

TREE MANAGEMENT PLAN FOR MARQUAND PARK, PRINCETON NJ



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Image # 1 – View of the threadleaf Japanese maple # 651
As seen from the moss sawara falsecypress # 659

I. EXECUTIVE SUMMARY

During the spring of 2014, at the behest of the Marquand Park Foundation Board, the Urban Forestry Consulting Group from the Morris Arboretum of the University of Pennsylvania conducted a tree inventory and assessment, mapped and updated tree locations, and documented existing conditions for 714 trees at Marquand Park. In the course of the tree inventory process, trees were assessed for life expectancy, safety, aesthetic contribution, pruning requirements, cable support requirements, and pests. Each of these trees has been geolocated and entered into a Global Information System (GIS) computer

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program by ESRI that is now available to the public online. Two versions have been created, one for the Board and the Open space Manager from the Municipality and the other for the general public. The Board version has editing capabilities and the general public version is read only. Each pin on the web map indicates the location of a tree that when clicked on will show a drop down box with most of the pertinent data about that tree.

For the purposes of this study we define a tree as any woody stemmed plant over 6" in Diameter at Breast Height (also referred to as DBH). Circumference at Breast Height (referred to as CBH) is our primary metric for measuring the size of a tree. In general, shrubs and herbaceous material are not included in this study. However, several multi-stemmed plants with stems smaller than 6" were accessioned in this inventory when we felt that they merited special attention or had some unique management considerations. In the consolidated inventory sheets in appendix 6, the cells shaded pink in color within the CBH column indicate a multi-stemmed plant.

This comprehensive inventory and assessment of the existing trees will become an important tool in the management of the collection that will hopefully enable the Board to make decisions regarding removals, pruning, and selection of new plants as well as cost projections for the future. It will also help Marquand Park achieve status as a Certified Arboretum and guide the implementation of policies concerning accession of new plants and care of the existing collection.

One hard copy of this report, the accompanying data sheets, and some additional information and articles will be delivered to Pam Machold, Marquand Foundation Chair, of 173 Prospect Ave. Princeton for safekeeping. Copies of this report and data in Excel format will be distributed to the remaining Board members electronically via Dropbox. Data on individual trees within the Park may be accessed by opening that Excel sheet and highlighting any of the tabs at the bottom. The categories of the tabs are as follows:

1. Full Inventory
2. Consolidated Inventory
3. Woods Area Inventory
4. Public Gardens Area Inventory
5. Species composition
6. Genera composition
7. Recommended Tree Removals
8. Recommended Pruning
9. Life Expectancy of each tree (based on visual health assessment)
10. Ash Management recommendations & list of all ash
11. Mulch Ring recommendations with map and list of 42 trees that need them
12. Recap of all pertinent statistics
13. Key to spreadsheet codes and abbreviations

II. RECOMMENDATIONS SUMMARY

These recommendations are summarized from and follow the format of this report's body and the general observations made during the consultants' site visits.

1. Tree Assessment Recommendations: This section's recommendations address arboricultural activities, such as tree pruning and removal, directly related to the tree inventory and assessment findings.

Tree Removal and In-Depth Inspection Recommendations:

- Make immediate arrangements to remove the nine (9) "A" and "B" priority trees that have been deemed as hazardous.
- Decide if and when to address the thirty (30) low-priority "C" and "CR" removals.
- Arrange to immediately perform the resistograph tests on the three (3) trees that have been designated as requiring further investigation.

Tree Pruning Recommendation:

- Make immediate arrangements to prune all of the twelve (12) "A" priority trees that have been deemed to have limbs that are especially hazardous.
- Schedule the pruning of the 146 trees in the "B" category for next year.
- Decide if and when to address the 263 trees in the "C" category that have lessor priority pruning needs.
- Make a long range plan as to how to meet the ongoing pruning needs in the Park. Engage in a frank discussion with the Municipality as to how this can best be done.

Tree Life Expectancy Recommendations:

- Anticipate budget requirements for the 56 trees expected to live less than five years. Some of these will be included in the immediate pruning and removal contract. The remaining ones should be identified and reviewed after the initial contract is completed.
- Create a long range tree maintenance plan that will address the issue of age diversity in the tree collection. This plan will set goals and guidelines for new accessions and tree planting. This document will become a key component of the submission to Morton Arboretum for Certified Arboretum status.

2. Tree Insect and Disease Recommendations: This section's recommendations address major pests observed or anticipated in Marquand Park and the impact that they may have on tree management activities and planning.

Plant Health Care Recommendations:

- Recommendations for the formation of a subcommittee to administer the Plant Health Care (PHC) Contract are outlined here.
- It is recommended that a PHC Manual or set of guidelines be written by this committee to guide the future care of the collection and the Arboretum as a whole.

An exemplar of a piece of the suggested manual is detailed here giving some examples of a few of the insect and disease challenges that may face Marquand Park in the future. It is not meant to be a

comprehensive list.

Emerald Ash Borer and Ash Management:

- Make arrangements for the immediate removal of the two white ash (#613 & 614) near the play areas in front along Lover's Lane. These two trees are identified as being particularly hazardous and are included in the list of nine trees recommended for immediate removal.
- Make arrangements to perform the resistograph test on white ash #190 that leans significantly over Mercer Road.
- Carefully examine the seven (7) white ash that have been identified as marginal specimens that have an anticipated life span of less than 15 years. Project out the costs of treating these trees with an insecticide for the next 10 years and weigh the costs of treatment versus the benefits derived. Make a decision based on this analysis as to whether or not these 7 ash should be removed or preserved.
- Make immediate arrangements with Pepper Deturo of Woodwinds to treat the fifteen (15) ash with a systemic insecticide. Meet with him on site to identify, locate and tag these trees to avoid confusion and to make a decision as to the most appropriate insecticide and mode of application.
- Develop a set of guidelines and recommendations for control and management of Emerald Ash Borer for dissemination to the Shade Tree Commission and the community at large as an outreach program and key component of the Marquand Park Arboretum management Plan.

3. Various Tree Management Recommendations: This section's recommendations address various and important issues affecting Marquand Park's tree management and planning activities.

Tree Species Diversity Recommendations:

- The Marquand Park Foundation should appoint a separate subcommittee that would be tasked with developing a list of recommended future plantings in both the Public Gardens Area and the Woods area. These recommendations should reflect the overall goals of these separate areas and continue to plant trees to provide species (and age) diversity. In general, underrepresented natives should be planted in the Woods area and exotic non-invasive trees of particular aesthetic qualities should be planned for the Public Garden area.
- *Acer* species should be planted less often (or not at all) so that, in the future, the tree diversity will meet the 10-20-30 rule.

Tree Planting Recommendations:

- Continue to augment the Marquand Park Arboretum with unusual and worthwhile tree species in the Public Garden area.
- Plant tree species that are adapted to the site conditions
- All tree planting activities should follow the ANSI A300 (Part 6) standards and the Best Management Practices companion publication.

New Tree Pruning Recommendations:

- New trees should be structurally pruned as necessary.
- Develop an outreach program for the community at large concerning the importance of structural pruning in developing worthwhile and hardy trees for the future.

Mower Damage and Mulching Recommendations:

- Make immediate arrangements with Joan Davio of Greenscapes to install the 42 mulch rings as listed on the separate Excel sheet within this report.
- Develop a secondary list that will include the approximately 60 remaining trees that should have mulch rings established.
- Develop guidelines and recommendations concerning proper mulching that will become part of the arboretum Management Plan.
- Develop an outreach program that will assist the community in understanding the benefits of correct mulching and the long term stress that is placed on a tree when Mower Root Damage and Mower Trunk Damage occur and turf is maintained within the drip line of a tree
- Develop guidelines and recommendations for mowing contractors to communicate the importance of not hitting exposed roots or trunks with mower decks or string trimmers (MRD & MTD)
- Use turf mowers with mulching blades during the fall to mulch the leaves into the turf and soil.
- Mulch should never be placed in direct contact with the trunk.
- Mulch should be a maximum of three inches thick.
- If decomposed mulch is too thick, use a hand-held spring steel-headed grass rake to distribute the excess organic matter under the tree's canopy.
- Large tree roots should not be harmed if the edge of mulch rings is delineated by manually.

Girdling Root Recommendations:

- Include guidelines and explanation of Stem Girdling Roots (SGR) in the Management Plan. Include this as part of the outreach mission to the community at large.
- When planting new trees, girdling roots should be removed or repositioned if possible.
- Inspect new trees for girdling roots at the nursery and, if discovered and severe, the tree should not be purchased.
- When planting new trees, decompact the soil using an air spade in as large an area as feasible around the planting hole. Care should be taken not to disturb established tree roots.
- Perform an air spade investigation on the Engelmann spruce to determine if there is a SGR.

Plant Health Care – (PHC) - Program Recommendations:

- A subcommittee should be established to administer the PHC Program.
- Accurate records of site visits, insect and disease conditions observed and treated must be maintained. MSDS sheets for any insecticide application must be retained.
- Primary goal of PHC program is preservation of the collection by managing insect and disease conditions at acceptable levels through minimal use of insecticides.

4. Administrative and Organizational Recommendations: This section's recommendations address administrative and organizational issues that impact planning and managing Marquand Park's Tree Collection

Periodic Inspections and Updating the Tree Assessment Recommendations:

- The Foundation should plan and budget for periodic updates of the tree inventory/assessment.
- Tree assessment updates should be performed by an appropriately qualified person who possesses

sufficient education, training, and experience in inspection techniques and tree hazard detection.

Maintaining the Tree Inventory & Assessment Spreadsheets and Collector map

Recommendations:

- Decide who will have the responsibility to maintain the Collector map and tree inventory and assessment spreadsheets.
- This person should have a working knowledge of GIS and MS-Excel software.
- Establish security and access protocols, such as password protection or access as read-only, to the GIS and spreadsheet data.
- The Morris Arboretum Consultants could maintain the tree inventory & assessment spreadsheets and GIS map if requested

Tree Tagging Recommendations:

- Develop a list of the missing or destroyed ID tags.
- Design, order, and install appropriate tree tags.

SIGNIFICANT FINDINGS AND RECOMMENDATIONS

Marquand Park should be regarded as two distinct and separate ecosystems that each have their own distinct management needs and goals. For the purposes of this report, I refer to them as the **Woods Area** and the **Public Garden Area**. (Refer to the map in Appendix 2 to see the delineation between these two areas).

Of the **714** identified trees in Marquand Park, **458** of them occur in what we have chosen to designate as the Woods Area. This is primarily the densely wooded area along Mercer Road and north to the first paved path. Each of these trees now has a small aluminum tag affixed to the trunk at eye level with the individual accession number of each plant stamped on its surface. The Woods Area is composed of **46** different species, 30% of the trees are sugar maple (*Acer saccharum*), 11% are tulip poplar (*Liriodendron tulipifera*) and 9% are Norway maple (*Acer platanoides*). Many of the older tulip poplar, white oak, black oak, red oak, American beech and hickories are quite large and especially awe inspiring. Future work in the Woods Area should adhere to the protocols of ecological restoration with an emphasis on native plantings and removal of invasives where practical. The inventory of the trees in the Woods Area can be found in Appendix 4.

The remaining **256** trees are located in the Public Garden Area of Marquand Park. This area is comprised of the open playing fields, playground, sand lot, parking lot and the sections of open lawn and paved pathways. We chose not to affix the aluminum tags on these trees as I felt that it might be visually intrusive and the great majority of these trees already have high quality signage attached to the trunk with both common and Latin names printed on them. Within this area there are **124** different species of trees, many of which are rare or exotic species that are a legacy of the original estate. It is my opinion that this section of the Park should be designated as an Arboretum and that official status as such should be pursued through the Certification Program at the Morton Arboretum in Chicago. This portion of the Park should be managed very differently than the Woods Area where exotic plants of merit should be welcomed and cared for as in a museum. A written accession policy outlining future planting and collection goals as well as management guidelines should be written & codified. The Inventory of the trees in the Public Garden Area can be found in Appendix 5 below.

The Full Inventory found in Appendix 6 includes both the Woods Area trees as well as the Public Garden Area trees. The Full Inventory shows most of the columns that we used to collect data about each tree and is printed on legal sized paper. A consolidated version of the Inventory occurs immediately after that in Appendix 10 and is printed on standard 8.5" x 11" stock. Cells that are shaded under the column CBH1 indicate trees that are multi stemmed.

The data from the full Inventory has been sorted into nine separate spreadsheets under the following needs categories:

1. **Woods Area** – This is a comprehensive inventory of all 458 trees of 46 different species that are found in the wooded section of the Park (see accompanying map that delineates this area). The understory plants in this area consist of small diameter trees, shrubs, and perennial and annual low plants. There are no lawn areas within the Woods Area portion of the Park.
2. **Public Garden Area** – This is the classic Arboretum portion of the Park that is bounded by Lover's Lane on the west, Stockton Street and the Institute home to the north, Guernsey Hall on the south, and the paved walkway on the east side that abuts the woods and leads to Mercer Road. The understory in this area is characterized by open turf areas and maintained lawns for recreation and leisure purposes.
3. **Tree Removals** – Suggested tree removals in this section are rated from A to C in terms of urgency and associated risk. There are **10** trees that have been classified as A or B priority removals that should be attended to in the immediate or near future as they pose a potential hazard to pedestrians, motorists or cyclists. There are **18** trees that are dead or nearly so, some of which can be left as habitat trees if they pose no risk. **16** others are designated "CR" for Consider Removal but pose a low risk factor.
4. **Tree Pruning** – Pruning is rated A to C, also in terms of urgency, but further modified by a numeral following the letter indicating the amount of pruning needed (1= a lot, 3= not so much). **9** trees have been identified as trees that require immediate pruning because of hazardous limbs over roads or pathways
5. **Life Expectancy** – rated from 0 = dead tree, <5 for trees expected to die within 5 years, 5 to 15 for trees that are somewhat compromised or showing signs of decline, and >15 for trees in good to excellent condition that can be expected to live at least 15 years or more. 92.3% of the trees have a life expectancy over 5 years, and 75% have a life expectancy of greater than 15 years.
6. **Species Present:** 142 different species of trees were observed and are listed here including the percentage of each within the collection. One species alone, *Acer saccharum*, comprises almost 20% of the entire collection, while many others are single representatives.
7. **Genera Present:** These 142 different species fall within 64 different Genera as listed. 20 of these Genera, however, comprise more than 85% of the trees in the collection. The information provided by these two sections will hopefully assist the Board in making future plant choices and establishing guidelines for future
8. **Mulch Rings Needed:** 42 trees in the Public Garden Area near the front are identified as having various degrees of Mower Root Damage (MRD) and/or Mower Trunk Damage (MTD) from mowers or other mechanical devices. It is recommended that these trees have mulch rings installed around the trunks of each of them and a thin layer of wood chip mulch spread within that area.

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9. **Ash Management** – 24 white ash (*Fraxinus americana*) are found in Marquand Park. Two of these should be removed immediately and 14 of these should be treated with an insecticide to prevent them from being killed by Emerald Ash Borer (EAB). EAB has been discovered two weeks ago in Bridgewater NJ less than 20 miles from Princeton and now poses a threat to all ash in New Jersey.

RECAP OF TREE-RELATED FINDINGS

<u>Item</u>	<u>Number</u>	<u>% of Total</u>
A. Total number of trees on Inventory	714	
Total number of trees in Woods Area	458	64%
Total number of trees in Public Garden Area	256	35.90%
B. Total number of tree species present	143	
Total number of Genera represented	64	
C. Tree Life Expectancy		
>15 years	544	75%
5-15 years	124	17.30%
<5 years	38	5.10%
Dead	18	2.50%
D. Tree Removal		
A - High Priority	4	0.56%
B. - Intermediate Priority	6	0.84
C. - Low Priority	13	1.82
Consider Removal	16	2.24
Hazard Inspection	3	0.14
E. Pruning		
Number of trees with pruning needs	424	59.40%
A. - Highest Priority - (A1-3, A2- 6)	9	1.20%
B. - Intermediate Priority (B1-28, B2-87, B3-37)	152	21.30%
C. - Low Priority (C1-19, C2-63, C3-18)	263	36.90%
F. Risk		
Number of trees with some degree of risk	441	61.85
Extreme	1	0.14
High	7	0.98
Moderate	29	4.07
Low	354	49.65

III. INTRODUCTION

A. Background

Marquand Park is a 17-acre arboretum and recreational area located on Lovers Lane in Princeton, New Jersey. It contains walking paths, a baseball field, and attractions for children such as a sandbox and a play structure as well as picnic and seating benches throughout the Park. Approximately half of the Park is passive wooded area with pathways wending through it, while the other half is used for recreation in a public garden setting. This area is characterized by open turf, the baseball diamond, and the children's play area interspersed with a very fine selection of mature trees and shrubs throughout.

Marquand Park was originally the property of the Princeton University professor Judge Richard Field, who bought 30 acres of farmland in 1842 for his personal estate. Fields and others began developing the land as an arboretum, and its development continued under Susan Brown, who acquired the land in 1871, and under Princeton University Professor Allan Marquand, who acquired the property in 1885.

In 1953, 17 acres of the land were given to Princeton borough by the Marquand family, and in 1955 a non-profit foundation was created to care for the park. Under the care of the Marquand Park Foundation, over 100 new species and trees of shrubs have been donated to the park or purchased by the foundation.

Eight of the largest trees of their species recorded in New Jersey are found in the park. Other well-known trees there include a dawn redwood, a species thought to be extinct until it was discovered in China in 1944, and a threadleaf Japanese maple, which is well known for the corkscrew-like shape of its trunk and branches.

Preserving these and the other park trees and reducing tree-related safety problems are prudent goals for any strategic planning process. At Marquand Park, documenting existing conditions will be an important resource for management and planning.

In April-May 2014, the Morris Consultants inventoried and assessed the Park's trees within the project boundary as shown in Appendix 7, and produced this tree management report.

B. Assignment

The Morris Consultants Scope of Work: A proposal, dated 02 April 2014, offered the following scope of services:

1. **Complete an action-based tree assessment:** This inventory/assessment service documents and prioritizes the nature and quality of the Park's trees. The tree inventory and assessment information was recorded directly into an iPad tablet using ArcGIS online software and

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Collector, an ESRI mobile data collection application. The proposal's scope included 360 trees; however, 714 trees were inventoried and assessed.

2. **Tree Mapping & Tagging:** The Morris Consultants produced a feature class layer with an attribute table in Collector. The Collector map shows each tree's location, inventory number, and the tree's life expectancy. Trees within the wooded area were tagged with small pre-numbered tags to facilitate finding a specific tree in this section.
3. **Produce this Tree Management Report:** Information from the tree inventory and assessment was synthesized and recorded in this Tree Management Report, which consists of methodology, inventory techniques, assessment criteria, statistics, findings, discussions, recommendations and appendices.

C. Setting Priorities for Tree Management

Trees are the most important green resource at Marquand Park. The mature trees contribute to a sense of place by defining spaces, screening and framing views, providing shade and wildlife habitat, mitigating stormwater flows, and providing other important benefits. Their contributed and perceived value warrants efforts to manage and preserve them. Tree management must plan for the care of existing landscape trees while periodically planting new trees. Effective and stable landscapes must strive for a mixed-age tree population. This means that trees must be planted routinely to replace trees that perish.

Throughout this report, we recommend that **safety-related issues** be addressed first. After all safety concerns have been addressed, resources should be allocated to **maintaining the health of the existing trees** to prevent conditions that would shorten their life expectancy or create safety hazards. While it may be tempting to base decisions on **aesthetic concerns**, such issues should only be addressed *after* safety and tree health.

This tree-management priority scheme – safety first, then maintenance of tree health, and finally aesthetics – is perhaps most useful when undertaking tree removals, pruning, and cabling. Not all trees that require these maintenance tasks need immediate attention to alleviate risks to people or property. In light of this, our assessment of required removals, pruning and cabling categorizes each tree as high-priority, intermediate-priority or low-priority. These categories parallel the management priority scheme described above.

To maintain tree health in the Park, it is essential to schedule tree management activities. Appendix 6 offers a tree-related management schedule that can help guide management activities and resource allocation.

TREE MANAGEMENT AT MARQUAND PARK

Preserving, protecting, and enhancing Marquand Park's tree resources *requires continued proactive management and budgeting support*. Simultaneously, it is important to plan for and plant a modicum of new trees, remedy tree-related safety hazards, and manage trees so they can fulfill their aesthetic contributions. We recommend that funds continue to be allocated to provide routine tree care. Part of the routine tree care budget should target systematic and periodic tree inspections to discover, prioritize, and remedy new tree conditions over time. From a management and budget perspective, it is

noteworthy trees at Marquand Park are mature, so the associated maintenance costs will be higher than for a landscape comprised of young trees.

D. Report Body Structure

This report's findings, discussions and recommendations are divided into four sections to facilitate using and reading the report. The sections are as follows:

1. **Tree Assessment: Findings, Discussions, and Recommendations:** This section of the report will address the arboricultural activities that are recommended for immediate and ongoing action. As mentioned above, they include tree pruning and removal, mulch ring installation, ash management and other items that are directly related to the tree inventory and assessment findings.
2. **Tree Insect & Disease Pests: Findings, Discussions, and Recommendations:** This section addresses major pests present or impending in the short-term at Marquand Park which impact tree management activities and planning.
3. **Various Tree Management Findings, Discussions, and Recommendations:** This section's topics address various important issues affecting Marquand Park's tree management and budgeting activities.
4. **Administrative and Organizational Issues: Findings, Discussions, and Recommendations:** This section's topics address administrative and organizational issues that impact planning and managing the common area tree resource.

These sections are not arranged by priority; therefore, it is vital to read all sections of the report body to fully understand tree management issues at The Park.

IV. TREE ASSESSMENT: FINDINGS, DISCUSSIONS, AND RECOMMENDATIONS

Introduction: This section's topics address arboricultural activities, such as tree pruning and removal, mulch ring installation, ash management, and other items that are directly related to the tree inventory and assessment findings. Detailed recommendations applicable to individual trees are made in the spreadsheet data appended to this report. A summary of the findings and recommendations for the inventoried and assessed trees are as follows:

A. Tree Removal and In-depth Inspection

Recommendations for tree removals are based on the following considerations:

- *High-priority* removals ("A") are those that pose an immediate safety hazard due to their structural condition and location near high-traffic areas or structures. They should be addressed as soon as possible.
- *Intermediate-priority* ("B") removals include trees with defects such as dead or dying trees that can fall onto less-trafficked areas.
- *Low-priority* ("C") removals include dead and/or smaller trees or other trees likely to fall completely within infrequently-used areas.

These categories are coded as A, B, and C in the "Re" (removal) column of the appended tree assessment spreadsheets. Trees identified as A and B priority removals are typically adjacent to highly-used areas or could fall on "targets" such as buildings or structures. C priority removals are typically trees well within mown areas, small trees, or trees that could impact low-rated targets.

Removals by Priority: Of the 714 assessed trees, **39** trees were recommended for removal.

This is 5.49% of the total inventory

- 4** of these were found to be high priority or "A" category for **immediate action**.
- 6** were found to be in the intermediate or "B" category **also for immediate action**.
- 13** trees are in the "C" category or low priority
- 16** trees are designated as "CR" or "Consider Removal"

Thirteen trees were low-priority removals which can be removed when budgets warrant or if staff or residents feel that the landscape aesthetics are suffering. Lower tree removal costs can usually be obtained by removing these trees during the winter because it is the arboricultural industry's slow time of year.

Consider Removal: In addition to the outright removals, twelve trees should be considered for removal (marked "CR" in the "Re" column of the tree assessment spreadsheet). Typically, these trees have low life expectancies and a plethora of other issues that may not make them worthy of the time and expense necessary to extend their lives. It is often advantageous to make a decision about the fate of these trees before scheduling a tree contractor for other arboricultural-related activities such as tree pruning or removal.

In-depth Safety Inspection: ("HI") Three trees were found that require an in-depth inspection to determine their safety and risk potential. An in-depth inspection is a progressive process that involves

gathering of visual clues, identifying and measuring defects, and diagnosing problematic conditions. Use of a resistograph to determine degree of hollowness in the stem is recommended.

B. Tree Pruning

Pruning is the most important ongoing maintenance task for Marquand Park's trees. The techniques used in pruning and the position of pruning cuts can greatly affect a tree's long-term structural integrity and safety. For this reason, it is *essential* to use qualified, properly-trained contractors and/or staff who understand the trees' physiological responses to pruning and are familiar with young tree pruning techniques that promote good structure in the future without jeopardizing the tree's biological health.

General pruning recommendations (marked "G Pr" on the tree inventory and assessment spreadsheets) include both priority and amount of required pruning and are assigned by considering multiple factors. These factors include safety issues such as the severity of a defect, probability of damage or injury, and size of the branch, limb, or trunk. Priority also considers the tree's long-term structural development and aesthetics. The three assessment categories are as follows:

- **"A" - High-priority** pruning, such as a large, dead branch showing fungal conks (codes A1, A2 or A3 on the tree assessment spreadsheet).

Twelve (12) trees were identified in the "A" category with conditions that are potentially hazardous that should be pruned immediately.

- **"B" - Intermediate-priority** pruning, such as a 3-inch diameter dead branch that could fall on a less used walkway (codes B1, B2 or B3 on the tree assessment spreadsheet). *These trees should be addressed only after all high-priority pruning is completed but should not be ignored.*

146 trees were identified in this category as having a moderate degree of risk associated with them. These trees should be pruned within the next year. The annual pruning activities should address all intermediate priority trees before pruning of the low priority trees. The strategic goal of the Foundation should be the elimination or minimization of any potentially hazardous tree conditions as identified in the "A" and "B" categories

- **"C" - Low-priority** pruning refers to trees that have pruning needs but are located within infrequently used areas (codes C1, C2 and C3 on the tree assessment spreadsheet). *These trees should only be addressed after all high- and intermediate-priority pruning is completed. In most cases, "C" priority tree care is recommended primarily for structural pruning for young trees or aesthetic considerations in older trees.*

Of the 714 assessed trees, 421 or 59% had some need of pruning. 12 trees were found to have high priority pruning needs. 146 trees were identified as having pruning needs that are of intermediate urgency and 263 are designated in the "C" or low priority category. The specific recommendations for each tree can be found under the Specific Pruning ("S PR") column of the tree assessment spreadsheets.

C. Tree Life Expectancy

Tree life expectancy is an estimation of how long an individual tree will survive given its specific set of circumstances and “normal” environmental conditions. It is a subjective judgment made by the arborist assessor about an individual tree on the tree inventory. Tree health, damage, location, and many other factors influence the decision about life expectancy.

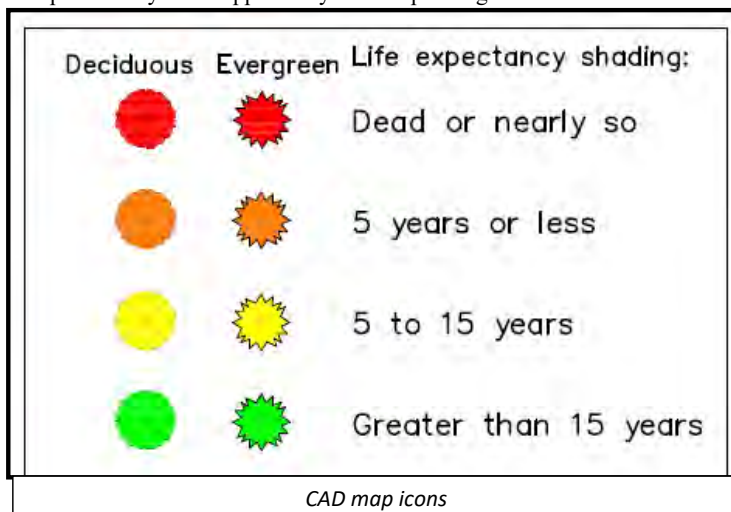
Using four categories to designate life expectancy, the Morris Consultants found the **714** assessed trees to be distributed as follows:

- Dead or nearly so: **18** trees = 2.5%
- Less than five years: **38** trees = 5.1%
- Five to fifteen years: **124** trees = 17.3%
- Greater than fifteen years: **544** trees = 75%

Many dead trees and trees in the “less than five years” category are recommended for removal and have been assigned a priority under removal recommendations.

Removal and replacement budgets should be programmed over a five-year period for those assigned to the less than five years category. The life expectancy of many of the trees in the “5 to 15” year category may be extended if health or structural problems are addressed in a timely way. The “greater than 15 year” category are worthy of routine preventative health care treatments as may be warranted.

The GIS map provided with this report visually represents the trees’ life expectancies at Marquand Park as determined by the assessors during their fieldwork. This map helps to identify the “weak” areas of landscape that may be an opportunity for tree planting.



V. INSECT AND DISEASE CONTROL RECOMMENDATIONS

A. Recommendations for Management of PHC Contract

1. A separate sub-committee of the Marquand Park Foundation should be formed to address the ongoing care of the plant collection in regard to the management of insect and disease conditions that may pose a threat to the health of the trees. This committee should be in charge of monitoring the Plant Health Care (PHC) contract and develop key plant/key pest guidelines for future.

2. Develop a set of guidelines for the ongoing Plant Health Care (PHC) plan for the Marquand Park trees. This should be a written document that outlines the terms of the PHC contract with the private arborist. The DeTuro family of Woodwinds has performed this service diligently for many decades and in the opinion of this observer that arrangement should be kept in place.

- Records of the scouting visits, pests or tree conditions noted, and applications of insecticide or fertilizer should be kept and provided to the Board on a regular basis. All MSDS sheets kept.
- A list of key plants and pests should be kept and reviewed periodically along with the scouting reports to assist in the management of insect and disease conditions in the Arboretum.

B. Suggested Outline for the Marquand Park PHC Manual

(This is not a comprehensive manual but a guideline for how one might be structured)

1. Tree Stress and its Relationship to Insect Damage

Fundamental to a set of guidelines for a PHC Program is an understanding of tree stress and its relationship to insect damage. A suggestion for this section of the guidelines might be as follows:

The fundamental concept for insect and disease control is to maintain a proper growing environment to encourage their vigor. Vigor should not be interpreted as rapid growth since very fast growth, especially when induced by over fertilization, can make a tree more prone to pest problems. Good cultural practices such as proper planting, irrigation, promoting good soil conditions, etc., are crucial for vigorous growth.

When a tree, for whatever reason, is not growing vigorously, it can become stressed. Some insects, like borers, can sense chemical signals from stressed trees. Insect outbreaks can further stress trees by removing nutrients from the tree. When feeding on sap, insects can secrete “honeydew” that can fall onto leaves and promote fungus which can block sunlight from getting to leaf surfaces and cause a drop in photosynthesis, which equates to a drop in the tree’s energy production further reducing vigor.

Most trees are often able to withstand a certain amount of insect infestation. It is when pest populations build to very high levels that problems occur. Unfortunately, pests are not usually noticed until they are in abundance. Therefore, a program of regular and methodical tree inspection should be implemented at Marquand Park, especially during the spring months when many insect infestations occur. Tree inspection should include examination of bark, stems, and leaves for any signs of pests or abnormal appearance of these plant structures

2. Key Disease Conditions Observed and Anticipated:

a. Crab Apple Diseases: Common *Malus* diseases such as fire blight, apple scab, and cedar-apple rust may be an issue. Very few in the collection but they are in high visibility areas. Consider fungicide applications in early spring.

a1. Cedar Apple Rust:

Prominently-placed crabapples will show symptoms of cedar-apple rust. This fungus requires both an apple and cedar (or juniper) to complete its life cycle. On the cedar, the fungus produces reddish-brown galls that are up to golf-ball size on young twigs. During wet weather these galls swell and begin to push out bright orange gelatinous tubular structures. Wind carries fungal spores from these gelatinous structures to susceptible apple or crabapple cultivars.

Infection occurs when these spores land on a susceptible apple cultivar and

moist conditions prevail. Small, yellow spots begin to appear on the upper leaf surface shortly after bloom. Spots gradually enlarge and become a bright yellow-orange color. These brightly colored spots make the disease easy to identify on leaves. In late summer, small tube-like structures (Figure 5) develop on the underside of the apple leaves. Spores are released from these structures and are blown by wind back to susceptible cedars or junipers, completing the disease cycle.



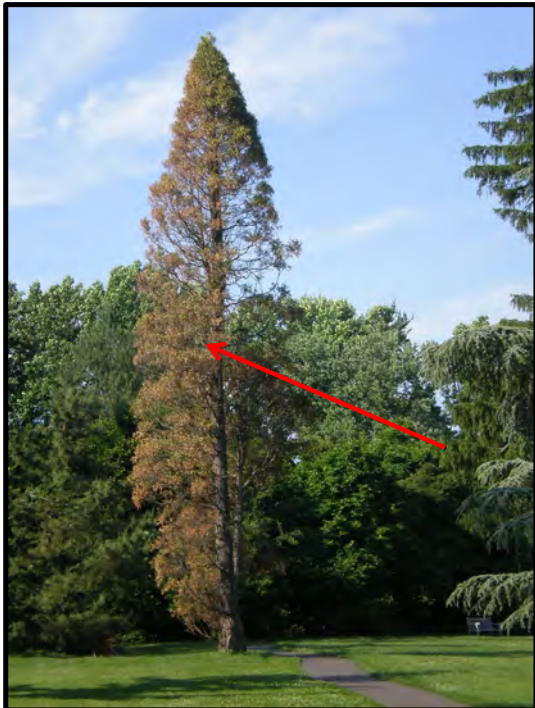
Figure 3: Cedar-Apple Rust on apple leaf.

In most cases, apple and crabapple trees are not seriously damaged by cedar apple rust. Heavily infected

leaves may drop prematurely and severe defoliation can cause reductions in fruit size and may weaken the tree. If defoliation occurs consistently for many years, the tree may decline and die.

a2. Bacterial leaf scorch: All of the red oaks should be visually examined during the summer scouting visit for any signs of dieback that might be associated with Bacterial Leaf Scorch.

a3. Seridium canker: Possible reason for decline of incense cedar #535. The fungus is transmitted by wind-blown spores on rain wetted branches and foliage. Drought stressed trees seem to be the most susceptible.



Seridium also affects Leyland cypress and certain species of Juniper

Image # 4 – The Incense cedar (*Libocedrus decurrens*) #535 at Marquand Park – This tree lost a major lead within the last two years. There is a significant cavity at the base of the tree. It has browned out very quickly this spring and there appears to be little chance for recovery. It is not a particularly hazardous tree at this point but it is unsightly and has been deemed “CR” for Consider Removal.

3. Insect Pests Noted and Anticipated in Marquand Park

a. Emerald Ash Borer recommendation: As outlined above, 15 ash should be treated now and a decision made as to whether or not to retain 7 marginal ones. A dialogue with Princeton Municipality regarding EAB should be initiated. An outreach initiative to the community and Municipality should be

established with informational alerts such as follows:

Emerald Ash Borer

Emerald Ash Borer (EAB) is one of the most significant challenges that ash (*Fraxinus*) trees face in our region. Since 2002, when it was first discovered in Detroit, this invasive exotic beetle has steadily spread, and has killed at least 200 million ash trees so far and threatens to kill most of the ash trees throughout

Deleted:

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Figure 5: Emerald Ash Borer with penny for scale

North America. EAB has been recently (May 20, 2014) discovered in Bridgewater, Somerset County, New Jersey. Currently, there is no way of eradicating this pest; however, individual trees can be treated with systemic pesticide to preserve them.

Twenty three ash trees were inventoried in Marquand Park comprising 3.23% of the total trees in the Park. Of those 23 trees, 18 of them occur in the Woods Area and are all mature trees in excess of 10"DBH. The two largest ashes are 47" DBH and 40" DBH respectively and are well worth protecting.

There is a cost calculator for ash tree management at <http://extension.entm.purdue.edu/treecomputer>. This online calculator allows you to estimate costs for treating trees, removing trees, and replanting with resistant species. Also, up-to-date treatment options and explanations are listed as a PDF at www.emeraldashborer.info/treatment.cfm

More information about this pest and possible on- and off-site uses for removed ash wood can be found at www.paemeraldashborer.psu.edu

Estimated Cost of Ash Borer Injections:

EMAMECTIN (TREE-Äge) charge for treatment is 10 to 16 dollars per trunk diameter inch. The 10 dollar rate is for trees less than 20 inches diameter. The rate per inch is higher for bigger trees, up to 16 dollars per diameter inch in jumbo trees (over 40 inch diameter.) The treatment should be done biennially. Ongoing studies are suggesting that three year control may be possible with this chemical if administered at higher dosage. Further studies are needed before we can recommend it for three year control.

BOTTOM LINE COST amounts to about 8- 10 dollars per trunk diameter inch per year to provide optimal control of ash borers and other ash pests.

This information is from www.tree-doc.com/page/page/3788874.htm

A more detailed report from Ohio State University concerning the management options for protecting ash can be found in the appendix.

b2. Leaf miners: Primarily observed on *Ilex* and *Betula*.

b3. Hemlocks: Develop guidelines concerning adelgid, hemlock elongate scale and mites. Review and examine the remaining hemlocks to determine if continuing care is worth it. Consider accessioning Chinese Hemlock into the collection.

b4. Scale: A wide variety of scale insects are apt to be found on several of the trees in the collection, notably the magnolia

b5 - Pine Bark Borer: The trunks of all white pine should be examined for any signs of borer activity.

b6. Tent caterpillar: An early season pest of *Prunus* species and easily controlled.

b7. Leaf chewing insects: this might include Gypsy Moth and Cankerworm as well as oak skeletonizer etc. that have been observed in the Park in years past.

b8. Taxus issues: Identify cause of declining *Taxus* next to *Pawloni*

VI. VARIOUS TREE MANAGEMENT FINDINGS, DISCUSSIONS, AND RECOMMENDATIONS

Introduction: This section's topics address various and important issues affecting Marquand Park's tree management and planning activities.

A. Tree Species and Age Diversity

Plant Species Composition Rule: The Morris Consultants use a 10-20-30 plant composition rule as a general guideline for plant diversity in parks or other large landscapes. The rule's premise is that a tree population should NOT consist of more than 10 percent of any one species, 20 percent of any one genus, or 30 percent of any one family.

Plant Classification Terminology: Plants are classified using a hierarchical structure; the higher levels are more general and the lower levels are more specific. The levels used in this report are **family**, **genus** and **species**.

The following example uses white pine, *Pinus strobus*, to illustrate these relationships.

More general	Family: Pinaceae contains pines, firs, spruces and related plants
↓	Genus: <i>Pinus</i> is a subset of Pinaceae that contains only pines
More specific	Species: <i>strobus</i> specifies a specific pine within the genus <i>Pinus</i>

This rule is often recommended in the management of large landscapes or city tree populations because of lessons learned from the Dutch elm disease epidemic. Aesthetically, it is more interesting and desirable to have a diverse selection of plants/trees within a landscape. Diverse landscapes decrease the potential for harm to the overall tree population in the event that a disease or insect attacks any one species by increasing distances from susceptible trees of the same kind. Also, the negative effects of any one disease or insect usually are minimized by having a diverse tree population, the idea being not to put "all of your eggs in one basket".

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The Morris Arboretum Arboricultural Consultants found that Marquand Park has a rich diversity of trees in both the Woods Area and the Public Gardens Area. Sugar maple is the species that is most notably overstocked and *Acer* is the only Genera that exceeds the 20% rule.

Within the Woods Area:

- **Species** represented by the greatest number of individuals:
139 Sugar maple (*Acer saccharum*) – 30.55% of 458 trees (guideline <10%)
142 *Acer saccharum* are found in the entire collection of 714 trees = **19.92%**
- **Genus** represented by the greatest number of individuals:
243 Maple (*Acer*) – comprise 34% of entire collection (guideline <20%)
- **Family** representing the greatest number of individuals:

B. Tree Age Diversity and Planting

As mentioned in the Tree Species Diversity section, effective and stable mature landscapes must strive for a mixed-age tree population. Since trees have a limited lifespan, they must be planted routinely to compliment new facilities, landscape designs, and to replace trees that die or structurally fail. At The Marquand Park it is important to continue to plan for and plant the next generation of trees. What tree species to plant and where to plant them should be guided by a landscape master plan that identifies potential tree planting locations and reflects a comprehensive design approach that considers building placement, views and vistas, maintenance, and diversity. A list of suggested tree species is offered in the appendix that can be used with the tree diversity information to choose species.

Trees should be planted to promote a diversity of ages as well as species. All tree planting activities should follow the *ANSI A300 (Part 6) - for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices (Transplanting)*. There is a companion ANSI A300 (Part 6) Best Management Practices booklet which guides the reader about how to properly plant trees.

Choosing trees species that are adapted to the Park's site conditions is important to help assure trees' longevity, health, and landscape usefulness.

C. Pruning Newly-Planted Trees

Structural training (pruning) is a multi-year investment requiring evaluation and corrective pruning on an annual basis. For recently planted trees, structural pruning is usually necessary to develop the proper branch and dominant leader architecture so that growth will yield a healthy, structurally sound tree.

All newly-planted trees should receive their first structural pruning two to three years following planting.

Along with dead, diseased or broken branches, structural pruning can be done judiciously when a tree is planted. Care should be taken no to over-prune because the tree is stressed from transplanting and requires as much of its leaf canopy as possible in order to manufacture food and increase root growth

for proper establishment. Structural pruning should be accomplished on a three-year cycle due to the relatively fast growth rates of younger trees.

An excellent website that discusses new tree structural pruning is:

www.treesaregood.com/treecare/pruning_young.aspx. A link to an informative brochure “Pruning Young Trees” is on that webpage as well and many instructive articles can be found on the web.

D. Mower Damage

Fifty-four trees, or over 20% of the trees in the Public Garden Area, were noted as having been damaged by mower/string trimmers. Most of the mower damage is inflicted on landscape trees in grass lawn areas.

This damage to the trunk flare (base) and surface roots is presently occurring and, as indicated by the condition of existing wounds, has been occurring for some time. Wounds caused by grass cutting activities affect long-term tree health by providing an entry point for disease and can compromise the tree’s anchorage.



Image #6 - Mowers wore away the edge of the mulch circle around the tree.

Mower-induced wounds will have a subtle but cumulative negative effect to tree health because the cell layer where new growth occurs is compromised. This damage must stop to help assure that trees are long-lived and remain vigorous.

The best way to alleviate mower/string trimmer damage is to educate mower/string trimmer contractors/operators that contacting trees with mower decks or string trimmers is an unacceptable maintenance practice that produces undesirable results. If turf maintenance is by contract, the contract language should include verbiage explaining the Board’s expectations about not harming trees, and follow-up with a periodic inspection. If turf maintenance activities are performed in-house, mower/string trimmer operators must understand that contacting trees with mower decks or string trimmers is an unacceptable maintenance practice that produces undesirable results. Supervisors should carry out periodic quality control inspections as well.

To help alleviate this type of damage, remove as much of the turf as possible around the tree's base and either leave it as bare soil or replace it with good quality mulch. Removing the grass around the tree's trunk will make mower/string trimmer operators' job easier and will remove their reason to get close to the tree's trunk. Also, since grass competes with tree roots for resources, turf removal will have the added benefit of promoting tree growth and health.

To remove turf around trees, spray the area with Roundup® or Rodeo® (chemical compound: glyphosate) or their equivalent around the base of trees in lawn area so that it is unnecessary for mowing equipment to get close to the tree's trunk flare. Larger areas are recommended around trees with surface roots that are susceptible to damage from mowers. **Care should be taken to avoid spraying the trunk of thin-barked trees, or the trunk, roots, or any suckers arising from the trunk or roots.**



Image #7 - Tree root area showing mineral soil after dead grass decomposes

If the area around the tree's base is to be mulched, mulch as much of the tree's surrounding area as is possible or practical, using no more than three inches of material. **Mulch should not be placed in direct contact with the trunk.**

E. Mulching

Mulching Mowers: Tree leaves are an important and free source of nutrients and organic matter. Decomposing leaves and twigs improve the soil's nutrient-holding capacity, and is a resource that should be retained and used on site. Turf mowers should be used during the fall to mulch the leaves into the turf and soil. If not already done so, the mowing would be more effective if specialized mulching blades are used.

Mulch Rings: Mulch not only reduces soil compaction, but reduces turf competition, stabilizes soil temperature, increases moisture absorption, reduces evaporation, and replenishes soil organic matter to the soil. Organic matter is valuable to the tree as a nutrient source. As it decomposes essential nutrients are released into the soil. It is also important to soil dwelling organisms such as earthworms, mycorrhizae¹ and beneficial bacteria.

However, mulching should be done correctly so it will not harm the tree.

- **Mulch should never be placed in direct contact with the trunk.**
- **Mulch should be a maximum of two inches thick.**
- If decomposed mulch is too thick and starting to mound, spread the excess organic matter out under the tree's canopy. Using a hand-held spring steel-headed grass rake is ideal for this purpose.

¹ Fungus that forms a symbiotic association with tree roots that is vital for tree survival.

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- Large tree roots should not be harmed if the edge of mulch rings is delineated by manually using an edging shovel. If physically defining the edge of the mulch is absolutely necessary, the operator should use their weight and stand on the shovel to penetrate the soil rather than just using their arms to drive the edging shovel blade into the ground. Also, consider the procedure of not cutting into the soil at all, and placing the mulch carefully to define the mulched edge.

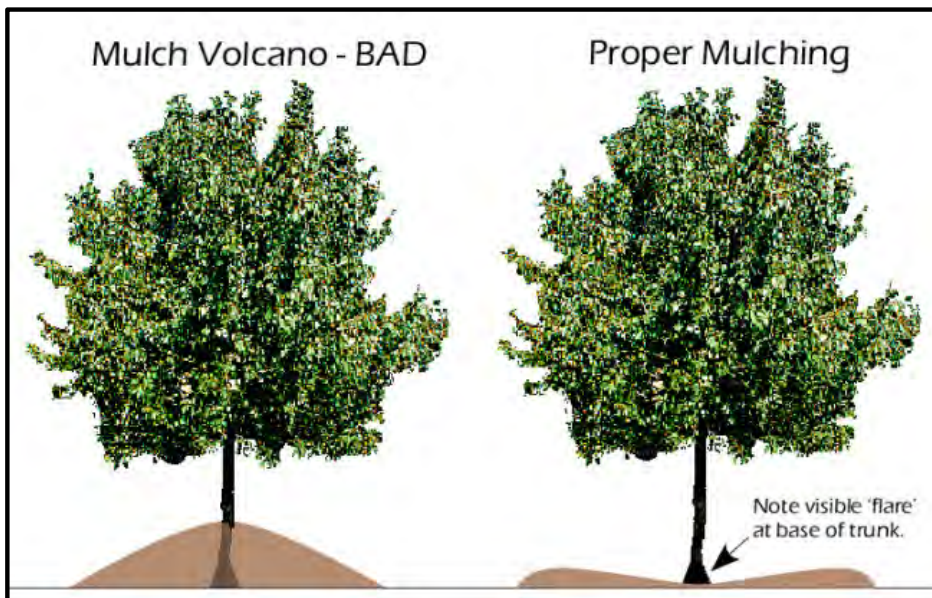


Image # 9 – Volcano mulching as opposed to proper mulching

F. Stem Girdling Roots

A tree may be girdled when a root grows in a position that crosses or wraps around the trunk. As the tree trunk grows and enlarges annually, the root restricts its growth. Gradually, it girdles or chokes the flow of water, nutrients, hormones, and carbohydrates in the trunk causing severe health problems and/or dead patches of bark above and below the restriction.

Several trees in Marquand Park were discovered with girdling roots which are not recommended for removal as removing large roots may jeopardize the tree's overall health. More girdling root conditions may exist, but these were not discovered during the field work since they are often hidden from view below ground or are covered by mulch.



Image #8: Girdling Root

Girdling roots usually are formed when the trees are being grown and are caused by nursery and transplanting practices, soil obstructions, and unknown factors. When plants are held in containers for too long a period of time, many roots begin to circle around the edge of the pot (as in Figure 3). These eventually can girdle the tree. Also, girdling roots can be caused by planting in very compacted soil because new roots have difficulty growing out of the planting hole and into the surrounding compacted soil. Roots can circle the bottom and sides of the planting hole, not unlike those growing in an undersized container. This may be an issue for trees in Marquand Park because of compacted soil conditions.

G. Plant Health Care Program

The biological health of Marquand Park's trees and shrubs would benefit from a Plant Health Care (PHC) program. PHC can be provided by many arboricultural companies, and is an effective and environmentally sensitive approach to pest and disease management that relies on a combination of common-sense practices. PHC programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, combined with available pest control methods, is used to manage pest damage economically, with the least possible hazard to people and the environment. PHC is a series of pest management evaluations, decisions and controls. A PHC program usually has four basic steps as follows:

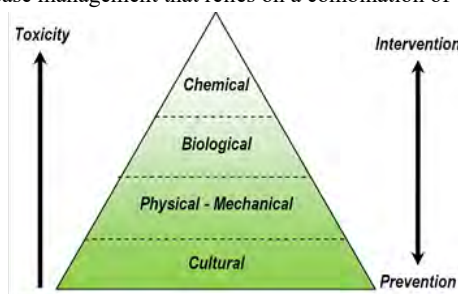


Image #10 – The 4 steps of PHC

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- **Step 1 - Set Action Thresholds:** Before taking any pest control action, the IPM technician first sets an action threshold, a point at which pest populations or environmental conditions indicate that pest control action must be taken. Sighting a single nefarious pest or a small population does not always mean control is needed. The level at which tree and shrub pests become a plant health threat is critical to guide future pest control decisions.
- **Step 2 - Monitor and Identify Pests:** Not all insects and diseases require control. Many organisms do not affect plant health and many are beneficial. IPM technicians accurately identify insects and diseases so that appropriate control decisions can be made in association with action thresholds. This step prevents pesticides from being used when they are superfluous and, if necessary, helps the IPM technician to choose the correct pesticide. *Figure 10: The PHC Symbolic Pyramid*
- **Step 3 – Prevention:** As a first line of pest control, PHC technicians review the landscape and current tree care procedures and identify ways to prevent pests & diseases from becoming a threat. This may mean recommending new or currently unused pest-resistant tree and shrub varieties and tweaking current tree and shrub care procedures. These preventative measures can be very effective and cost-efficient and present little to no risk to the park users or the environment.
- **Step 4 – Control:** Once monitoring, identification, and action thresholds indicate that pest control is required, and preventive methods are no longer effective or available, the PHC technician evaluates the proper control method both for effectiveness and risk. Effective, less risky pest controls are used first, including highly targeted chemicals, such as pheromones to disrupt pest mating, biological controls, such as introducing insect predators who prey on the targeted insect, or mechanical control, such as trapping or hand removal. If further monitoring, identification and action thresholds indicate that less risky controls are not effective, additional methods, such as targeted spraying of pesticides or fungicides, would be employed.

VII. ADMINISTRATIVE AND ORGANIZATIONAL ISSUES: FINDINGS, DISCUSSIONS, AND RECOMMENDATIONS

Introduction: This section's topics address administrative and organizational issues that impact planning and management of Marquand Park.

A. Periodic Inspections and Updating the Tree Inventory/Assessment

Information recorded during the tree inventory and assessment represents tree conditions at the time of inspection. Since tree conditions change over time, we recommend that the Marquand Park Board plan and budget for periodic updates to the tree inventory/assessment and the associated arboricultural tasks necessary to remediate hazardous conditions and maintain tree health and longevity.

There is no absolute rule governing the amount of time between tree assessment updates. In light of this, courts have set a "reasonable person" standard, which represents a reasoned outlook on how often tree assessments should be updated. Since tree conditions can change overnight due to a severe storm event, or may change slowly, it is reasonable to presume that the frequency for tree assessment updates be evaluated as conditions warrant. The Marquand Park Board must interpret the amount of time

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between “periodic updates” of the tree assessment in light of the “reasonable person” standard, and change update frequencies based on potential risk.

Potential risk can be thought of as the likelihood that an adverse event will occur and the likely consequence of the adverse event. The likelihood of the event is considered in terms of both potential for tree failure and the likelihood that something of significance (target) will be present at the time of failure. The consequence is considered in terms of how large the tree or branch is and how susceptible to harm is the target.

Therefore, in areas of higher potential risk, such as the large, mature trees adjacent to Lovers’ Lane, Mercer Road and the playground areas tree assessments should be done every one or two years. In Woods Area where there are considerably fewer targets, tree assessments can be done every three to five years. Please note that these are guidelines only. It is also prudent to inspect trees just after conditions have changed in a relatively short period of time, such as after an extreme storm event. The tree assessment updates should be performed by an appropriately qualified person who possesses sufficient education, training, and experience in inspection techniques and tree hazard detection.

A main objective of a tree assessment is to decrease tree-related hazards, thereby reducing the likelihood and severity of damage. Liability cannot totally be eliminated; however, proper planting and aftercare, combined with regular pruning and periodic inspections, decreases the chance that weaknesses or defects will cause the tree to become hazardous.

B. Using and Maintaining the Tree Spreadsheets and GIS Map

Electronic Spreadsheet: Regular and routine maintenance of the GIS based inventory/assessment spreadsheet is essential to provide accurate and up-to-date information to support tree and landscape maintenance and planning.

The tree assessment/inventory spreadsheets can be used to:

- Direct tree pruning and other tree-related activities
- Produce reports and summaries
- Record completion of maintenance tasks, such as tree removals or pruning
- Record newly-planted trees
- Prepare budgets
- Focus landscape planning and tree replacements
- Provide guidelines for increasing species diversity
- Identify those species and genera that are overrepresented and should be limited in future plantings

GIS Map: A GIS file showing the trees in the project area was submitted with this report. This map contains layers of information showing inventoried tree location, type, inventory number, canopy spread, and life expectancy (by different hatch colors). The GIS file connects the spreadsheet information with the tree in the landscape. Clicking on an individual pin on the map will open a drop down menu with all of the pertinent data concerning that tree.

The GIS map is a useful tool for planning and maintenance. The graphic representation dramatically and effectively shows spatial relationships of tree inventory and assessment information. For example, the colored-coded tree icons on the life expectancy layer visually identify short-lived trees and their locations.

Maintenance, Management, and Integrating the Tree Inventory and Assessment Spreadsheet with the GIS Map: Maintenance and management are essential to maximize the GIS map and tree inventory and assessment spreadsheets. If their accuracy and completeness are not maintained, their effectiveness will be severely diminished. Therefore, the GIS map must be updated in unison with the tree inventory/assessment spreadsheet. This is especially true for tree removals and to show newly planted trees.

It is important to establish protocols for maintaining the accuracy and completeness of these systems. The Morris Arboretum's team recommends considering the following:

- An individual should be given responsibility as “gatekeeper” to maintain the GIS map and tree inventory and assessment spreadsheets as a separate and distinct responsibility. This individual(s) should be experienced and competent in the use of GIS and Microsoft Excel software.
- Accessioning – Spreadsheet and GIS information must be updated when new trees are installed.
- Spreadsheet and GIS information must be updated when the tree is removed.
- Computer records for removed trees should be kept on a separate worksheet (included with the submitted tree inventory/assessment spreadsheet) for reference and historical purposes.
- Arborist inspections should be periodically scheduled and computer records updated.
- Computer backups should be developed and maintained.

Management and Controls: Management and controls are essential for the GIS map and tree inventory and assessment spreadsheets. Controls limit who has access to information and, most importantly, who has access to change and update information. This is the primary reason for implementing the two ports of access to GIS Collector. The map and spreadsheet for public consumption is a “Read Only” copy on which no data may be altered. The copy designed for the Marquand Park Board and Princeton Municipal personnel may be edited and updated as you may deem necessary. The user name is **Marquandpark** (all one word with a capitol M) and the password is **greattrees** (all one word in lower case). I would urge caution however, as it is easy to make mistakes that may be difficult to correct later on. One suggestion might be to limit the Board copy to only a handful of folk and the municipal arborist, Greg O'Neill. In any case, an original copy on file on the Morris Arboretum shared drive at the University of Pennsylvania.

C. Tree Identification Tagging

One of Marquand Park's unique features are the Identification labels that have been installed in previous years. Most of these are of high quality with small springs placed over the stand off screws to allow for future growth of the tree. Tree Identification tags, such as these are aesthetically pleasing and can be used to hone tree identification skills as well as enhance the visitor experience and foster an appreciation of the collection itself. Many of the rare and exotic species would be very difficult to identify were it not for these tags.

Image #11: Tree identification tag with spring loaded stand off screws

Tree tags, like the type shown in Figure 11, do require maintenance such as periodically backing out the screws so the tag doesn't contact the tree's bark. There are approximately 20-25 ID tags that should be replaced at this time as they have been bent, stolen, vandalized, squirrel chewed or engulfed by the growth of the tree. One tree has been misidentified and in two cases an incorrect scientific name is listed. It would be prudent to make a list of these and replace them as soon as possible.





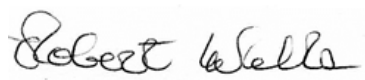
Image # 12 – *Pinus rigida* #538 sign attached to the trunk of *Picea abies* #539

VIII. ASSUMPTIONS AND LIMITING CONDITIONS

1. During the inspections and evaluations, only above ground parts were observed. Decayed roots are difficult to detect and evaluate and were not part of this scope of work.
2. Visual inspection was limited to what could be seen readily from the ground.
3. This report covers trees only within the defined project area. Do not assume that the inspector looked at trees other than those covered in this report.
4. The information in the inventory represents conditions at the time of the inspection. Tree conditions can degrade or change due to progressive decay, storm, and/or mechanical injury.
5. Even healthy sound trees constitute some risk. Most trees, especially older trees, have defects. Not all trees with defects should be considered unreasonable risks. The tree inspections and assessments are designed to identify those trees that have warning signs of structural weakness.
6. There may be inventoried trees with hidden defects that may not be detected.
7. Consider all trees and shrubs as field identified. The Morris Consultants strive for accuracy; however, because of field conditions, unusual species, or the availability of discernible plant characteristics from buds, fruits, flowers, or leaves, some plant species may be misidentified.

IX. CERTIFICATION

I certify that I am a member in good standing of the International Society of Arboriculture and am licensed as a Board Certified Master Arborist (#NJ0142B), New Jersey Certified Tree Expert (# 257), and am a member in good standing of American Society of Consulting Arborists (ASCA). I further certify that I represent the Morris Arboretum of the University of Pennsylvania and that this is my work product based on my professional judgment and current industry standards and understanding. This report, as a whole or in part, is for the sole use of the client, The Marquand Park Foundation, and may not be sold, distributed, or used for other purposes without written permission of the author.



18 June, 2014

Respectfully Submitted:

Robert Wells, ISA BCMA NJ0142B
Associate Director of Urban Forestry

Date



APPENDIX 1: TREE INVENTORY AND ASSESSMENT METHODOLOGY

The tree inventory and assessment data was entered directly into an ESRI Global Information Systems (GIS) computer program called Collector. Information for each of the 713 trees was gathered in the field and entered onto a handheld Apple iPad. Once the data is entered on each tree the physical location of that tree is recorded on the program and depicted with a small pin. Locations may vary up to 5 meters in any direction. Where possible, the pins have been manually shifted to reflect the most accurate location possible. This is possible in the Public Garden Area where individual canopies can be recognized on the map. This is more problematic in the Woods Area where canopies merge and overlap.

This section explains how to read and extract the spreadsheet data, because it was field recorded using codes to make data collection and sorting more efficient. These codes are explained in Appendix 3 and in the spreadsheet file as a worksheet.

Keying Inventory Information to the Tree Location: A unique inventory number was assigned for each inventoried and assessed tree. This information provides the connection between the recorded tree information and its physical location. These inventory numbers are not concurrent with the inventory numbers that were used in the previous tree location maps for Marquand Park.

Tree Assessment Criteria - Major Categories and Overview: The tree's information, recorded in the inventory/assessment spreadsheet, falls into several major categories:

- 1) Identification,
- 2) Size,
- 3) Maintenance actions and tree condition,
- 4) Risk assessment, and
- 5) Landscape usefulness.

The identification information includes the inventory number (**Inv #**) and the tree's **common** and **scientific name**. Size information includes tree trunk circumference for up to five stems (**1,2,3,4,5, CBH**), measuring point on trunk (**meas @**), tree height (**Ht**), and tree canopy spread in one direction (**Sprd**). Life expectancy (**Life Exp**) for the tree is estimated in a range of years (0, <5, 5 to 15, and >15).

Under the "Maintenance Action" part of the inventory form is both recommended maintenance and existing conditions. Pruning and tree removals are major tree maintenance activities. Removals (**Re**) are categorized into *priorities A, B, C, Requires a Hazard Inspection (hi), and Consider Removal (cr)*. General Pruning (**G Pr**) records *priority* and *amount* of pruning recommended, while Specific Pruning (**Sp Pr**) recommendations specific actions to be taken. Girdling Root (**Gd Rt**) details root problems visible at or above ground level. Cabling information (**C**) records the recommended or existing cable and bracing *installations*, Maintenance Score (**Mt Sc**) describes existing problematic conditions.

Form (Fm) is used to describe general aesthetic functions of trees. *Blanks* indicate a generally useful tree; *Excellent* (e) indicates exceptional trees, while *Fair* (f) and *Poor* (p) indicate diminishing quality.

Pests including insects, diseases, and mites are noted when found and recognized by the arborist assessor. Further inspection and evaluation is necessary before deciding whether control is necessary. The **Comments** section of the inventory form contains comments related to other parts of the assessment and unusual conditions or notes.

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APPENDIX 2: SPREADSHEET CODES FOR MARQUAND PARK INVENTORY

<i>Headings:</i>	<i>Explanation and column codes:</i>
Inventory Number =	A unique inventory number was assigned for each inventoried and assessed tree. The numbers were assigned in the order that trees were inventoried.
Common Name =	common name of the tree
Scientific Name =	botanical name of the tree
Meas @ =	if marked, level (in feet) where "CBH" measurements were made; "base" = tree measured where trunk contacts earth
CBH 1-5 =	Circumference breast height in inches (4.5 feet standard measurement from the ground) multiple entries indicate the number of trunks or stems
Ht =	Tree canopy spread, i.e. - the diameter in feet of the branch spread measured in 1 dimension
Space=	Tree height infect (estimated)
Life Exp =	Planting location type
Likelihood Failure=	Life expectancy in one of four ranges, in years (0 [dead or nearly so], <5, 5-15, >15)
Likelihood of Impact Target=	the chance of a tree failure occurring (Improbable, Possible, Probable, Imminent)
Consequences=	the chance of a tree impacting a specific target (Very Low, Low, Medium, High)
Risk Assessment=	based on the value of the target and the harm that may be done to it (Negligible, Minor, Significant, Severe)
Re =	based on combination of failure, impact target, and consequences (Low, Moderate, High, Extreme)
G Pr =	Recommended for removal (Priority a, b, or c; cr = consider removal; x= already removed; hi = hazard inspection recommended)
Sp Pr =	General Pruning Recommendations - General (Priority A, B, or C; Amount 1, 2, or 3. Note: "A" is highest priority pruning, "1" = greatest amount of pruning)
	Specific Pruning recommendations
	bbr = broken branch
	cd = remove codominant limb
	cp = clearance pruning
	cl = correct leader
	cr lb = removed cracked limb
	cr br = removed cracked branch
	crd = crown reduction
	cw = prune to clear overhead wire
	d,dw = deadwood pruning
	e, elev = elevate limbs
	ewr = end weight reduction
	h = hanging detached branch
	haz b = hazardous branch
	haz d = hazardous deadwood
	haz h = hazardous hanging detached branch
	ldr = leader
	LL= remove long limb or leader
	pa= limit paving
	re ldr = remove leader
	re lw lmb = remove lower limb
	re lmb = remove limb
	rlb = remove limb
	s = remove stub
	sep = separate
	shp = shape
	sk = prune suckers
	sm d = remove small deadwood
	smL = small leader
	str, struc = structural pruning necessary
	sub = subordinate prune
	sub ldr = subordinate leader
	t = thin branch density
	trash = trash in tree (usually plastic bags)
	v = remove vines
	vpr = vista pruning or view pruning
	ws = water sprouts
	xbr = remove crossing branches

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Headings:	Explanation and column codes:
G Rt =	Girdling Root (re = remove girdling root or roots; x = existing girdling root; poss = possible girdling root.
C =	Cabling and Bracing to reinforce weaknesses: (1st letter is Priority [a, b, or c] # indicates the number of cables required; x# = the number of existing cables in the tree; u# indicates the number of cables requiring upgrading, braces=threaded rod)
Mt Sc =	Maintenance Score
	c = pruning cut made too close
	cmp = compaction
	dp = tree is planted too deep
	fc = flush cuts present
	gw = guy wire(s)
	hbdam = herbicide damage
	j root = tree probably "j" rooted
	lion t = lion-tailed pruning
	mr = mower root damage
	mt = mower or string trimmer trunk damage
	m = mulched too deep;
	ndm = needs mulch
	op = overpruned
	ow = overhead wires present
	pp = poor pruning
	rex = root collar excavation recommended
	s =stubs present
	sb = synthetic burlap
	sr = synthetic rope
	tipping = branch tips improperly pruned
	trdam = trunk damage
	w = needs water
	wbask = wire basket not removed/handles exposed
Fm =	Tree form (Blank = acceptable; E = excellent form; F = fair; or P = poor)
Pests =	Tree diseases or insects noted at time of survey
	anth = anthracnose
	arm = armillaria
	as = apple scab
	b = borer
	bc = bark canker
	bls = bacterial leaf scorch
	ca = carpenter ants
	car = Cedar Apple Rust
	csga = Cooley spruce gall aphid
	dip = diplodia
	fb = fireblight
	fc = fungal conks
	g = gall
	hlm = Holly Leaf Miner
	jb = Japanese beetle
	l =lacebug
	lfbl = leaf blight
	mi = mites
	phy = Phytophthora
	pi = Poison Ivy
	sc = scale
	skl = skeletonizers
	smd = sooty mold
	sskr = sapsuckers
	tent cat = tent caterpillars
	twig g = twig gall
	wpa = white pine aphid
	wps = white pine scale
	wsp = wasps

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Spreadsheet Codes for Marquand Park	
Headings:	Explanation and column codes:
Comments =	Comments and specific directions applying to other columns, hazard inspections, or miscellaneous notes
	bad = basal area decay
	bk = bark
	br = branch
	ca, cav = cavity
	cd, codom = codominant stem
	cf = compressed fork
	cr = crack running longitudinally
	dam = damage
	F500, F300 = Resistograph model to use in hazard inspections, includes number or drilling sites recommended
	fcr = frost crack
	haz = hazard
	lb = limb
	lg = large
	pr = prune
	rci = root collar investigation recommended
	re = remove
	sm = small
	tr = trunk
	tw = twig



Image # 13 – *Cornus kousa* # 577 – Magnificent tree

APPENDIX 3: MARQUAND PARK TREE INVENTORY – CONSOLIDATED VERSION – JUNE 15, 2014

ID #	Common Name	Scientific Name	CBH_1	Spread	Height	LifeExp	Risk	Re	G_Pr	Sp_Pr	Comments
1	shellbark hickory	<i>Carya laciniosa</i>	90	90	>15	Low					Over paved pathway. Good condition.
2	tulip poplar	<i>Liriodendron tulipifera</i>	124		110	>15	Low				
3	tulip poplar	<i>Liriodendron tulipifera</i>	125		110	>15	Low				
4	sugar maple	<i>Acer saccharum</i>	55	50	>15	Low				d, h	Hanger over walkway
5	American linden	<i>Tilia americana</i>	48	50	>15	Low		B3		d	
6	American beech	<i>Fagus grandifolia</i>	90	65	>15	Low		B3		d,h	
7	shagbark hickory	<i>Carya ovata</i>	19	23	5~15			C2		v	
8	tulip poplar	<i>Liriodendron tulipifera</i>	112	110	>15	Low		B3		d	
9	tulip poplar	<i>Liriodendron tulipifera</i>	140	100	>15	Low		B2		d	Lightning protection
10	white oak	<i>Quercus alba</i>	76	65	>15	Low		B2		d	Upper crown lean
11	American linden	<i>Tilia americana</i>	23	25	>15						
12	Norway maple	<i>Acer platanoides</i>	42	40	>15						
13	American beech	<i>Fagus grandifolia</i>	101	70	>15	Low		C3		d	
14	American linden	<i>Tilia americana</i>	31	30	>15	Low					Remove 1 lead leaning over path
15	American linden	<i>Tilia americana</i>	23	20	5~15	Low		C3		d, xbr	
16	sugar maple	<i>Acer saccharum</i>	52	40	>15	Low		C2		d, h	
17	red oak	<i>Quercus rubra</i>	133	110	>15	Low		B3		d	
18	Norway maple	<i>Acer platanoides</i>	31	30	>15						
19	tulip poplar	<i>Liriodendron tulipifera</i>	133	115	>15	Low					
20	Norway maple	<i>Acer platanoides</i>	23	20	>15						
21	Japanese maple	<i>Acer palmatum</i>	18	23	>15						
22	tulip poplar	<i>Liriodendron tulipifera</i>	146	115	>15	Low		B2		D	
23	Carolina silverbell	<i>Halesia carolina</i>	31	25	>15						
24	American holly	<i>Ilex opaca</i>	21	18	>15						
25	white ash	<i>Fraxinus americana</i>	33	30	0	Low					
26	Norway maple	<i>Acer platanoides</i>	23	25							
27	black cherry	<i>Prunus serotina</i>	34	30	>15						
28	black gum	<i>Nyssa sylvatica</i>	73	40	>15						
29	red oak	<i>Quercus rubra</i>	75	25	0						
30	tulip poplar	<i>Liriodendron tulipifera</i>	141	110	>15						
31	American linden	<i>Tilia americana</i>	18	20	5~15						
32	tree of heaven	<i>Ailanthus altissima</i>	20	25	>15						
33	American linden	<i>Tilia americana</i>	140	110	>15	Low		B2		D	
34	American linden	<i>Tilia americana</i>	21	15	5~15						Storm damage
35	American linden	<i>Tilia americana</i>	20	22	>15						
36	American linden	<i>Tilia americana</i>	40	35	>15						
37	American linden	<i>Tilia americana</i>	34	30	>15	Low		C3		d,h	Sm hanger over. Path
38	American linden	<i>Tilia americana</i>	34	33	>15						
39	Norway maple	<i>Acer platanoides</i>	17	20	>15						Elevate over path
40	tulip poplar	<i>Liriodendron tulipifera</i>	116	100	>15	Low		B3		d, h	
41	tulip poplar	<i>Liriodendron tulipifera</i>	104	90	>15						
42	black cherry	<i>Prunus serotina</i>	20	25	>15						
43	amur cork tree	<i>Phellodendron amurense</i>	30	28	>15						
44	American linden	<i>Tilia americana</i>	30	25	0			C			Leave for habitat
45	amur cork tree	<i>Phellodendron amurense</i>	29	20	5~15						
46	Japanese maple	<i>Acer palmatum</i>	17	23	>15						
47	American beech	<i>Fagus grandifolia</i>	27	30	>15				C3	h	
48	tulip poplar	<i>Liriodendron tulipifera</i>	145	115	>15	Low					
49	tulip poplar	<i>Liriodendron tulipifera</i>	116	110	>15	Low					
50	Norway maple	<i>Acer platanoides</i>	21	25	>15						

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51	American linden	<i>Tilia americana</i>	28	23	>15	Low	C3	e	Leans over path, elevate slightly
52	Norway maple	<i>Acer platanoides</i>	28	25	>15				
53	white oak	<i>Quercus alba</i>	37	27	5~15				
54	American linden	<i>Tilia americana</i>	22	25	5~15				
55	American linden	<i>Tilia americana</i>	19	18	>15				
56	black cherry	<i>Prunus serotina</i>	46	40	>15				
57	American linden	<i>Tilia americana</i>	35	35	>15				
58	tulip poplar	<i>Liriodendron tulipifera</i>	120	55	<5				Armillaria, lightning scar, leave for wildlife
59	Norway maple	<i>Acer platanoides</i>	24	28	>15				
60	American beech	<i>Fagus grandifolia</i>	56	45	>15				
61	tulip poplar	<i>Liriodendron tulipifera</i>	147	100	>15	Low	B3	d	
62	tulip poplar	<i>Liriodendron tulipifera</i>	137	100	>15		C2	d,v	
63	Japanese maple	<i>Acer palmatum</i>	20	20	>15				
64	shellbark hickory	<i>Carya laciniosa</i>	98	90	>15	Low	B2	d	Hangs over path
65	Japanese maple	<i>Acer palmatum</i>	24	22	>15				
66	Japanese maple	<i>Acer palmatum</i>	46	30	>15				
67	American persimmon	<i>Diospyros virginiana</i>	64	40	>15	Low			Leans over lawn area.
68	American persimmon	<i>Diospyros virginiana</i>	60	40	>15				
69	American linden	<i>Tilia americana</i>	38	30	>15				
70	tulip poplar	<i>Liriodendron tulipifera</i>	158	110	<5				Threat to other trees, long spiral lightning scar.
71	Carolina silverbell	<i>Halesia carolina</i>	28	27	>15				
72	amur cork tree	<i>Phellodendron amurense</i>	24	30	<5				Long scar on tr
73	Carolina silverbell	<i>Halesia carolina</i>	20	28	>15				
74	black cherry	<i>Prunus serotina</i>	32	40	>15				
75	Norway maple	<i>Acer platanoides</i>	36	40	>15				
76	sugar maple	<i>Acer saccharum</i>	20	40	>15				
77	Norway maple	<i>Acer platanoides</i>	17	25	>15				
78	Norway maple	<i>Acer platanoides</i>	32	35	>15				
79	Norway maple	<i>Acer platanoides</i>	34	33	>15				
80	tulip poplar	<i>Liriodendron tulipifera</i>	125	20	0				Wildlife tree
81	tulip poplar	<i>Liriodendron tulipifera</i>	33	30	5~15				
82	black cherry	<i>Prunus serotina</i>	41	40	>15				
83	tulip poplar	<i>Liriodendron tulipifera</i>	59	50	>15	Low	C3		
84	Norway maple	<i>Acer platanoides</i>	50	45	>15				
85	black cherry	<i>Prunus serotina</i>	37	40	>15				
86	tulip poplar	<i>Liriodendron tulipifera</i>	43	50	>15		C3		
87	Japanese maple	<i>Acer palmatum</i>	25	30	>15				
88	black cherry	<i>Prunus serotina</i>	43	40	>15				
89	American linden	<i>Tilia americana</i>	34	35	5~15				Sm cav at 6'
90	Norway maple	<i>Acer platanoides</i>	22	35	>15				
91	slippery elm	<i>Ulmus rubra</i>	27	38	5~15				
92	slippery elm	<i>Ulmus rubra</i>	45	50	>15				
93	Japanese maple	<i>Acer palmatum</i>	18	23	>15				
94	common horsechestnut	<i>Aesculus hippocastanum</i>	27	28	>15				
95	Japanese maple	<i>Acer palmatum</i>	18	25	>15				
96	black cherry	<i>Prunus serotina</i>	32	40	>15				
97	tulip poplar	<i>Liriodendron tulipifera</i>	61	55	>15				
98	sweet cherry	<i>Prunus avium</i>	21	35	5~15				Looks thin
99	English yew	<i>Taxus baccata</i>	24	20	>15				
100	eastern hemlock	<i>Tsuga canadensis</i>	27	35	>15				
101	flowering dogwood	<i>Cornus florida</i>	27	25	5~15	Low	C3	d, h, over pathway	Exudation from scar on tr
102	eastern hemlock	<i>Tsuga canadensis</i>	31	35	>15				
103	eastern hemlock	<i>Tsuga canadensis</i>	27	30	>15		C3	ewr, clip ends over path	

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104	eastern hemlock	<i>Tsuga canadensis</i>	23	25	5~15				
105	eastern hemlock	<i>Tsuga canadensis</i>	24	33	>15				
106	eastern hemlock	<i>Tsuga canadensis</i>	20	22	5~15				
107	tulip poplar	<i>Liriodendron tulipifera</i>	162	110	>15	Low	C2	d	
108	Norway maple	<i>Acer platanoides</i>	30	35	>15				
109	amur cork tree	<i>Phellodendron amurense</i>	44	35	>15	Low	C3	D	
110	amur cork tree	<i>Phellodendron amurense</i>	29	32	>15		C3	D	
111	amur cork tree	<i>Phellodendron amurense</i>	81	45	>15	Low	B2	v,d	
112	cucumber tree	<i>Magnolia acuminata</i>	170	90	>15	Low	B2	D	
113	Japanese maple	<i>Acer palmatum</i>	32	32	>15				
114	shagbark hickory	<i>Carya ovata</i>	17	22	>15				
115	amur cork tree	<i>Phellodendron amurense</i>	35	25	5~15	Low	C3	d	
116	amur cork tree	<i>Phellodendron amurense</i>	28	30	>15	Low	C3	D	
117	amur cork tree	<i>Phellodendron amurense</i>	31	23	5~15	Low	C3	d	
118	amur cork tree	<i>Phellodendron amurense</i>	21	20	>15	Low	C3	d	
119	amur cork tree	<i>Phellodendron amurense</i>	76	75	>15	Low	B2	D	
120	black walnut	<i>Juglans nigra</i>	77	35	>15	Low	B3	d	
121	Japanese snowbell	<i>Styrax japonica</i>	22	20	>15		C3	d, h, no threat	
122	eastern hemlock	<i>Tsuga canadensis</i>	133	70	>15	Low	C3	d, h	
123	amur cork tree	<i>Phellodendron amurense</i>	45	30	>15	Low	C3	d	Right on property line
124	amur cork tree	<i>Phellodendron amurense</i>	78 @ 3'	42	>15	Low	B2	d, h	
125	English yew	<i>Taxus baccata adpressa</i>	28 @ 1'	16	>15				
126	English yew	<i>Taxus baccata adpressa</i>	25 @ 1'	16	<5				One lead dead
127	Sawara false cypress	<i>Chamaecyparis pisifera</i>	84 @ 3'	35	5~15	Moderate	B2	cr	Sig cav at 7', 2 beam cracks
128	English yew	<i>Taxus baccata adpressa</i>	26 @ 1'	20	>15		C3	d	
129	Sawara false cypress	<i>Chamaecyparis pisifera</i>	52	40	>15				Large basal cavity
130	English yew	<i>Taxus baccata adpressa</i>	34	35	>15				
131	eastern hemlock	<i>Tsuga canadensis</i>	24 @ 2'	20	5~15		C3	d	
132	eastern hemlock	<i>Tsuga canadensis</i>	32	38	>15		C3	d	
133	Fraser fir	<i>Abies faseri</i>	21	22	>15		C3	d, v	
134	sweet cherry	<i>Prunus avium</i>	57	40	>15	Low	C2	d, h	
135	Japanese maple	<i>Acer palmatum</i>	26	30	>15				
136	Fraser fir	<i>Abies faseri</i>	15	22	>15		C3	d	
137	Japanese maple	<i>Acer palmatum</i>	38 @ 3'	35	>15		C3	d	
138	Fraser fir	<i>Abies faseri</i>	17	20	>15		C3	d	
139	Fraser fir	<i>Abies faseri</i>	22	22	0	Low	C		
140	Fraser fir	<i>Abies faseri</i>	22	25	>15		C3	d, v	
141	Fraser fir	<i>Abies faseri</i>	17	23	>15				
142	Fraser fir	<i>Abies faseri</i>	24	27	>15				
143	Japanese snowbell	<i>Styrax japonica</i>	16	20	>15		C3	d	
144	eastern hemlock	<i>Tsuga canadensis</i>	82	65	>15		C1	d	
145	Fraser fir	<i>Abies faseri</i>	14	14	5~15		C3	d	
146	amur cork tree	<i>Phellodendron amurense</i>	43	35	>15				
147	Fraser fir	<i>Abies faseri</i>	25	30	>15				
148	Fraser fir	<i>Abies faseri</i>	18	22	<5				Shaded out
149	amur cork tree	<i>Phellodendron amurense</i>	44	25	>15	Low	C3	d, h, ewr	Branch over neighbors shed
150	tulip poplar	<i>Liriodendron tulipifera</i>	55	50	>15	Low			
151	Japanese maple	<i>Acer palmatum</i>	18	25	>15				
152	white ash	<i>Fraxinus americana</i>	92	60	>15	Moderate	B2	d, h, elev	Leans over private residence
153	Japanese maple	<i>Acer palmatum</i>	21	25	>15				
154	Japanese maple	<i>Acer palmatum</i>	13	20	>15				
155	Japanese maple	<i>Acer palmatum</i>	17	25	>15				
156	Japanese maple	<i>Acer palmatum</i>	14	22	>15				

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157	black locust	<i>Robinia pseudoacacia</i>	31		40	>15	Low	Cr	C3	d	Slight lean towards private residence
158	black locust	<i>Robinia pseudoacacia</i>	15		35	5~15	Low		C3	d	
159	sweet cherry	<i>Prunus avium</i>	25		30	<5	Low		C3	d	Cracks on stem, dieback
160	amur cork tree	<i>Phellodendron amurense</i>	38		40	>15	Low		C3	d	
161	Japanese maple	<i>Acer palmatum</i>	27		30	5~15	Low		C3	d	
162	Japanese maple	<i>Acer palmatum</i>	15		22	5~15					
163	Norway maple	<i>Acer platanoides</i>	56		50	>15			C2	d	
164	Japanese maple	<i>Acer palmatum</i>	21		27	>15					
165	Japanese maple	<i>Acer palmatum</i>	22		25	>15					
166	black cherry	<i>Prunus serotina</i>	46		50	5~15	Low		C3	d, bbr	
167	Norway maple	<i>Acer platanoides</i>	40		30	>15	Low		C2	d	Codominant
168	amur cork tree	<i>Phellodendron amurense</i>	30		30	5~15			C3	d	
169	Japanese maple	<i>Acer palmatum</i>	17		22	>15					
170	amur cork tree	<i>Phellodendron amurense</i>	41		35	5~15			C2	d	
171	Japanese maple	<i>Acer palmatum</i>	15		20	5~15					Basal cavity
172	Japanese maple	<i>Acer palmatum</i>	18		22	5~15			C3	d	
173	black cherry	<i>Prunus serotina</i>	51		50	>15			C3		
174	Norway maple	<i>Acer platanoides</i>	38		40	>15	Low		C3	d, h	
175	tulip poplar	<i>Liriodendron tulipifera</i>	40		50	>15	Low		C3	d	Over pathway
176	tulip poplar	<i>Liriodendron tulipifera</i>	41		45	>15	Low		C3	d	
177	red bud	<i>Cercis canadensis</i>	24		25	<5			C3	d	
178	largeleaf Japanese holly	<i>Ilex crenata</i>	21		14	>15					
179	red oak	<i>Quercus rubra</i>	131		90	>15	Low		B2	d, h	
180	amur cork tree	<i>Phellodendron amurense</i>	16		14	>15					
181	tulip poplar	<i>Liriodendron tulipifera</i>	22		22	>15	Low				
182	sugar maple	<i>Acer saccharum</i>	24		25	>15	Low		C3	d	
183	sugar maple	<i>Acer saccharum</i>	24		28	>15					
184	sugar maple	<i>Acer saccharum</i>	18		25	>15	Low				Crack in upper crown
185	sugar maple	<i>Acer saccharum</i>	45		45	>15	Low		B3	d	
186	sugar maple	<i>Acer saccharum</i>	33		30	5~15	Low				Rip out in upper crown
187	Japanese maple	<i>Acer palmatum</i>	15		15	5~15			C3		Top ripped
188	American beech	<i>Fagus grandifolia</i>	79		65	5~15	Low		B2	d, bbr, h	Storm damage
189	tulip poplar	<i>Liriodendron tulipifera</i>	169		105	>15	Low	Hi	B1		Hazard inspection suggested, basal cavities
190	white ash	<i>Fraxinus americana</i>	127		65	5~15	Moderate				Basal cav, tree hangs over wires, topped by utilit
191	sugar maple	<i>Acer saccharum</i>	39		45	5~15	Low		C3	d, bbr	Growing into # 190
192	sugar maple	<i>Acer saccharum</i>	38		40	5~15	Low		C2	d, v	Tree hangs over utility wires
193	sugar maple	<i>Acer saccharum</i>	43		45	>15	Low		C2	d, v	
194	sugar maple	<i>Acer saccharum</i>	19		25	<5	Low	Cr			
195	sugar maple	<i>Acer saccharum</i>	52		45	>15	Low		C2	d, v	Over wires
196	sugar maple	<i>Acer saccharum</i>	40		50	>15	Low		C3	d, v	Over wires
197	sugar maple	<i>Acer saccharum</i>	42		55	>15	Low		C3	d, h	Over wires, tr wound
198	sugar maple	<i>Acer saccharum</i>	56		60	>15	Low		C3	d	
199	sugar maple	<i>Acer saccharum</i>	26		35	>15					
200	tulip poplar	<i>Liriodendron tulipifera</i>	131		90	>15	Low		B2	d, h	Over wires
201	sugar maple	<i>Acer saccharum</i>	21		30	>15					
202	sugar maple	<i>Acer saccharum</i>	18		33	5~15	Low				Cavity at 12'
203	American beech	<i>Fagus grandifolia</i>	100		95	>15	Low		B1	Mulch, d, h	
204	Japanese maple	<i>Acer palmatum</i>	20		22	>15			C3	d, bbr	
205	Norway maple	<i>Acer platanoides</i>	17		22	>15					
206	sugar maple	<i>Acer saccharum</i>	33		40	>15					
207	black oak	<i>Quercus velutina</i>	109		95	>15	Low				Significant lean
208	sugar maple	<i>Acer saccharum</i>	38		40	>15					
209	white oak	<i>Quercus alba</i>	143		100	>15	Low		B2	d	

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263	sugar maple	<i>Acer saccharum</i>	22	30	5~15					
264	tulip poplar	<i>Liriodendron tulipifera</i>	117	110	>15	Low	C2	d		
265	sugar maple	<i>Acer saccharum</i>	46	45	>15					
266	sugar maple	<i>Acer saccharum</i>	44	45	>15	Low	C2	d		
267	white ash	<i>Fraxinus americana</i>	45	48	>15		C2	d		
268	sugar maple	<i>Acer saccharum</i>	45	50	>15	Low	B2	d		
269	sugar maple	<i>Acer saccharum</i>	22	38	>15					
270	black cherry	<i>Prunus serotina</i>	14	25	0	Low	B			
271	Norway maple	<i>Acer platanoides</i>	24	40	>15					
272	sugar maple	<i>Acer saccharum</i>	20	30	>15	Low	C3	d		
273	black cherry	<i>Prunus serotina</i>	38	40	>15	Low	C3	d		
274	Norway maple	<i>Acer platanoides</i>	27	30	0	Low	B			
275	sugar maple	<i>Acer saccharum</i>	20	33	>15					
276	sugar maple	<i>Acer saccharum</i>	48	55	>15	Low	C2	d, h		
277	sugar maple	<i>Acer saccharum</i>	59	60	>15	Low	C1	d, h		
278	sugar maple	<i>Acer saccharum</i>	46	45	>15					
279	sugar maple	<i>Acer saccharum</i>	35	35	5~15					Top broken out
280	sugar maple	<i>Acer saccharum</i>	40	40	>15					
281	sugar maple	<i>Acer saccharum</i>	35	40	>15					
282	sugar maple	<i>Acer saccharum</i>	18	25	>15					
283	sugar maple	<i>Acer saccharum</i>	25	40	>15					
284	sugar maple	<i>Acer saccharum</i>	32	40	>15					
285	black oak	<i>Quercus velutina</i>	119	100	>15	Moderate	B1	d, ewr, h		Leans over utility and rd
286	sugar maple	<i>Acer saccharum</i>	26	30	5~15	Low				
287	sugar maple	<i>Acer saccharum</i>	27	40	>15	Low	C3	d		
288	sugar maple	<i>Acer saccharum</i>	30	35	>15	Low	C3	d, h		
289	tulip poplar	<i>Liriodendron tulipifera</i>	151	105	>15	Moderate	A2	d, h, ewr		
290	sugar maple	<i>Acer saccharum</i>	27	35	5~15	Low	C3	d		
291	sugar maple	<i>Acer saccharum</i>	27	40	>15	Low	C3	d		
292	sugar maple	<i>Acer saccharum</i>	30	40	>15		C3	d		
293	sugar maple	<i>Acer saccharum</i>	33	45	>15		C3	d, h		
294	sugar maple	<i>Acer saccharum</i>	24	30	5~15		C2	d, bbr		Top broken
295	sugar maple	<i>Acer saccharum</i>	33	38	>15					
296	tulip poplar	<i>Liriodendron tulipifera</i>	150	110	>15		C1	d		
297	sugar maple	<i>Acer saccharum</i>	46	40	>15					
298	tulip poplar	<i>Liriodendron tulipifera</i>	126	100	>15		C3	d		
299	sugar maple	<i>Acer saccharum</i>	21	35	>15					
300	sugar maple	<i>Acer saccharum</i>	48	50	>15	Low	B3	d, bbr		
301	American linden	<i>Tilia americana</i>	79	60	>15	Low	B2	d, h, v		Hangers over pathway
302	sugar maple	<i>Acer saccharum</i>	31	45	>15	Low	C3	d, h		
303	sugar maple	<i>Acer saccharum</i>	24	35	>15					
304	sugar maple	<i>Acer saccharum</i>	21	24	>15	Low	C3	d		
305	tulip poplar	<i>Liriodendron tulipifera</i>	147	110	>15	Low	B2	d		
306	red oak	<i>Quercus rubra</i>	86	90	>15					
307	Norway maple	<i>Acer platanoides</i>	65	85	>15					
308	Norway maple	<i>Acer platanoides</i>	15	25	>15					
309	sugar maple	<i>Acer saccharum</i>	47	45	>15					
310	sugar maple	<i>Acer saccharum</i>	47	50	>15					
311	black oak	<i>Quercus velutina</i>	107	105	>15					
312	sugar maple	<i>Acer saccharum</i>	36	40	>15					
313	sugar maple	<i>Acer saccharum</i>	27	35	>15					
314	sugar maple	<i>Acer saccharum</i>	34	40	<5	Low	C	C3	d	Beam split
315	sugar maple	<i>Acer saccharum</i>	20	33	5~15	Low	C3	v		

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316	sugar maple	<i>Acer saccharum</i>	26	40	>15	Low		C3	d	
317	sugar maple	<i>Acer saccharum</i>	19	30	<5	Low	C			
318	sugar maple	<i>Acer saccharum</i>	40	43	>15	Low		C3	d	
319	sugar maple	<i>Acer saccharum</i>	27	35	>15	Low		C3	d	
320	black oak	<i>Quercus velutina</i>	92	65	0	Low	B			
321	sugar maple	<i>Acer saccharum</i>	20	33	>15					
322	sugar maple	<i>Acer saccharum</i>	27	30	>15					
323	tulip poplar	<i>Liriodendron tulipifera</i>	143	95	>15	Low				
324	red oak	<i>Quercus rubra</i>	125	50	0	High	A			
325	sugar maple	<i>Acer saccharum</i>	54	50	>15	Low		B3	D	
326	sugar maple	<i>Acer saccharum</i>	35	35	5~15	Low		C3	D, h	Cav at base
327	tulip poplar	<i>Liriodendron tulipifera</i>	143	110	>15	Low		B2	D	Hangs over util. And mercer rd
328	American beech	<i>Fagus grandifolia</i>	50	50	>15	Low		B2	D, h	
329	sugar maple	<i>Acer saccharum</i>	42	45	>15	Low		B3	D, h	
330	American beech	<i>Fagus grandifolia</i>	38	35	5~15	Low		B2	D	Dead limb over util.
331	tulip poplar	<i>Liriodendron tulipifera</i>	151	105	>15	Moderate		B2	D	Hangs over mercer rd and util.
332	sugar maple	<i>Acer saccharum</i>	28	35	>15	Low		C3	D, h	Over sidewalk
333	American beech	<i>Fagus grandifolia</i>	17	22	5~15	Low		C3	D, h	
334	American beech	<i>Fagus grandifolia</i>	96	90	>15	Moderate		B2	D	Over util.
335	American beech	<i>Fagus grandifolia</i>	50	50	>15	Low		C2	D, h	
336	sugar maple	<i>Acer saccharum</i>	28	35	>15			C3	D	
337	sugar maple	<i>Acer saccharum</i>	33	35	>15					
338	red oak	<i>Quercus rubra</i>	166	100	>15	Low				Recent storm damage, 40' from path
339	sugar maple	<i>Acer saccharum</i>	43	40	>15					Storm damage
340	white oak	<i>Quercus alba</i>	71	60	>15					
341	sugar maple	<i>Acer saccharum</i>	55	50	>15					
342	sugar maple	<i>Acer saccharum</i>	54	50	>15	Low		C3	D	
343	sugar maple	<i>Acer saccharum</i>	35	45	>15					
344	American beech	<i>Fagus grandifolia</i>	86	70	>15	Low		B2	D, h	
345	American beech	<i>Fagus grandifolia</i>	32	30	5~15					
346	tulip poplar	<i>Liriodendron tulipifera</i>	150	100	>15	Low				Big rip out in upper crown.
347	sugar maple	<i>Acer saccharum</i>	26	33	>15	Low		C3	D, h	
348	tulip poplar	<i>Liriodendron tulipifera</i>	39	40	>15					
349	sugar maple	<i>Acer saccharum</i>	39	40	>15					
350	sugar maple	<i>Acer saccharum</i>	19	25	>15					
351	black oak	<i>Quercus velutina</i>	84	65	5~15					Significant lean
352	sugar maple	<i>Acer saccharum</i>	34	35	>15					
353	sugar maple	<i>Acer saccharum</i>	24	35	>15					
354	sugar maple	<i>Acer saccharum</i>	24	25	0		C			Woodpecker nest, leave for habitat.
355	sugar maple	<i>Acer saccharum</i>	52	60	>15			C2	D, h	Recent storm damage
356	sugar maple	<i>Acer saccharum</i>	36	40	>15					
357	sugar maple	<i>Acer saccharum</i>	35	35	5~15					
358	sugar maple	<i>Acer saccharum</i>	31	35	>15					
359	sugar maple	<i>Acer saccharum</i>	41	35	>15			C2	D, h	
360	tulip poplar	<i>Liriodendron tulipifera</i>	70	60	>15					
361	sugar maple	<i>Acer saccharum</i>	29	35	5~15	Low		C3	D, h	Crown damaged by failure of adj tree.
362	sugar maple	<i>Acer saccharum</i>	40	30	>15			C3	D, h	
363	sugar maple	<i>Acer saccharum</i>	55	40	5~15	Low		B2	D, h	Storm damage cr leans over bench.
364	white ash	<i>Fraxinus americana</i>	48	40	5~15					Missshapen cr.
365	sugar maple	<i>Acer saccharum</i>	34	33	5~15	Low		C3	D, h	
366	black oak	<i>Quercus velutina</i>	137	105	>15	Low		B1	D	Deadwood over pathway.
367	sweetgum	<i>Liquidambar styraciflua</i>	52	40	>15	Low		C3	D, v	
368	shagbark hickory	<i>Carya ovata</i>	24	30	>15	Low		C3	D, h	

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369	tulip poplar	<i>Liriodendron tulipifera</i>	144	110	>15	Low	B2	D	Adj to pathway.
370	tulip poplar	<i>Liriodendron tulipifera</i>	113	110	>15	Low	B2	D	
371	tulip poplar	<i>Liriodendron tulipifera</i>	121	110	>15	Low	B3	D	
372	eastern hemlock	<i>Tsuga canadensis</i>	88	65	>15	Low	B2	D, bbr	
373	Norway maple	<i>Acer platanoides</i>	61	55	>15	Low	C3	D, bbr	Cracked lower limb.
374	Norway maple	<i>Acer platanoides</i>	51	55	>15				
375	Norway maple	<i>Acer platanoides</i>	60	55	>15	Low	C3	D	
376	tulip poplar	<i>Liriodendron tulipifera</i>	156	40	0	High	A		Next to tool shed. Shoe string root rot.
377	Japanese maple	<i>Acer palmatum</i>	26	25	>15		C3	D	
378	Norway maple	<i>Acer platanoides</i>	22	30	>15				
379	Norway maple	<i>Acer platanoides</i>	45	45	>15				
380	black locust	<i>Robinia pseudoacacia</i>	87	55	<5	Low	Cr		Significant lean, cracks, long wd on tension side.
381	Norway maple	<i>Acer platanoides</i>	29	40	>15				
382	Norway maple	<i>Acer platanoides</i>	39	40	>15	Low	C3	D	
383	Japanese maple	<i>Acer palmatum</i>	24	20	>15	Low	C3	D, e	
384	Norway maple	<i>Acer platanoides</i>	22	24	>15	Low	C3	D	
385	Norway maple	<i>Acer platanoides</i>	53	40	>15	Low	C3	D, v	
386	black locust	<i>Robinia pseudoacacia</i>	83	70	>15	Low	B2	D, h	
387	Norway maple	<i>Acer platanoides</i>	31	35	>15				
388	Norway maple	<i>Acer platanoides</i>	40	40	>15	Low	C3	D, v	
389	Norway maple	<i>Acer platanoides</i>	32	32	>15	Low	C3	D, v	
390	Norway maple	<i>Acer platanoides</i>	21	22	5~15	Low	C3	D, v	
391	Norway maple	<i>Acer platanoides</i>	32	30	>15	Low	C3	D, v	
392	Norway maple	<i>Acer platanoides</i>	70	40	>15	Low	C2	D, e, h	
393	Norway maple	<i>Acer platanoides</i>	42	40	>15	Low	C3	D, bbr	
394	Norway maple	<i>Acer platanoides</i>	76	55	>15	Low	B2	D, bbr, h	Split limb over pathway and tool house.
395	sugar maple	<i>Acer saccharum</i>	63	50	5~15	Low	B2	D, v	Deadwood over pathway.
396	red oak	<i>Quercus rubra</i>	36	40	>15	Low	C3	D	Leans over pathway at mercer rd entrance.
397	black cherry	<i>Prunus serotina</i>	32	35	5~15	Low	C3	D, v	
398	white oak	<i>Quercus alba</i>	127	75	>15	Low	B2	D	
399	elm	<i>Ulmus</i>	29	25	5~15		C2	D, bbr	
400	red maple	<i>Acer rubrum</i>	28	30	5~15	Low	C3	D	Storm damaged top.
401	American holly	<i>Ilex opaca</i>	27	20	>15				
402	sugar maple	<i>Acer saccharum</i>	53	45	5~15	Low	B2	D	Leans over util. and street.
403	sugar maple	<i>Acer saccharum</i>	59	55	>15	Low	C3	D	
404	sugar maple	<i>Acer saccharum</i>	41	30	5~15	Low	C3	D	
405	American holly	<i>Ilex opaca</i>	21	22	>15				
406	red maple	<i>Acer rubrum</i>	20	30	>15				
407	London planetree	<i>Platanus x acerifolia</i>	77	80	>15				
408	silver maple	<i>Acer saccharinum</i>	103	65	>15	Low	C2	D, bbr	
409	London planetree	<i>Platanus x acerifolia</i>	45	40	>15				
410	Norway maple	<i>Acer platanoides</i>	19	30	>15				
411	red maple	<i>Acer rubrum</i>	113	70	5~15	Low	B1	D, bbr	Lots of storm damage in crown.
412	white ash	<i>Fraxinus americana</i>	98	85	>15	Low	B2	D, h	
413	red maple	<i>Acer rubrum</i>	37	28	5~15		C2	D, bbr	Storm damage
414	pin oak	<i>Quercus palustris</i>	21	23	5~15		C3	D, bbr	
415	red oak	<i>Quercus rubra</i>	32	40	>15	Low	C3	D	
416	white ash	<i>Fraxinus americana</i>	60	70	>15	Low	B2	D	
417	sugar maple	<i>Acer saccharum</i>	40	40	>15		C3	D	
418	sugar maple	<i>Acer saccharum</i>	47	45	>15	Low	C3	D, bbr	
419	red maple	<i>Acer rubrum</i>	61	60	>15	Low	C2	D, xbr	
420	white ash	<i>Fraxinus americana</i>	64	60	>15				
421	white ash	<i>Fraxinus americana</i>	79	65	>15				

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422	pin oak	<i>Quercus palustris</i>	22	35	5~15				
423	slippery elm	<i>Ulmus rubra</i>	29	39	>15				
424	red maple	<i>Acer rubrum</i>	42	30	<5	Low			Covered in vines leaning towards seminary property
425	Norway maple	<i>Acer platanoides</i>	32	30	>15				
426	white ash	<i>Fraxinus americana</i>	34	35	<5				
427	sugar maple	<i>Acer saccharum</i>	25	38	5~15				
428	ironwood	<i>Carpinus caroliniana</i>	30	22	>15		C3	D, bbr	Storm damage
429	ironwood	<i>Carpinus caroliniana</i>	25	26	5~15				Cavity at base. Several long cracks.
430	ironwood	<i>Carpinus caroliniana</i>	18	16	5~15				
431	red maple	<i>Acer rubrum</i>	81	50	>15		C2	D, bbr	Storm damage
432	red maple	<i>Acer rubrum</i>	56	40	5~15		B2	D, bbr	Storm damage in crown.
433	katsuratre	<i>Cercidiphyllum japonicum</i>	40	43	>15		C3	D	Storm damage Smaller lead is hollow and will collapse in 5 yr. Main lead is covered with hederella helix, ivy.
434	white ash	<i>Fraxinus americana</i>	84	85	5~15				
435	white ash	<i>Fraxinus americana</i>	42	50	>15				
436	Catalpa?		57	55	5~15				
437	white ash	<i>Fraxinus americana</i>	51	55	>15				
438	white ash	<i>Fraxinus americana</i>	55	60	>15				
439	American linden	<i>Tilia americana</i>	58	50	>15				
440	red maple	<i>Acer rubrum</i>	49	55	>15				
441	sugar maple	<i>Acer saccharum</i>	55	50	>15				
442	sugar maple	<i>Acer saccharum</i>	25	30	>15				
443	sugar maple	<i>Acer saccharum</i>	31	40	>15				
444	American linden	<i>Tilia americana</i>	104	90	>15	Low			
445	sugar maple	<i>Acer saccharum</i>	31	20	5~15	Low			
446	sugar maple	<i>Acer saccharum</i>	26	35	>15				
447	black cherry	<i>Prunus serotina</i>	64	60	5~15	Low			Severe lean over pathway.
448	sugar maple	<i>Acer saccharum</i>	40	40	>15	Low	C2	D	
449	red oak	<i>Quercus rubra</i>	62	65	5~15		C2	D	In drainage area, lots of deadwood.
450	red maple	<i>Acer rubrum</i>	35	40	>15				
451	white ash	<i>Fraxinus americana</i>	36	40	5~15				
452	silver maple	<i>Acer saccharinum</i>	113	20	0				Wildlife habitat.
453	crabapple	<i>Malus sp.</i>	23	25	<5				
454	sugar maple	<i>Acer saccharum</i>	25	40	>15				
455	red cedar	<i>Juniperus virginiana</i>	31	25	<5	Low			
456	white ash	<i>Fraxinus americana</i>	150	100	>15	Low			
457	eastern white pine	<i>Pinus strobus</i>	118	95	>15	Low			Habitat tree, possible active eagles' nest.
458	American arborvitae	<i>Thuja occidentalis</i>	48	35	>15	Low	C3	D	Wet area. Property line?
459	Japanese oak	<i>Quercus dentate</i>	69	52	>15	Low	B2	D, h	Recent poor pruning, hanger over pathway.
460	red oak	<i>Quercus rubra</i>	171	110	>15	Low	B2	D, v	Deadwood over pathway.
461	American beech	<i>Fagus grandifolia</i>	92	105	>15	Low	B3	D	Deadwood over pathway.
462	shellbark hickory	<i>Carya laciniosa</i>	93	70	>15	Low	B3	D	Deadwood over pathway.
463	Chinese chestnut	<i>Castanea mollissima</i>	40	40	>15	Low	B3	D, h	Deadwood over pathway.
464	pin oak	<i>Quercus palustris</i>	60	60	5~15	Low	B3	D	Ganoderma lucida at base.
465	Chinese chestnut	<i>Castanea mollissima</i>	42	35	>15	Low	B2	D	Trunk wound.
466	red oak	<i>Quercus rubra</i>	202	40	0		C		
467	white oak	<i>Quercus alba</i>	162	80	>15	Low	B2	D	Deadwood over pathway, chicken of the woods on bas
468	American linden	<i>Tilia americana</i>	90	65	>15	Low	B2	D, h	Deadwood over bench.
469	sweetgum	<i>Liquidambar styraciflua</i>	71	65	>15	Low	B2	D, h	Deadwood over bench, shaded out by white oak.
470	white ash	<i>Fraxinus americana</i>	110	60	<5	Moderate Cr	A1	D	In decline.
471	American linden	<i>Tilia americana</i>	45	40	>15	Low	B3	D	
472	shagbark hickory	<i>Carya ovata</i>	43	55	>15	Low			
473	sweetgum	<i>Liquidambar styraciflua</i>	87	70	>15	Low	B3	D, v	

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474	474	red oak	<i>Quercus rubra</i>	104	70	>15	Low	B1	D	
475	475	black gum	<i>Nyssa sylvatica</i>	49	55	>15	Low	B2	D, h	Deadwood over pathway.
476	476	scarlet oak	<i>Quercus coccinea</i>	54	50	>15	Low	B3	D, h	
477	477	Franklinia Tree	<i>Franklinia altamaha</i>	11 @ 1'	15	<5		C3	D	Memorial tree? Trunk damage.
478	478	shingle oak	<i>Quercus imbricaria</i>	60	55	>15	Low	B2	D, h	Storm damage over pathway.
479	479	Franklinia Tree	<i>Franklinia altamaha</i>	13 @ 1'	10	5~15				
480	480a	goldenrain tree	<i>Koelreutaria paniculata</i>	66	40	5~15	Low	B2	D	Deadwood over pathway, leaning.
	480b	goldenrain tree	<i>Koelreutaria paniculata</i>	32	20	>15	Low	B3	D	
	480c	goldenrain tree	<i>Koelreutaria paniculata</i>	26	25	>15	Low	C3	D	
	480d	goldenrain tree	<i>Koelreutaria paniculata</i>	32	28	5~15	Low	C3	D	Cavity at base.
	480e	goldenrain tree	<i>Koelreutaria paniculata</i>	30	22	5~15	Low	B3	D, h	Severe lean, partially uprooted, tr injury.
	480f	goldenrain tree	<i>Koelreutaria paniculata</i>	28	24	0	Low	C		Dead limb over bench, partially uprooted.
	480g	goldenrain tree	<i>Koelreutaria paniculata</i>	33	20	5~15	Low	C3	D	Grows horizontally, beam crack.
	480h	goldenrain tree	<i>Koelreutaria paniculata</i>	30	25	5~15	Low	C3	D	Leaning, partially uprooted.
	480i	goldenrain tree	<i>Koelreutaria paniculata</i>	30	25	<5	Low			Wound at base.
481	481a	dove tree	<i>Davidia involucrata</i>	49	28	5~15	Low	B2	D, h	Basal cavity
	481b	dove tree	<i>Davidia involucrata</i>	38	25	5~15	Low	B2	D, h	Severe lean, resting on trunk of K. paniculata.
	481c	dove tree	<i>Davidia involucrata</i>	22	15	<5	Low	Cr		
482	482	katsuratree	<i>Cercidiphyllum japonicum</i>	162 @ B	50	>15	Low	B2	D, xbr	
483	483	Kentucky coffeetree	<i>Gymnocladus dioica</i>	79	53	>15		B2	D	
484	484	willow oak	<i>Quercus phellos</i>	27	32	>15	Low	C3	D, e	
										Center lead broken out, basal cavity. Trunk significantly compromised.
485	485	willow oak	<i>Quercus phellos</i>	156	75	<5	Low	B		
486	486	Japanese zelkova	<i>Zelkova serrata</i>	76	45	>15	Low	B1	D, h, xbr	
487	487	Persian ironwood	<i>Parrotia persica</i>	89 @ B	33	>15	Low	C2	D, xbr, ws	
488	488	fastigate arborvitae	<i>Thuja occidentalis</i>	122	50	>15	Low	C3	D, v	
489	489	columnar eastern white pine	<i>Pinus strobus</i> 'Fastigiata'	23	18	5~15		C3	D	Slight lean, too wet, thin.
490	490	common bald cypress	<i>Taxodium distichum</i>	93	60	>15	Low	C2	D, v, h, bbr	
491	491	autumn Higan cherry	<i>Prunus subhirtella</i> 'Autumnalis'	56	43	5~15	Low	B1	D, v	Center lead dead, covered with ivy. CBH 6- 42
492	492	cucumber tree	<i>Magnolia acuminata cordata</i>	108	55	>15	Low	C2	D	
493	493	dawn redwood	<i>Metasequoia glyptostroboides</i>	185	95	>15	Low	B2	D, v	
494	494	Serbian spruce	<i>Picea omorika</i>	35	42	>15	Low	C2	D, v, sk	
495	495	white ash	<i>Fraxinus americana</i>	23	28	>15	Low	C3	D, xbr	
496	496	cucumber tree	<i>Magnolia acuminata</i>	58	37	>15	Low	C3	D	
497	497	lenne magnolia	<i>Magnolia x soulangiana</i> 'Lennei'	27	27	>15	Low	C2	Ws, xbr	Exquisite flower.
498	498	cutleaf European beech	<i>Fagus sylvatica</i> 'Laciniata'	62	30	>15	Low	C1	D, v, xbr, h	Clear out invasives in drip line.
499	499	loebner magnolia	<i>Magnolia x loebneri</i>	100 @ B	18	>15	Low	C1	D, v, ws	
500	500	cinnamon hemlock	<i>Tsuga canadensis cinnamomea</i>	31	10	<5		C1	D, v	Rare plant completely covered in vines.
501	501	largeleaf hemlock	<i>Tsuga canadensis macrophylla</i>	26	16	>15		C2	D, v	
502	502	yulan magnolia	<i>Magnolia heptapeta</i>	82	30	>15	Low	C2	D, h, v	
503	503	red maple	<i>Acer rubrum</i>	29	25	<5	Low	B2	D, v	
504	504	tulip poplar	<i>Liriodendron tulipifera</i>	67	45	5~15		C1	D, v	
505	505	tulip poplar	<i>Liriodendron tulipifera</i>	28	30	<5		Cr		Completely covered with vines.
506	506	red maple	<i>Acer rubrum</i>	59	55	>15	Low	B1	D, v	Remove invasives at base of tree.
507	507	tulip poplar	<i>Liriodendron tulipifera</i>	54	50	>15	Low	B2	D, v	Remove invasives.
508	508	tulip poplar	<i>Liriodendron tulipifera</i>	51	50	>15	Low	B2	D, v	Remove invasives.
509	509	tulip poplar	<i>Liriodendron tulipifera</i>	49	50	>15	Low	B2	D, v	Remove invasives.
510	510	tulip poplar	<i>Liriodendron tulipifera</i>	47	50	>15	Low	B2	D, v	Remove invasives.
511	511	tulip poplar	<i>Liriodendron tulipifera</i>	59	55	5~15	Low	B1	D, v	Clear out invasives at base.
512	512	tulip poplar	<i>Liriodendron tulipifera</i>	54	45	5~15	Low	B1	D, v	Clear out invasives at base.
513	513	red mulberry	<i>Morus rubra</i>	48	25	<5	Low	Cr		Covered with vines.
514	514	tulip poplar	<i>Liriodendron tulipifera</i>	60	60	5~15	Low	B2	D, v	
515	515	tulip poplar	<i>Liriodendron tulipifera</i>	54	60	5~15	Low	B1	D, v	

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516	516	red oak	<i>Quercus rubra</i>	38	60	5~15	Low	B2	D, v	
517	517	Himalayan white pine	<i>Pinus griffithii</i>	81	50	>15	Low	B1	D, v, h	
518	518	common horsechestnut	<i>Aesculus hippocastanum</i>	124	35	>15	Low	C3	D, v	
519	519	Norway spruce	<i>Picea abies</i>	54	40	>15	Low	C3	D	
520	520	southern magnolia	<i>Magnolia grandiflora</i> 'Brackens Brown Beauty'	30 @ 1'	20	>15				
521	521	pink star magnolia	<i>Magnolia stellata rosea</i>	67 @ 2'	22	>15	Low	C2	D, v, ws	
522	522	verbanica magnolia	<i>Magnolia x soulangiana verbanica</i>	60	23	5~15	Low	C2	D, v	Clear out invasives.
523	523	kobus magnolia	<i>Magnolia kobus</i>	75	30	>15	Low	C2	D, bbr, ws	Beam crack on low limb.
524	524	white fringetree	<i>Chionanthus virginicus</i>	16 @ 1'	16	>15		C3	d, sk	
525	525	China fir	<i>Cunninghamia lanceolata</i>	96	55	>15		C3	D	
526	526	weeping nootka falsecypress	<i>Chamaecyparis nootkatensis pendula</i>	14	8	<5		Cr		Tree collapsed.
527	527	blue Nootka falsecypress	<i>Chamaecyparis nootkatensis glauca</i>	41	35	>15				
528	528	flowering dogwood	<i>Cornus florida</i>	47 @ B	22	>15		C3	D, h, ws, bbr	
529	529	oriental spruce	<i>Picea orientalis</i>	94	55	>15	Low	B2	D, v	Top blown out on large lead.
530	530	Japanese cryptomeria	<i>Cryptomeria japonica</i> 'Lobblil'	65	50	>15		C3	D, bbr	
531	531	sweet bay magnolia	<i>Magnolia virginiana</i>	14	16	5~15		C3	D, xbr, bbr	Needs mulch ring.
532	532	Japanese black pine	<i>Pinus thunbergii</i>	40	22	>15		C3	D, bbr, v	Morning dove nest.
533	533	threadleaf falsecypress	<i>Chamaecyparis pisifera</i> 'Filifera'	35	30	>15		C3	D, xbr	
534	534	blue atlas cedar	<i>Cedrus atlantica glauca</i>	77	35	>15		C2	D, v	
535	535	incense cedar	<i>Libocedrus decurrens</i>	80	45	5~15	Low	B3	D	Appears to have lost a leader, cavity at base. Significant browning.
536	536	Japanese white pine	<i>Pinus parviflora</i> 'glauca'	26	22	>15		C3	D	
537	537	hinoki falsecypress	<i>Chamaecyparis obtusa</i>	37	18	>15		C3	D, bbr, v	
538	538	pitch pine	<i>Pinus rigida</i>	36	23	>15		C3	D, h	
539	539	Norway spruce	<i>Picea abies</i>	118	60	>15	Low	B2	D, h, bbr	
540	540	Douglas fir	<i>Pseudotsuga menziesii</i>	56	40	>15	Low	C3	D, v	
541	541	Norway spruce	<i>Picea abies</i>	118	65	>15	Low	B2	D, bbr, h	
542	542	eastern white pine	<i>Pinus strobus</i>	36	20	5~15				Growing out of trunk of spruce.
543	543	Lebanon cedar	<i>Cedrus libani</i>	60	30	>15	Low	B3	D, h	
544	544	Norway spruce	<i>Picea abies</i>	124	65	>15	Low	B2	D, bbr, v	
545	545	European larch	<i>Larix decidua</i>	80	60	>15	Low	B2	D, v	
546	546	golden thread-leaved sawara cypress	<i>Chamaecyparis pisifera</i> 'filifera aurea'	58	50	>15	Low	C2	D, h	
547	547	yellow fruited English yew	<i>Taxus baccata lutea</i>	43	30	>15	Low	B2	D, e	Low branches at eye level, good example of layers.
548	548	amur cork tree	<i>Phellodendron amurense</i>	95	50	>15	Low	B1	D, v	
549	549	moss Sawara cypress	<i>Chamaecyparis pisifera squarrosa</i>	117	60	>15	Low	B1	D, bbr, h	
550	550	weeping Higan cherry	<i>Prunus subhirtella</i> 'pendula'	90	33	>15	Low	C2	sk, v	
551	551	dove tree	<i>Davidia involucrata</i>	29	25	>15	Low	C3	D	
552	552	oriental photina	<i>Photina villosa</i>	9	15	>15		C3	d, sk	
553	553	dawn redwood	<i>Metasequoia glyptostroboides</i>	13 @ 1'	15	>15				
554	554	Chinese redbud	<i>Cercis chinensis</i>		17	<5		C1	D	Multiple stems +20
555	555	oriental arborvitae	<i>Thuja orientalis</i>	89	30	5~15	Low	B2	D, bbr, h	Remove invasives. Significant lean.
556	556	Colorado spruce	<i>Picea pungens</i>	58	43	>15	Low	B3	D, bbr	
557	557	eastern redbud	<i>Cercis canadensis</i>	9	16	>15		C2	D, h, xbr	
558	558	Japanese red umbrella pine	<i>Pinus densiflora</i> 'Umbraculifera'	42 @ B	12	5~15				Large split out.
559	559	western white pine	<i>Pinus monticola</i>	28	17	>15		C3	D	
560	560	eastern white pine	<i>Pinus strobus</i> 'glauca'	51	38	>15		C1	D, v	
561	561	kousa dogwood	<i>Cornus kousa</i>	39 @ B	15	5~15		C3	D	Needs mulch ring.
562	562	kousa dogwood	<i>Cornus kousa</i>	54 @ B	20	>15		C3	D, ws	
563	563	kousa dogwood	<i>Cornus kousa</i>	57 @ B	20	>15		C2	D, h, bbr, v	
564	564	kousa dogwood	<i>Cornus kousa</i>	63 @ B	20	>15		C1	D, v, h	
565	565	eastern hemlock	<i>Tsuga canadensis</i>	21	15	0	Low	C		
566	566	eastern hemlock	<i>Tsuga canadensis</i>	33	35	5~15		C1	D, v	Lower half of tree shaded out.
567	567	black walnut	<i>Juglans nigra</i>	69	60	>15	Low	B2	D, v	

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568	kousa dogwood	<i>Cornus kousa</i>	45 @ B	18	5~15		C2	D, v, ws	
569	eastern hemlock	<i>Tsuga canadensis</i>	34 @ B	25	5~15	Low	C2	D, v	
570	eastern hemlock	<i>Tsuga canadensis</i>	28	28	>15	Low	C3	D, v	
571	kousa dogwood	<i>Cornus kousa</i>	41 @ B	18	>15		C3	D, h, ws, e	
572	Norway spruce	<i>Picea abies</i>	115	75	>15	Low	B1	D, v	
573	Cornelian cherry dogwood	<i>Cornus mas</i>		18	<5	Low	Cr	D	Multistem +7, water sprouts +20
574	Cornelian cherry dogwood	<i>Cornus mas</i>	88 @ B	20	5~15	Low	Cr	D, v	Multistem +7, water sprouts +20
575	kousa dogwood	<i>Cornus kousa</i>	52 @ B	18	>15		C3	D, v	
576	eastern hemlock	<i>Tsuga canadensis</i>	58	45	>15	Low	C3	D	
577	kousa dogwood	<i>Cornus kousa</i>	54 @ B	18	>15		C3	D, xbr	
578	kousa dogwood	<i>Cornus kousa</i>	46 @ B	20	>15		C3	D	
579	eastern white pine	<i>Pinus strobus</i>	102	75	5~15	High	Cr	crd	Codom @ 20', side leaning over road rotted. Util, lamp post, busy road targets. Small canker at buttress root.
580	Franklinia Tree	<i>Franklinia altamaha</i>	19 @ B	16	<5				
581	hackberry	<i>Celtis occidentalis</i>	33	30	>15		C3	D	
582	kousa dogwood	<i>Cornus kousa</i>	58 @ B	18	>15		C2	D, v	
583	silver maple	<i>Acer saccharinum</i>	14	20	>15		Cr		Volunteer.
584	kousa dogwood	<i>Cornus kousa</i>	72 @ B	18	<5	Low	Cr		
585	eastern white pine	<i>Pinus strobus</i>	45	35	>15	Low	C2	D, h	
586	eastern white pine	<i>Pinus strobus</i>	43	35	5~15	Low	C2	d, v	
587	eastern white pine	<i>Pinus strobus</i>	46	35	>15	Low	C1	D, v, h	
588	eastern white pine	<i>Pinus strobus</i>	36	20	0	Low	B		
589	eastern white pine	<i>Pinus strobus</i>	32	30	>15	Low	C2	D, v	
590	eastern white pine	<i>Pinus strobus</i>	36	32	5~15	Low	C2	D, h	
591	eastern white pine	<i>Pinus strobus</i>	37	32	>15	Low	C2	D, ewr, v	
592	kousa dogwood	<i>Cornus kousa</i>	50 @ B	16	>15		C3	D	
593	kousa dogwood	<i>Cornus kousa</i>	45 @ B	16	<5	Low	C		
594	kousa dogwood	<i>Cornus kousa</i>	15 @ B	13	>15		C3	D, xbr	
595	eastern white pine	<i>Pinus strobus</i>	48	32	>15		C3	D	
596	eastern white pine	<i>Pinus strobus</i>	48	32	>15		C3	D, h	
597	eastern white pine	<i>Pinus strobus</i>	53	35	5~15	Low	B2	D, bbr	Storm damaged top.
598	eastern white pine	<i>Pinus strobus</i>	36	32	>15		C3	D	
599	black gum	<i>Nyssa sylvatica</i>	22	19	<5		C		Covered with vines.
600	hackberry	<i>Celtis occidentalis</i>	36	30	>15	Low	C3	D, e	
601	black gum	<i>Nyssa sylvatica</i>	27	25	<5		C1	D, v	Top covered with vines.
602	black gum	<i>Nyssa sylvatica</i>	28	30	>15		C2	D, v	
603	hackberry	<i>Celtis occidentalis</i>	35	32	>15	Low	C2	D, xbr	Needs mulch ring.
604	black gum	<i>Nyssa sylvatica</i>	24	33	>15	Low	C2	D	
605	black gum	<i>Nyssa sylvatica</i>	23	30	>15	Low	C2	D, xbr, e.	
606	hackberry	<i>Celtis occidentalis</i>	26	25	>15	Low	C3	D, e	
607	London planetree	<i>Platanus x acerifolia</i>	41	40	>15	Low	B3	D, h, ewr	Clip back over road.
608	ironwood	<i>Carpinus caroliniana</i>	22	22	>15		C3	V	
609	hackberry	<i>Celtis occidentalis</i>	21	26	>15		C3	D, e	
610	English elm	<i>Ulmus procera</i>	97	60	5~15	Extreme	A1	Active failure.	14" limb over road, actively failing.
611	white oak	<i>Quercus alba</i>	100	65	>15	Low	B2	D, e	Elevate low limbs over road.
612	white oak	<i>Quercus alba</i>	57	60	>15	Low	B3	D	
613	white ash	<i>Fraxinus americana</i>	110	85	<5		A		Significant basal cavity, extensive dieback in cr. Bark peeling away.
614	white ash	<i>Fraxinus americana</i>	71	60	<5		B		Extensive dieback in crown, significant lean.
615	Nordmann fir	<i>Abies nordmanniana</i>	91	60	>15	Low	C3	D	
616	Norway maple	<i>Acer platanoides</i>	79	45	>15	Low	B2	D, h	
617	tulip poplar	<i>Liriodendron tulipifera</i>	142	90	5~15	Moderate	Hi		Very deep basal cavity. Use resistograph
618	ironwood	<i>Carpinus caroliniana</i>	22 @ 3'	20	>15		C3	Xbr	
619	American beech	<i>Fagus grandifolia</i>	31	30	>15	Low	B3	Ewr	Clip in from road.

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620	620	white ash	<i>Fraxinus americana</i>	88		90	>15	Low	B2	D	
621	621	white ash	<i>Fraxinus americana</i>	89		95	>15	Moderate	A2	D	Lean over road.
622	622	Norway maple	<i>Acer platanoides</i>	78		55	>15	Low	B2	D	Deadwood over road.
623	623	tulip poplar	<i>Liriodendron tulipifera</i>	122		100	>15	Moderate	A2	D	Deadwood over parking lot.
624	624	tulip poplar	<i>Liriodendron tulipifera</i>	134		60	<5	Moderate	B		Previously topped, 20' stag horn over parking lot.
625	625	Japanese maple	<i>Acer palmatum</i>	44		35	>15	Low	A2	D, h, bbr	Over playground.
626	626	Norway maple	<i>Acer platanoides</i>	66		50	5~15	Low	B2	D, bbr	Over playground, storm damage, canker at 25'.
627	627	hedge maple	<i>Acer campestre</i>								
628	628	sweetgum	<i>Liquidambar styraciflua</i>	87		75	>15	Moderate	B1	D, bbr, h	Broken 4" limb over playground at 25'.
629	629	American beech	<i>Fagus grandifolia</i>	65 @ 2'		33	>15	Low	C3	D, h	
630	630	gingko	<i>Ginkgo biloba</i>	131		80	>15	Low	B3	D	Dead limb over bench.
631	631	Cilician fir	<i>Abies cilicica</i>	108		95	>15	Low	B3	D	
632	632	Norway spruce	<i>Picea abies</i>	115		70	>15		C2	D	
633	633	Abies sp	<i>Abies</i>	93		80	>15		C3	D	
634	634	Japanese zelkova	<i>Zelkova serrata</i>	88		50	>15	Low	B2	D, xbr	
635	635	willow oak	<i>Quercus phellos</i>	118		75	>15	Low	B1	D, e	Deadwood over wak.
636	636	crabapple	<i>Malus sp.</i>	22 @ 2'		12	>15				
637	637	silver linden	<i>Tilia tomentosa</i>	37		25	>15	Low	C3	D, xbr	
638	638	Persian ironwood	<i>Parrotia persica</i>	60 @ B		25	>15		C1	D, xbr, v	
639	639	autumn purple white ash	<i>Fraxinus americana</i> 'Autumn Purple'	29		25	>15	Low			Needs mulch ring
640	640	honey locust	<i>Gleditsia tricanthos</i>	36		25	>15		C2	D	Needs mulch ring.
641	641	white oak	<i>Quercus alba</i>	53		30	>15		C3	D, h	Needs mulch ring.
642	642	shingle oak	<i>Quercus imbricaria</i>	47		38	>15		C2	D, xbr	
643	643	English oak	<i>Quercus robur fastigiata</i>	43 @ B		30	>15		C3	D, ewr	One limb sticking out the side, needs mulch ring.
644	644	Norway spruce	<i>Picea abies</i>	117		55	5~15	Low	B1	D, bbr, ewr, h	Top blown out in storm. Multiple hangers and two cracked limbs.
645	645	American Yellowwood	<i>Cladrastis kentukea</i>	64		50	5~15	Low	B1	D	Hollow stem, codom crack, dieback in crown.
646	646	paperbark maple	<i>Acer griseum</i>	36 @ 1'	15	14	5~15	Low	C3	D	Basal trunk wound
647	647	Sawara falsecypress	<i>Chamaecyparis pisifera</i>	115		70	>15	Low	B2	D	
648	648	hawthorn	<i>Crataegus sp.</i>	16		20	>15	Low	C3	D,e,Xbr	
649	649	ginkgo	<i>Ginkgo biloba</i>	54		50	>15	Low	C3	Xbr	
650	650	weeping hemlock	<i>Tsuga canadensis 'pendula'</i>	29 @ 1'	20	7	>15	Low	C3	Ewr	Clip in ends extending into pathways
651	651	Japanese maple	<i>Acer palmatum</i>	43 @ B	27	14	>15	Low	C3	D	Signature tree, center lead broke in winter storm. Beam crack on k
652	652	plume falsecypress	<i>Chamaecyparis pisifera plumosa</i>	123		70	>15	Low	B2	D, h, bbr,v	
653	653	tiger tail spruce	<i>Picea torana</i>	54		47	>15	Low	C3	D,V	Unusual basal swelling
654	654	Japanese maple 'Bloodgood'	<i>Acer palmatum 'Bloodgood'</i>	26 @ B	25	15	>15	Low	C3	D	
655	655	purple leaf beech	<i>Fagus sylvatica 'Atropunicea'</i>	42		35	>15	Low	C3	D	Grade out excess rocks and soil away. from base
656	656	Korean stewartia	<i>Stewartia koreana</i>	32		33	>15	Low			Beautiful tree!
657	657	Engleman spruce	<i>Picea engelmannii</i>	67		60	>15	Low	C2	D	Looks thin, may be mite damage
658	658	dwarf Norway spruce	<i>Picea abies Maxwellii</i>	15 @ 1'	15	7	5~15	Low	C3	D	One stem damaged
659	659	moss sawara cypress	<i>Chamaecyparis pisifera squarrosa</i>	122		70	>15	Low	B2	D, bbr,	Beautiful low limbs, recent storm damage
660	660	Colorado blue spruce	<i>Picea pungens glauca</i>	16 @ B	6	8	>15	Low			Newer planting
661	661	Kwanzan cherry	<i>Prunus serrulata 'Kwanzan'</i>	28	25	18	>15	Low			Planted April 2014
662	662	Lebanon cedar	<i>Cedrus libani stenocoma</i>	83		75	>15	Low	C3	D	
663	663	hackberry	<i>Celtis occidentalis</i>	43		38	>15	Low	C3	D	Small trunk wound
664	664	Japanese wisteria	<i>Wisteria floribunda</i>		50	10	>15	Low	C2	d, v	This is 7 distinct clusters planted in a circle - white flower. Support
665	665	weeping cherry	<i>Prunus subhirtella pendula</i>	24	15	13	5~15	Low	C3	d,v,e	Volunteer, directly on property corner by fence
666	666	blackhaw viburnum	<i>Viburnum prunifolium</i>	23 @ B	22	17	>15	Low			Needs mulch ring
667	667	Lebanon cedar	<i>Cedrus libani</i>	110		70	>15	Low	B2	D	Neighbor's car parked underneath. Located next to gate to Guerns
668	668	Yoshino cherry	<i>Prunus x yedoensis</i>	43		32	5~15	Low	C3	D	Cavity in trunk at 9. Feet. Along property line
669	669	kousa dogwood	<i>Cornus kousa</i>	52 @ B	40	20	>15	Low			
670	671	sugar maple	<i>Acer saccharum</i>	25		25	>15	Low			Remove wire on trunk
671	672	Japanese crabapple	<i>Malus floribunda</i>	44	38	20	>15	Low	C2	D,xbr,ws	Needs mulch ring, tent catapillar present
672	673	Norway spruce	<i>Picea abies</i>	101		68	>15	Low	C1	D,V	Lots of poison ivy, needs mulch ring

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Tree Management Plan for Marquand Park

673	674	Norway spruce	<i>Picea abies</i>	94		68	>15	Low	C1	D,V, Bbr	Covered with poison ivy,needs mulch ring	
674	670	eastern white pine	<i>Pinus strobus</i>	97		90	>15	Moderate	B1	D,V, Bbr	Near picnic bench	
675	678	eastern white pine	<i>Pinus strobus</i>	100		90	>15	Moderate	B1	D,V, Bbr,H	Near Guernsey Hall property line, recent storm damage	
676	675	eastern white pine	<i>Pinus strobus</i>	88		95	>15	Low	C1	D,V, Bbr	Over picnic bench, lots of recent storm damage	
677	676	eastern white pine	<i>Pinus strobus</i>	81		90	>15	Moderate	B2	D,V, Bbr	Near picnic bench	
678	677	eastern white pine	<i>Pinus strobus</i>	97		100	>15	Moderate	B1	D,V, Bbr	recent storm damage	
679	679	eastern white pine	<i>Pinus strobus</i>	104		100	>15	Moderate	B1	D,V, Bbr,H	recent storm damage, co dom at 30',hanger	
680	680	kousa dogwood	<i>Cornus kousa</i>	84 @ B	45	25	>15	Low	C3	D		
681	681	kousa dogwood	<i>Cornus kousa</i>	72 @ B	48	25	>15	Low	C3	D,v		
682	682	kousa dogwood	<i>Cornus kousa</i>	52 @ B	40	20	>15	Low	C3	D,v, string in tree		
683	683	English yew	<i>Taxus baccata aurea</i>	150 @ B	40	20	<5	Low	C		Multi lead older yew, more than half dead	
684	684	empress tree	<i>Paulonia tomentosa</i>	209		38	<5	High	A2	crd,d,v	Signature tree for the park,preserve as a veteran, large cavity at base	
685	685	Japanese Pagodatree	<i>Styphnolobium japonicum</i>	76		55	>15	Moderate	B2	D	Needs mulch ring	
686	686	Japanese Pagodatree	<i>Styphnolobium japonicum</i>	64		50	>15	Moderate	B2	D	Over display board	
687	687	Japanese Pagodatree	<i>Styphnolobium japonicum</i>	65		45	5~15	High	A2	D	Over benches and display board	
688	688	Japanese maple	<i>Acer palmatum</i>	18		20	5~15	Low	C3	D,v,ewr	Has significant lean, over fence,poor structure	
689	689	eastern white pine	<i>Pinus strobus</i>	105		95	>15	Moderate	B1	D,v,bbr,h	Near parking lot, lots of recent storm damage	
690	690	willow oak	<i>Quercus phellos</i>	69		70	>15	Moderate	B3	D	Over parking area	
691	691	Japanese maple	<i>Acer palmatum</i>	26		30	>15	Low			Among several other small diameter Japanese maple	
692	692	Japanese maple	<i>Acer palmatum</i>	21		25	>15	Moderate	B3	D,v	14" lead is dead and hangs over parking lot, leans over parking area	
693	693	Japanese maple	<i>Acer palmatum</i>	15		20	>15	Low	C3	D		
694	694	red oak	<i>Quercus rubra</i>	83		75	>15	Moderate	B3	D,v	Crown is over parking area	
695	695	Japanese maple	<i>Acer palmatum</i>	34		23	>15	Low	C3	E,v	Leans over parking area	
696	696	Norway maple	<i>Acer platanoides</i>	66		55	>15	Moderate	B2	D,h,v,bbr	Top blown out in storm, hangs over parking area	
697	697	Japanese maple	<i>Acer palmatum</i>	26		20	>15	Moderate	B3	D,v	Leans over parking area,one low dead limb	
698	698	Eastern arborvitae	<i>Thuja occidentalis</i>	28		23	5~15	Low	C3	D,v	Hangs over parking area	
699	699	Norway maple	<i>Acer platanoides</i>	49		50	>15	Low	C3	D,e,v	Crown hangs over neighbor's driveway	
700	700	tulip poplar	<i>Liriodendron tulipifera</i>	138		100	>15	Moderate	B2	D	Very large tree between parking and Lovers Lane	
701	701	Japanese yew	<i>Taxus cuspidata</i>	23		20	>15	Low			Next to Lovers Lane sidewalk	
702	702	English yew	<i>Taxus baccata</i>	62 @ B	30	16	5~15	Low	Cr	C2	D,bbr,h,v	A beat up old specimen, many cracked limbs, next to big tulip
703	703	American beech	<i>Fagus grandifolia</i>	82		60	>15	Low	B3	D,v	Deadwood over sidewalk	
704	704	tulip poplar	<i>Liriodendron tulipifera</i>	128		60	>15	High	B2	D,v,trash in tree	Over parking	
705	705	American linden	<i>Tilia tomentosa</i>	24	8	12	>15	Low	Cr	C3	E	Located at corner of entrance, may be a sight line problem
706	706	white fringetree	<i>Chionanthus virginicus</i>		12	14	>15	Low				Multi stemmed plant located at entrance to Park on right side
707	707	shadblow serviceberry	<i>Amelanchier canadensis</i>		6	10	>15	Low				Located in center of parking area
708	708	shadblow serviceberry	<i>Amelanchier canadensis</i>		6	10	>16	Low				Located in center of parking area
709	709	shadblow serviceberry	<i>Amelanchier canadensis</i>		6	10	>17	Low				Located in center of parking area
710	710	shadblow serviceberry	<i>Amelanchier canadensis</i>		6	10	>18	Low				Located in center of parking area
711	711	shadblow serviceberry	<i>Amelanchier canadensis</i>		6	10	>19	Low				Located in center of parking area
712	712	shadblow serviceberry	<i>Amelanchier canadensis</i>		6	10	>20	Low				Located in center of parking area
713	713	tulip poplar	<i>Liriodendron tulipifera</i>	97		55	>15					Woods tree - next to #320 black oak
714	714	sugar maple	<i>Acer saccharum</i>	28		35	>15					Woods tree - next to #310 sugar maple

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Tree Management Plan for Marquand Park

APPENDIX 4: SUGGESTED TREE REMOVALS

#	ID #	Common Name	Scientific Name	CBH_1	Height	LifeExp	Failure	Impact	Conseq	Risk	Re	Comments
1	324	red oak	<i>Quercus rubra</i>	125	50	0	Probable	High	Severe	High	A	Near Mercer Road
2	376	tulip poplar	<i>Liriodendron tulipifera</i>	156	40	0	Probable	High	Severe	High	A	Next to tool shed. Shoe string root rot.
3	613	white ash	<i>Fraxinus americana</i>	110	85	<5	Probable	High	Severe	High	A	Significant basal cavity, extensive dieback in cr. Bark peeling away.
4	614	white ash	<i>Fraxinus americana</i>	71	60	<5	Probable	High	Severe	High	A	Extensive dieback in crown, significant lean.
5	270	black cherry	<i>Prunus serotina</i>	14	25	0	Probable	Low	Minor	Low	B	small tree next to path
6	274	Norway maple	<i>Acer platanoides</i>	27	30	0	Probable	Low	Minor	Low	B	small tree next to path
7	320	black oak	<i>Quercus velutina</i>	92	65	0	Probable	Moderate	Significant	Moderate	B	Near Mercer Road
8	466	red oak	<i>Quercus rubra</i>	202	40	0	Possible	Moderate	Severe	Moderate	B	40' trunk
9	485	willow oak	<i>Quercus phellos</i>	156	75	<5	Probable	Low	Severe	Moderate	B	Center lead broken out, basal cavity. Trunk significantly compromised.
10	588	eastern white pine	<i>Pinus strobus</i>	36	20	0	Possible	Low	Minor	Low	C	
11	44	American linden	<i>Tilia americana</i>	30	25	0					C	Leave for habitat
12	139	Fraser fir	<i>Abies fraseri</i>	22	22	0	Possible	Low	Minor	Low	C	
13	217	tulip poplar	<i>Liriodendron tulipifera</i>	19	25	0	Possible	Low	Minor	Low	C	
14	230	sugar maple	<i>Acer saccharum</i>	16	0	0					C	Armillaria
15	314	sugar maple	<i>Acer saccharum</i>	34	40	<5	Possible	Low	Minor	Low	C	Beam split
16	317	sugar maple	<i>Acer saccharum</i>	19	30	<5	Possible	Low	Minor	Low	C	
17	354	sugar maple	<i>Acer saccharum</i>	24	25	0					C	Woodpecker nest, leave for habitat.
18	480f	goldenrain tree	<i>Koelerutaria paniculata</i>	28	24	0	Probable	Moderate	Minor	Low	C	Dead limb over bench, partially uprooted.
19	565	eastern hemlock	<i>Tsuga canadensis</i>	21	15	0	Possible	VeryLow	Negligible	Low	C	
20	593	kousa dogwood	<i>Cornus kousa</i>	45 @ B	16	<5	Possible	Low	Minor	Low	C	
21	599	black gum	<i>Nyssa sylvatica</i>	22	19	<5					C	Covered with vines.
22	681	English yew	<i>Taxus baccata aurea</i>	150 @ B	20	<5	Possible	Low	Minor	Low	C	Multi lead older yew, more than half dead
23	157	black locust	<i>Robinia pseudoacacia</i>	31	40	>15	Possible	Low	Significant	Low	Cr	Slight lean towards private residence
24	194	sugar maple	<i>Acer saccharum</i>	19	25	<5	Probable	Low	Minor	Low	Cr	
25	253	sugar maple	<i>Acer saccharum</i>	26	30	5~15	Possible	Low	Minor	Low	Cr	
26	380	black locust	<i>Robinia pseudoacacia</i>	87	55	<5	Possible	Low	Severe	Low	Cr	Significant lean, cracks, long wd on tension side.
27	470	white ash	<i>Fraxinus americana</i>	110	60	<5	Probable	Medium	Severe	Moderate	Cr	In decline.
28	481c	dove tree	<i>Davidia involucrata</i>	22	15	<5	Probable	Low	Minor	Low	Cr	
29	505	tulip poplar	<i>Liriodendron tulipifera</i>	28	30	<5					Cr	Completely covered with vines.
30	513	red mulberry	<i>Morus rubra</i>	48	25	<5	Probable	Medium	Minor	Low	Cr	Covered with vines.
31	526	weeping nootka falsecypress	<i>Chamaecyparis nootkatensis pendula</i>	14	8	<5					Cr	Tree collapsed.
32	544	incense cedar	<i>Libocedrus decurrens</i>	80	55	<5	Possible	Low	Minor	Low	Cr	browned out very quickly, lost a lead last year, cavity at base
33	573	Cornelian cherry dogwood	<i>Cornus mas</i>	0	18	<5	Possible	Low	Minor	Low	Cr	Multistem +7, water sprouts +20
34	574	Cornelian cherry dogwood	<i>Cornus mas</i>	88 @ B	20	5~15	Possible	Low	Minor	Low	Cr	Multistem +7, water sprouts +20
35	579	eastern white pine	<i>Pinus strobus</i>	102	75	5~15	Probable	High	Significant	High	Cr	Codominant @ 20', side leaning over road rotted. Util, lamp post, busy road targets. Small canker at buttress root.
36	583	silver maple	<i>Acer saccharinum</i>	14	20	>15					Cr	Volunteer.
37	584	kousa dogwood	<i>Cornus kousa</i>	72 @ B	18	<5	Possible	Low	Minor	Low	Cr	
38	700	English yew	<i>Taxus baccata</i>	62 @ B	16	5~15	Probable	Low	Minor	Low	Cr	A beat up old specimen, many cracked limbs, next to big tulip
39	703	American linden	<i>Tilia tomentosa</i>	24	12	>15	Improbable	Low	Negligible	Low	Cr	Located at corner of entrance, may be a sight line problem
40	189	tulip poplar	<i>Liriodendron tulipifera</i>	169	105	>15	Possible	Low	Significant	Low	Hi	Hazard inspection suggested, basal cavities
41	190	white ash	<i>Fraxinus americana</i>	127	65	5~15	Possible	Medium	Severe	Moderate	Hi	Cavity at base, leans over road
42	617	tulip poplar	<i>Liriodendron tulipifera</i>	142	90	5~15	Possible	Medium	Severe	Moderate	Hi	Very deep basal cavity. Use resistograph!
39 Suggested Removals			4 - 'A' Priority									
5.46% of Total			5 - 'B' Priority									
			13 - 'C' Priority									
			17 - 'Consider Removal									
			3 - 'Further Inspection needed'									

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Tree Management Plan for Marquand Park



Map of Marquand Park showing location of the 10 “A” & “B” or high priority removals and 3 Hazard Inspections

Wooded Area is outlined in green and the Public Garden area is outlined in blue.

Map on following page is the removals location map as it appears in the GIS program with all of the “C” or low priority removals shown as well as the “CR” or trees that should be Considered for Removal.

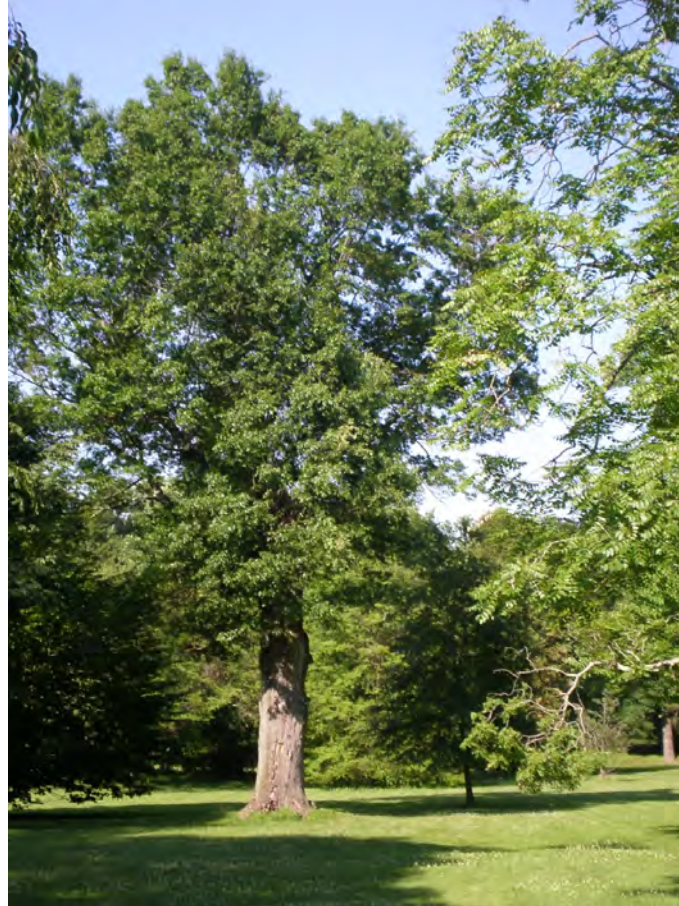
Tree Management Plan for Marquand Park



Tree Management Plan for Marquand Park



Ash # 613 & # 614 to be removed



Willow oak # 485 to be removed

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40' Red oak stick #466 to be removed

Black oak # 320 near Mercer Road to remove

Tree Management Plan for Marquand Park

APPENDIX 5: SUGGESTED ACTIVITY SCHEDULE

TREATMENT-ACTIVITY	YEAR*	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
REMOVALS													
A Priority	1	X	X	X							X	X	X
B Priority	2	X	X	X							X	X	X
Removals	4A	X	X	X							X	X	X
Stump Removal	3A	X	X	X							X	X	X
In-depth Inspection	1				X	X	X	X	X	X			
PRUNING													
A Priority	1	X	X	X							X	X	X
B Priority	2	X	X	X							X	X	X
Routine Pruning (Five- YearRotation)	3	X	X	X							X	X	X
Training Pruning (Three-Year-Rotation)	1A	X	X	X							X	X	X
FERTILIZATION													
Macronutrient (NPK) -Fair and Poor Condition Trees	1A			X	X						X	X	
Macronutrient (NPK)- Excellet and Good condition Trees	2			X	X						X	X	
Micronutrient (Trunk or Foliar)	N					X	X	X	X				
Micronutrient (soil treatment)	N												
PEST MANAGEMENT													
Scouting	1A				X	X	X	X	X	X			
Pesticide Treatments	N				X	X	X	X	X	X			
BLS Irrigation								X	X	X			
Pest Pruning	N												
TREE PLANTING													
B&B/Container	1A			X	X	X				X	X	X	
Bare Root	1A		X	X	X								
Watering (New Trees)	1A				X	X	X	X	X	X	X		
Cabling & Bracing	4N	X	X	X								X	X
Tree Circles mulch	1A												
Tree circles spray	1A				X	X	X						
Watering (Older Trees)	1A						X	X	X	X	X		
INVENTORY-ASSESSMENT													
Update tree inventory	3	X	X								X	X	X
Update Computer Database	1A												
Update CAD map	1A												

Notes: Shaded areas () indicate months where tasks can be completed operationally

* = Year task is recommended to be initiated/completed

A = Continue on an annual basis after task is initiated

N = Implement on an as-needed basis

X = Optimal biological time (or for cost-efficiency)

This chart has been provided in order to help the property manager better organize the tree maintenance program.

This table shows recommended months that particular maintenance tasks should take place. The success of most tree maintenance tasks, such as planting, pruning, or fertilizing, is dependent upon seasonal temperature and weather conditions.

The maintenance tasks described in this plan should be scheduled for and performed during optimal biological periods to sustain tree health and to ensure the best chance for survival of The Park's trees.

APPENDIX 6: PROJECT AREA MAP



Example of the GIS Tree Inventory map with tree ID numbers inked in to illustrate. Rolling the cursor over a pin will allow a pop up box to appear with all the data concerning that tree.

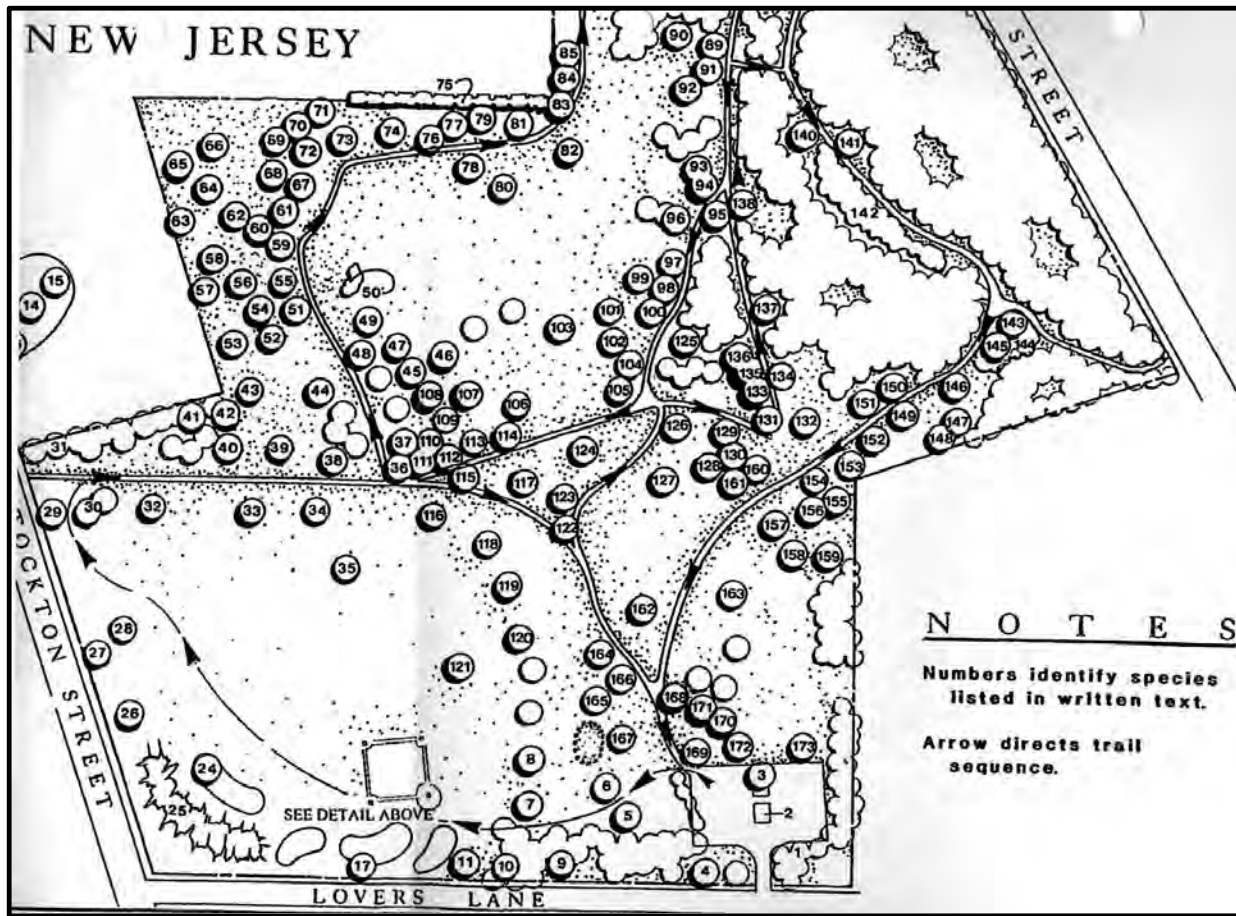
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Tree Management Plan for Marquand Park



Roland Machold's tree Location sketch from the 2003 revision of the *Guide to Marquand Park*

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Tree Management Plan for Marquand Park

APPENDIX 7: MULCH RING RECOMMENDATIONS

#	ID #	Common Name	Scientific Name	CBH	Height	Comment
1	610	English elm	<i>Ulmus procera</i>	97"	60'	Deep crack in co-dominant lead at 25'
2	611	white oak	<i>Quercus alba</i>	110"	85'	Along Lover's Lane
3	612	white oak	<i>Quercus alba</i>	57"	60'	Along Lover's Lane
4	615	Nordman fir	<i>Abies nordmanniana</i>	91"	60'	north side of play area
5	616	Norway maple	<i>Acer platanoides</i>	79"	45'	Over play area
6	617	tulip poplar	<i>Liriodendron tulipifera</i>	142"	90'	cavity at base, bees inside
7	618	ironwood	<i>Carpinus caroliniana</i>	22" @ 3'	20'	Along Lover's Lane
8	619	American beech	<i>Fagus grandifolia</i>	31"	30'	Along Lover's Lane
9	620	white ash	<i>Fraxinus americana</i>	88"	90'	
10	621	white ash	<i>Fraxinus americana</i>	89"	95'	
11	622	Norway maple	<i>Acer platanoides</i>	78"	55'	near Lover's Lane
12	624	tulip poplar	<i>Liriodendron tulipifera</i>	134"	60'	MRD, white rot fruiting body present
13	625	Japanese maple	<i>Acer palmatum</i>	4 leads	35'	Next to play area
14	626	Norway maple	<i>Acer platanoides</i>	66"	50'	over play area
15	627	hedge maple	<i>Acer campestre</i>	38" @ base	22'	Across path from main sign
16	628	sweetgum	<i>Liquidambar styraciflua</i>	87"	75'	next to hedge maple
17	629	American beech	<i>Fagus grandifolia</i>	65" @ 2'	33'	east side of play area
18	630	ginkgo	<i>Ginkgo biloba</i>	131"	80'	Over swing area
19	631	Cilician fir	<i>Abies cilicica</i>	108"	95'	
20	632	Norway spruce	<i>Picea abies</i>	115"	70'	
21	633	Nordman fir	<i>Abies nordmanniana</i>	93"	80'	
22	634	Japanese zelkova	<i>Zelkova serrata</i>	88"	50'	
23	635	willow oak	<i>Quercus phellos</i>	118"	75'	
24	636	Japanese crabapple	<i>Malus floribunda</i>	22" @ 2'	12'	
25	637	silver linden	<i>Tilia tomentosa</i>	37"	25'	
26	638	Persian ironwood	<i>Parrotia persica</i>	60" @ base	25'	
27	645	yellowwood	<i>Cladrastus kentuckia</i>	Multi stem	50'	one lead is dead
28	646	paperbark maple	<i>Acer griseum</i>	36" @ 1'	15'	scar on trunk
29	648	hawthorn	<i>Crataegus sp?</i>	16"	20'	
30	649	ginkgo	<i>Ginkgo biloba</i>	54"	50'	
31	651	Japanese maple	<i>Acer palmatum</i>	43" @ base	14'	Signature tree of the Arboretum
32	653	tiger tail spruce	<i>Picea torana</i>	54"	47'	Unusual swelling at base - graft incompatibility?
33	657	Engelman spruce	<i>Picea englemanni</i>	67"	60'	3 lead tree, mite damage?, possible girdling root?
34	662	hardy cedar of Lebanon	<i>Cedrus libani stenacoma</i>	83"	75'	
35	663	hackberry	<i>Celtis occidentalis</i>	43"	38'	
36	669	kousa dogwood	<i>Cornus kousa</i>	52" @ base	20'	
37	671	sugar maple	<i>Acer saccharum</i>	25"	25'	Remove wire on trunk
38	672	Japanese crabapple	<i>Malus floribunda</i>	44"	20'	
39	685	Japanese pagodatree	<i>Stephanalobium japonicum</i>	76"	55'	In a group of 3 behind sign
40	686	Japanese pagodatree	<i>Stephanalobium japonicum</i>	64"	50'	In a group of 3 behind sign
41	687	Japanese pagodatree	<i>Stephanalobium japonicum</i>	65"	45'	In a group of 3 behind sign
42	706	fringetree	<i>Chionanthus virginicus</i>	Multi stem	14'	left of entrance drive

Prep

Tree Management Plan for Marquand Park

APPENDIX 8: ASH INVENTORY AND MANAGEMENT

#	ID #	Common Name	Scientific Name	CBH 1	CBH 2	CBH3	DBH	Height	LifeExp	Failure	ImpactTarget	Conseq	Risk	Re	G_Pr	Sp_Pr	Comments
1	456	white ash	Fraxinus americana	150			47.8	100	>15	Probable	Low	Severe	Low				
2	190	white ash	Fraxinus americana	127			40.4	65	5~15	Probable	Medium	Significant	Moderate	Hi			Basal cavity, tree hangs over wires, topped by utility
3	470	white ash	Fraxinus americana	110			35.0	60	<5	Probable	Medium	Severe	Moderate	CR	A1	D	In decline.
4	613	white ash	Fraxinus americana	110			35.0	85	<5					A			Significant basal cavity, extensive dieback in cr. Bark peeling away.
5	412	white ash	Fraxinus americana	98			31.2	85	>15	Possible	Low	Minor	Low		B2	D, h	
6	152	white ash	Fraxinus americana	92	62		29.3	60	>15	Probable	Medium	Significant	Moderate		B2	d, h, elev	Leans over private residence
7	621	white ash	Fraxinus americana	89			28.3	95	>15	Probable	Medium	Severe	Moderate		A2	D	Lean over road, MTD
8	620	white ash	Fraxinus americana	88			28.0	90	>15	Probable	Low	Minor	Low		B2	D	
9	434	white ash	Fraxinus americana	84	65		26.8	85	5~15						C1	d,v	Smaller lead is hollow, will collapse < 5 yr. Main lead is covered with ivy.
10	421	white ash	Fraxinus americana	79			25.2	65	>15								
11	219	white ash	Fraxinus americana	74			23.6	85	>15	Possible	Low	Minor	Low		B2	d	
12	614	white ash	Fraxinus americana	71			22.6	60	<5					B			Extensive dieback in crown, significant lean, MTD, MRD
13	420	white ash	Fraxinus americana	64			20.4	60	>15								
14	416	white ash	Fraxinus americana	60	32		19.1	70	>15	Probable	Low	Minor	Low		B2	D	
15	438	white ash	Fraxinus americana	55			17.5	60	>15								
16	437	white ash	Fraxinus americana	51			16.2	55	>15								
17	364	white ash	Fraxinus americana	48			15.3	40	5~15								Missshapen crown
18	267	white ash	Fraxinus americana	45			14.3	48	>15						C2	d	
19	435	white ash	Fraxinus americana	42			13.4	50	>15								
20	451	white ash	Fraxinus americana	36			11.5	40	5~15								
21	426	white ash	Fraxinus americana	34			10.8	35	<5								
22	25	white ash	Fraxinus americana	33			10.5	30	0	Possible	Low	Significant	Low				
23	639	white ash 'Autumn purple'	Fraxinus americana	29			9.2	25	>15	Possible	Low	Negligible	Low				Needs mulch ring
24	495	white ash	Fraxinus americana	23	19	19	7.3	28	>15	Possible	Low	Minor	Low		C3	D, xbr	
			To be removed		2												
		Do not treat or	consider removal		7												
		Treat	>15 lifespan		15												
			Total		24												

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**APPENDIX 9: MARQUAND PARK TREE INVENTORY – SORTED BY
SCIENTIFIC NAME AND GROUPED BY GENERA**

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#	Common Name	Scientific Name	Species	%	Genera
1	Cilician fir	<i>Abies cilicica</i>	1	0.14	13 Abies
2	Fraser fir	<i>Abies faseri</i>	10	1.40	
3	Nordmann fir	<i>Abies nordmanniana</i>	2	0.28	
4	hedge maple	<i>Acer campestre</i>	1	0.14	243 Acer
5	paperbark maple	<i>Acer griseum</i>	1	0.14	
6	Japanese maple	<i>Acer palmatum</i>	35	4.90	
7	Japanese maple 'Bloodgood'	<i>Acer palmatum 'Bloodgood'</i>	1	0.14	
8	Norway maple	<i>Acer platanoides</i>	47	6.58	
9	red maple	<i>Acer rubrum</i>	13	1.82	
10	silver maple	<i>Acer saccharinum</i>	3	0.42	
11	sugar maple	<i>Acer saccharum</i>	142	19.89	
12	common horsechestnut	<i>Aesculus hippocastanum</i>	2	0.28	2 Aesculus
13	tree of heaven	<i>Ailanthus altissima</i>	1	0.14	1 Ailanthus
14	shadblow serviceberry	<i>Amelanchier canadensis</i>	6	0.84	6 Amelanchier
15	ironwood	<i>Carpinus caroliniana</i>	5	0.70	5 Carpinus
16	shellbark hickory	<i>Carya laciniosa</i>	3	0.42	8 Carya
17	shagbark hickory	<i>Carya ovata</i>	4	0.56	
18	mockernut hickory	<i>Carya tomentosa</i>	1	0.14	2 Castanea
19	Chinese chestnut	<i>Castanea mollissima</i>	2	0.28	
20	northern catalpa	<i>Catalpa speciosa</i>	1	0.14	1 Catalpa
21	blue atlas cedar	<i>Cedrus atlantica glauca</i>	1	0.14	4 Cedrus
22	Lebanon cedar	<i>Cedrus libani</i>	2	0.28	
23	Lebanon cedar	<i>Cedrus libani stenocoma</i>	1	0.14	
24	hackberry	<i>Celtis occidentalis</i>	6	0.84	6 Celtis
25	katsuratree	<i>Cercidiphyllum japonicum</i>	2	0.28	2 Cercidiphyllum
26	eastern redbud	<i>Cercis canadensis</i>	2	0.28	3 Cercis
27	Chinese redbud	<i>Cercis chinensis</i>	1	0.14	
28	blue Nootka falsecypress	<i>Chamaecyparis nootkatensis glauca</i>	1	0.14	11 Chamaecyparis
29	weeping nootka falsecypress	<i>Chamaecyparis nootkatensis pendula</i>	1	0.14	
30	hinoki falsecypress	<i>Chamaecyparis obtusa</i>	1	0.14	
31	Sawara falsecypress	<i>Chamaecyparis pisifera</i>	3	0.42	
32	threadleaf falsecypress	<i>Chamaecyparis pisifera 'Filifera'</i>	1	0.14	
33	golden thread-leaved sawara cypress	<i>Chamaecyparis pisifera 'filifera aurea'</i>	1	0.14	
34	plume falsecypress	<i>Chamaecyparis pisifera plumosa</i>	1	0.14	
35	moss Sawara cypress	<i>Chamaecyparis pisifera squarrosa</i>	1	0.14	
36	atlantic white cedar	<i>Chamaecyparis thyoides</i>	1	0.14	1 Chionanthus
37	white fringetree	<i>Chionanthus virginicus</i>	2	0.28	
38	American Yellowwood	<i>Cladrastis kentukea</i>	1	0.14	1 Cladrastus
39	flowering dogwood	<i>Cornus florida</i>	2	0.28	22 Cornus
40	kousa dogwood	<i>Cornus kousa</i>	18	2.52	
41	Cornelian cherry dogwood	<i>Cornus mas</i>	2	0.28	
42	hawthorn	<i>Crataegus sp.</i>	1	0.14	1 Crataegus
43	Japanese cryptomeria	<i>Cryptomeria japonica 'Lobbii'</i>	1	0.14	1 Cryptomeria
44	China fir	<i>Cunninghamia lanceolata</i>	1	0.14	1 Cunninghamia
45	dove tree	<i>Davidia involucrata</i>	2	0.28	2 Davidia
46	American persimmon	<i>Diospyros virginiana</i>	2	0.28	2 Diospyros
47	American beech	<i>Fagus sylvatica</i>	17	2.38	19 Fagus
48	purple leaf beech	<i>Fagus sylvatica 'Atrapunicea'</i>	1	0.14	
49	cutleaf European beech	<i>Fagus sylvatica 'Laciniata'</i>	1	0.14	
50	Franklinia Tree	<i>Franklinia altamaha</i>	3	0.42	3 Franklinia
51	white ash	<i>Fraxinus americana</i>	23	3.22	23 Fraxinus
52	ginkgo	<i>Ginkgo biloba</i>	2	0.28	2 Ginkgo
53	honey locust	<i>Gleditsia tricanthos</i>	1	0.14	1 Gleditsia
54	Kentucky coffeetree	<i>Gymnocladus dioicus</i>	1	0.14	1 Gymnocladus
55	Carolina silverbell	<i>Halesia carolina</i>	3	0.42	3 Halesia
56	largeleaf Japanese holly	<i>Ilex crenata</i>	1	0.14	4 Ilex
57	American holly	<i>Ilex opaca</i>	3	0.42	
58	black walnut	<i>Juglans nigra</i>	2	0.28	2 Juglans
59	red cedar	<i>Juniperus virginiana</i>	1	0.14	1 Juniperus
60	goldenrain tree	<i>Koelerutaria paniculata</i>	1	0.14	1 Koeleruteria

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61	European larch	<i>Larix decidua</i>	1	0.14	1 Larix
62	incense cedar	<i>Libocedrus decurrens</i>	1	0.14	1 Libocedrus
63	sweetgum	<i>Liquidambar styraciflua</i>	4	0.56	4 Liquidambar
64	tulip poplar	<i>Liriodendron tulipifera</i>	66	9.24	66 Liriodendron
65	cucumber tree	<i>Magnolia acuminata</i>	2	0.28	
66	cucumber tree	<i>Magnolia acuminata cordata</i>	1	0.14	
67	southern magnolia	<i>Magnolia grandiflora</i> 'Brackens Brown Beauty'	1	0.14	
68	yulan magnolia	<i>Magnolia heptapeta</i>	1	0.14	
69	kobus magnolia	<i>Magnolia kobus</i>	1	0.14	
70	pink star magnolia	<i>Magnolia stellata rosea</i>	1	0.14	9 Magnolia
71	sweet bay magnolia	<i>Magnolia virginiana</i>	1	0.14	
72	loebner magnolia	<i>Magnolia x loebneri</i>	1	0.14	
73	lenne magnolia	<i>Magnolia x soulangiana 'Lennei'</i>	1	0.14	
74	verbanica magnolia	<i>Magnolia x soulangiana verbanica</i>	1	0.14	
75	Japanese crabapple	<i>Malus floribunda</i>	1	0.14	
76	crabapple	<i>Malus sp.</i>	2	0.28	3 Malus
77	dawn redwood	<i>Metasequoia glyptostroboides</i>	2	0.28	2 Metasequoia
78	red mulberry	<i>Morus rubra</i>	1	0.14	1 Morus
79	black gum	<i>Nyssa sylvatica</i>	7	0.98	7 Nyssa
80	Persian ironwood	<i>Parrotia persica</i>	2	0.28	2 Parrotia
81	empress tree	<i>Paulonia tomentosa</i>	1	0.14	1 Paulonia
82	amur cork tree	<i>Phellodendron amurense</i>	20	2.80	20 Phellodendron
83	oriental photina	<i>Photina villosa</i>	1	0.14	1 Photina
84	Norway spruce	<i>Picea abies</i>	9	1.26	
85	dwarf Norway spruce	<i>Picea abies Maxwellii</i>	1	0.14	
86	Engleman spruce	<i>Picea engelmannii</i>	1	0.14	
87	Serbian spruce	<i>Picea omorika</i>	1	0.14	
88	oriental spruce	<i>Picea orientalis</i>	1	0.14	16 Picea
89	Colorado spruce	<i>Picea pungens</i>	1	0.14	
90	Colorado blue spruce	<i>Picea pungens glauca</i>	1	0.14	
91	tiger tail spruce	<i>Picea torana</i>	1	0.14	
92	Japanese red umbrella pine	<i>Pinus densiflora 'Umbraculifera'</i>	1	0.14	
93	Himalayan white pine	<i>Pinus griffithii</i>	1	0.14	
94	western white pine	<i>Pinus monticola</i>	1	0.14	
95	Japanese white pine	<i>Pinus parviflora 'glauca'</i>	1	0.14	
96	pitch pine	<i>Pinus rigida</i>	1	0.14	29 Pinus
97	eastern white pine	<i>Pinus strobus</i>	22	3.08	
98	columnar eastern white pine	<i>Pinus strobus 'Fastigiata'</i>	1	0.14	
99	Japanese black pine	<i>Pinus thunbergii</i>	1	0.14	
100	London planetree	<i>Platanus x acerifolia</i>	3	0.42	3 Platanus
101	sweet cherry	<i>Prunus avium</i>	4	0.56	
102	black cherry	<i>Prunus serotina</i>	14	1.96	
103	Kwanzan cherry	<i>Prunus serrulata 'Kwanzan'</i>	1	0.14	
104	autumn Higan cherry	<i>Prunus subhirtella 'Autumnalis'</i>	1	0.14	23 Prunus
105	weeping cherry	<i>Prunus subhirtella pendula</i>	1	0.14	
106	weeping Higan cherry	<i>Prunus subhirtella 'pendula'</i>	1	0.14	
107	Yoshino cherry	<i>Prunus x yedoensis</i>	1	0.14	
108	Douglas fir	<i>Pseudotsuga menziesii</i>	1	0.14	1 Pseudotsuga
109	white oak	<i>Quercus alba</i>	11	1.54	
110	scarlet oak	<i>Quercus coccinea</i>	1	0.14	
111	Japanese oak	<i>Quercus dentate</i>	1	0.14	
112	shingle oak	<i>Quercus imbricaria</i>	2	0.28	
113	pin oak	<i>Quercus palustris</i>	3	0.42	44 Quercus
114	willow oak	<i>Quercus phellos</i>	4	0.56	
115	English oak	<i>Quercus robur fastigiata</i>	1	0.14	
116	red oak	<i>Quercus rubra</i>	14	1.96	
117	black oak	<i>Quercus velutina</i>	7	0.98	
118	black locust	<i>Robinia pseudoacacia</i>	4	0.56	4 Robinia
119	Korean Stewartia	<i>Stewartia koreana</i>	1	0.14	1 Stewartia
120	Japanese Pagodatree	<i>Styphnolobium japonicum</i>	3	0.42	3 Styphnolobium
121	Japanese snowbell	<i>Styrax japonica</i>	2	0.28	2 Styrax

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122	common bald cypress	<i>Taxodium distichum</i>	1	0.14	1 Taxodium
123	English yew	<i>Taxus baccata</i>	2	0.28	
124	English yew	<i>Taxus baccata adpressa</i>	5	0.70	
125	English yew	<i>Taxus baccata adpressa</i>	3	0.42	
126	English yew	<i>Taxus baccata aurea</i>	1	0.14	13 Taxus
127	yellow fruited English yew	<i>Taxus baccata lutea</i>	1	0.14	
128	Japanese yew	<i>Taxus cuspidata</i>	1	0.14	
129	American arborvitae	<i>Thuja occidentalis</i>	1	0.14	
130	fastigate arborvitae	<i>Thuja occidentalis</i>	1	0.14	3 Thuja
131	oriental arborvitae	<i>Thuja orientalis</i>	1	0.14	
132	American linden	<i>Tilia americana</i>	22	3.08	
133	silver linden	<i>Tilia tomentosa</i>	1	0.14	23 Tilia
134	eastern hemlock	<i>Tsuga canadensis</i>	16	2.24	
135	cinnamon hemlock	<i>Tsuga canadensis cinnamomea</i>	1	0.14	19 Tsuga
136	largeleaf hemlock	<i>Tsuga canadensis macrophylla</i>	1	0.14	
137	weeping hemlock	<i>Tsuga canadensis 'pendula'</i>	1	0.14	
138	American elm	<i>Ulmus americana</i>	2	0.28	
139	English elm	<i>Ulmus procera</i>	1	0.14	6 Ulmus
140	slippery elm	<i>Ulmus rubra</i>	3	0.42	
141	blackhaw viburnum	<i>Viburnum prunifolium</i>	1	0.14	1 Viburnum
142	Japanese wisteria	<i>Wisteria floribunda</i>	1	0.14	1 Wisteria
143	Japanese zelkova	<i>Zelkova serrata</i>	2	0.28	2 Zelkova
			714	100.00	
	64 different Genera observed	Genera - 20 most widely represented	#	%	
		<i>Acer</i>	243	34.03	
		<i>Liriodendron</i>	66	9.24	
		<i>Quercus</i>	44	6.16	
		<i>Pinus</i>	29	4.06	
		<i>Prunus</i>	23	3.22	
		<i>Tilia</i>	23	3.22	
		<i>Fraxinus</i>	23	3.22	
		<i>Cornus</i>	22	3.08	
		<i>Phellodendron</i>	20	2.80	
		<i>Fagus</i>	19	2.66	
		<i>Tsuga</i>	19	2.66	
		<i>Picea</i>	16	2.24	
		<i>Abies</i>	13	1.82	
		<i>Taxus</i>	13	1.82	
		<i>Chamaecyparis</i>	11	1.54	
		<i>Ulmus</i>	6	0.84	
		<i>Celtis</i>	6	0.84	
		<i>Amelanchier</i>	6	0.84	
		<i>Robinia</i>	4	0.56	
		<i>Liquidambar</i>	4	0.56	
			610	85.43	

APPENDIX 10: ASSORTED TREE IMAGES FROM MARQUAND



Tulip polar # 189 with basal cavity – need to inspect further

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Base of white ash # 190 with leaning over Mercer Road



Large basal cavity of ash # 190 – Needs further inspection

Dead Taxus # 683 near parking lot white pine brush on the ground behind it is from the neighbor's tree





Recent Mower Root Damage to Norway maple # 616

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Tulip poplar # 624 near playground – has a 134” Circumference at Breast Height — has a 20’ dead top and is in decline – life expectancy of less than five years because of damage from mowers

Fungal fruiting body from a white rot root and butt rot fungus that has gained entry into the tree through multiple scars at base from Mower Root Damage and Mower Trunk Damage

The crown of this tree can be seen in the image on the next page

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This is the basal area of Japanese maple # 624 that has multiple examples of surface roots that have been repeatedly damaged by mowers. This tree is now in decline

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Wooded area near Mercer Road where several trees were lost in Sandy. This open area is a perfect spot to fit in some new native trees



Fresh example of Mower Root Damage





Paved entrance to the Park is in disrepair and needs to be attended to



**Open area up front near the intersection of Lover's and Stackton
has many opportunities for new plantings**



Invasive vine growth is gobbling up much great plant material

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**Japanese maple #651 -
The signature tree of Marquand Park**