TREE INVENTORY ANALYSIS & MANAGEMENT PLAN

The Holly Hills Special Business District

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EXECUTIVE SUMMARY

The Holly Hills *Standard Inventory Analysis and Management Plan*, written by Davey Resource Group, Inc. "DRG", focuses on addressing the maintenance needs of the Holly Hills Special Business District's (referred to as "Holly Hills" in this plan) tree resources. DRG completed a tree inventory for Holly Hills in August 2025, and analyzed the inventory data to understand the structure of the inventoried tree resource and provide maintenance recommendations.

In addition, DRG analyzed the available data from the City of St. Louis's tree inventory to determine species, size class, and condition compositions of Holly Hill's 2,246 trees. While this data is not completely up to date it offers the best route to determining general composition trends to guide future maintenance efforts.

TREE CHART KEY FOR TREE SURVEY

- Address - closest visible address to the tree
- Street - street location of the recorded Address
- Location - further clarification if tree is not clearly associated with a parcel, such as:
    - Street if tree is on side of lot
    - Island if tree is not between street and sidewalk
    - Other identifying information as necessary
- Common name = common or trade name
- Species = Latin name
- DBH = Diameter at Breast Height (4.5' above soil level)
    - On multi-stem trees the largest stem was measured

  Condition =
    - Good = free from any major defects or/or health concerns
    - Fair = minor defects and/or health concerns affecting less than 20% of the tree; tree will likely recover
    - Poor = significant defects and/or health concerns affecting more than 20% of the tree; tree may recover with additional care
    - Dead = Tree is either entirely dead or significant (>50%) dead wood with major defects to be considered functionally dead
- Risk = Risk Rating using the International Society of Arboriculture Basic Tree Risk Assessment Form and valid for 6 months from the date of data collection
- Work =
    - Remove = Remove tree
    - Prune = Prune to remove dead wood and/or defects
- Priority =
    1. Immediate action needed
    2. Action needed within 6-12 months
    3. Action needed within 12-24 months
- Notes
    - DW = dead wood present
        - Numbers marked with " indicate approximate size of deadwood in inches
    - DB = dieback observed
    - Other descriptions as necessary
        - "Large damaged branch over road," etc.

INTRODUCTION

The inventory of Holly Hills conducted by DRG includes data on 250 street trees and 97 trees located in medians within the Holly Hills SBD's service area. Only trees with defects judged to require mitigation within 24 months from the date of data collection were recorded; trees with minor defects, dead wood under 1", smaller caliper trees, and/or trees generally incapable of presenting any risk to residents were not recorded.

The City of St. Louis's inventory includes 2, 245 trees within the Holly Hills SBD maintenance boundaries in addition to 32 stumps and 308 vacant sites.

Recommended Approach to Tree Management

An effective approach to tree resource management follows a proactive and systematic program that sets clear and realistic goals, prescribes future action, and periodically measures progress. A robust tree management program establishes tree maintenance priorities using data on trees under the managers' care.

In August 2025, DRG surveyed the street and median trees within the Holly Hills SBD service area to develop this management plan. Consisting of two sections, this plan considers the diversity, distribution, and condition of the inventoried tree population and provides a prioritized system for managing the SBD's tree resource.

- **Section 1: Structure and Composition of the Tree Resource** summarizes the inventory data with trends representing the current state of the tree resource.
- **Section 2: Recommended Management of the Tree Resource** details a prioritized management program designed to prioritize safety, healthy, and diversity in the urban forest
- **Section 3: Maintenance Schedule And Budget** provides an estimated budget for recommended maintenance activities over a five-year period.
- **Section 4: Tree Planting Plan** discusses priority planting areas and maximizing return on investment in tree planting, as well as proper species selection and planting techniques

SECTION I:

STRUCTURE AND COMPOSITION OF THE TREE RESOURCE

In August 2025, Mark Halpin of DRG collected site data for a tree inventory contracted by Holly Hills. In addition, the **City of St. Louis Forestry Division provided inventory data for all 2,246 trees within the Holly Hills SBD service area**. This section analyzes the composition of the tree resource according to species, condition, and size class.

It is important to note that population wide data obtained from the City of St. Louis's tree inventory has not been entirely updated since 2017; the data analysis is therefore approximate but may still serve to demonstrate general trends.

SPECIES COMPOSITION AND DIVERSITY

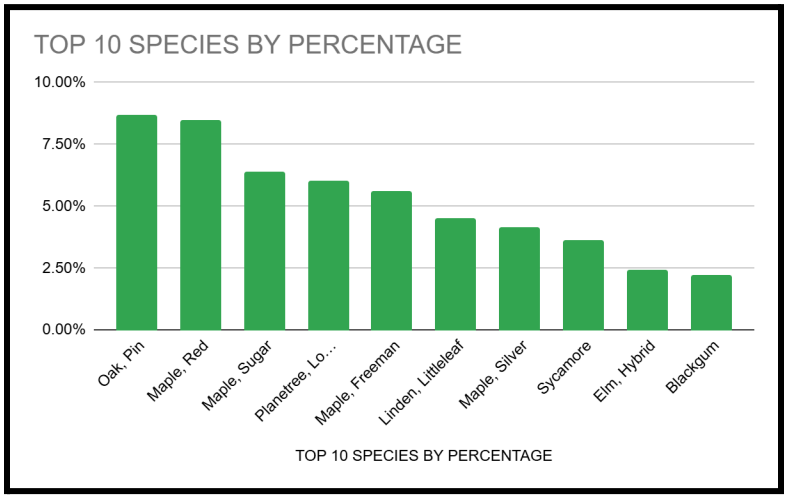
The tables below show the most commonly occurring trees in Holly Hills, grouped by Family. Genus and Species. These metrics are useful for analyzing diversity and planning future work.

TOP 5 FAMILIES BY PERCENTAGE		
SAPINDACEAE	Maple	26.86%
FAGACEAE	Oak	14.20%
PLATANEAE	Planetrees	10.41%
ULMACEAE	Elm	5.81%
MALVACEAE	Lindens	4.64%
TOP 5 GENERA BY PERCENTAGE		
ACER	Maple	26.86%
QUERCUS	Oak	14.20%
PLATANUS	Planetree/Sycamore	10.41%
TILLIA	Linden	4.64%
ULMUS	Elm	3.60%

TOP 10 SPECIES BY PERCENTAGE		
Oak, Pin	*Quercus palustris*	8.67%
Maple, Red	*Acer rubrum*	8.48%
Maple, Sugar	*Acer saccharum*	6.39%
Planetree, London	*Platanus x acerifolia*	6.04%
Maple, Freeman	*Acer x freemanii*	5.61%
Linden, Littleleaf	*Tillia cordata*	4.53%
Maple, Silver	*Acer saccharinum*	4.14%
Sycamore	*Platanus occidentalis*	3.64%
Elm, Hybrid	*Ulmus x*	2.44%
Blackgum	*Nyssa sylvatica*	2.24%

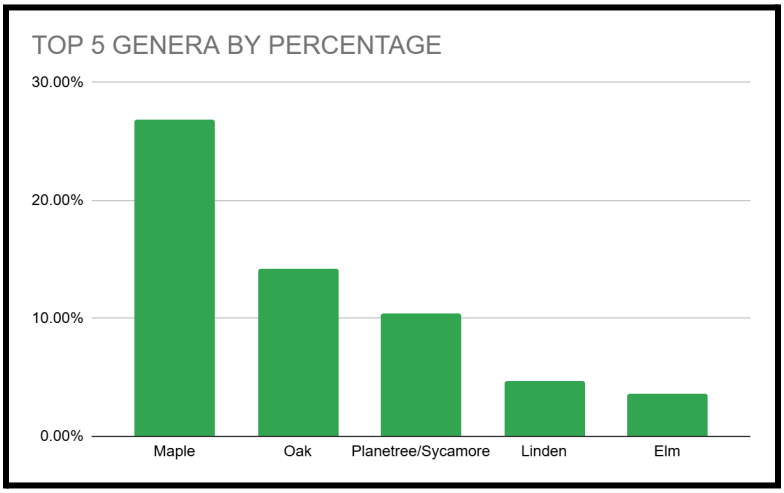
The 10-20-30 rule is a common standard for tree population distribution, in which a single species should compose no more than 10% of the tree population, a single genus no more than 20%, and a single family no more than 30% (Santamour 1990). **This rule is a useful guideline for assessing species diversity in urban tree populations.**

The table above and accompanying chart show Holly Hills' distribution of the 10 most abundant tree species inventoried. Pin oak, red maple, sugar maple, London plane tree and Freeman maple (a silver/red maple hybrid) are the 5 most abundant species; pin oak and red maple are both under 10%.

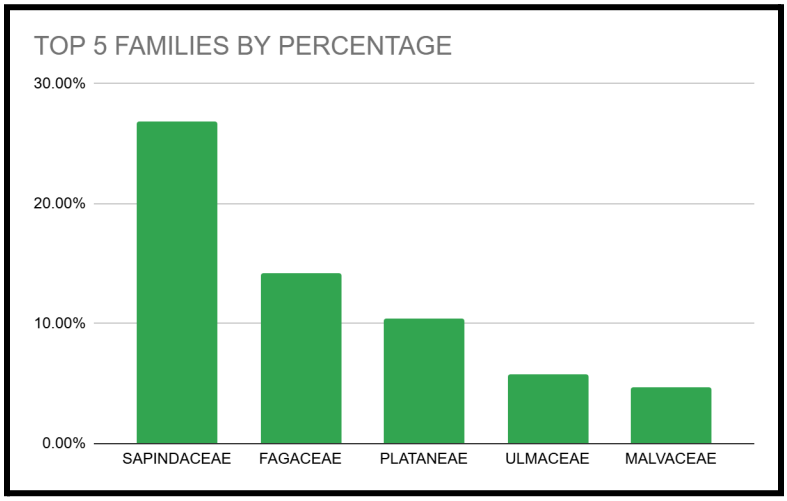


GENUS & FAMILY COMPOSITION

The tables here show the top 5 genera and top 5 families present in the inventory. **Only the maple genus (*Acer*), in the *Sapindaceae* family, exceeds the threshold.** At 26.86%, maples are in excess of the 20% threshold.



The second most abundant genus is oak (*Quercus*), in the family Facageae, at 14.2% and below the threshold. The *Platanus* genus (planetree family, *Platanaceae*), containing London plane tree and American sycamore, is likewise well below the threshold.



At the family level, no family is above the threshold of 30%. Only the Sapindaceae (which includes maples) comes close at 26.86%.

Discussion

These findings should be tempered with the consideration that the 10-20-30 rule is simply a benchmark. Maple is one of the most abundant naturally occurring genus in Missouri and high percentages of maples and Sapindaceous plants itself is not overly concerning in our state. **However, red maple, freeman maple, sugar maple and silver maple have all been overplanted in our region** and Holly Hills' high percentage of these species is somewhat concerning. The maple genus exceeds the recommended threshold and should be planted in minimal numbers.

Oak is the cornerstone genus of Missouri's forests and as such the relatively high percentage of oaks is not a concern.

KEY TAKEAWAYS:

- Future plantings should gravitate away from the Maple genus, and favor species other than the overplanted maple species. Other maples such as *Acer miyabei* 'State Street' and *Acer truncatum* (Shantung maple) may be used in limited numbers.
- The percentage of northern pin oak in the inventory approaches the threshold; this species has been overplanted in our region. Future plantings should rely on a diverse palette of other Missouri native oak species and omit pin oak.
- No other species or genus are present in numbers to cause concerns in regards to diversity.

Having a diverse tree species distribution makes urban forests less likely to be significantly damaged by a single pest or disease outbreak, ensuring that the landscaping remains healthy and visually appealing. A mix of tree species adds variety in terms of color, shape, size, and texture, which can enhance the overall beauty of the landscape. Varying growth rates, sizes and characteristics also spreads out maintenance types and costs by ensuring that tree populations do not all develop uniformly.

With the exception of maples, Holly Hills appears to have quite good species, genus and family diversity.

PEST SUSCEPTIBILITY

Early diagnosis of disease and infestation is essential to ensuring the health and continuity of the tree resource.

Pest Susceptibility Recommendations

The abundance of maples and oaks in Holly Hills' tree resource is a management concern because it creates unnecessary risk in the event of an invasive pest outbreak. This abundance is not only more tree resource to lose but is also more habitat for the pests it is susceptible to, making it easier for them to spread. Increasing species diversity is a critical goal that will help Holly Hills' tree resources be resilient in the event of future pest invasions.

While it might be prudent for Holly Hills to limit planting species in the Sapindaceae and Fagaceae families, **efforts to improve diversity at the genus and species level are a better use of short-term resource**s until more research is done on family diversity as a mechanism for promoting system resilience. For this reason, Holly Hills should use its resources to inspect trees in the *Acer* and *Quercus* genus for signs of infestation on a routine basis, so affected trees can be quarantined or removed to contain the pest before an outbreak starts.

OF PARTICULAR CONCERN ARE THE FOLLOWING DISEASES:

The Asian longhorned beetle (ALB) is an invasive insect that attacks and kills maple and other hardwood trees. The insect grows inside trees and feeds on the living tissues that carry nutrients. Trees cannot heal from the damage ALB causes. Infested trees can become safety hazards since branches can drop and trees can fall, especially during storms. (From

https://www.aphis.usda.gov/plant-pests-diseases/alb).

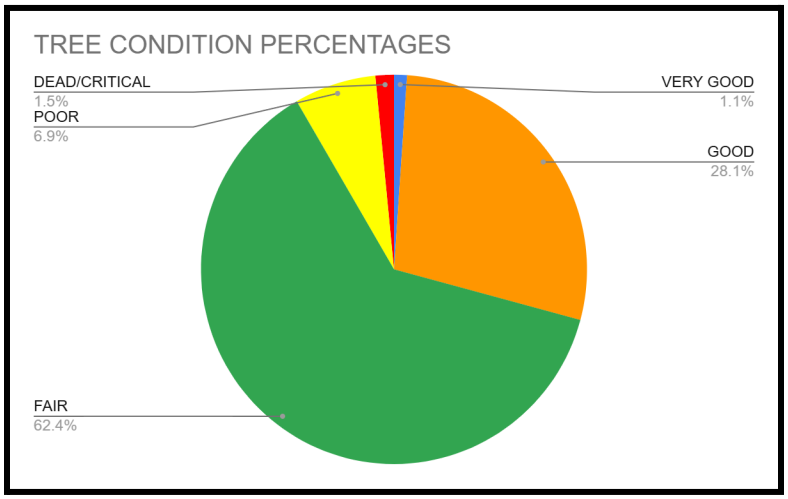
ALB is not currently present in Missouri but is likely to appear in our state within the next decade and could be disastrous for maple populations. **This is more reason to limit maple plantings**.

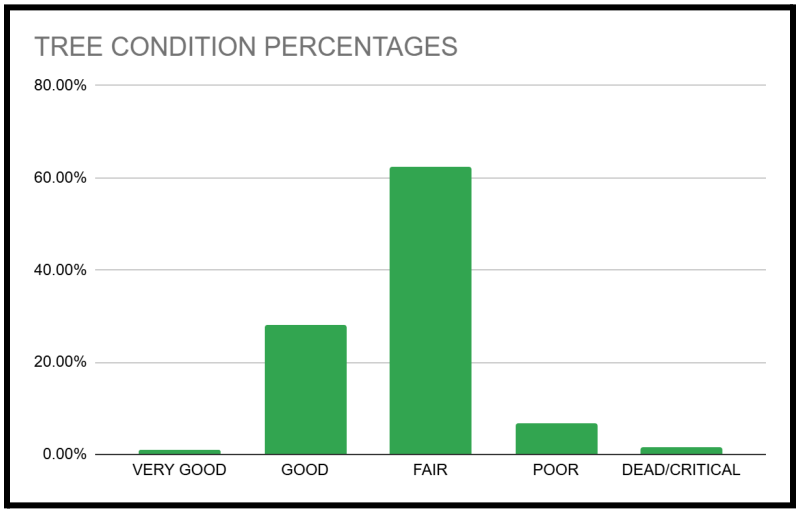
Oak wilt is a lethal disease of oaks, especially species in the red oak group. The fungus responsible, *Bretziella fagacearum*, invades the tree, causing it to die. In Missouri, the oak wilt fungus is spread primarily when sap-feeding beetles carry oak wilt spores to fresh wounds during the early part of the growing season. Once established in a tree, oak wilt can move though root grafts to nearby oaks. (From https://mdc.mo.gov/trees-plants/diseases-pests/oak-wilt)

Oak wilt is best managed by not pruning mature oak trees during its active season (Mid-March through June although it is best to avoid warm-season pruning altogether) and proactive removal of infected trees.

CONDITION

Several factors affect condition rating for each tree, including root characteristics, branch structure, trunk, canopy, foliage condition, and the presence of pests. The condition of each inventoried tree was rated as Very Good, Good, Fair, Poor, Critical or Dead (the category 'Excellent' is also present in the inventory in miniscule numbers and was combined with Very Good to simplify). The general health of the inventoried tree population was characterized by the most prevalent condition assigned during the inventory.





Condition analysis of the inventoried population is shown in the accompanying charts (note both charts show the same data in different formats. Dead and Critical have been combined to make the charts more concise).

The data shows most of the inventoried trees were recorded in Fair or Good condition. Based on these data, the general health of the inventoried tree population is rated as Fair. Holly Hills has a low percentage of dead trees and trees in Poor condition, so the general health of the Holly Hills's tree resource will approach Good with heightened maintenance activities.

Condition Recommendations

- **Dead and Critical trees should be removed as soon as practicable,** because the health of these trees is unlikely to recover even with increased care and present a risk. However, smaller trees in these categories typically present little risk and may be left until funding or work availability allows.

- Younger trees rated in Fair or Poor condition may benefit from structural pruning to improve their health over time. Pruning should follow ANSI A300 (Part 1) guidelines.
- Poor condition ratings among mature trees were generally due to visible signs of decline and stress, including decay, dead limbs, sparse branching, or poor structure.
- Poor condition trees may be raised to Fair with proper care (pruning, plant health care) particularly when young. Older trees in Poor condition may be retained, sometimes for prolonged periods of time, with proper monitoring and pruning. **However it is important to consider return-on-investment when maintaining trees in Poor condition; if a tree is unlikely to survive through a 5 year pruning cycle it may not be prudent to invest funds in its maintenance.**

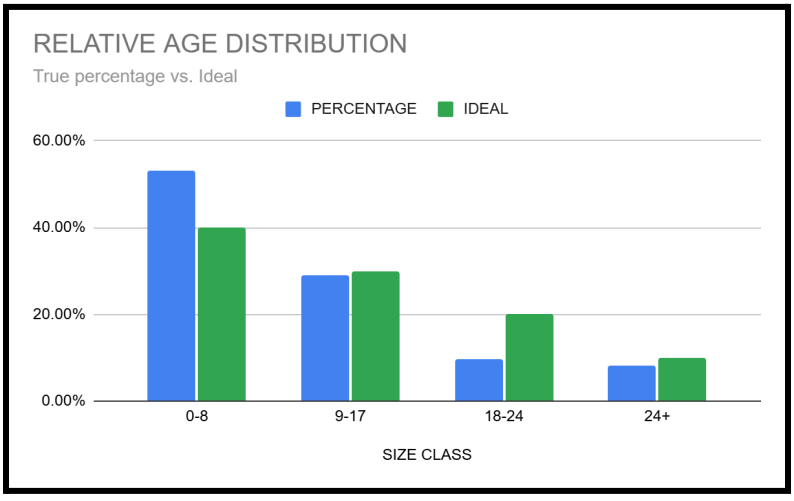
RELATIVE AGE DISTRIBUTION

The chart below shows the relative age distribution of Holly Hills' trees compared to an ideal distribution based on industry standards:

RELATIVE AGE DISTRIBUTION		
SIZE CLASS	**PERCENTAGE**	**IDEAL**
0-8	53.23%	40.00%
9-17	28.95%	30.00%
18-24	9.58%	20.00%
24+	8.11%	10.00%

Analysis of a tree population's relative age distribution is performed by assigning age classes to the size classes of inventoried trees, offering insight into the maintenance needs of Holly Hills' tree resource. The inventoried trees are grouped into the following relative age classes:

- **Young trees** (0–8 inches diameter at breast height (DBH))
- **Established trees** (9–17 inches DBH)
- **Maturing trees** (18–24 inches DBH)
- **Mature trees** (greater than 24 inches DBH)



These size classes were chosen so that the inventoried tree resource

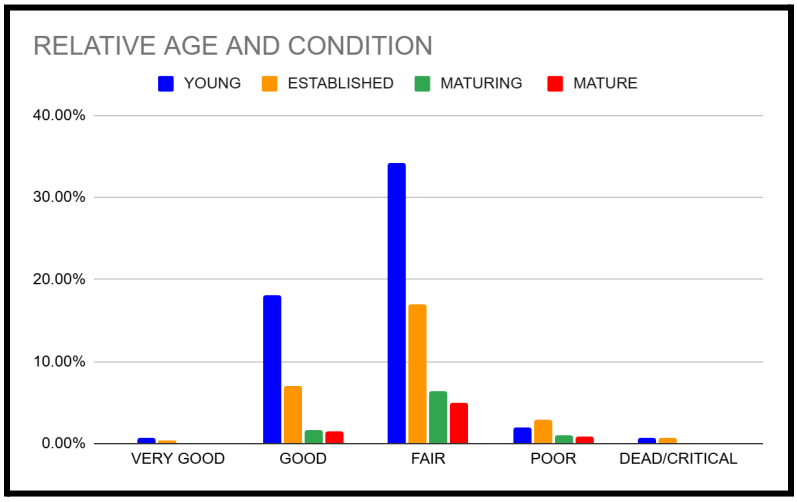
can be compared to the ideal relative age distribution, which holds that the largest proportion of the inventoried tree population (approximately 40%) should be young trees, while a smallest proportion (approximately 10%) should be mature trees (Richards 1983). The chart above shows this comparison. Since tree species have different lifespans and mature at different diameters, actual tree age cannot be determined from diameter size class alone, yet size classifications can be extrapolated into relative age classes. The chart above analyzes Holly Hills' relative age distribution compared to the ideal.

As shown in the chart above, Holly Hills has an overabundance of young trees (over 12%), a negligible shortage of established trees, and a significant shortage of maturing trees (just over 10%). Mature tree percentage is slightly below ideal.

It is important to note that the City's inventory data has not been fully updated since 2017 and the true age distribution may be somewhat different. Based on a visual estimate of Holly Hills the analyzed data appears to be fairly close to reality.

Relative Age Recommendations

While Holly Hills has an excess of young trees and a shortage of maturing trees, it has a low percentage of trees in these relative age/size classes in poor condition, as shown in the accompanying chart. This indicates that young trees have the potential of reaching maturity if they are well maintained.



Likewise, the maturing trees in Fair or better condition are likely to survive if given proper care; while this category may be the one in which Holly Hills is lacking it is also the most resilient category of trees, meaning that numbers may stabilize and reach ideal percentages with the adoption of a maintenance plan.

- **DRG recommends that Holly Hills concentrate on young and maturing tree maintenance to conserve the condition of young trees as they age, while seeking to conserve mature trees.**
- **Tree planting should never be abandoned, but should not be top priority.**

- Holly Hills should focus on tree preservation and proactive care of maturing trees, to protect them from unnecessary removal and to prevent them from succumbing to treatable defects. Prioritizing proactive maintenance above tree planting will shift the relative age distribution towards the ideal over time.

Much young tree maintenance such as structural pruning, watering and mulching can be performed by volunteers and thus may pose little direct cost to the Holly Hills SBD. This highlights the importance of establishing community engagement in supporting Holly Hills' tree resources.

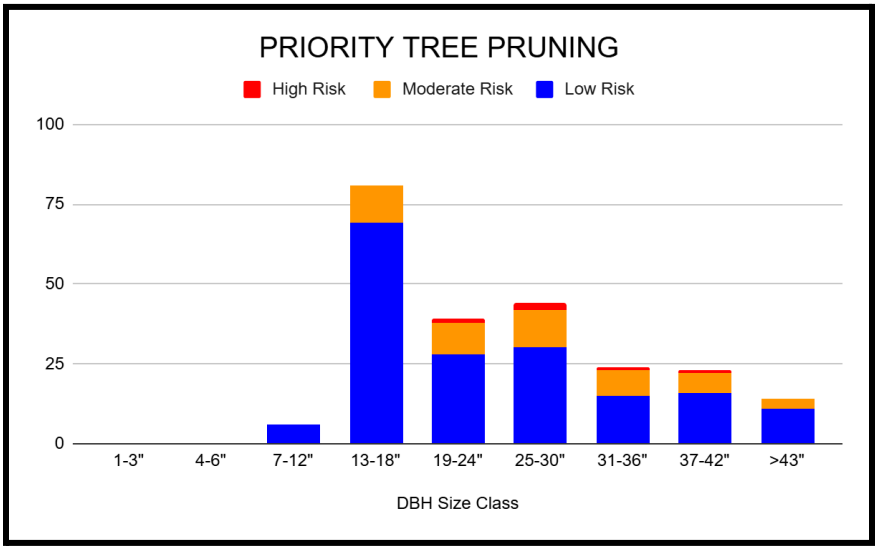
SECTION II:

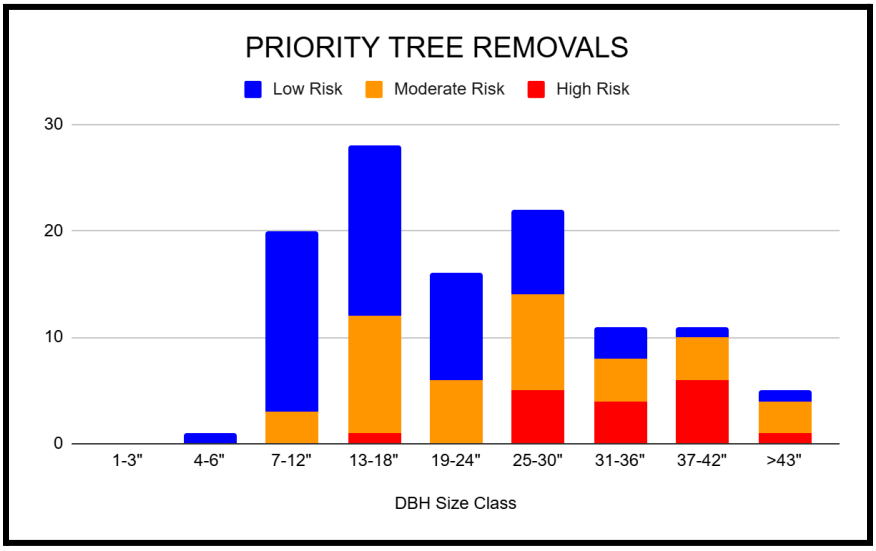
RECOMMENDED MANAGEMENT

During the inventory, both a risk rating and a recommended maintenance activity were assigned to each tree. DRG recommends prioritizing and completing each tree's recommended maintenance activity based on the assigned risk rating. This five-year tree management program takes a multi-faceted and proactive approach to tree resource management.

RISK MANAGEMENT AND RECOMMENDED MAINTENANCE

The two charts to the right show recommended priority tree pruning and removal work based on risk and size class.





Although tree removal is usually considered a last resort, and may sometimes create a reaction from Holly Hills residents, there are circumstances in which removal is necessary. Trees fail from natural causes such as diseases, insects, and weather conditions, and from physical injury due to vehicles, vandalism, and root disturbances. DRG recommends that trees be removed when corrective pruning will not adequately mitigate risk or when correcting problems would be cost-prohibitive. DRG recommends that tree maintenance activities are prioritized and completed based on the risk rating that

was assigned to each tree during the inventory. The following section describes recommended maintenance for each risk rating category.

Diseased, dying, and nuisance trees warrant removal. Even though large short-term expenditures may be required, it is important to secure the funding needed to complete priority tree removals. Expedient removal reduces risk and promotes public safety. The following sections briefly summarize the recommended removals identified during the inventory.

HIGH PRIORITY RECOMMENDED MAINTENANCE

Pruning or removing High Risk trees is strongly recommended to be prioritized and completed as soon as possible. In general, maintenance activities should be completed first for the largest diameter trees (>25") that pose the greatest risk. Once addressed, recommended tree maintenance activities should be completed for smaller diameter trees (<25") that pose the greatest risk. Addressing High Risk trees in a timely and proactive manner often requires significant resources to be secured and allocated. However, performing this work expediently will mitigate risk, improve public safety, and reduce long-term costs.

PRIORITY TREE REMOVALS				PRIORITY TREE PRUNING			
DBH Size Class	High Risk	Moderate Risk	Low Risk	DBH Size Class	Low Risk	Moderate Risk	High Risk
1-3"		0	0	1-3"	0	0	
4-6"		0	1	4-6"	0	0	
7-12"		3	17	7-12"	6	0	
13-18"	1	11	16	13-18"	69	12	
19-24"		6	10	19-24"	28	10	1
25-30"	5	9	8	25-30"	30	12	2
31-36"	4	4	3	31-36"	15	8	1
37-42"	6	4	1	37-42"	16	6	1
>43"	1	3	1	>43"	11	3	
TOTALS	**17**	**40**	**57**	**TOTALS**	**175**	**51**	**5**

High Priority Pruning Recommendations

The inventory identified 5 High Risk trees recommended for pruning in size classes from 26-52 inches DBH. These trees will be pruned in winter through spring of 2026.

High Priority Removal Recommendations

DRG identified 17 High Risk trees recommended for removal. The diameter size class for the High Risk trees ranged from 14-52 inches DBH. DRG recommends that trees be removed when pruning will not correct their defects, eliminate the risks that their defects cause, or when corrective pruning would be cost-prohibitive. This tree should be removed immediately based on its risk rating and size class.

This list has been passed on to the City of St. Louis Forestry Division and will be removed as soon as budget and staffing allow.

MODERATE AND LOW PRIORITY RECOMMENDED MAINTENANCE

Pruning or removing Moderate and Low Risk trees are generally the next priorities for maintenance activities. For efficiency, Moderate and Low Risk removals may also be addressed when removing adjacent higher risk trees. Most trees recommended for pruning with these risk levels can be maintained during proactive, routine pruning cycles. DRG recommends implementing proactive maintenance programs incrementally over time as the backlog of risk is reduced.

Moderate Risk Pruning Recommendations

Moderate Risk pruning should be performed after all High Risk recommended maintenance is complete and may be performed concurrently with other Moderate Risk removals. **The inventory identified 51 Moderate Risk trees recommended for pruning.** The diameter size classes for Moderate Risk trees ranged between 13-43 inches DBH.

Moderate Risk Removal Recommendations

DRG identified 40 Moderate Risk trees recommended for removal. All Moderate Risk trees recommended for removal ranged from 7-12-43 inches or greater DBH.

This list has been passed on to the City of St. Louis Forestry Division and will be removed as soon as budget and staffing allow.

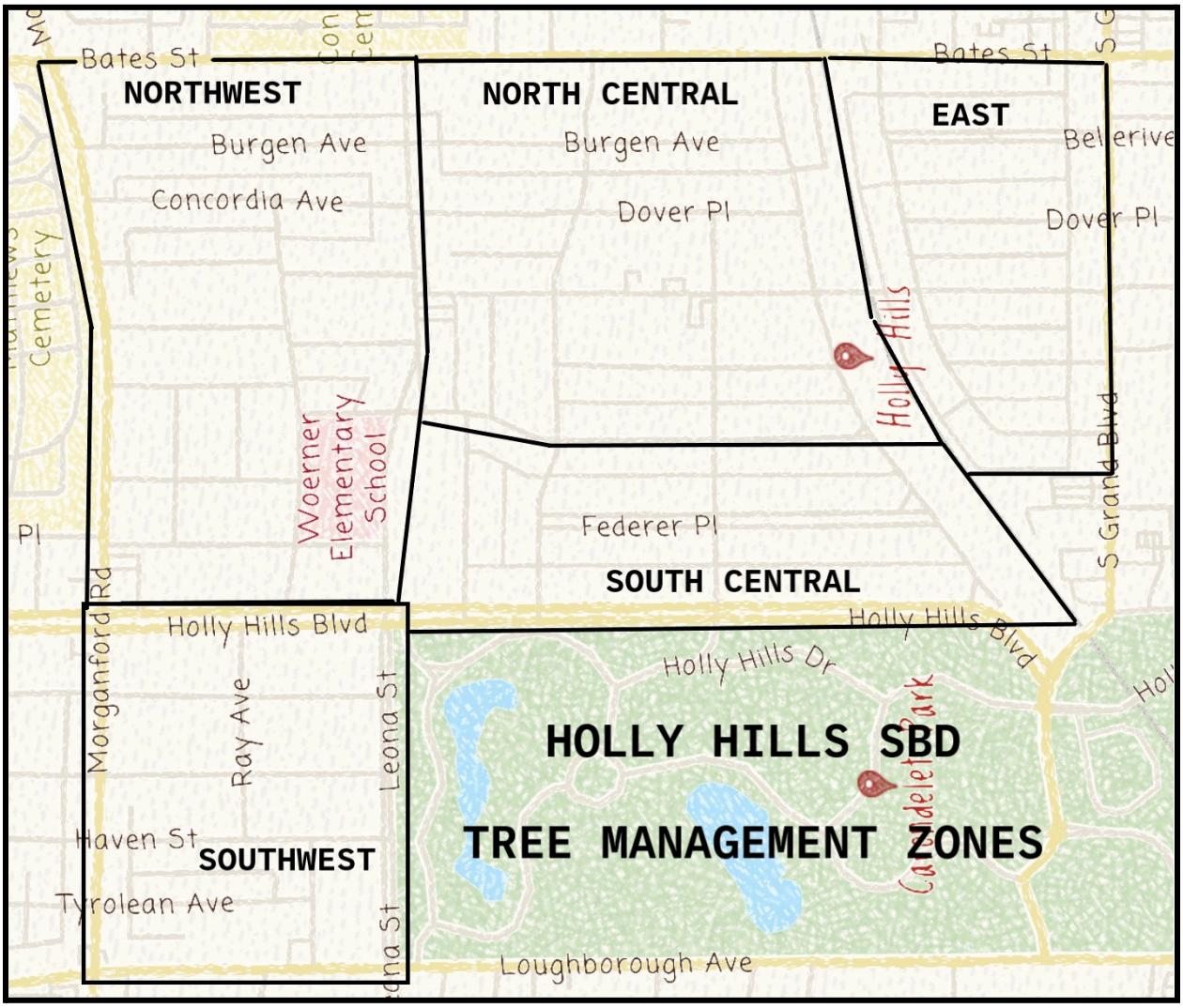
Low Priority Removal Recommendations

DRG identified 57 Low Risk trees recommended for removal, which ranged from 7-12 to 43 inches or greater by DBH size class**.** Low Risk removals pose little threat; these trees are generally small, dead, invasive, or poorly formed trees that need to be removed. Eliminating these trees will reduce breeding site locations for insects and diseases and will increase the aesthetic value of the

area. Healthy trees growing in poor locations or undesirable species are also included in this category.

All Low Risk trees should be removed when convenient after all higher risk pruning and removals have been completed and may be performed concurrently with routine pruning.

ROUTINE MAINTENANCE



HOLLY HILLS SBD PROPOSED TREE MANAGEMENT ZONES (NOT INCLUDING CARONDELET PARK):

- Northwest (NW) - Bates, Leona (west side), Federer, Morganford (east side)
- Southwest (SW) - Holly Hills (including medians), Leona (including medians), Loughborough (north side), Morganford (east side)
- North Central (NC) - Bates, Arendes, Bowen, Leona (east side including island at Bowen)
- South Central (SC) - Federer, Arendes, Holly Hills (including medians), Leona (east side)
- East (E) - Bates, S. Grand, Bowen, Dewey

Proposed maintenance zones are shown on the map above. In practice each zone will likely have slightly different tree counts, species and size class compositions, general condition ratings and

maintenance needs. If significant differences are found to a degree that budgeting is adversely affected the boundaries may be shifted as needed.

ROUTINE INSPECTIONS

Inspections are essential to uncovering potential problems with trees. They should be performed by a qualified arborist who is trained in the art and science of planting, caring for, and maintaining individual trees. Arborists are knowledgeable about the needs of trees and are trained and equipped to provide proper care. Ideally, the arborist will be ISA Certified and also hold the ISA Tree Risk Assessment Qualification credential.

Routine Inspection Recommendations

All trees should be regularly inspected and attended to as needed; of particular importance is inspecting larger trees for risk. When trees require additional or new work, they should be added to the maintenance schedule. The budget should also be updated to reflect the additional work. Utilize a spreadsheet to make updates, edits, and keep a log of work records. In addition to locating trees with unidentified defects, inspections also present an opportunity to look for signs and symptoms of pests and diseases. Holly Hills has a large population of trees that are susceptible to pests and diseases, including ash, maple, and oak.

- **DRG recommends that Holly Hills perform routine inspections by windshield survey (inspections performed from a vehicle) in line with ANSI A300 (Part 9) annually and after all severe weather events**, to identify defects with heightened risk, signs of pest activity, and symptoms of disease.
- When trees need additional maintenance, they should be added to the work schedule immediately.
- **The City's inventory includes 1,027 trees over 7" DBH and 564 over 13" DBH, meaning ~800 trees would likely benefit from an annual inspection.**

ROUTINE PRUNING CYCLE

Based on Miller and Sylvester's research (*An Economic Evaluation of the Pruning Cycle*), DRG recommends five-year Routine Pruning cycles to maintain the condition of the inventoried tree resource.

The Routine Pruning cycle includes all Low Risk trees that received a "Prune" maintenance recommendation, which included 175 trees in the August 2025 survey. These trees should be addressed after all High and Moderate Risk pruning is completed.

Estimating that Holly Hills has a total of ~2,245 trees, a 5-year maintenance cycle would encompass ~450 trees per year to cover the entire tree population over the full cycle. Assuming that an average

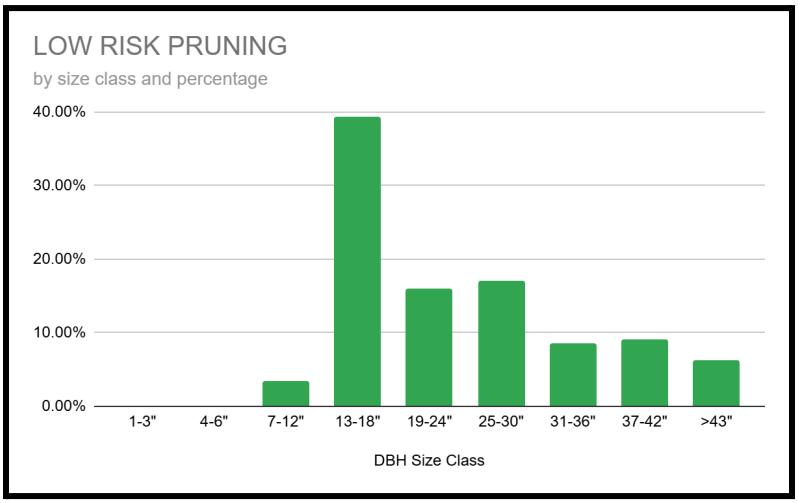
of 15-25% of trees will need to be pruned annually, between roughly 65-115 should be serviced annually.

These trees will likely pose some risk but have a smaller defect size and/or a lower probability of impacting a target. Over time, routine pruning can minimize reactive maintenance, limit instances of elevated risk, and provide the basis for a robust risk management program.

Routine Pruning Cycle Recommendations

Holly Hills' 2025 tree survey included 175 Low Risk trees that should be included in the routine pruning cycle, and DRG recommends that the Holly Hills establish a five-year Routine Pruning. DRG recommends that the Routine Pruning cycle begins in Year One of the proposed five-year program, after all High Risk Recommended Maintenance is complete.

The table to the right shows the size class distribution of these trees; over 55% fall between 13-24" DBH



The annual Level 1 windshield assessment should include a more in-depth inspection of the tree population to refine the pruning cycle for coming years.

YOUNG TREE TRAINING CYCLE

Trees included in the Young Tree Training cycle are generally less than 8 inches DBH. These younger trees sometimes have branch structures that can lead to potential problems as the tree ages. Potential structural problems include codominant leaders, multiple limbs attaching at the same point on the trunk, or crossing/interfering limbs. If these problems are not corrected, they may worsen as the tree grows, increasing its risk rating and creating potential liability.

The recommended length of a Young Tree Training cycle is three years because young trees tend to grow at faster rates than mature trees. The Young Tree Training cycle differs from the Routine Pruning cycle in that the Young Tree Training cycle generally only includes trees that can be pruned from the ground with a pole pruner or pruning shear.

The City's tree inventory contains 1,064 trees between 1-8" DBH not rated as Critical or Dead and only 38 in Poor condition. With proper care the majority of these trees may graduate into larger size classes.

Young Tree Training Cycle Recommendations

DRG recommends that Holly Hills implement a three-year Young Tree Training cycle beginning after the completion of all Extreme and High Risk Recommended Maintenance activities, or concurrently if volunteer labor is available. The Young Tree Training cycle is vital for the future condition of the inventoried tree population.

- **DRG recommends that an average of between 150-250 trees be trained with structural pruning each year** over three years, beginning in Year One of the management program.
- 672 trees in the inventory are below 3" DBH and may require little or no pruning

When new trees are planted, they should enter the Young Tree Training cycle after establishment, typically within 2–3 years after planting. In future years, the number of trees in the Young Tree Training cycle will be based on tree planting efforts and growth rates of young trees. Holly Hills should strive to training-prune approximately one-third of its young trees each year.

Some Young Tree Training tasks can be accomplished with volunteer labor if training is adequate; partnering with organizations such as STL Neighborhood Foresters can help achieve these goals without added costs.

Trees with complex structural problems, particularly trees at the larger end of the Young Tree size class range that have gone unmaintained for many years, will likely require expert intervention. **410 trees fall between 5-8" DBH and are likely to require professional care.**

SECTION III:

MAINTENANCE SCHEDULE AND BUDGET

Utilizing 2025 Holly Hills tree inventory data, an annual maintenance schedule was developed detailing the recommended tasks to complete each year. DRG made budget projections using industry knowledge and public bid tabulations. A complete table of estimated costs for Holly Hills's five-year tree management program follows - note that tree planting and young tree training costs are omitted for brevity.

This schedule provides a framework for completing the recommended inventoried tree maintenance over the next five years. Following this schedule can shift tree maintenance activities from being reactive to a more proactive tree care program.

To implement the maintenance schedule, Holly Hills' tree maintenance budget should be:

- **No less than $38,280 for the first year of implementation.**
- **No less than $50,640 for the second year.**
- **$47,320, $45,150 and $40,810 each of the final three years of the maintenance schedule.**

Annual budget funds are needed to ensure that High Risk trees are expediently managed and that the vital Young Tree Training and Routine Pruning cycles can begin as soon as possible. If routing efficiencies and/or contract specifications allow more tree work to be completed in a given year, or if this maintenance schedule requires adjustment to meet budgetary or other needs, then it should be modified accordingly. Unforeseen situations such as severe weather events may arise and change the maintenance needs of trees. If maintenance needs change, then budgets, staffing, and equipment should be adjusted to meet the new demand

HOLLY HILLS BUDGET SHEET

Activity Cost			Year 1		Year 2		Year 3		Year 4		Year 5		Five-Year Cost
High Priority Pruning	25-30"	$1,030	2	$2,060		$0		$0		$0		$0	$2,060
	31-36"	$1,160	1	$1,160		$0		$0		$0		$0	$1,160
	37-42"	$1,260	2	$2,520		$0		$0		$0		$0	$2,520
	>43"	$1,370		$0		$0		$0		$0		$0	$0
Activity Total(s)			**5**	**$5,740**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$5,740**
Moderate Priority Pruning	13-18"	$690		$0	12	$8,280		$0		$0		$0	$8,280
	19-24"	$910	6	$5,460	4	$3,640		$0		$0		$0	$9,100
	25-30"	$1,030	9	$9,270	3	$3,090		$0		$0		$0	$12,360
	31-36"	$1,160	5	$5,800	3	$3,480		$0		$0		$0	$9,280
	37-42"	$1,260	5	$6,300	1	$1,260		$0		$0		$0	$7,560
	>43"	$1,370	3	$4,110	0	$0		$0		$0		$0	$4,110
Activity Total(s)			**28**	**$30,940**	**23**	**$19,750**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$50,690**
Routine Inspection	Drive-by Assessment	$1	600	$600	600	$600	600	$600	600	$600	600	$600	$3,000
	Walk-by Assessment	$5	200	$1,000	200	$1,000	200	$1,000	200	$1,000	200	$1,000	$5,000
Activity Total(s)			**800**	**$1,600**	**800**	**$1,600**	**800**	**$1,600**	**800**	**$1,600**	**800**	**$1,600**	**$8,000**
Routine Pruning Cycle	7-12"	$210		$0	0	$0	2	$420	2	$420	2	$420	$1,260
	13-18"	$690		$0	0	$0	19	$13,110	20	$13,800	30	$20,700	$47,610
	19-24"	$910		$0	7	$6,370	7	$6,370	7	$6,370	7	$6,370	$25,480
	25-30"	$1,030		$0	6	$6,180	8	$8,240	8	$8,240	8	$8,240	$30,900
	31-36"	$1,160		$0	3	$3,480	5	$5,800	4	$4,640	3	$3,480	$17,400
	37-42"	$1,260		$0	4	$5,040	4	$5,040	8	$10,080		$0	$20,160
	>43"	$1,370		$0	6	$8,220	5	$6,850		$0		$0	$15,070
Activity Total(s)			**0**	**$0**	**26**	**$29,290**	**50**	**$45,830**	**49**	**$43,550**	**50**	**$39,210**	**$157,880**
Activity Grand Total			**833**		**849**		**850**		**849**		**850**		**4,231**
Cost Grand Total				**$38,280**		**$50,640**		**$47,430**		**$45,150**		**$40,810**	**$222,310**

The above table is provided in spreadsheet format as well so that the SBD can explore different numbers and pricing options to create realistic budgets for ongoing projects.

Note that this budget reflects nearly “ideal” maintenance practices, and excellent maintenance can still be provided with smaller budgets. However with smaller budgets work should be targeted and prioritized to a higher degree to ensure optimal efficiency. This can be done by slightly shifting funds towards Routine Inspection. Even a few hours of extra inspection time can help re-prioritize work and ensure that trees in greatest need of service are addressed.

SECTION IV

PLANTING RECOMMENDATIONS

PLANTING FOR MAXIMIZED BENEFITS

While tree planting should not be a top priority for Holly Hills currently, it is important to focus on planting at least enough trees to account for natural mortality (typically 2-5% in urban areas). For Holly Hills this would be 45-112 trees per year. **Due to the high percentage of young trees and the need to prioritize mature/maturing tree maintenance, lower numbers (20-30) would likely be adequate for the next several years.**

Targeting plantings to increase Return-on-Investment is important. Avoid planting in low-quality sites (tree lawn widths less than 3 feet should be avoided) and focus on larger sites that can support quality shade trees.

- **A mature shade tree such** as bur oak (*Quercus macrocarpa*) or Kentucky coffee tree (*Gymnocladus dioicus*) **provides between 4-5 times the benefits of the equivalent ornamental tree** such as redbud (*Cercis canadensis*) or flowering cherry (*Prunus spp.*).

To help prioritize plantings, DRG has ranked all Vacant sites in the City's inventory within Holly Hills using three qualifiers:

1. Tree Lawn Width
2. Traffic Calming Priority
3. Special Considerations

TREE LAWN WIDTH

Holly Hills has several streets with premium tree lawn sizes which should be prioritized for future plantings:

- Dover Place - Tree Lawns are 8-9' wide
- Holly Hills Blvd - Tree Lawns are ~12' wide
- Leona St - Tree lawns are up to 14' wide

TRAFFIC CALMING PRIORITY

Trees can act in a traffic calming capacity by causing roads to appear more narrow, thus reducing speeds. Combined with other traffic safety measures, trees can help keep areas with high pedestrian traffic safer.

DRG identified 3 main arterial roads in Holly Hills - Holly Hills Blvd, Leona St,, and Wilmington Ave. - as traffic calming priority areas.

Priority was ranked 1-3:

- Arterial roads with special considerations (see below) were ranked Priority 3
- Arterial roads without considerations were ranked Priority 2
- All other roads ranked Priority 1

SPECIAL CONSIDERATIONS

In addition, DRG identified 3 areas of unusually high pedestrian traffic:

1. **Woerner Elementary School**
2. **St. Stephen Protomartyr**
3. **Epiphany Lutheran Church**

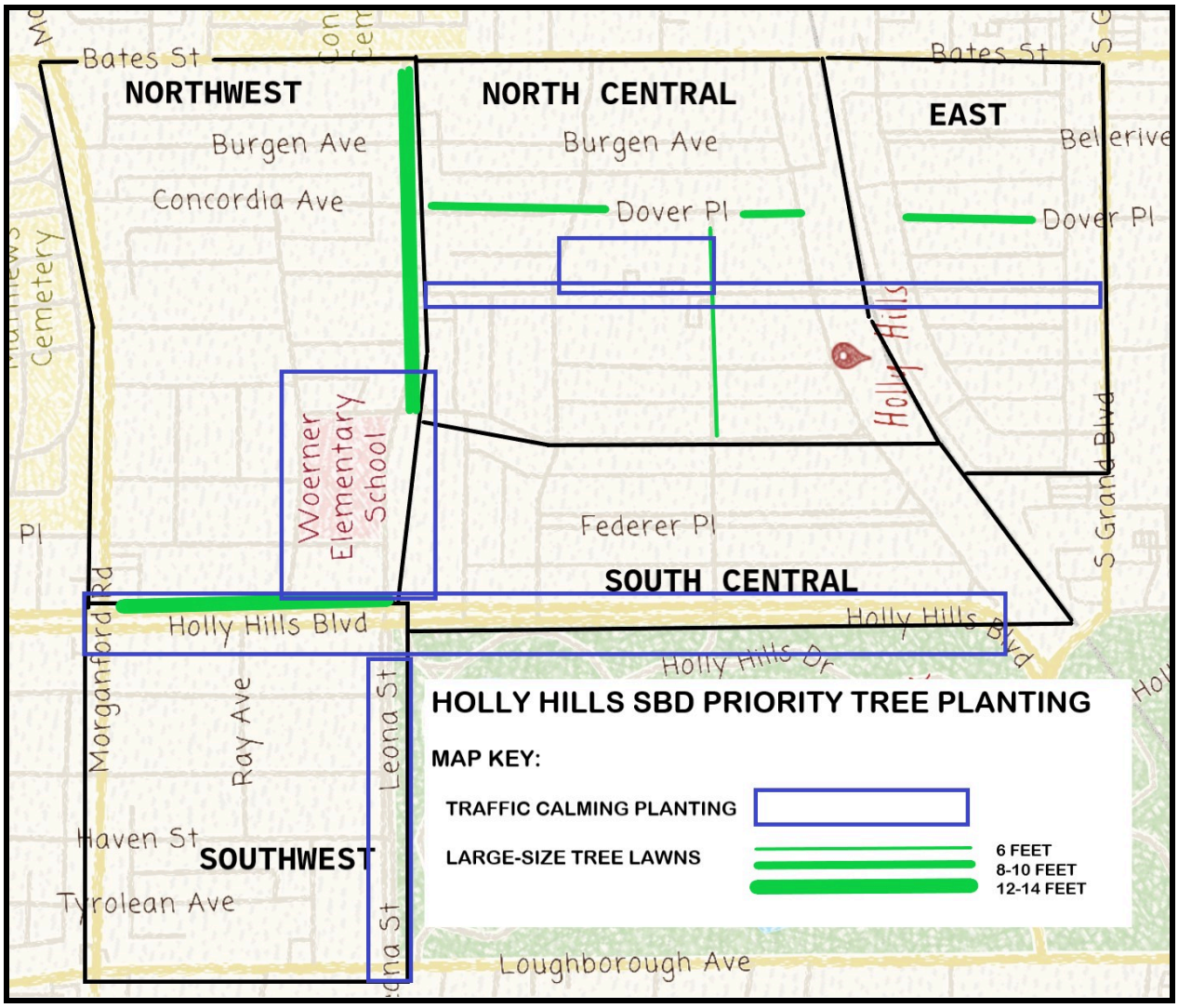
These areas deserve special consideration due to the high number of children walking near them. In addition, Epiphany Church and Woerner Elementary are both located close to the intersection of Leona and Holly Hills, already identified as a traffic calming priority area by the SBD.

PRIORITY RANKING

All sites were sorted by tree lawn width, traffic calming priority based on volume of traffic, and special considerations.

- Sites with large tree lawns, traffic calming priority ranking of 3 (special considerations) were assigned an overall ranking of “A”
- Sites with large tree lawns and traffic calming priority ranking 2 were assigned a ranking of “A”
- Sites were assigned an overall ranking of “B” if they had only:
    - large tree lawns OR
    - Traffic calming priority
- Sites with tree lawns 6’ or less and no traffic calming priority were assigned an overall ranking of “C”

These sites are provided as a separate sheet. A map showing the traffic calming and large tree lawn zones is below:



HOLLY HILLS PRIORITY PLANTING ZONES

SPECIES SELECTION

It's important to consider a variety of factors that will ensure the trees are both aesthetically pleasing and functional for the community. Consider trees that offer vibrant flowers, colorful autumn foliage, and a mix of evergreen trees. Ensure the tree selection and planting locations comply with City of St. Louis tree ordinances. Native trees are well-suited to the local climate and soil, which means they require less maintenance, water, and pest control. They also support local wildlife. However, careful use of non-native species that have proven themselves to be adaptable, dependable and devoid of invasive characteristics can increase species diversity without detriment to native ecosystems.

This species list has been selected for tolerance to the Missouri region, as well as for general pest resistance. In addition to proper tree selection, good cultural practices can encourage tree health:

- Plant trees slightly above grade to prevent root ball saturation.
- Avoid planting large trees too close to buildings, sidewalks, or utilities.
- Prune trees regularly to encourage air flow through their canopies.

This list is by no means exhaustive or all-inclusive; trees recommended by local resources such as the Missouri Department of Conservation and the Missouri Botanical Gardens are acceptable planting options. DRG intends this list to provide examples of either underutilized species or cultivars of common species that are well-suited for environments such as those of Holly Hills.

Recommended Species - Shade Trees

Liriodendron tulipifera 'Emerald City'
'Emerald City' tulip tree
Height: 55'
Spread: 25'
Description:
Tulip tree is a top performer, a tough, disease and stress-resistant native flowering tree with excellent ecological benefits. However its mature size of 100+ feet can quickly become a liability in urban environments. With a smaller size and a thicker, leathery leaf that holds up to heat and drought better, 'Emerald City' retains all of the benefits of the straight species without its problems.

Gymnocladus dioicus
'Espresso' Kentucky Coffee Tree
**Missouri Native Species*
Height: 50'
Spread: 35'
Description:
Large, frond-like, doubly compound leaves form a canopy of dappled shade that gives this city-tough tree an airy, tropical feel. The arching branches of this seedless selection present an elm-like shape as the tree matures. Good tolerance of heat, drought, cold and alkaline soils.
Produces leaves late, defoliates early and does not provide dense shade, making it easier to grow grass in its dripline.

Quercus texana
Nuttall oak
**Missouri Native Species*
Height: 60'
Spread: 50'
Description:
Native to wet, heavy, bottomland soils in floodplain forests along the gulf coasts and up the Mississippi river basin. Nuttall oak is a beautiful, large, shade tree and provides rich, red-orange fall color. Well adapted to a wide range of soil types, it does well in low moist areas but is also drought tolerant once established.

Quercus phellos
Willow oak
**Missouri Native Species*
Height: 75'
Spread: 50'
Description:
Easily grown in average, medium to wet, well-drained soils in full sun. Tolerates light shade. Prefers moist, well-drained loams but adapts to a wide range of soil conditions including clays with somewhat poor drainage. Currently one of the best performing trees at Holly Hills.

Taxodium distichum
Bald cypress 'Shawnee Brave'
Height: 75'
Spread: 20'
**Missouri Native Species*
Description:
Shawnee Brave Bald Cypress is a cultivar of bald cypress that is more narrow, grows a strong leader and denser foliage than the straight species. Tolerates a wide range of soil conditions ranging from average to wet soils. It also tolerates deer, erosion, clay soil and air pollution.
Bald cypress is currently one of the best performing trees at Holly Hills.

Taxodium ascendens
Pond cypress 'Greenfeather', 'Debonair'
Height: 50'
Spread: 20'
Description:
Upright, narrow tree selections offer a uniform growth rate while tolerating extremes including drought and standing water conditions. Excellent alternative to T. distichum to encourage species diversity.

Nyssa sylvatica
Black tupelo
**Missouri Native Species*
Height: 65'
Spread: 35'
Description:
Grows well in medium to wet soils in full sun to part shade and prefers moist, acidic soils. It tolerates poorly-drained soils as well as dry conditions. Excellent red fall color. Cultivars such as 'Wildfire', 'Afterburner' and 'Green Gables' have superior form to the straight species.

Maclura pomifera
'White Shield' Osage orange
Height: 35’
Spread: 35’
Description:
Both fruitless and thornless, this tough Midwest native is heat and drought tolerant with remarkably dark green, glossy foliage. A very fast grower (up to 3’ per year) with no common pests or diseases. One of the toughest trees.

Recommended Species - Ornamental Trees

Cladrastis kentuckea
Yellowwood
Height: 40’
Spread: 40’
Description:
Yellowwood is a medium- to large-sized tree with smooth bark, large hanging clusters of fragrant white flowers, and clear yellow fall color. Choose a yellowwood tree for excellent shade in a small to medium sized landscape.

Magnolia virginiana
Sweetbay Magnolia
Height: 35’
Spread: 20’
Description:
Easily grown in acidic, medium to wet soils in full sun to part shade. Prefers moist, rich, organic soils, but, unlike most other magnolias, tolerates wet, boggy soils. Features cup-shaped, sweetly fragrant (lemony), 9-12 petaled, creamy white, waxy flowers (2-3" diameter) which appear in mid-spring and sometimes continue sporadically throughout the summer.

Chionanthus virginicus
Fringetree
**Missouri Native Species*
Height: 20’
Spread: 20’
Description:
Chionanthus virginicus, commonly called fringetree, is a deciduous, Missouri native shrub or small tree with a spreading, rounded habit that typically grows 12-20' tall. Naturally occurring in wet areas, it is tolerant of prolonged periods of soil moisture. Common name refers to the slightly fragrant, spring-blooming flowers which feature airy, terminal, drooping clusters (4-6" long) of fringe-like, creamy white petals.

Recommended Species - Conifers for Screening

Juniperus virginiana
'Canaertii' Juniper
**Missouri Native Species*
Height: 35 feet
Spread: 15 feet
Description:
Tolerates a wide range of soils and growing conditions, from swamps to dry rocky glades. Prefers moist soils but is intolerant of constantly wet soils. It has the best drought resistance of any conifer native to the eastern U.S. ‘Canaertii’ is a compact pyramidal cultivar with ascending branching that grows to 20’ tall over the first 15 years.

CONCLUSION:

EVALUATING AND UPDATING THIS PLAN

This Standard Inventory Analysis and Management Plan provides management priorities for the next five years, and it is important to update the tree inventory as work is completed, so the software can provide updated species distribution and benefit estimates.

This empowers staff to self-assess the Holly Hills's progress over time and set goals to strive toward by following the adaptive management cycle. Below are some ways of implementing the steps of this cycle:

- Prepare planting plans well enough in advance to schedule and complete stump removal in the designated area, and to select species best suited to the available sites.
- Annually comparing the species distribution of the inventoried tree resource with the previous year after completing planting plans to monitor recommended changes in abundance.
- Schedule and assign high-priority tree work so it can be completed as soon as possible instead of reactively addressing new lower priority work requests as they are received.
- Include data collection such as measuring DBH and assessing condition into standard procedure for tree work and routine inspections, so changes over time can be monitored.

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