so long as they are in compliance with all relevant Arboricultural standards and practices.

Damage from Construction or Vehicle Strike

PHPD staff or the Forestry Consultant should assess trees that have been impacted by a vehicle strike or piece of construction equipment. If the tree has suffered physical damage or extreme root compaction and is likely to decline and become high risk, it should be scheduled for removal in order to maintain public safety. That decision will be based on the best professional judgement of the Forestry Consultant or park district staff.

Reasonable Resident Request

If a tree has non-terminal pest or pathogen issues, moderately poor structure or is in somewhat poor condition, a concerned resident or park patron may request the removal of the tree. These requests will be reviewed by park district staff and/or the Forestry Consultant and evaluated on a case-by-case basis. If the tree shows significant potential to decline or pose a threat, the park district may agree to the removal within a reasonable time frame. Young and healthy trees will generally not be considered eligible. Priority will always be given to trees in danger of threatening public safety.

Interference with Utility or Signage

A tree should be removed if it is interfering with the function or visibility of official traffic control devices or has impacted above or belowground utilities in a manner that cannot be mitigated by pruning or other measures. In these cases, it is likely that no new tree will be planted in these sites.

Overplanted and Underperforming

No healthy tree shall be removed for the sole reason of having been overplanted. As a result of this Plan, PHPD will be enhancing diversity in the urban forest, with the goal of building a diverse urban forest. Overplanted species listed as being in poor condition will be reviewed to assess further decline or recovery. Those trees in noticeable decline shall be removed at the discretion of park district staff and/or the Forestry Consultant. This will be used as a preventative measure so that these trees do not continue to decline to a point where they become hazardous, and not used as a reason to remove an otherwise healthy tree.

Basic Park District Tree Removal Requirements and Standards

All the following requirements and standards shall be met during tree removal activities as matter of local policy. For a more detailed view of the specific ANSI and ISA standards, please see Appendix I:

Prospect Heights Park District Internal Policies

1. All personnel directly involved with process of chainsaw operation, climbing, bucket truck operation, and rigging limbs shall be provided with sufficient training and experience to perform such duties while employed by Prospect Heights Park District, as either grounds maintenance, or performing work as a contractor employed by the park district.
2. Only qualified utility arborists may perform tree removal operations within ten feet of an electric utility line. PHPD employees or contractors may complete the process of trunk removal and stump grinding only if the remaining portion of the tree is greater than ten feet away from a transmission line.
3. The park district will not remove healthy trees in order to meet diversity goals, unless the tree poses a risk to persons or property.
4. The park district shall not perform or assist, programmatically or financially, with the removal of trees on private property. Public/Private tree ownership is defined as having 51% or greater of its trunk diameter on park property. Limbs overhanging park property may be pruned back to the property line with adjacent properties

Tree Planting

Whereas tree removal is necessary to promote public safety, planting of new trees must occur to increase diversity and canopy cover. As a means of attaining the goals of increasing canopy cover to 40%, and increasing overall diversity significantly, this plan calls for the planting of nearly 1,000 trees over the coming 10 years. These trees will be planted by park district staff, contractors, and possibly volunteers who have been properly trained. This plan has a direct goal of planting trees where they have the best chances to establish and thrive based on their specific sites and species requirements.

For the goals and milestones shown below, plantings should be expected hold steady at approximately 100 per year on average, which will outpace the number of expected removals called for each year.

For the costs of planting, $300 per tree (installed) has been used. This is a conservative estimate based on retail costs, and likely the park district will be able to perform planting at a more favorable rate. Costs have been estimated using mostly 2.5" balled and burlapped trees. However, if smaller containerized stock is planted, these numbers could be reduced significantly. If volunteer labor is employed, these costs could reduce significantly as well, as mentioned above in the Strategic Partnerships section. The Tree For A Life program could also easily reduce costs.

	Milestones	2022	2023	2024	2025	2026	2027-2032
PLANTINGS	Trees Planted	20	35	50	65	80	100/year avg
	Planting Cost (2021)	$6,000	$10,500	$15,000	$19,500	$24,000	$30,000
	Planting Cost (CPI)	$6,000	$10,500	$15,000	$19,500	$24,000	$30,000

The Importance of Planning Your Tree Planting

The Right Tree in the Right Site

Urban Forestry has an unfortunate history of not planning carefully for tree planting. Whatever was readily available, inexpensive, urban tolerant, and grew fast was seen as desirable, and often planning of tree plantings was left to developers, or nurseries and plantsmen. With our history of invasive insects and diseases in the Midwest region, and knowing these will only get worse in the future, it is more crucial than ever that we have a process to plan our tree plantings.

This process should involve assessing each site to be planted in much the same way we would assess a tree, except that in this case, we look for factors such as available above and below ground growing space, how much light the site receives, amount of soil moisture present, and possibly other factors such as soil pH and texture. Once this information is collected, planting sites can be matched with trees which are well suited to those sites. Matching the right tree to the right site like this will result in trees which establish faster, grow more vigorously, live longer, and provide far greater benefits. Even a simpler version of this process is better than nothing.

Playing an active role in tree planting planning also allows for meeting diversity standards such as the taxonomic, spatial, and age class diversity principles outlined above, and attempts to get the tree population into compliance with the "20-10-5 Rule". Park districts have a distinct advantage here over street tree populations, as trees can be planted nearly anywhere vs needing to replace a tree very close to the removal site of an old tree on the parkway. Being targeted about species selection also allows the use of species which are slightly more difficult to find appropriate sites for. These species that are considered "less urban tolerant" can still be planted when the appropriate site is found!

The success of a tree depends on where and how it is planted. Park District staff or the Urban Forestry Consultant should assess planting sites before trees are purchased and installed each year, to ensure the correct tree is being planted for the correct site. Each tree planted represents a 25-75+ year commitment, and this planning helps to increase the benefits to the community from this commitment. A list of acceptable species to be planted appears in Appendix A.

Nursery Stock Procurement

Nursery stock quality is yet another aspect of planning which can help a tree establish, survive, and thrive to provide great benefits to the community. PHPD staff or the Forestry Consultant should inspect and select every tree which is to be planted on park property to minimize the possibility of installing lower quality nursery stock. Specifications should be for material no smaller than 1.75" caliper, with good form for the species, planted as either balled and burlapped or minimum 5-gallon containerized stock.

Currently, the nursery industry is recovering from a nursery stock shortage due to high demand to replace Ash trees lost to Emerald Ash Borer, which impacted the availability of some species. We strongly recommend to not to accept substitutions in the requested species lists, as many nurseries may still attempt to substitute overplanted trees for some of the higher diversity species which may still be difficult to obtain. It is recommended to have an approved substitution prepared for each requested tree species. A list of species and acceptable substitutes has been included in Appendix C.

Tree Transport and Planting

Proper transport and planting procedures determine a tree's success after planting. Even healthy trees from the field, if improperly transported, may dry out during transport, or suffer structural damage to root balls.

When it comes time to plant, trees planted too deeply will suffer from root compaction and trunk decay. Trees planted without properly dug holes may suffer from stunting. Trees planted without proper removal of packaging materials may develop girdling roots. Trees planted too high may have surface root desiccation. Trees improperly staked or with improper trunk protection may suffer from trunk wounds or girdling of the entire trunk. The standards and Best Management Practices for tree transport and planting are detailed later in this section, as well as Appendix J. Trees may be planted by a local volunteer work force so long as the workers have been adequately trained by the Forestry Consultant or other local qualified organization prior to planting, and trees are of a smaller size such as containerized stock.

Tree Spacing and Visibility Requirements

Minimum tree spacing between large, medium, or small sized deciduous shade trees should be appropriate for the species and conform to Arboricultural Best Management Practices. It is generally recommended this be no less than 40 feet between plantings, with some exceptions for smaller trees. This will allow trees to grow to their full potential without heavy competition for water and nutrients with neighboring trees, and without limited space for crown growth. As mentioned previously, a direct goal is to create a multilayered canopy, and this may involve some degree of latitude when it comes to spacing requirements.

Watering

Watering of newly planted trees is essential to their establishment, growth, and survival, particularly during the first 2 years of their lives. There are several different options for watering trees, including outside contractors, use of in-house staff, or use of volunteer labor. Since these costs can vary greatly, they have not been included in the budget table above, but it is worthy of note that determining how trees are watered may have a significant impact on the budget. Use of volunteer or in-house labor is strongly recommended to keep costs down.

Challenges of Urban Plantings

Urban planting sites are a difficult environment for a tree to thrive in, and based on long term data, it is expected that 5-10% of new plantings fail each planting cycle. The park district's contracts for tree planting should include a one to two-year replacement warranty for any new trees that fail to thrive in their new environment. Urban tree plantings can pose an uphill battle in many ways, due to limited soil volume, salt runoff, airborne pollutants, and other factors. New planting mortality is to be expected, despite best efforts to prevent such an outcome, but the planning measures outlined above will help to mitigate annual new planting mortality

Tree Planting Requirements and Standards

Prospect Heights Park District Internal Policies

1. Planting sites shall be determined and monitored using the District's tree inventory, in conjunction with park district staff and Forestry Consultant input.
2. New planting sites should be 10 feet away from signage, driveways, intersections, and utility structures. If this distance cannot be maintained, the site should not be planted, even if a tree was removed from the same site.
3. Choice of species for planting should be done so according to the District's taxonomic, spatial, and age-class diversity goals. A diverse and resilient urban forest minimizes exposure to financial, environmental, and health risks while maximizing aesthetics, environmental benefits, and ecosystem services to its residents and patrons.
4. All planting stock shall be grown within 250 miles of the City of Prospect Heights.

5. Acceptable nursery stock shall conform to the following standards:
   - **A.** Minimum of 1.75 inch caliper, measured at six inches from the trunk flare
   - **B.** Root ball conforms to ANSI Z60.1 Standards for Nursery Stock
   - **C.** Less than 10% deadwood in the crown
   - **D.** Architecture consistent for the species, cultivar, or variety in question
   - **E.** No included bark or other such narrow branch attachments, unless consistent with species or variety
   - **F.** Free of pests or pathogens
   - **G.** Approved species list for Prospect Heights Park District
6. Planting and digging of certain species shall only occur at certain times of year, in accordance with nursery industry best management practices and professional judgement. These times are subject to the professional opinions of both PHPD and its contractors.
7. JULIE, or another similar utility locating service, shall be contacted, and all utilities located a minimum of three days before planting is scheduled to begin.
8. A minimum of a one-year replacement guarantee shall be extended from approved nurseries and plantsmen for all new plantings rated to hardiness zone five or lower.

Tree Pruning

When maintaining a tree population for its greatest benefits and lowest risk, tree pruning is one of the most cost-effective maintenance activities which can be performed. Pruning provides several important services for a tree: It reduces the risk of failure, provides clearance for utilities or other structures, reduces wind resistance and wind damage, maintains overall tree health, and improves overall aesthetics.

For the goals and Milestones, the most critical needs of the Prospect Heights Park District were prioritized. This priority list begins with trees identified as Hazard Prunes, Priority Prunes, or young trees in need of establishment or training pruning. During the inventory, 190 such trees were identified, and will be prioritized first before beginning any sort of cycle prune. After this, it is recommended that PHPD slowly increase the number of trees pruned each year through 2032 until they are at full capacity to handle the 6-year pruning cycle which has been proposed. Once in the full 6 year pruning cycle for the estimated tree population of 2,110 total trees by 2032, it is anticipated that approximately 200 trees per year will require pruning to maintain this cycle.

It should be noted here that because PHPD has so many trees in natural or unmanaged areas, we factored these trees out of the cycle pruning program, since traditionally they are not cycle pruned, and only trees in managed areas are. For this reason, we used 1,000 trees (and not 1,821) as a starting number, eventually ramping up to 1,200 trees (and not 2,110) by 2032.

For cost estimates associated with these activities, several assumptions were made: First, because young trees (12" and less in diameter) are easy to prune, it is assumed that park district staff can prune all trees less than 12", and $40 per tree was used as an estimate for this group, based on average cost in the industry at this time. For medium (12"-24") and large (24"+)trees, average figures of $75 and $150 per tree (respectively) were used, once again based on average cost in the industry (see tables below). Consistent with other budget tables, a 3% annual CPI increase was added for the final 5 years.

Currently, PHPD prunes trees reactively, using a combination of in-house labor and contracted services for storm damage or other needs. This is why establishing a budget for pruning is so important, so that it becomes regular maintenance. Using well-trained volunteer labor to prune young, newly planted trees and smaller trees which can safely be pruned from the ground without power equipment, it is believed that these budget figures could be even more favorable. This makes the budget estimates below fairly conservative, as is the case with all budget projections in this Plan.

Milestones	2022	2023	2024	2025	2026	2027-2032
Trees Pruned	165	170	175	180	185	200/year avg
Notes	Dead Limb and Most Prioirty Prunes	Remaining Prioirty Prunes and Begin Cycle Pruning	175 Cycle Prunes	180 Cycle Prunes	190 Cycle Prunes	Approximately 200 Cycle Prunes / year in perpetuity
Cost (2022)	$8,745	$9,010	$9,275	$9,540	$9,805	$12,050
Cost (CPI)	$8,745	$9,010	$9,275	$9,540	$9,805	$13,858

Provided below is a series of estimates based on the change in composition of the Urban Forest over time. As larger underperforming trees are removed and smaller trees planted in their place, the size breakdown of the Urban Forest will change. Given this expected change in the average size of trees, we have included several breakdowns below estimating costs as the composition of the Urban Forest changes. Overall, the tree population of PHPD will become somewhat younger, which mostly offsets the increase in the number of trees being pruned by providing an overall lower cost of pruning per tree. Please note these are estimates, and should be reviewed periodically to ensure accuracy, and we are using just over ½ of all inventoried trees to reflect the number of trees in managed and manicured areas, and excluding trees in natural or unmanaged areas from these projections.

2022 Cost Breakdown – Pruning 165 Trees/Year by 2022

	Total Trees	Avg %	Cost/Tree	Pruned/year	Cost/year
Evergreen	200	20.00%	$20	33	$ 660.00
Large (>24")	75	7.50%	$150	12	$ 1,856.25
Medium (13-24")	250	25.00%	$75	41	$ 3,093.75
Small (1-12")	475	47.50%	$40	78	$ 3,135.00
					$ 8,745.00

2027 Cost Breakdown – Pruning 185 Trees/Year by 2027

	Total Trees	Avg %	Cost/Tree	Pruned/year	Cost/year
Evergreen	235	21.36%	$20	40	$ 790.45
Large (>24")	100	9.09%	$150	17	$ 2,522.73
Medium (13-24")	340	30.91%	$75	57	$ 4,288.64
Small (1-12")	425	38.64%	$40	71	$ 2,859.09
					$ 10,460.91

2032 Cost Breakdown – Pruning 200 Trees/Year by 2032

	Total Trees	Avg %	Cost/Tree	Pruned/year	Cost/year
Evergreen	260	21.67%	$20	43	$ 866.67
Large (>24")	150	12.50%	$150	25	$ 3,750.00
Medium (13-24")	370	30.83%	$75	62	$ 4,625.00
Small (1-12")	420	35.00%	$40	70	$ 2,800.00
					$ 12,041.67

Pruning Activities

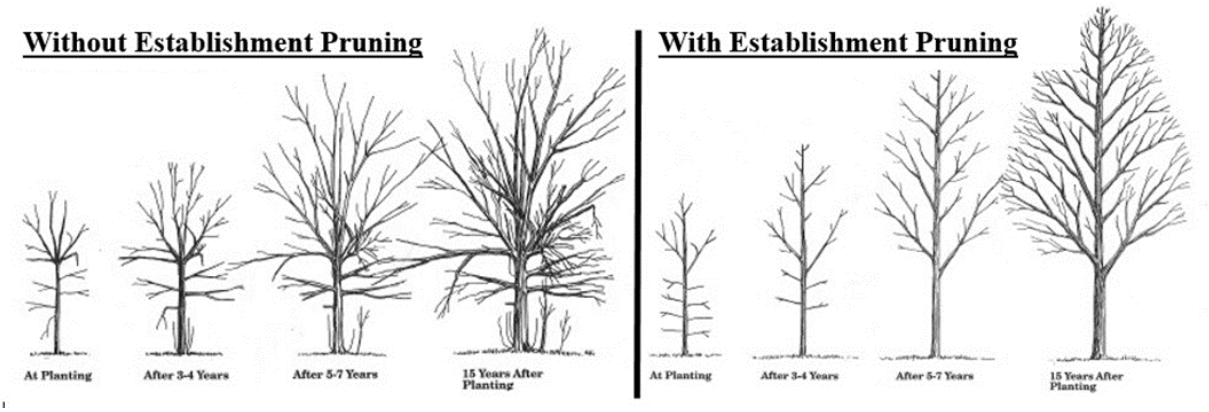
Creation of a Pruning Cycle

Initially, trees have been prioritized which have been identified in the inventory as requiring either Priority, Dead Limb, or Training pruning, regardless of where they are located. This is to prioritize public safety before routine maintenance. After these trees are pruned, PHPD should aim to create a 6 year pruning cycle based on the size of its tree population both now and in 2032. Though the overall tree population will go from 1,821 trees to 2,110 by 2032, we have only used between 1,000 (2022) and 1,200 (2032) trees for these projections, as trees in natural areas will not be subject to cycle pruning. We believe this is a realistic goal based on communications with park district staff.

Though tree pruning may seem expensive, the cost of maintaining trees is significantly less than the costs associated with trees damaging property or injuring residents or patrons. The benefits trees provide when healthy and well maintained can be prolonged and significantly increased, as shown in the projections above. A cycle pruning program is the hallmark of an effective forestry program, and it is highly recommended that PHPD plan to increase budgets for this essential expense.

Pruning of Young Trees

For the purposes for this Plan, a young tree will is considered to be under 12" DBH. Young trees are still trying to acclimate to their sites. The pruning of young trees has different goals and outcomes than the pruning of larger, mature trees. Standard nursery stock has been meticulously pruned for four to ten years to have a single trunk, and the specific branching patterns which are considered common to the various tree species. Without proper establishment pruning, these trees might have multiple trunks, poor branch structure, and overall poor form and architecture.



Pruning of young trees to establish proper form is one of the most cost-effective maintenance activities which can be performed. It is an inexpensive task that does not require a great time commitment, and saves thousands of dollars in pruning and maintenance costs later in the tree's life. As mentioned above, due to not having to climb trees or use dangerous equipment, young trees may be pruned by park district staff or well-trained volunteer labor, with proper training from the Forestry Consultant or a similar qualified organization.

Pruning of Mature Trees

A mature tree, for the purposes of this Plan, is considered to be 12" or greater in diameter. Mature trees are established in and acclimated to their sites. The pressure these trees face from their environment generally comes from above-ground factors such as pests, pathogens, man-made structures, other trees, storms or lightning strikes, as well as some below ground factors like girdling roots, limited soil volume, or poor soil quality. Pruning is performed to mitigate the above-ground issues, as well as balance out any below ground issues when possible. Natural aging and limb dieback are additional reasons these trees are pruned.

Pruning of mature trees may mitigate a short-term risk, such as after a storm, or pruning may be done to maintain a tree's long-term health and structure. In the wild, trees shed limbs frequently. This is called self-pruning. Allowing trees to self-prune over time is not advisable in an urban setting. Safety factors may arise, and the process of self-pruning may bring up aesthetic issues in an urban environment. Mature public trees should only be pruned by professional Certified Arborists and done in accordance with industry Best Management Practices and accepted ISA and ANSI standards.

Private Property Trees

Prospect Heights Park District shall not be responsible for the pruning of trees located on private property. The park district reserves the right to prune portions of trees overhanging their property back to the adjacent property line, but is under no obligation to do so, and will perform such pruning at the discretion of park district staff and/or the Forestry Consultant

Reasons for Pruning

Establishment Pruning

Establishment pruning of newly planted trees is the single most cost-saving measure in tree care, as it establishes good form and branch structure for the life of the tree. Establishment pruning should be performed a minimum of one time prior to the tree reaching six inches in diameter. Once established, the tree will only require periodic cycle pruning to maintain an appropriate form for the urban forest and to maintain health and keep the tree free of dead limbs. As mentioned above, because establishment pruning can be done without the use of dangerous equipment, the use of well-trained volunteers can be an effective means of pruning these young trees.

Cycle Pruning

A Best Management Practice in Urban Forestry is that trees should be pruned on a cyclical basis as preventative maintenance. No tree should go more than seven years without proper pruning. Cycle pruning ensures that dead branches, storm damaged limbs, or unsightly growth are removed before becoming hazardous or bad for the health of the tree. Cyclical pruning also ensures the proper leaf to stem ratio, which provides structural support for the tree. It also ensures that pruning stays relatively inexpensive, as severe issues do not have time to develop. Cycle pruning is a maintenance activity which if performed regularly, actually needs to be performed less often!

Emergency / Storm Damage Pruning

Emergency pruning is nearly always necessary to mitigate severe risk after storm events, such as limbs which have fallen and are blocking traffic, have impacted a structure or playground, are interfering with a utility, or are hanging and in imminent danger of doing any of the above. Emergency and Storm Damage Pruning should be conducted at the discretion of District staff, with the best interests of the public in mind. This is one of the few occasions on which the recommendations of this Plan may be temporarily suspended. When life or property are in imminent danger due to a downed tree or tree part, District staff or contractors may take whatever action is practical and reasonable to mitigate such danger.

Sanitation Pruning

When a tree has been diagnosed as having been diseased or infested with a pest or disease, sanitation pruning may be employed to maintain the tree while removing the diseased or infested portions. This technique is only effective when the host tree is infected/infested with certain pests and pathogens, and only in a localized area of the tree. With more widespread cases of disease or insect infestation, removal will be the most cost-effective and safest option to avoid endangering other nearby trees, as these pests and diseases tend to spread, particularly when there is more of the same species nearby.

Removal of High Risk Limbs

At times, a tree as a whole may not pose a high risk, but a single limb may have defects that make it hazardous. At these times, the removal of such limbs or parts may render the tree to be low risk again, without causing permanent damage to the tree.

Prospect Heights Park District Internal Policies

1. All activities directly related to the operation of a chainsaw, bucket truck, limb rigging, or tree climbing shall be performed by a qualified park district employee, or under the supervision of a certified arborist or arborist trainee.
2. No pruning or maintenance activity that takes place within ten feet of a power transmission line shall be performed by a PHPD employee unless certified as a qualified Utility Arborist.
3. No cabling, bracing, or other such support systems shall be installed in PHPD-owned trees, either by the PHPD, its residents, or any contractors. Exception may be made by obtaining prior written approval of the park district or it's Board of Commissioners.
4. No heading, pollarding or espalier pruning shall be conducted on park district-owned trees, and no wound dressings shall be used under any circumstances, without prior approval of Prospect Heights Park District.
5. The need for pruning and maintenance of individual trees shall be at the discretion of PHPD and/or the Forestry Consultant.
6. No more than 25% of a tree's crown shall be removed during pruning operations in order to preserve the health of the tree. Any more than 25% of the crown being removed put the tree in danger of severe dieback, and removal should be considered at that point.

Other General Maintenance

Maintenance Activities

Retaining a Consultant

The task of enhancing an Urban Forestry program can be difficult! There may be new challenges and learning curves, contracts to renegotiate, bid documents to create, resident or patron concerns to manage, and other experiences which may require the assistance of a professional. Currently, PHPD does not have a Certified Arborist on staff, though they do have knowledgeable parks staff. That said, at least during the initial years of navigating the goals outlined in this plan, retaining an Urban Forestry Consultant would be a wise decision.

The Forestry Consultant may be involved in sourcing and interviewing contractors and vendors for tree pruning, removal, and planting operations, assisting in maintaining the tree inventory, training park district staff on tree health and risk assessments, assisting in explaining policies to residents and patrons, and preparing contract and bid specifications. The importance of this early relationship cannot be overstated, no matter how large or small the organization.

Chemical Applications

Trees, like people, sometimes contract pests and pathogens. Often these pests and pathogens can be controlled with a simple chemical application just as illnesses in humans can be controlled with medication. This practice is called Plant Health Care. When financially practical, chemical control for common pests or pathogens may be utilized as a preventative or curative method, and increase the aesthetics and benefits of the tree population.

At present, PHPD does not treat any trees for any known pests or pathogens. However, since future infestations or outbreaks are unpredictable, PHPD staff have expressed that they are are not averse to chemical treatment if it makes environmental and financial sense to do so, and it reserves the right to create and execute a treatment program should it make sense to do so.

Residents of Prospect Heights may not perform chemical applications on any park district owned trees under any circumstances. Treatments performed by the park district on it's own trees must be performed by a Certified Arborist who holds a valid Pesticide Applicators license.

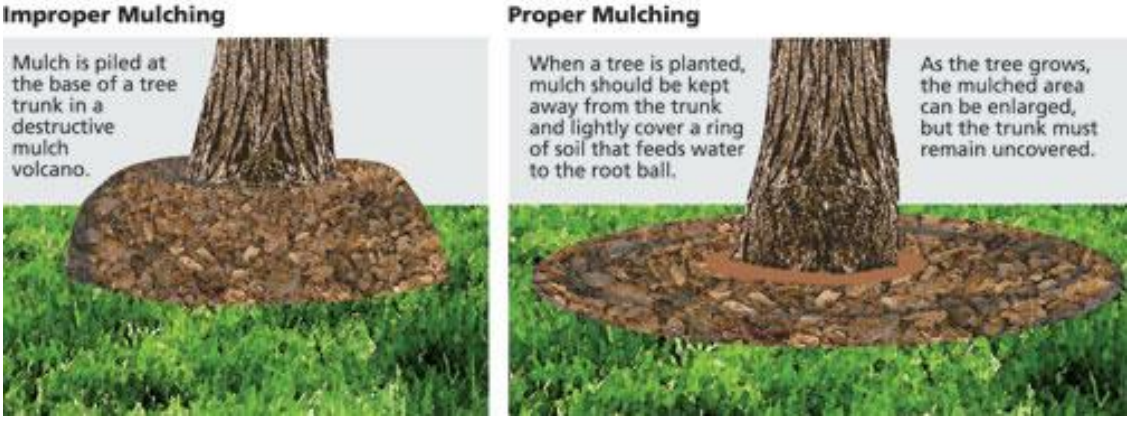
Water Management

The importance of water in the establishment, growth, and survivorship of trees cannot be overstated. Most trees adapted to our climate zone (USDA Zone 5b) are also adapted to the amount of moisture we have in an average year. However, younger trees with less expansive root systems are susceptible to prolonged drought. Young trees need supplemental watering, which is an essential maintenance activity and can prevent newly planted tree mortality.

As we anticipate approximately 1,000 additional trees being planted over the course of the next 10 years, this concept becomes very important. A watering program, as mentioned previously, may be performed by well-trained volunteer labor, in-house staff, or by an outside contractor. Whichever way the park district chooses to perform this task, it is vital, even though it is not represented in our budget tables due to high variability in who will perform this work. A general rule would be to expect to pay somewhere on the order of $50/tree per year for the first 2 years of its life to water it several times throughout the first 2 growing seasons.

Mulch

Proper application of mulch is a necessary and cost-effective maintenance activity. Mulch has many benefits, including reducing weed growth in the root zone, protecting the tree trunk and root flare from lawn maintenance equipment, allowing water to move into the soil, reducing evaporation and drought stress, and creating a naturally fertile soil environment. Turf grass typical of parkways competes for water and nutrients, and mulch reduces this competition. But not all mulching is beneficial. The practice known as "Volcano Mulching" is the practice of piling mulch against the trunk in excess of 3" deep. This causes moisture build up against the trunk, and can cause decay of the trunk tissue, and possibly death. Material such as crushed limestone, red volcanic rock, or rubber pellets can alter the soil chemistry in an undesirable way, and cause dieback or tree death.



Fortunately, mulch is a commodity most park districts can get for free so long as they are pruning and removing trees each year. A marshalling yard for wood chips is established in PHPD's service area for internal use by the District and its staff. All newly planted trees should have mulch applied appropriately. A goal for PHPD should be to mulch all trees 12" DBH and smaller, but for now, mulch for all newly planted trees, and preventing volcano mulching should be a primary concern.

Tree Preservation and Management During Construction

Though park districts do not have the same ordinances as municipalities when it comes to tree protection on private property, they should still abide by Best Management Practices when performing development work on their own property. Tree and shrub protection and preservation during construction represents an investment in the community! Ensuring the protection and preservation of these trees while minimizing burdens to businesses, developers, and residents is essential to a healthy urban forest.

Tree protection and preservation during periods of construction involves protecting trees from damage caused by construction activities. This damage includes physical and chemical damage to the trunk, branches, and roots. Damage may be caused by equipment such as backhoes, skid steers, or other appendage-type equipment. Effects of damage to the visible above ground portions of the tree can be obvious, as when branches are broken. But hidden effects such as root compaction or improper grading may not become evident for years until the tree begins to die back. The standards set forth below and in Appendix L are industry standards with a proven record of success.

Prospect Heights Park District Internal Policies

1. A tree survey shall be performed by a qualified individual prior to the beginning of any development activities on park district property. The survey shall detail the size, species, and condition of each tree six inches DBH and greater OR managed landscape tree (intentionally planted, non-volunteer tree) of any size.
2. The Tree Survey and a Tree Protection Plan may be submitted to the City of Prospect Heights and all relevant architects, engineers, and workers, detailing the following:
   - **A.** Trees to be removed
   - **B.** Trees to be preserved
   - **C.** Location and size of the Tree Protection Zone (TPZ) for each tree
3. The Tree Protection Zones for each tree shall be visibly delineated by the site engineer, using orange snow fencing or other high visibility exclusion material. When such a delineation is not possible, all workers on site shall be made aware of the TPZ verbally.

Tree Risk Assessment Policy

Trees provide ecosystem and aesthetic benefits, but all trees also pose some degree of risk. Determining the acceptable level of risk, along with effectively managing that risk, is a key priority for urban forestry operations. As a tree manager, PHPD must always assume some degree of risk. It is up to the park district to track that risk and ultimately decide how to mitigate risk from trees in a manner which is responsible both economically as well as in the interest of public safety.

Levels of Risk Assessment – An Overview

These Risk Assessment Levels are based on the International Society of Arboriculture's (ISA) Tree Risk Assessment Qualification (TRAQ) protocols, as well as the ANSI A300 Part 9 (Tree Risk Assessment) Standards. The TRAQ forms can be found in Appendix H at the end of this Plan. All trees in PHPD parks were assessed for a basic level of risk during the inventory. These assessments were rapid assessments, and do not represent any formal level of TRAQ risk assessment and are not legally binding. They are solely intended to provide the district with data showing a need for a more detailed assessment of individual trees such as those listed below.

Level 1 Assessment

Also called a "limited visual assessment", whereby a tree has a basic analysis of obvious physical defects and condition. The assessor walks or drives by the tree, assesses it quickly for defects, evaluates the risk posed by the subject tree, and reports the results of the assessment to the tree owner. Often, prior to a recommendation, a more detailed (Level 2 or Level 3) assessment will be required to gather additional data.

Level 2 Assessment

A Level 2 Assessment, also called a "basic assessment", is a report detailing the information collected during a detailed visual inspection of the tree and the surrounding site. Such an inspection requires a 360 degree walk around, and may include the use of simple tools, such as binoculars, magnifying lenses, mallets, probes, and trowels or shovels. The goal is to get a more complete picture of the tree in its environment, as well as previous histories of failures, and a root to branch evaluation of not only the tree but also potential "targets" which falling tree limbs may impact. Targets are things such as structures, people, vehicles, or other things which may be damaged or injured by trees.

Level 3 Assessment

A Level 3 Assessment, also called an "advanced assessment", provides detailed information about specific tree parts, targets, and risk associated with each potential interaction. By definition it requires specialized equipment known as "advanced tools", such as bucket trucks, resistance drills, sonic tomographs, and other such equipment. This is the most detailed and time-intensive type of assessment, and is typically only performed when a decision to retain or remove a tree is very difficult, as would be the case for a high quality tree near a potential target that has significant defects, the extent of which are not known, but must become known before making a decision.

Considerations in Assessing Risk

The following are meant for the reader to gain insight into the risk assessment process. TRAQ inspections were not performed on park district trees, but this information will help to understand the terminology, and inform staff and residents as to how and why these inspections are performed.

Likelihood of Tree Part Failure

Like it sounds, this is a process of determining how likely a tree part is to fail, and then how likely that failure is to impact a target. Likelihood of failure is an assessment of the tree's defects, and the load on those defects, like weight, gravity, ice, or wind. The parts impacted are generally the roots, root plate, trunk, branches, or potentially whole tree failure at multiple points.

Likelihood of Impacting a Target

Determining the likelihood of impacting a target is figuring out the occupancy rate, or the amount of time that targets (people or high value property) are within the fall zone of a tree. A large tree in the middle of a field could fail with little impact, but that same tree in a playground might have serious consequences. In many roadways, motor traffic is present day and night. All of the park district's inventoried 1,821 trees are on publicly owned land, where failure of a tree could impact motorists, park patrons, structures or other "targets".

Consequences of a Tree Failure Impacting a Target

The potential consequences of the tree failure impacting a target is a cumulative function of both the "value" of the target (person vs car) and the consequences to that target if the tree fails. Whereas the previous step was concerned with occupancy rates, this step looks at the consequences of the impact, and assumes that the target is always present.

To follow with the above example, it is assumed that if a park tree were to fail, that a car, utility line, and person are all underneath it at the time of failure, and the consequences to those targets is evaluated. Consequences are generally considered to be "minor" for targets that can be easily replaced or repaired, and step up through 4 levels with the highest level being "severe", which would constitute severe injury to a person, or even a fatality.

Weather

Every tree, no matter how healthy, can fail from wind, lightning strikes, ice loading or soil saturation. "Normal" weather can cause tree or tree part failures for trees which have existing defects, like deadwood, cavities, or poor architecture. Extreme weather events, by contrast, can cause the failure of perfectly healthy trees. For all Tree Risk Assessments, Risk should be assessed assuming "normal" weather conditions. Though it should be noted that "normal" weather conditions for northeastern Illinois do include gusty winds, thunderstorms, snow, and even an occasional ice storm. It is the extremes of these events that should be considered abnormal.

Prospect Heights Park District SAMPLE Tree Risk Assessment Policy

Prospect Heights Park District (PHPD) has created this SAMPLE policy to show what maintaining an acceptable level of risk as it pertains to its park tree population will look like for a future TBD policy. In order to maintain an acceptable level of public safety, while mitigating undue burden, PHPD is considering adopting the following (or similar) risk assessment protocols:

1. The PHPD maintains a tree inventory detailing the species, size, and condition of all trees on District owned land, as well as a basic level of risk posed by each tree. This Urban Forestry Management Plan recommends that the trees listed as being in elevated risk categories during the initial inventory be audited on an ad hoc basis. During these audits, qualified park district staff and/or the Forestry Consultant should inspect these trees and identify trees potentially posing an unacceptable level of risk. Such trees identified shall either be scheduled for a more detailed risk assessment (Level 2 or 3), or shall be mitigated, either by pruning, bracing, or removal, as soon as practical following the assessment.
2. District5 staff or the Forestry Consultant shall perform risk assessments on an ad hoc basis by monitoring the trees during the normal course of daily operations. Trees which may appear to present an elevated risk level shall be scheduled for a more detailed risk assessment (Level 2 or 3), or shall be mitigated, either by pruning, bracing, or removal, as soon as practical following the assessment.
3. Upon notification from a resident or patron of a concern about a potentially high-risk tree, qualified District staff and/or the Forestry Consultant shall perform a Level 1 limited visual inspection within (XX) business days of the notification by the resident. If a Level 2 or Level 3 Risk Assessment is required based on that inspection, it shall be performed within an additional (XX) business days. A decision shall be made by park district staff, the Board of Commissioners, and/or the Forestry Consultant as to what the appropriate mitigation measures are, if any.
4. All trees determined to be in need of mitigating actions (removal, pruning, etc.) should be documented in writing by District staff and/or the Urban Forestry Consultant. This documentation shall include the date the assessment was performed, the species, size, and condition of the tree, and a brief narrative detailing which parts of the tree are likely to fail, the likelihood of failure, the likelihood of impacting a target, the consequences of tree or tree part failure, and the overall tree risk rating, per the ISA's TRAQ system of risk assessment and/or ANSI A300 pt 9 standards.
5. A minimum branch diameter of three (3) inches, by ocular estimate, shall be the standard to which this risk assessment policy applies. Assessing all branches smaller than three inches represents an undue burden to the park district.

Full TRAQ Forms can be found in Appendix H at the end of this report.

TRAQ Tree Risk Assessment Matrices

Likelihood of Tree Failure Impacting Target

Likelihood of Tree Failure	Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Risk Rating Matrix

Likelihood of Failure and Impact	Consequences			
	Negligible	**Minor**	**Significant**	**Severe**
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Likelihood of Tree Failure Impacting Target

Likelihood of Failure	Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Risk Rating Matrix

Likelihood of Failure and Impact	Consequences			
	Negligible	**Minor**	**Significant**	**Severe**
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Projected Budget

The budget numbers below, as mentioned several times through this Plan, are conservative figures based on current industry rates for the services listed. Based on input from staff, the budget begins this year with a dollar amount that is within their current annual budget for tree related expenses. From there, the budget increases slightly each year, and projects through 2032, at which time, including CPI, the budget will have increased from the current level of approximately $21,250 in 2022 to approximately $57,250 by 2032. This represents a relatively modest budget increase for such an increase in values of the Urban Forest and maintenance of public safety.

	Milestones	2022	2023	2024	2025	2026	2027-2032
REMOVALS	Trees Removed	7	12	21	25	30	40/year avg
	Diameter Inches	221"	255"	375"	371"	373"	400"
	Notes	Priority Removals 24" and Larger	Priority Removals from 20-24"	Priority Removals 17-19"	Prioirity Removals 14-18"	Priority Removals 12-13"	Prioritize Remaining Removals
	Removal Cost (2022)	$5,525	$6,375	$9,375	$9,275	$9,325	$10,500
	Removal Cost (CPI)	$5,525	$6,375	$9,375	$9,275	$9,325	$10,500

	Milestones	2022	2023	2024	2025	2026	2027-2032
PLANTINGS	Trees Planted	20	35	50	65	80	100/year avg
	Planting Cost (2021)	$6,000	$10,500	$15,000	$19,500	$24,000	$30,000
	Planting Cost (CPI)	$6,000	$10,500	$15,000	$19,500	$24,000	$30,000

	Milestones	2022	2023	2024	2025	2026	2027-2032
PRUNING	Trees Pruned	165	170	175	180	185	200/year avg
	Notes	Dead Limb and Most Prioirty Prunes	Remaining Prioirty Prunes and Begin Cycle Pruning	175 Cycle Prunes	180 Cycle Prunes	190 Cycle Prunes	Approximately 200 Cycle Prunes / year in perpetuity
	Cost (2022)	$8,745	$9,010	$9,275	$9,540	$9,805	$12,050
	Cost (CPI)	$8,745	$9,010	$9,275	$9,540	$9,805	$13,858

	Milestones	2022	2023	2024	2025	2026	2027-2032
FORESTRY CONSULTANT	Notes	Basic Assistance with contract prep, etc	Appraisals and Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management	Inventory Updates / Risk Management
	Cost (2022)	$1,000	$1,500	$2,500	$2,500	$2,500	$2,500
	Cost (CPI)	$1,000	$1,500	$2,500	$2,500	$2,500	$2,875

TOTALS	**TOTALS - 2021 $**	**$21,270**	**$27,385**	**$36,150**	**$40,815**	**$45,630**	**$55,050**
	TOTALS - CPI 3%	**$21,270**	**$27,385**	**$36,150**	**$40,815**	**$45,630**	**$57,233**

Summary / Conclusion

Prospect Heights Park District has a unique urban forest in several senses: First, it serves several different communities, and its footprint is not just related to a single entity. It therefore has the ability to positively impact, raise awareness in, and be an Urban Forestry leader in all of its service areas. Secondly, its tree population has 2 very distinct systems, those being the natural systems in its forested areas, and the managed systems in its manicured areas of the parks. Each of these systems requires different management strategies and has different metrics for outcomes. But having both in the District is a bit of a rarity, and has tremendous potential for enhancements and shared goals. Finally, PHPD is a smaller tree population overall compared to many surrounding districts, and in that sense has a more manageable tree population that stakeholders and staff can really "get their arms around" when it comes to management.

When it comes to the managed and manicured areas of the parks, though the existing diversity of trees in the PHPD system overall is fairly low, and there are many trees to be removed or maintained, this presents great opportunities for the future! Diversifying the tree population for better resilience to pest and pathogen outbreaks, as well as better aesthetics, stormwater and energy savings, and other benefits would be relatively easy by selecting trees that are underrepresented in the population. Creating a tree planting plan that matched the right trees to the right sites will increase tree longevity, and since bigger trees provide greater benefits, this process of strategic tree planting will provide great value to PHPD and all of the residents it serves. And using the pruning and maintenance strategies outlines in the Plan, safety will be increased as risk is lowered and benefits are increased!

There is also a separate report and stewardship plan which has been created for the natural areas which were inventoried and assessed. The strategies here will be different, as the District still seeks to reduce risk and maximize benefits, but also create healthy ecosystems. These systems will provide benefits for other things, like pollinators, birds, and other flora and fauna. And because they exist in the context of an urban / suburban environment, they can also be enjoyed by park patrons as well, and act as an interpretive and learning feature about natural ecosystems in our area. It is strongly encouraged that the reader access this stewardship plan for an even more diverse view of the trees and ecosystems in the PHPD service area.

Of all of these assets, the benefits they provide, and strategies discussed to manage them, the greatest is the staff and partners of the PHPD system. Staff have taken the time to make the management of the urban forest a priority, and them along with local stakeholders will team together in order to realize the goals set forth in this Plan. And these tasks in some respects are not easy! They require dedication, hard work and overcoming adversity. But the payoff is well worth the effort. As mentioned many times throughout, ecological and economic circumstances and in a constant state of change. This Plan is meant to be adaptively managed in anticipation of and in response to these changes, and reviewed periodically to constantly better itself and the urban forest in Prospect Heights Park District. We thank PHPD for the opportunity to partner on this project and look forward to assisting them with realizing its goals now and in the future.

Glossary of Terms

Aerial Device: Any piece of equipment expressly intended to elevate a human worker above the level at which they typically stand with their feet on the ground surface. Can include but is not limited to bucket trucks, scissor lifts, etc

Aggressive: A floral or faunal organism which is native (endemic) to the United States or northern Illinois, but which is known to outcompete other more desirable organisms

Arborist: An individual engaged in the profession of arboriculture who is educated, trained and licensed to provide for or supervise the management of trees and other woody plants

Arborist Trainee: Any person working under the direct supervision of an Arborist or Certified Arborist

Balled and Burlapped: A tree, shrub, or other plant prepared for transplanting by allowing the roots to remain covered by a ball of soil around which canvas or burlap is tied and secured with a basket.

Bare Root: Harvested plants from which the soil or growing medium has been removed

Best Management Practices (BMP): Methods or techniques found to be the most effective and practical means in achieving an objective while making the optimum use of resources.

Caliper: Standard nurseryman's measure of tree diameter (size). Caliper measurement of the trunk shall be taken six inches above the ground up to and including four-inch caliper size. If the caliper at six inches above the ground exceeds four inches, the caliper should be measured at 12 inches above the ground.

Certified Arborist: An individual who has sufficient experience in the field of Arboriculture, and has been certified by the International Society of Arboriculture as being a Certified Arborist

Border Trees: Trees whose trunks, when measured at DBH, are situated on both Public and private property

Branch Collar: The branch collar is the point where a branch joins the trunk or another branch. This is the area the arborist chooses to make a proper cut.

Climbing Line: Any rope or other such material explicitly intended for bearing the weight of a human being

Collected Plants: Trees or shrubs which have been sourced from private property for the intent of transplanting elsewhere

Compacted Soil: A high-density soil lacking structure and porosity, characterized by restricted water infiltration and percolation (drainage), and limited root penetration

Consumer Price Index: an index of the variation in prices paid by typical consumers for retail goods and other items

Containerized: A tree, shrub, or other plant prepared for transplanting, or grown in, a solid-walled container such as a plastic pots or wooden boxes

Contracted Staff: People working for the park district as part of an independently owned and operated private company which performs work for the park district, but who are not directly employed by the park district

Controlling Authority: An agency, organization, or corporate entity with the legal authority and/or obligation to manage individual trees or tree populations

Crew Leader: Any personal who has by direction or implication been chosen to lead a team of In-House or Contracted Staff

Crown: The upper part of a tree, measured from the lowest branch, including all branches and foliage

Critical Root Zone (CRZ): The minimum volume of roots necessary for a tree to have health and stability

Cycle Pruning: The process of routine maintenance pruning of trees, not related to storm damage or other hazard or emergency related-pruning, that occurs on a set and predictable time scale set forth by the park district

Deadwood: Wood on a tree or shrub which is no longer biologically living and becomes brittle or prone to failure

Decline/Declining: Trees or shrubs which are experiencing symptoms of a general decline on health due to age, pest, or pathogen related issues

Desirable: A Tree or other plant whose characteristics are sought after due to ecology, aesthetics, or public safety

Diameter or DBH: Diameter at Breast Height. A standard forestry measure of tree diameter (size), measured at 4.5’ above ground level on the uphill side of a tree using a Diameter Tape or Biltmore Stick

Digging Machine(s): Any piece of mechanical equipment whose express purpose is to remove soil and plants from their current locations

Diseased: The status of a tree which has been negatively impacted by a pathogen, bacterial, fungal, viral, or similar lower life forms

Drip Line: The soil surface delineated by the branch spread of a single plant or group of plants

Drought: A period of two weeks or greater, during which there is less than one inch of rainfall, when the average daytime temperature during that same period exceeds 75 degrees Fahrenheit.

Dutch Elm Disease: A fungal pathogen which causes the decline and death of specific species of Elm trees.

Dying: A tree which is in the process of biological death due to senescence, disease, infestation, or other such malady from which there is very little to no hope of long-term survival

EAB: Emerald Ash Borer. An invasive beetle pest which affects all Ash trees.

Establishment Pruning: The pruning of a young tree in order to establish proper form and branching habit.

Established Trees: Those trees which have been permanently planted for a period of no less than 6 months, and which have permanent roots established in the soil

Failure (tree failure): Breakage of stem or branches, or loss of mechanical support in the root system

Feeder Root: Any portion of the below ground portions of the tree whose purpose is to absorb water and nutrients

Floodplain: Land which has been determined to be periodically inundated with water from a nearby moving or static water body, such as a lake or river. Determined by the Federal Emergency Management Agency

Flush Cut: Either a pruning cut or final cut to remove a stump, for which the maximum acceptable distance from the ground or the branch bark ridge shall be no greater than 2 inches.

Full-Time: An employee who has regular employment through the park district and whose work hours exceed 36 hours in a week, and who is employed year-round.

Fungal: Any of a group of spore-producing organisms feeding on organic matter, including molds, yeast, mushrooms, and toadstools.

Grade: The level or pitch of a certain piece of land, as defined by the trees or shrubs which inhabit it

Hardscape: The nonliving or man-made fixtures of a planned outdoor area, such as sidewalks, retaining walls, street lamps, etc.

Hazard: A known and documented state of imperiling public safety

Healthy Tree: Any tree which is successfully adapting to it's environment, and shows no signs of disease, pests, pathogens, or other such maladies, as determined by park district staff or the Forestry Consultant

Host: An organism which is susceptible to a known pest or pathogen

Infested: The status of a tree which has been negatively impacted by pests

In-House Staff: Staff directly employed by the Prospect Heights Park District, on either a full-time or Part-Time Basis

Invasive: A floral or faunal organism which is not native (endemic) to the United States or northern Illinois

Job Site: Any geographic location where a person or persons will be performing activities related to the care and maintenance of PHPD property

J.U.L.I.E. (811): The Illinois underground utility locating service

Liner Nursery: A privately owned plant propagation facility which specializes in the growth of small trees which are intended to be planted for growth into a full form

Managed: A tree or shrub which is in an area of the park district which is routinely mowed and managed. Not a wild forest grown tree or shrub, or area containing such trees and shrubs

Manufacturer's Recommendations: Any expressly written instruction manual for a given piece of equipment that details how said equipment is supposed to be managed or maintained

Mineral Soil: Any substrate which is composed of a variety of rocks and minerals in various states of decomposition, leading to the development of a substance on which living plants may live

Mitigation: The process of diminishing risk

Monoculture: A population of trees in close proximity to one another which is comprised of 3 species or less of trees and shrubs which is prone to pest or pathogen outbreak

Natural Resources: Flora, fauna, and other such living and non-living parts of the environment which the Prospect Heights Park District maintains

Nursery Stock: Woody Perennials which are of a "Tree Form" growth habit and are supplied by a nursery contractor for planting. Not established trees.

Park District Property: Land which, by deed or title, belongs to the Prospect Heights Park District

Parkway Tree: Any woody plant within a Publicly-Owned right-of-way, or any other property owned or managed by the Prospect Heights Park District

Part-Time: An employee who has regular employment through the park district and whose work hours are less than 36 hours in a week, and who is employed year-round.

Pathogen: A fungus, virus, or other such microscopic organism which causes decline or death of trees

Pest: An insect or other macrofaunal organism which causes decline or death of trees

Private Property: Land which, by deed or title, does not belong to the Prospect Heights Park District

Public Safety: The welfare and protection of the general public

Reforestation: The process by which trees are planted to replace trees which have been removed

Rigging Line: Any rope or other such material explicitly intended for bearing the weight of a tree limb. Not to be used for supporting a human being.

Right-of-Way (ROW): The publicly-owned land on which a road, drainage ditch, trail, or other public access is built

Risk: A situation involving potential exposure to danger or endangering public safety

Root Protection Zone (RPZ): The area on the ground surrounding a tree in which excavation, compaction, and other construction-related activities should be avoided or mitigated

Saddle: A piece of equipment expressly intended to hold a human being above ground level with the assistance of a rope or other such device

Sanitation Pruning: The removal of tree limbs that have become diseased or infested, in order to prevent the spread of disease or infestation from spreading throughout the rest of the tree e.g., Dutch Elm Disease, Black Knot Fungus, etc.

Seasonal Employees: Those employees retained by the park district for less than 6 months out of the calendar or budget year

Shrub: Any woody perennial which has a multi-stemmed growth habit not consistent with being considered a tree. Can be subject to interpretation by PHPD Staff.

Sound Wood: Structurally sound, non-decayed, non-compromised wood in the trunk or Scaffold Branches

Staff: Those employees retained by the park district on a full-time basis with benefits provided

Structural Root: Any portion of the below ground portions of the tree whose purpose is to stabilize the plant against the forces of wind and gravity

TRAQ: Tree Risk Assessment Qualification. The International Society of Arboriculture's formal status of an individual who is qualified to assess the risk that trees may bring to the general public

Tree Protection Zone (TPZ): The area surrounding a tree in which excavation and other construction-related activities should be avoided.

Tree Risk: The likelihood and consequences of failure of a tree or tree parts

Tree Risk Assessment: A systematic process used to identify, analyze, and evaluate tree risk

Underperforming: Trees which have systematic health and vigor issues resulting in poor health, architecture, or other such maladies as determined by park district staff

Undesirable: A tree which is not desired in the landscape due to ecological, aesthetic, or public safety reasons, as determined by PHPD Staff.

Unmanaged: A tree or shrub which is in an area of the Prospect Heights Park District which is not routinely mowed and managed. A wild forest grown tree or shrub, or area containing such trees and shrubs.

Urban Wood: Any tree or other woody perennial material which has been harvested for the sole purpose of long term storage in the form of furniture, recreational material, etc. Differentiated from "Reclaimed Wood"

Utility Arborist: A person explicitly trained in the management of trees and other plants in relation to energized power lines. Someone who is licensed to work with conflicts between trees and such energized power lines.

APPENDIX A: APPROVED AND UNAPPROVED SPECIES

NOT APPROVED	APPROVED SPECIES			
Any Size	Large Trees	Medium Trees	Small Trees	Evergreens
AILANTHUS	BALDCYPRESS	ALDER	AMERICAN REDBUD	ARBOR VITAE
AMUR CORKTREE	BEECH-AMERICAN	AMUR MAACKIA	APPLE-CRAB	DOUGLAS FIR
ASH-EUROPEAN	BEECH-EUROPEAN	BIRCH-RIVER	APPLE-EDIBLE	EASTERN REDCEDAR
ASH-GREEN	BUCKEYE-OHIO	BIRCH-WHITE	BUCKEYE-RED	FIR-CONCOLOR
ASH-WHITE	BUCKEYE-YELLOW	BLACKGUM	CHERRY-ORNAMENTAL	HEMLOCK-SPP
BOXELDER	CATALPA	ELM-CHINESE	DOGWOOD-SPP	JUNIPER-COMMON
BUCKTHORN	CHESTNUT-CHINESE	HARDY RUBBER TREE	HAWTHORN-COCKSPUR	PINE-AUSTRIAN
BURNING BUSH	DAWN REDWOOD	HAZELNUT-TURKISH	HAWTHORN-SPP	PINE-MUGO
CHERRY-BLACK/PIN	ELM-HYBRID	HORNBEAM-AMERICAN	HYDRANGEA-PEEGEE	PINE-WHITE
COTTONWOOD	GINKGO*	HORNBEAM-EUROPEAN	LILAC-SHRUB	SPRUCE-BLUE
ELM-AMERICAN	HACKBERRY	IRONWOOD	LILAC-TREE	SPRUCE-NORWAY
ELM-SIBERIAN	HICKORY-SPP	KATSURA	MAGNOLIA-SAUCER	SPRUCE-SPP
HONEYSUCKLE	HONEYLOCUST	MAPLE-HEDGE	MAPLE-AMUR	YEW
MAPLE-NORWAY	HORSECHESTNUT	MAPLE-MIYABEI	MAPLE-JAPANESE	
MAPLE-SILVER	KENTUCKY COFFEETREE*	MAPLE-PAPERBARK	PEACH/NECTARINE	
MULBERRY-SPP	LARCH	MAPLE-SHANTUNG	PLUM-SPP	
PEAR-CALLERY	LINDEN-AMERICAN	MAPLE-TRIFLORUM	ROSE OF SHARON	
POPLAR-SPP	LINDEN-LITTLELEAF	OAK-CHINKQUAPIN	SERVICEBERRY-SPP	
POPLAR-WHITE	LONDON PLANETREE	OAK-ENGLISH	SMOKETREE	
PRINCESS TREE	MAGNOLIA-CUCUMBER	OAK-SHINGLE	WITCH HAZEL	
RUSSIAN OLIVE	MAPLE-SUGAR	PERSIAN IRONWOOD		
WALNUT-ANY	OAK-BLACK	YELLOWWOOD		
	OAK-BURR	GOLDEN RAINTREE		
	OAK-PIN	MOUNTAIN ASH		
	OAK-RED	PEAR-EDIBLE		
	OAK-SWAMP WHITE	SASSAFRASS		
	OAK-WHITE	SEVENTH SON FLOWER		
	PAGODATREE			
	PERSIMMON			
	SWEETGUM			
	SYCAMORE			
	TULIPTREE	* - Male Only		
	ZELKOVA			

Appendix B: Additional Comments on Species

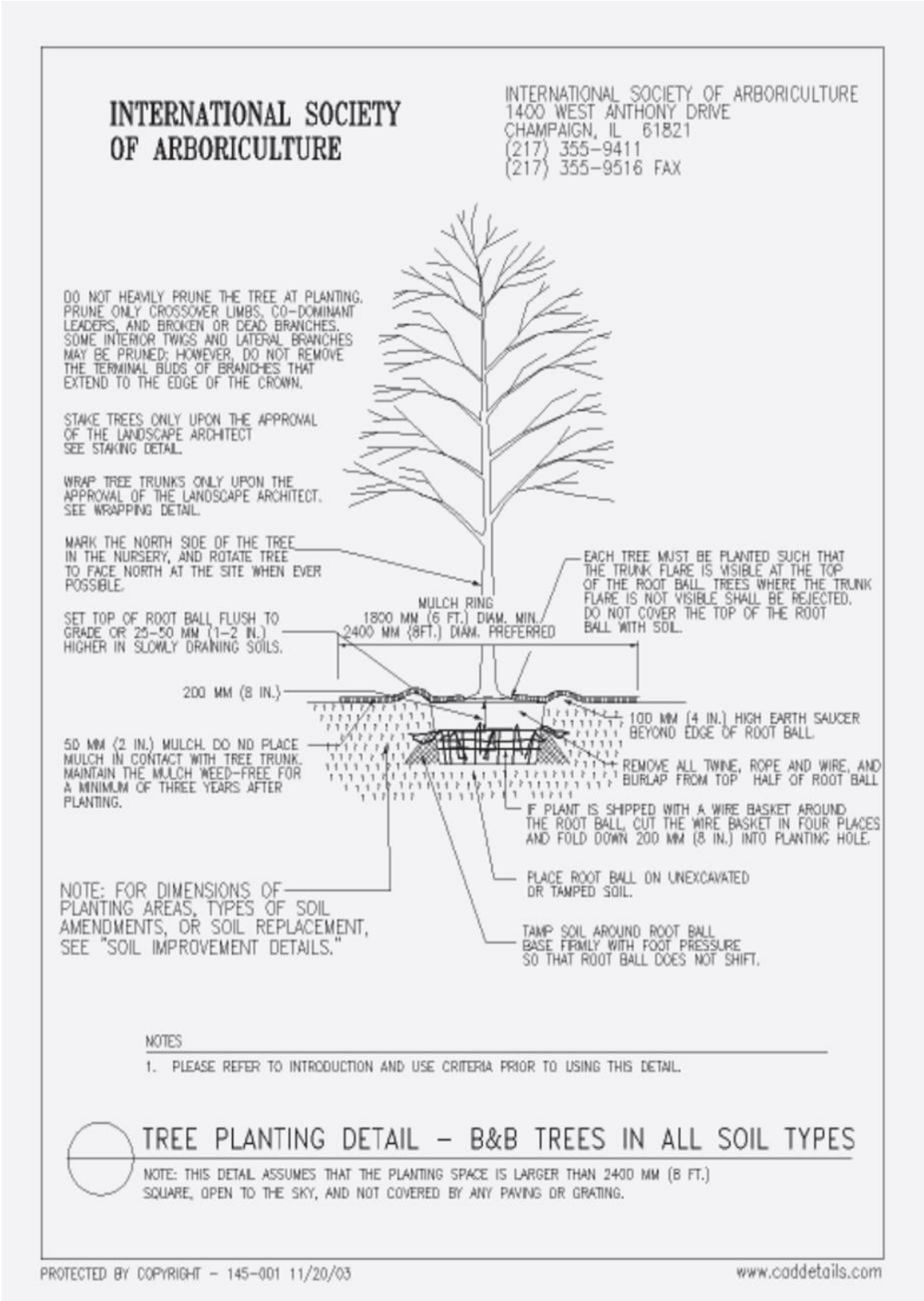
SPECIES	COMMENTS
AILANTHUS	NOT APPROVED
ALDER-SPP	
AMERICAN HORNBEAM	
AMERICAN REDBUD	
AMUR MAACKIA	
APPLE-CRAB SPP	Apple Scab resistant varieties only
APPLE-EDIBLE	Parks Only
APRICOT	NOT APPROVED
ARBOR VITAE	Parks only
ASH-BLUE	NOT APPROVED
ASH-GREEN	NOT APPROVED
ASH-WHITE	NOT APPROVED
ASPEN	Improved varieties only
BALDCYPRESS	Prefer 'Shawnee Brave'
BEECH-AMERICAN	
BEECH-SPP	Prefer 'Tricolor' or 'Riversii'
BIRCH-RIVER	Prefer Single stem only
BIRCH-SPP	Sweet Birch, Yellow Birch, or other newintroductions
BIRCH-WHITE	Bronze Birch Borer resistant only, prefer 'Whitespire'
BLACK LOCUST	Improved varieties only, prefer 'Purple Robe'
BLACKGUM	
BOXELDER	NOT APPROVED
BUCKEYE-OHIO	
BUCKEYE-RED	Prefer 'Ft. McNair' or Bottlebush
BUCKEYE-YELLOW	
BUCKTHORN	NOT APPROVED
BURNING BUSH	NOT APPROVED
CAROLINA SILVERBELL	Protected sites only
CATALPA	
CHERRY-BLACK	NOT APPROVED
CHERRY-PURPLE LEAF	
CHERRY-SPP	Ornamental, Black Knot resistant varieties only
COTTONWOOD	NOT APPROVED
DAWN REDWOOD	
DOGWOOD-SPP	Hardy varieties only
DOUGLAS FIR	Parks only
EASTERN REDCEDAR	Parks only
ELM-AMERICAN	NOT APPROVED
ELM-HYBRID	Hardy varieties only
ELM-RED	NOT APPROVED
ELM-SIBERIAN	NOT APPROVED
ELM-SPP	New cultivar introductions
EUONYMUS	Eastern Wahoo ONLY no non-native varieties
FIR-SPP	Parks only
FRINGETREE	
GINKGO	Male only
GOLDEN RAINTREE	
HACKBERRY	
HARDY RUBBER TREE	
HAWTHORN-SPP	Thornless varieties only
HICKORY-BITTERNUT	
HICKORY-SHAGBARK	
HONEYLOCUST	Prefer 'shademaster' or 'inermis'
HONEYSUCKLE	NOT APPROVED
HORNBEAM-EUROPEAN	
HORSECHESTNUT	
HYDRANGEA-PEEGEE	
IRONWOOD	
JUNIPER-COMMON	Parks Only
KATSURA	
KENTUCKY COFFEETREE	Fruitless varieties only
LARCH	

SPECIES	COMMENTS
LILAC-SHRUB	Parks Only
LILAC-TREE	Improved varieities, tree form only
LINDEN-AMERICAN	
LINDEN-LITTLELEAF	
LINDEN-SILVER	
LINDEN-SPP	
LONDON PLANETREE	Prefer 'Exclamation!', 'Bloodgood' not allowed
MAGNOLIA-CUCUMBER	
MAGNOLIA-SAUCER	Scale resistant varieties only
MAGNOLIA-SHRUB	Star Magnolia or similar Magnolia pruned to tree form
MAPLE-AMUR	Parks only unless pruned to tree form
MAPLE-AUTUMN BLAZE	Or other similar Acer x freemannii
MAPLE-BLACK	
MAPLE-HEDGE	
MAPLE-JAPANESE	Small growing space only
MAPLE-MIYABEI	Prefer 'State Street'
MAPLE-NORWAY	NOT APPROVED
MAPLE-PAPERBARK	
MAPLE-RED	Improved varieties only
MAPLE-SILVER	NOT APPROVED
MAPLE-SUGAR	Prefer 'Green Mountain'
MOUNTAIN ASH	Improved varieties only
MOUNTAIN ASH-EUROPEAN	Improved varieties only
MULBERRY-SPP	NOT APPROVED
OAK-BURR	
OAK-CHESTNUT	
OAK-CHINKQUAPIN	
OAK-ENGLISH	
OAK-PIN	
OAK-RED	
OAK-SWAMP WHITE	
OAK-WHITE	
OTHER	Open for new introductions
PAGODATREE	
PEACH	Parks only
PEAR-CALLERY	NOT APPROVED
PEAR-EDIBLE	Parks Only
PERSIAN IRONWOOD	Medium growing space only
PERSIMMON	American variety preferred (Diospyros virginiana)
PINE-AUSTRIAN	Parks Only
PINE-SCOTCH	Parks only
PINE-WHITE	Parks only
PLUM-SPP	Parks Only
PUSSYWILLOW	Parks only
ROSE OF SHARON	
SASSAFRAS	
SERVICEBERRY-SPP	Prefer 'Autumn Brilliance'
SEVENTH SON FLOWER	
SHRUB-SPP	Parks only, open for new introductions
SMOKETREE	American variety preferred, small growing space only
SPRUCE-BLUE	Parks only
SPRUCE-NORWAY	Parks only
SPRUCE-SPP	Parks only
SUMAC	Parks only
SWEETGUM	Prefer 'Happidaze'
SYCAMORE	In natural areas only, London Planetree preferred
TULIPTREE	
VIBURNUM	Tree form only
WALNUT-BLACK	NOT APPROVED
WILLOW-SPP	NOT APPROVED
YELLOWWOOD	
YEW	Parks Only
ZELKOVA	Prefer 'Green Vase'

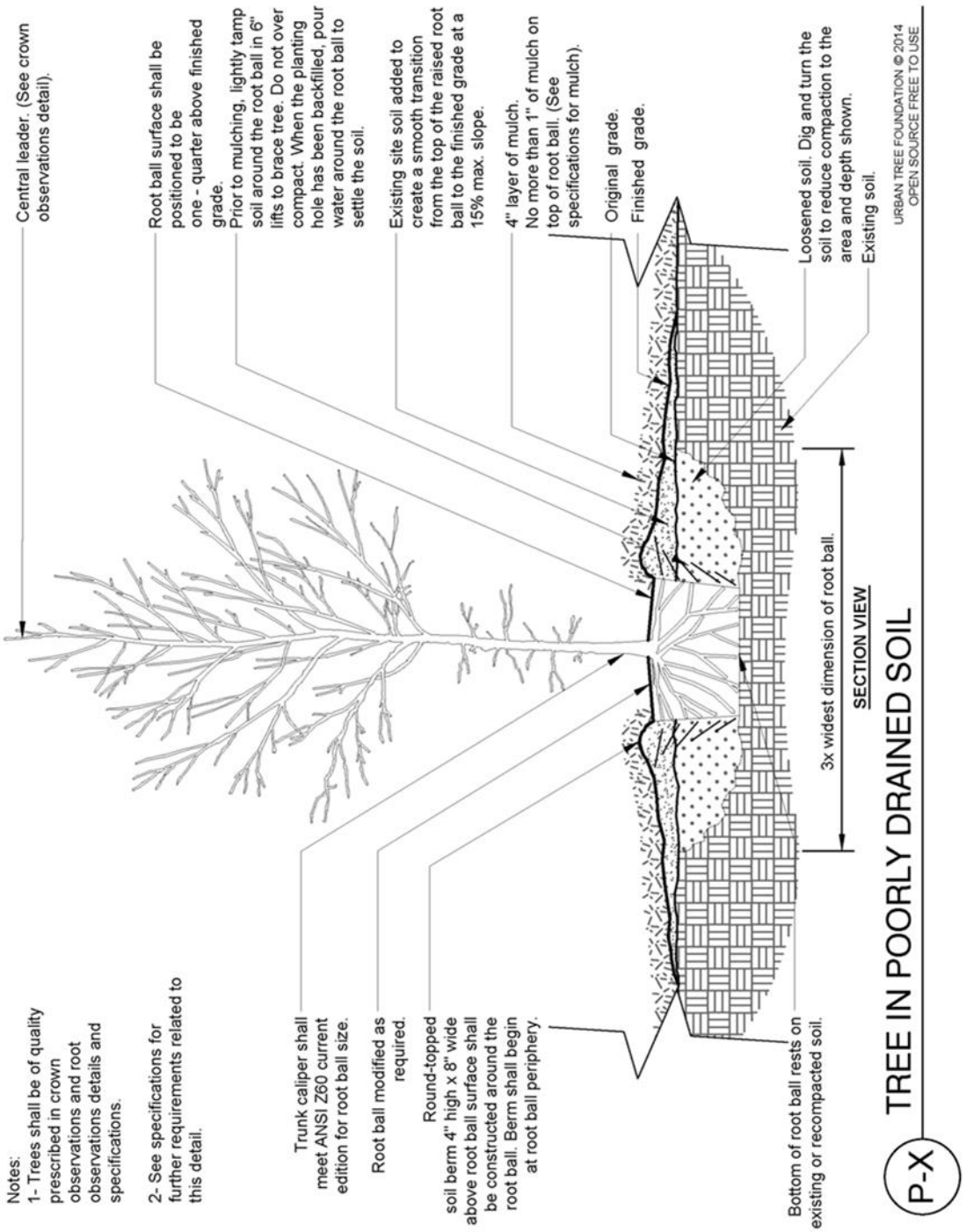
Appendix C: Species Substitutions

Species	Planting Time	Acceptable Substitutes
Alder, Black/Speckled	Spring	River Birch, Planetree
Amur Maackia	Spring	Yellowwood, Shingle Oak
Baldcypress	Spring	Larch, Dawn Redwood
Beech, European	Spring	Red Oak, Buckeye
Birch, River (Multi Stem)	Spring	Alder, Swamp White Oak
Birch, White	Spring	River Birch, Alder
Black Locust (Purple Robe)	Any	Honeylocust, Kentucky Coffeetree
Blackgum	Spring	Sweetgum, Dogwood
Buckeye, Ohio (Autumn Splendor)	Any	Horsechestnut, Catalpa
Buckeye, Red	Spring	Dogwood, Hawthorn
Buckeye, Yellow	Spring	Planetree, Sweetgum
Catalpa	Any	Kentucky Coffeetree, Tuliptree
Cherry, Sargent	Spring	Red Buckeye, Tree Lilac
Chestnut, Chinese	Spring	Turkish Hazelnut, Persimmon
Crabapple (Larger)	Any	Tree Lilac, Hawthorn
Dawn Redwood	Spring	Baldcypress, Larch
Dogwood, Cornelian	Spring	Tree Lilac, Hawthorn
Dogwood, Pagoda	Spring	Sargent Cherry, Smoketree
Douglas Fir	Spring	Concolor Fir, Spruce
Elm, Hybrid (Larger)	Any	Hackberry, Hardy Rubbertree
Fir, Concolor	Spring	Douglas Fir, Spruce
Ginkgo (Standard)	Any	Tuliptree, Catalpa
Golden Raintree	Spring	Katsura, Magnolia
Hackberry, Common	Any	Hybrid Elm, Hardy Rubbertree
Hardy Rubber Tree	Any	Tuliptree, Zelkova
Hawthorn, 'Inermis'	Any	Crab Apple, Dogwood
Hawthorn, Winterking	Any	Tree Lilac, Smoketree
Hazelnut, Turkish	Spring	Persimmon, Catalpa
Hickory, Bitternut	Spring	Oak spp, Beech spp
Hickory, Shagbark	Spring	Oak spp, Beech spp
Hornbeam, American	Spring	Ironwood, Hawthorn
Hornbeam, European (Columnar)	Spring	English Oak (columnar)
Horsechestnut (Baumanii)	Any	Buckeye, Catalpa
Ironwood	Spring	American Hornbeam,Hawthorn
Katsura	Spring	Magnolia, Seventh Son Flower
Kentucky Coffeetree	Any	Honeylocust, Black Locust
Larch	Spring	Baldcypress, Dawn Redwood
Lilac, Japanese Ivory Silk	Any	Hawthorn, Sargent Cherry
Linden, Greenspire	Any	Kentucky Coffeetree, Hybrid Elm
Linden, Redmond	Any	Catalpa, Hackberry
Locust, Skyline	Any	Kentucky Coffeetree,Black locust
London Planetree	Spring	Sweetgum, Blackgum
Magnolia, Cucumber	Spring	Yellow Buckeye, Catalpa
Magnolia, Saucer	Spring	Persian Ironwood, Katsura
Magnolia, Star	Spring	Sargent Cherry, Smoketree
Maple, Autumn Blaze	Any	Black Maple, Shantung Maple
Maple, Black	Any	Shantung Maple, Autumn Blaze
Maple, Paperbark	Spring	Triflorum Maple, Tree Lilac
Maple, Shantung	Any	Sugar Maple, Miyabei Maple
Maple, Sugar	Any	Autumn Blaze, Shanting Maple
Maple, Triflorum	Spring	Paperbark Maple, Tree Lilac
Mountain Ash	Spring	Black Locust, Hawthorn
Oak, Burr	Spring	Shingle Oak, Swamp White Oak
Oak, English (Columnar)	Any	European Hombeam
Oak, English (Standard)	Any	White Oak, Burr Oak
Oak, Red	Spring	Black Oak, Chinquapin Oak
Oak, Shingle	Spring	Chinquapin Oak, English Oak
Oak, Swamp White	Spring	London Planetree, Burr Oak
Oak, White	Spring	Burr Oak, English Oak
Oak,Chinquapin	Spring	Shingle Oak, Red Oak
Persian Ironwood	Spring	Seventh Son Flower, Katsura
Persimmon	Spring	Turkish Hazelnut, Zelkova
Pine, Limber	Spring	Spruce, Concolor Fir
Pine, Red	Spring	Douglas Fir, Eastern Redcedar
Poplar, Hybrid	Any	London Planetree, Baldcypress
Redbud	Any	Serviceberry, Hawthorn
Redcedar, Eastern	Spring	Spruce, Douglas Fir
Serviceberry	Any	Redbud, Tree Lilac
Seventh Son Flower	Spring	Persian Ironwood, Katsura
Smoketree	Spring	Magnolia, Seventh Son Flower
Sourwood	Spring	Blackgum,Sweetgum
Spruce, Black Hills	Spring	Eastern Redcedar, Concolor Fir
Spruce, Blue	Spring	Eastern Redcedar, Douglas Fir
Spruce, Norway	Spring	Eastern Redcedar, Concolor Fir
Spruce, Serbian	Spring	Eastern Redcedar, Douglas Fir
Sweetgum	Spring	Yellow Buckeye, Larch
Tuliptree	Any	Zelkova, Ginkgo
Yellowwood	Spring	Amur Maackia, Shingle Oak
Zelkova	Spring	Tuliptree, Ginkgo

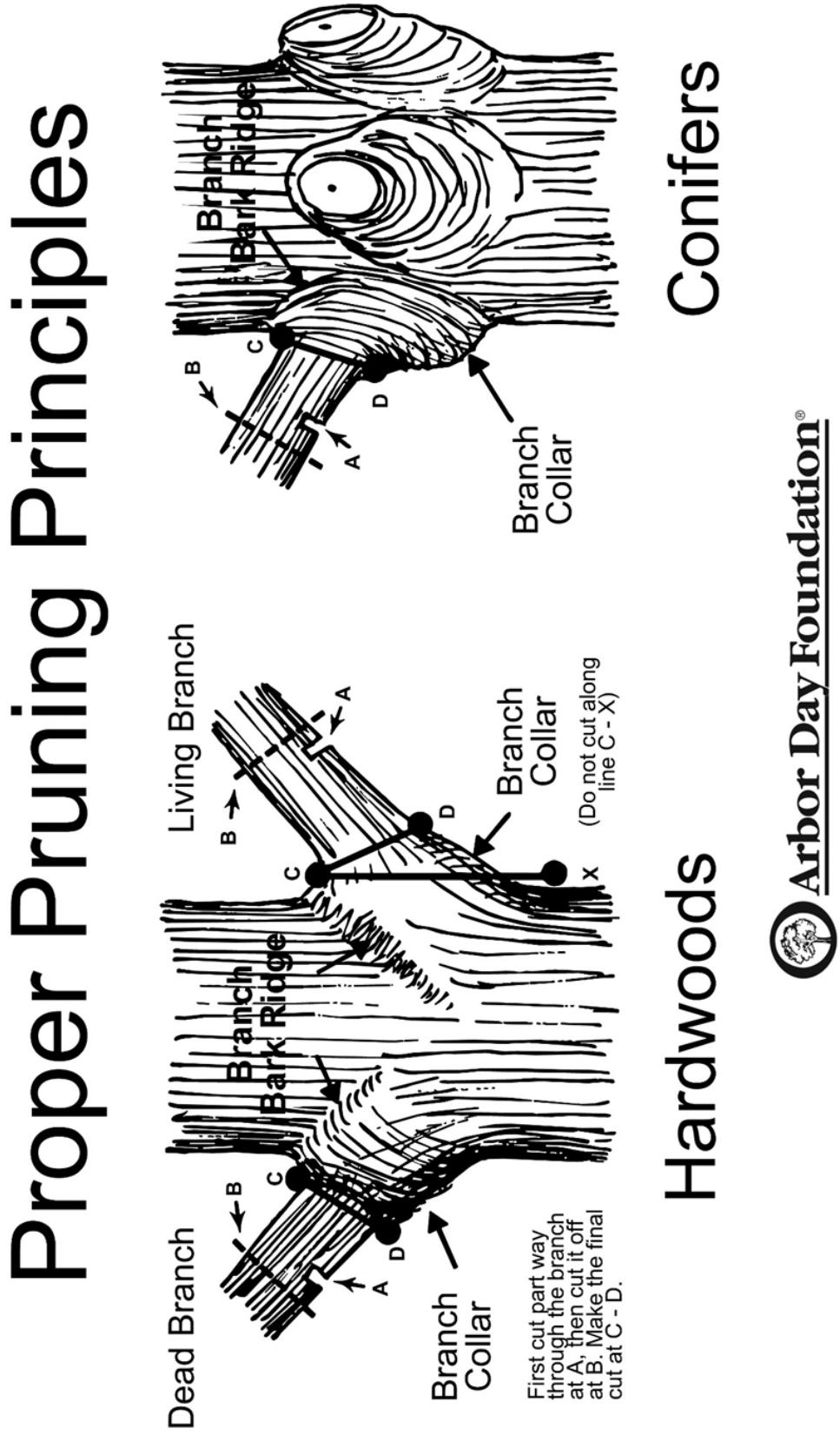
Appendix D: Balled and Burlapped Planting Detail



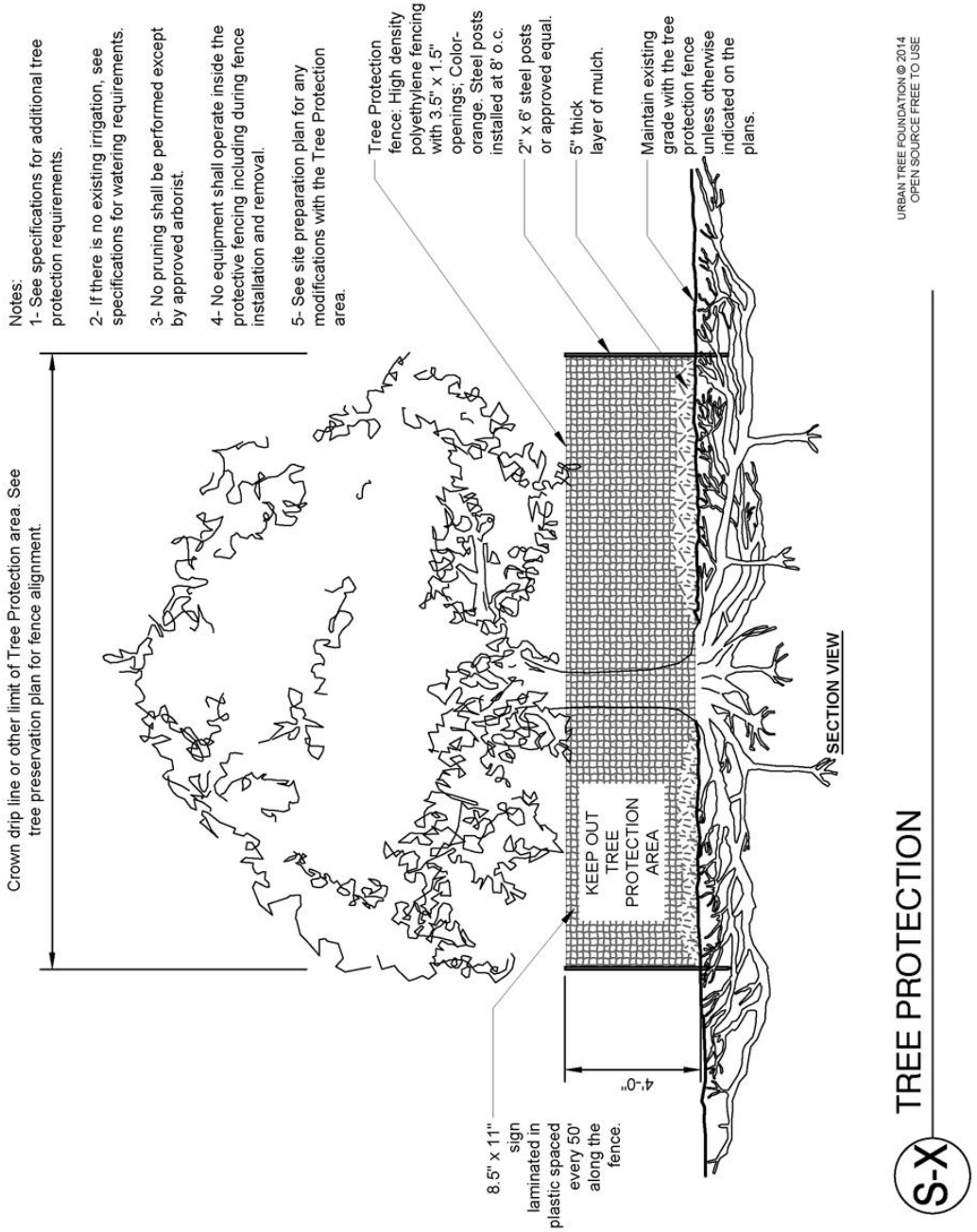
Appendix E: Containerized Planting Detail



Appendix F: Tree Pruning Detail



Appendix G: Tree Protection Detail



Appendix H: ISA Tree Risk Assessment Form (TRAQ Level 2-Basic)

ISA Basic Tree Risk Assessment Form

Client _____ Date _____ Time _____
Address/Tree location _____ Tree no. _____ Sheet _____ of _____
Tree species _____ dbh _____ Height _____ Crown spread dia. _____
Assessor(s) _____ Time frame _____ Tools used _____

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target zone: Target within 1 x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate (1 – rare, 2 – occasional, 3 – frequent, 4 – constant)	Practical to move target?	Restriction practical?
1							
2							
3							
4							

Site Factors

History of failures _____ **Topography** Flat ☐ Slope ☐ _____% **Aspect** _____
Site changes None ☐ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe _____
Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ☐ _____% Describe _____
Prevailing wind direction _____ **Common weather** Strong winds ☐ Ice ☐ Snow ☐ Heavy rain ☐ Describe _____

Tree Health and Species Profile

Vigor Low ☐ Normal ☐ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal _____% Chlorotic _____% Necrotic _____%
Pests _____ **Abiotic** _____
Species failure profile Branches ☐ Trunk ☐ Roots ☐ Describe _____

Load Factors

Wind exposure Protected ☐ Partial ☐ Full ☐ Wind funneling ☐ _____ **Relative crown size** Small ☐ Medium ☐ Large ☐
Crown density Sparse ☐ Normal ☐ Dense ☐ **Interior branches** Few ☐ Normal ☐ Dense ☐ **Vines/Mistletoe/Moss** ☐ _____
Recent or planned change in load factors _____

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR _____%
Dead twigs/branches ☐ ____% overall Max. dia. _____
Broken/Hangers Number _____ Max. dia. _____
Over-extended branches ☐
Pruning history
Crown cleaned ☐ Thinned ☐ Raised ☐
Reduced ☐ Topped ☐ Lion-tailed ☐
Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐
Codominant ☐ _____ Included bark ☐
Weak attachments ☐ _____ Cavity/Nest hole ____% circ.
Previous branch failures ☐ _____ Similar branches present ☐
Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐
Conks ☐ Heartwood decay ☐ _____
Response growth _____

Main concern(s) _____

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐ _____
Likelihood of failure Improbable ☐ Possible ☐ Probable ☐ Imminent ☐ _____

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
Codominant stems ☐ Included bark ☐ Cracks ☐
Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐
Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
Cavity/Nest hole _____% circ. Depth _____ Poor taper ☐
Lean _____° Corrected? _____
Response growth _____
Main concern(s) _____

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth _____ Stem girdling ☐
Dead ☐ Decay ☐ Conks/Mushrooms ☐
Ooze ☐ Cavity ☐ _____% circ.
Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____
Root plate lifting ☐ Soil weakness ☐
Response growth _____
Main concern(s) _____

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐
Likelihood of failure
Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

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Risk Categorization

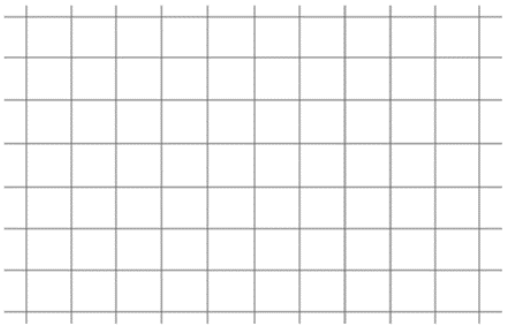
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Failure: Possible	Failure: Probable	Failure: Imminent	Impact: Very low	Impact: Low	Impact: Medium	Impact: High	Failure & Impact (from Matrix 1): Unlikely	Somewhat	Likely	Very likely	Consequences: Negligible	Minor	Significant	Severe	Risk rating of part (from Matrix 2)
1																							
2																							
3																							
4																							

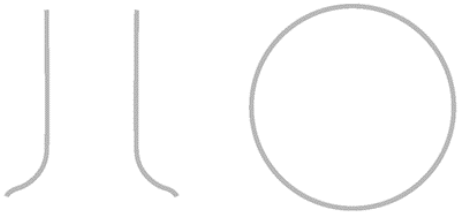
Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low





Notes, explanations, descriptions _____

Mitigation options _____ **Residual risk** _____

Residual risk _____

Residual risk _____

Residual risk _____

Overall tree risk rating Low ☐ Moderate ☐ High ☐ Extreme ☐ **Work priority** 1 ☐ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ☐ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** _____

Data ☐Final ☐Preliminary **Advanced assessment needed** ☐No ☐Yes-Type/Reason _____

Inspection limitations ☐None ☐Visibility ☐Access ☐Vines ☐Root collar buried Describe _____

Appendix I: ANSI Z133.1 Standards – Applies to All Sections

All of the ANSI Z133.1 safety standards shall apply to all tree care operations outlined in the Urban Forestry Management Plan. Listed below is a basic overview of the standard, and it is not verbatim. A full text of this manual will be made available to all Prospect Heights Park District employees and contractors involved with tree care operations.

1. All tools and equipment utilized during tree care operations, including those not specifically mentioned below, shall be inspected and maintained by qualified personnel in accordance with the manufacturer's care instructions.
2. All staff shall be trained in the proper use, inspection, and maintenance of said equipment.
3. Certified arborists or arborist trainees shall conduct job briefings daily prior to tree care operations of any kind and the information shall be communicated to all workers.
4. All activities performed on any job site for any activity outlined in this Urban Forestry Management Plan shall comply with all applicable OSHA guidelines and standards.
5. Traffic and pedestrian control shall be established around the job site prior to the beginning of tree care operations.
6. Emergency contact information and a safety kit conforming to the ANSI Z308.1 standards shall be made available to all workers. All employees shall have basic instruction on the use of CPR and First Aid.
7. Personal Protective Equipment (PPE) shall be required when there is a reasonable probability of injury or illness on the job site. Such a determination will be made by the Certified Arborist or Arborist Trainee prior to the beginning of tree care operations each day, and PPE shall be made available. PPE shall be well-maintained in accordance with the manufacturer's requirements.
8. Head protection shall conform to ANSI Z89.1, face and eye protection shall conform to ANSI Z87.1, respiratory protection shall comply with ANSI Z88.2, and leg protection shall always be worn when using a chainsaw.
9. Flammable liquids shall be kept a minimum of ten feet from open sources of flame or high heat and shall be stored in approved containers.
10. All park district staff and contractors working near electrical hazards shall be qualified to do so and shall be educated in the full ANSI standards for Electrical Hazards and Line Clearance.
11. Vehicles and mobile equipment shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements and shall be equipped with all standard safety devices, decals, and instructions, and shall be operated within all federal, state, and local motor vehicle codes and ordinances.

12. Aerial devices shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions.

13. Aerial devices shall be stabilized by wheel chocks, outriggers, or stabilizers as necessary for the device, and shall never be used to lift, hoist, or lower logs or equipment unless specifically designed to do so.

14. Aerial devices shall be equipped with fall protection devices and permanent load ratings, both in accordance with ANSI/SIA 92.2 or 92.5, as applicable to the specific aerial device.

15. No aerial device shall be allowed to make contact with electrical conductors, and minimum safe approach distances shall be maintained in accordance with the ANSIZ133.1 Standard.

16. All brush chippers shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions.

17. Sprayers and related plant health care equipment shall be inspected and maintained by qualified personnel in accordance with the manufacturer's requirements, and shall be equipped with all standard safety devices, decals, and instructions

18. Sprayer tanks or other similar enclosed spaces shall not be entered unless performed through a confined-space entry plan in accordance with OSHA 1910.46 Requirements, including air-quality testing, training, and PPE.

19. Chain saws and other similar portable power tools shall not be operated unless the manufacturer's safety devices are in proper working order. Such safety devices shall not be removed or modified.

20. Forestry staff shall have a minimum of two points of attachment to the tree or aerial device while operating a chainsaw at all times, unless the hazard posed by the second point of attachment poses a greater hazard than utilizing one point of attachment.

21. A visual hazard assessment, including a root collar inspection, shall be performed by a certified arborist or arborist trainee prior to climbing, entering, or performing work in or on any tree, and a second crew member shall be within visual or voice communication at all times during arboricultural operations that are in excess of 12 feet from the ground surface.

22. All ropes, saddles, carabiners, and other similar climbing equipment shall be: a) approved for use in the tree care industry by the manufacturer, b) have a minimum breaking strength or load capacity of 5,000 lbs., c) be inspected before each use, d) Equipment shall be removed from service when it shows signs of excessive wear or deterioration.

23. All pruning, removal, and rigging operations shall have a designated drop zone where limbs, trunks, and tools can be dropped from aloft without impacting pedestrians or passersby. A visual or verbal communication system between the employee aloft and the employee(s) on the ground shall be established to determine when the employee aloft will safely drop tree parts or tools.

24. Any tree parts which cannot be safely dropped or controlled from aloft shall have a separate rigging line tied to them to help control their fall. The tree shall be inspected for structural stability prior to the establishment of a rigging system in the tree. When trees appear to have defects that could jeopardize the ability to safely use a rigging system to drop or control a limb, an alternate plan shall be implemented.

25. All equipment utilized in rigging shall meet the load ratings for the limb being rigged, and a qualified employee, trained in proper rigging procedure shall determine the rigging procedure and equipment to be utilized. Any equipment which has been damaged or overloaded shall be removed from service.

26. When felling (removing) a tree, a crew leader shall make the determination of what equipment is necessary, and how many crew members are to be directly involved in drop zone operations. A well-established escape route shall be planned for involved workers prior to the beginning of felling operations. Any non-involved workers shall be beyond twice the height of the trunk or tree being removed during felling operations.

27. Notches shall be used on all trees and trunks greater than five inches in diameter during felling operations, and should conform to the standards set forth in the ANSIZ133.1 Standard.

28. Loose clothing, ropes, lanyards, and saddles shall not be worn during any tree care activity where the risk of entanglement with tools or machinery is possible, particularly with brush chippers.

Appendix J: Tree Planting Standards (ANSI/ISA BMP)

ANSI Z60.1

1. All root ball and container sizes for all balled and burlapped stock shall conform to the Z60.1 standards for width and depth, such that they encompass enough of the fibrous root system as necessary for the full recovery of the plant upon installation.
2. All bare root stock shall conform to ANSI Z60.1 standards for minimum root spread.
3. All containerized stock shall conform to ANSI Z60.1 standards for plant and container size, as specified by the park district, and shall be healthy, vigorous, well-rooted and established in the container in which it is growing. The root system shall reach the sides of the container, but shall not have excessive growth encircling the inside of the container.
4. All collected plants (those grown on unmanaged land) shall be so designated, and shall be considered to be nursery-grown stock when they have been successfully reestablished in a nursery row and grown under regular nursery cultural practices for a minimum of two growing seasons.
5. The trunk or stem of the plant shall be in the center of the ball or container, with a 10% overall variance in location.
6. The use of digging machines in both the packaging and installation of trees is considered an acceptable nursery practice.

ANSI A300 – Part 6

1. Planting sites and work sites shall be inspected for hazards by the park district prior to the beginning of work each day. If portions of the work site are outside of the original scope of work, the controlling authority shall be notified immediately.
2. Location of utilities, obstructions, and other such hazards above and below ground shall be taken into account prior to planting and transplanting operations. These include, but are not limited to, gas, electric, sewer, communication, drainage, and signage.
3. The following shall be taken into consideration prior to transport and planting: Requirements of individual trees, compass orientation of field-grown trees, site feasibility assessments, soil assessment, and drainage assessment.
4. Tools for planting and transplanting shall be properly labelled or purchased for their intended use, and be maintained in accordance with the manufacturer's recommendations
5. The system used to move and store the plant shall minimize desiccation and other damage to the crown, trunk or rootball, and the health and vigor of the plant shall be maintained during these periods.

6. The hole to be dug for all new plantings shall be a minimum of 150% larger than the rootball or container diameter, as deep as the root flare of the tree to be planted, and shall have sides from which soil has been loosened in order to aid in root penetration.
7. For balled and burlapped trees, all rootball supporting materials shall be removed from the upper third of the rootball, and removed from the planting hole prior to final backfilling.
8. Prior to planting, container root balls shall be managed by approved methods such as, shaving the root ball, slicing the root ball, and redirecting or removing encircling roots.
9. Backfill shall comprise of either the same soil created when the hole was excavated, or a similarly amended mixture to meet a specific objective, and shall be applied in a layered fashion to reduce future settling and prevent air pockets.
10. Mulch shall be applied at a depth of two to four inches, near - but not touching - the trunk of the tree, and extending to the perimeter of the planting.
11. Support systems such as guy-wires or stakes shall not be installed except where needed.

ISA BMP Manual – Tree Planting

1. Timing of planting shall be determined based on the species, and the best professional opinion of the employees of or contractors working for the Prospect Heights Park District.
2. All employees and contractors employed by or working for the Prospect Heights Park District shall be familiar with the following types of planting types, and when it is appropriate to use each:
   A. **Bare-Root:** Field-grown, and dug without soil during the dormant season
   B. **Ball and Burlap:** Field grown and packaged with a soil ball, using burlap, twine, and a retaining basket of some kind
   C. **Tree Spade:** Transplanted using a mechanical tree spade to hold the soil ball during transport
   D. **In-Ground Fabric Bag:** Field grown with the root mass contained in a semi-permeable fabric bag
   E. **Container Grown:** Grown above ground in containers of various shapes, sizes, and materials
3. Trees packaged with root balls must have their first structural root within two inches of the soil surface. Trees with deeper structural roots will not perform well when transplanted, and should be avoided when selecting nursery stock.

4. Trees with root balls shall be handled by the ball, not the stem, to ensure no damage occurs to the root-soil interface or to the stem itself.
5. Trees with leaves shall be transported with a fabric tarp to minimize desiccation and have had their root balls wetted prior to transport.
6. Sites shall be tested for drainage, nutrient levels, and pH prior to planting (or prior to species selection, if possible).
7. Container stock shall be removed from its container, and any encircling roots pruned off prior to planting, and the root ball shaved as necessary.
8. For balled and burlapped trees, encircling roots shall be mitigated prior to planting, wrappings shall be left on until the tree is in the hole; wrapping shall then be removed from the third to fourth of the wire basket and burlap from the top of the ball.
9. As soil is added, wet and tamp each layer down to ensure good moisture and reduction of air bubbles.
10. Do not prune trees at time of planting, unless to remove dead, dying, diseased, or cracked branches, as it may take away from root development to have the tree attempt to heal these above-ground wounds.
11. The use of trunk wrap may be considered in areas with harsh winters, specifically on trees with thin bark, such as London Planetree and certain Maple species.

Appendix K: Tree Pruning Standards (ANSI/ISA BMP)

ANSI A300 - Part 1

1. A designated Arborist or Arborist Trainee shall visually inspect each tree before beginning work. If any condition is observed above and beyond the original scope of work, said condition shall be reported to the controlling authority before any work begins.
2. Pruning cuts which remove a branch at its point of origin shall be made close to the trunk or parent branch without cutting into the branch-bark collar or leaving a stub.
3. Pruning cuts made to reduce the length of a limb or parent stem shall be made at a slight angle relative to the remaining stem, and not damage the remaining stem. If pruning to a lateral branch, the lateral should be large enough to assume the terminal role.
4. Final cuts shall be made such that the result is a flat surface, with the adjacent bark firmly attached.
5. Not more than 25% of the foliage shall be removed during an annual growing season, depending on the tree species, size, age, and condition. If more frequent pruning due to utilities, vistas, or health considerations is necessary, removal of the tree should be considered as an alternative to pruning.

ISA BMP Manual

1. All employees or contractors directly involved with the pruning of trees shall be familiar with the following pruning types and how they are to be used in conjunction with one another:
    1. **Pruning to Clean**: Selective removal of dead, diseased, detached, cracked, and broken branches
    2. **Pruning to Thin:** Selective removal of small live branches to reduce crown density
    3. **Pruning to Raise:** Selective removal of branches to provide vertical clearance
    4. **Pruning to Reduce:** Selective removal of branches and stems to decrease the height or spread of a tree or shrub
    5. **Structural Pruning:** Selective removal of live branches and stems to influence the orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems
    6. **Pruning to Restore:** Selective removal of branches, sprouts, and stubs from trees and shrubs which have been topped, severely headed, vandalized, lion-tailed, storm damaged, or otherwise damaged
2. Every effort shall be made to time pruning of individual tree species to be done in accordance with best management practices for the tree species in question. All pruning work shall be done so at the discretion of the Prospect Heights Park District and its approved contractors.

Appendix L: Tree Protection (ANSI/ISA BMP)

ANSI A300 – Part 5

1. Tree management plans and specifications for tree management shall be written and administered by a certified arborist qualified in the management of trees and shrubs during site planning, development, and construction. Such activities may include, but are not limited to: demolition, grading, building construction, walkway or roadway construction, excavation, trenching and boring, or other such activity which has the potential to negatively impact trees.
2. The management of trees and shrubs shall be incorporated into the following phases of the site development process:
   A. Planning
   B. Design
   C. Pre-Construction
   D. Construction
   E. Landscape
   F. Post-Construction
3. During the Planning phase, an assessment of tree and shrub resources on the site shall be performed by a certified arborist. The assessment shall identify the species, condition, and size of each tree and shall be incorporated into the site design. Trees to be retained or protected shall appear on site design maps. Trees on neighboring property which could also be impacted should also be considered.
4. During the design phase, a tree management report shall be developed for trees to be conserved on the site, and shall be included in the construction plans and specifications, which may include, but are not limited to:
   A. Trees to be retained
   B. Tree and Root Protection Zones (TPZ/RPZ)
   C. Tree Protection Zone barriers
   D. Tree Protection plans
   E. Soil erosion control
   F. Soil compaction controls
   G. Staging and storage areas
   H. Other relevant on-site activities

5. Grading and demolition plans shall include all trees to be retained and removed, as well as the tree protection plans for working around trees to be retained. Plans shall also include equipment routes for avoiding the TPZ. Consequences for non-compliance shall be specified.
6. During the pre-construction phase, all tree protection plans shall be effectively communicated to all parties involved with the site development, and tree protection zone barriers shall be in place prior to the beginning of any construction activities.
7. The TPZ shall be delineated around all trees to be protected during construction, and shall be based on the size, species, and condition of the tree and its root system. Six to 18 times the diameter of the tree is generally considered to be acceptable. Deviations from this diameter may be made at the discretion of a certified arborist. Activities which could damage tree roots or compact soil should be avoided in the TPZ
8. Fencing or other visible barriers to the TPZ shall be installed prior to site clearing, grading, and demolition, and maintained throughout the construction and landscaping phase. When this is not feasible, alternate methods may be considered.
9. During the construction phase, compliance with tree protection plans shall be monitored by a certified arborist, and any damage to tree barriers or trees, or non-compliance shall be reported to the project manager or owner, or other controlling authority.
10. When removing vegetation or pavement during demolition, equipment used adjacent to the TPZ shall be specified to avoid damage to the tree and the surrounding soil, and soil protection measures shall be in place prior to vehicle or heavy traffic in or near the TPZ.
11. Storage or disposal of construction materials or hazardous materials shall not occur in the TPZ.
12. Fill within the TPZ shall not be permitted without mitigation to allow for proper air and water availability to existing roots. If fill cannot be avoided in the TPZ, compaction of fill shall be avoided, and consideration shall be given to a permanent well installation to protect the tree and its roots.
13. During the landscape, irrigation, and lighting phase, levels of compliance shall be documented and reported by a certified arborist. Non-compliance shall be reported to the project manager.
14. During the post-construction phase, a remedial and long-term maintenance plan shall be specified for existing and new landscaping, to ensure success of preservation efforts and newly planted landscaping.
15. Pruning shall be considered to reduce wind sail when necessary. It should not be considered to compensate for root loss.
16. Mulch shall be applied to as much of the tree protection zone as possible, in order to create a favorable soil environment for root recovery after construction activities.

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1. A cost-benefit analysis shall be conducted during the planning phase. In some cases, money may be better invested in tree planting post-construction.
2. The species and age of tree shall be evaluated by a certified arborist, so that trees in good condition with desirable characteristics are preserved, but those in poor condition or with undesirable characteristics are not.
3. A tree inventory and tree management report shall be conducted during the planning phase, and a certified arborist shall work closely with developers to ensure best management practices are being met for both parties.
4. Effort shall be made to retain groups of trees, such that there is a wind and solar buffer around the highest quality trees if possible.
5. The Critical Root Zone (CRZ) is the area around the tree trunk where roots essential for tree health and stability are located. A Tree Protection Zone (TPZ) is an arborist-defined area around the tree which should include the CRZ, as well as additional area to ensure future stability and growth. The TPZ is subject to the professional opinion of the certified arborist.
6. An attempt shall also be made to preserve native soil for landscape planting as native soil with horizons and development is preferred over fill or black dirt.
7. If a sufficient TPZ cannot be established, a 6-12" layer of hardwood mulch, 3/4-inch plywood mat over a four-inch layer of hardwood mulch, or other such measures shall be temporarily installed over the CRZ in order to prevent root and soil compaction.
8. Trunk protection shall be installed on trees very close to construction activities, and should consist of 2x4 or 2x6 planks, strapped snugly to the tree trunk with wire or other strapping, preferably with a closed-cell foam between the trunk and the planks.
9. When roots over one inch cannot be avoided, they shall be pruned, not left torn or crushed. Acceptable methods of pruning are:
   A. Excavation using supersonic air tools, pressurized water, or hand tools, followed by selective root cutting
   B. Cutting through the soil along a predetermined line with a tool designed to cut roots
   C. Mechanically excavating the soil and selectively pruning remaining roots.
10. Wells, tree islands, retaining walls, and other such structures or strategies shall be considered as alternatives to any cut/fill work in the CRZ or TPZ.
11. Monitoring shall take place during construction and post-construction phases, and any non-compliance should be reported to the proper controlling authority right away, so that timely remediation or mitigation efforts may be undertaken.