DIXIE HIGHWAY TROLLEY LINE

TREE REMOVAL & REPLACEMENT PLAN

Ft. Mitchell, KY | May 2018

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1. HISTORY:

In 1950 the trolley line from Covington to Fort Mitchell was decommissioned and the City made a decision to transform that excess right of way into green space. The City installed sidewalks along Dixie Highway and planted trees in the right-of-way that today are mature and provide a very pleasant environment for residents.

In 2016 the City of Fort Mitchell was considering applying for a grant to widen the sidewalks along this stretch of Dixie Highway which would have required the removal and replacement of some trees. During the course of that process it was identified that many of the trees in the right-of-way were reaching the end of their life expectancy and were species ill-suited for long-term. While the grant application was not made, it was recommended that the City look at the comprehensive removal and replacement of trees in the near future.

2. PROJECT AREA:

This project will focus on the area along the west side of Dixie Highway from Sunnymeade Drive to the gas station located just north of Beechwood Road. The right of way in the project area varies anywhere from 15 - 35 feet and currently has approximately 70 trees.

3. GOALS:

1. Provide protection and to make sure that removal of all trees are conducted with proper considerations and adequate replacement program.

2. Provide and maintain healthy street trees.

3. Expand and improve upon the established Urban Forestry of the City of Ft. Mitchell.

4. SITE CONDITIONS

As a prominent greenway along Dixie Highway entering the City of Ft. Mitchell, the Ft. Mitchell Trolley line Right-of-Way (ROW) corridor is a highly visible and well used asset to the community with a well establish but aging and declining tree canopy. In addition to it aesthetic value it is also a major pedestrian connection from Beechwood Road to the Downtown core.

There are limiting factors that will have impact on the tree selections and placement. The Corridor varies in width from 15' to 35' with Dixie highway to the north east and the ROW line to the southwest. This width is minimized by the presence of overhead utility lines the entire length of the corridor and sidewalk. Due to these obstacles tree species and location have been carefully studied to not encroach upon these lines or encroach upon the sidewalk corridor.

5. TREE INVENTORY FINDINGS

Within the entire population, 67% of the trees are in Fair or Worse condition; A Certified Arborist from Davey Resource Group, Inc. assessed and inventoried 69 public trees located along the Dixie Highway Trolley Line Right-of-Way on U. S. Route 25. Seven tree species were recorded during the inventory. The most common species were Callery pear, crabapple, and hawthorn. The majority (54%) of the inventoried trees were in Fair condition, 33% were considered to be in Good condition, and 13% were in Poor condition.

6. TREE INVENTORY DATA ANALYSIS

- Within the entire population, 67% of the trees were in Fair or Worse condition. They will likely have a shortened service life and/or require frequent and higher levels of maintenance in the long term.
- All the pear trees have inherently poor structure. The trees have been repeatedly pruned for aerial line clearance and several trees have trunk and branch defects. Therefore, it is likely there will be frequent limb and trunk failures during storms.
- Two species comprise almost 70% of the population. It is preferred that no one species comprise 10% of any tree population.
- 39% of the trees are Callery pear; the Kentucky Exotic Pest Plant Council classifies this species as an invasive tree and a "severe threat" to native ecosystems.
- Although most of the trees are under 20" dbh, there is decent diversity in sizes and ages.
- Considering the species and condition of the Dixie Highway trees, the trees will likely only have 10 more years of service before they decline, die, or need to be removed after severe weather events.

7. DISCUSSION

In general, the positive aspects of the Dixie Highway Trolley Line trees are that most are currently in Fair condition, pose minimal safety risks, and have few structural defects. Aspects of the trees that negatively affect sustainability and value to the community are that the trees are comprised primarily of short-lived species, are invasive species that threaten the native habitat, are subject to structural limb failure, and are prone to insect and disease infestations.

Overall, the evaluation of the inventory data reveals that the Dixie Highway Trolley Line tree population is currently not sustainable without expensive and frequent maintenance and intervention.

8. RECOMMENDATIONS

The trees along the highly visible and highly traveled Dixie Highway Trolley Line route should not only be attractive but should reflect the city's dedication to providing a high quality of life and effectively using municipal resources to do so.

It is recommended that the city take a proactive management approach to enhancing the Dixie Highway Trolley Line corridor by implementing phased tree replacement project. Over a period of no more than 2 to 3 years, the existing trees should be removed and replaced with new trees that meet the criteria for long-term sustainability – diverse species matched to the site conditions; species that are low maintenance, insect and disease resistant, and attractive; and ones that will provide the citizens and community multiple benefits for years to come. A new landscape design that incorporates current industry standards and best management practices for tree species and site selection could transform the Dixie Trolley Line corridor into a showcase of sustainable forest management and be a source of civic pride.

1. INVENTORY/ASSESSMENT METHODOLOGY

In December 2017, a Certified Arborist from Davey Resource Group, Inc. (Davey) assessed and inventoried the public trees located along the Dixie Highway Trolley Line on U. S. Route 25. Data for the following tree and site attributes were collected:

- Location - The nearest street address for each tree along the trolley line was assigned to each tree.
- Species – A tree was identified by genus, species, and cultivar when possible.
- Size – Size was measured in diameter inches at breast height (dbh), 4.5 feet above ground level.
- Condition - The general health of a tree population indicates how well trees are performing given their site-specific conditions. General health affects both short-term and long-term maintenance needs and costs as well as canopy continuity. The condition factors considered for each tree included rooting characteristics, branch structure, trunk, canopy spread, and the presence of pests. The condition of each inventoried tree was recorded as Excellent, Good, Fair, Poor, or Critical according to International Society of Arboriculture's Best Management Practices for Tree Inventories (See Appendix 3 for more detailed definitions).
- Risk Assessment – A Level 2 risk assessment was performed for each tree according to the ANSI A300 (Part 9) standards for risk assessment. Risk was rated as Low, Moderate, or High; risk level depends both on the condition of the tree and the potential targets that could be damaged by failure of the tree or a tree part.
- Observations - Notes about the tree or site conditions, such as presence of insects, structural defects, mechanical damage, etc., were recorded.
- Representative photographs of site and tree conditions were taken.

2. INVENTORY FINDINGS/STATISTICS

A total of 69 trees were inventoried along the historic Dixie Highway Trolley Line right-of-way. The complete inventory data are found in Appendix 4. Data analysis of the tree population characteristics can reveal current conditions and trends that can guide short-term and long-term tree management planning. The inventory data was analyzed and the following findings were revealed:

SPECIES:

Seven (7) distinct tree species were recorded during the inventory. The most common species were Callery pear, crabapple, and hawthorn. The total species count is presented in Table 1, and the distribution percentages are found in Figure 1.

Species	Number of trees
Callery pear	27
Crabapple	21
Hawthorn	12
Red maple	4
Golden raintree	3
Witch hazel	1
Blue spruce	1

Table 1. Tree Species Composition with Total Number of Trees per Species

TREE SPECIES DISTRIBUTION

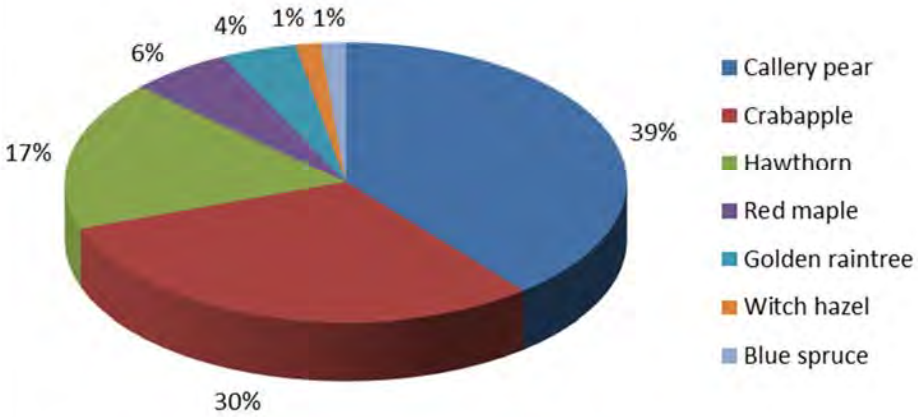


Figure 1. Tree Species Distribution, expressed as a percentage of the entire population.

SIZE:

Measuring diameter size is important for risk assessment, can provide an estimate of the relative age of the trees, and offers insight into the future canopy. Based on diameter measurements alone, it would appear that the majority of trees fall into young or mid-life stages, but considering the species present, these diameter measurements indicate established, mature trees. The tree population's size distribution can be seen in Table 2.

Diameter Range	Number of Trees	Percent
0-8"	19	28%
9-17"	44	64%
18-24"	6	9%

Table 2. Number of Trees in Each Size Category

LOCATION:

Knowing the location of each tree by block allows easier maintenance planning and may provide insight into preferred sites for future planting. The breakdown of tree location is presented in Table 3. The blocks are not all the same length, so the quantities do not necessarily reflect an inequity in distribution.

Location - Dixie Highway blocks, as Designated by Side Streets	Number of trees
Beechwood Rd. and north	4
Beechwood Rd. to Woodlawn Ave.	5
Woodlawn Ave. to Greenbriar Ave.	16
Greenbriar Ave. to Burdsall Ave.	16
Burdsall Ave. to Pleasant Ridge Ave.	8
Pleasant Ridge Ave. to Superior Dr.	10
Superior Dr. to Sunnymede Dr.	10

Table 3. Number of Trees per Block

TREE CONDITION:

Most (54%) of the inventoried trees were in Fair condition, (Figure 2), with a total 87% of trees surveyed considered to be Fair, Good, or Excellent condition. Trees in Poor or Critical conditions comprised 13% of the tree population.

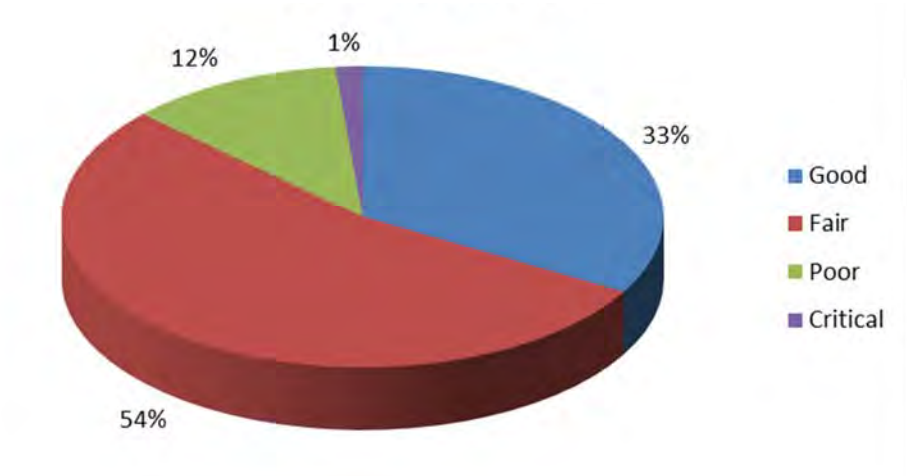


Figure 2. Condition of trees, as a percentage of the total population.

RISK LEVEL:

The majority (52) of the trees assessed were found to be Low risk, with only 2 trees falling into the High risk category (Table 4).

Risk Assessment	Number of Trees
High	2
Moderate	15
Low	52

Table 4. Risk Assessment of Trees.

3. DIXIE HIGHWAY TROLLEY LINE TREE POPULATION ISSUES AND DISCUSSION

The trees along the highly visible and highly traveled Dixie Highway Trolley Line route should not only be attractive, but should reflect the city's dedication to providing a high quality of life and effectively using municipal resources to do so. A sustainable tree population along Dixie Highway, as well as in the city as a whole, will provide maximum benefits to citizens, workers, and visitors and require less resources to keep it safe and healthy.

In general, a sustainable urban forest is a forest that is diverse, with species well-suited to site conditions, insect and disease resistant, and low maintenance. A tree population meeting these criteria is sustainable, resilient, and produces maximum social, economic, and ecological benefits for the community. The Dixie Highway Trolley Line tree population has been assessed to determine it's current level of sustainability. The factors considered in that assessment are discussed below.

IMPORTANT SUSTAINABILITY FACTORS:

- Condition – The overall health of trees has a direct impact on the sustainability of the urban forest. Trees in worse condition require more maintenance, are at greater risk of insect and disease problems, and can present a risk to the public. Trees in better condition require less maintenance, are less prone to storm damage, look better, and provide maximum environmental services to the city.
- Structure - Structural defects in trees are negatively associated with the overall viability of the forest in both the short and long terms. Codominant stems and included bark can lead to the tree splitting or losing significant limbs, particularly during wind or ice events. Girdled roots and trees planted at less than ideal depth (no root collar visible) can lead to overall failure of the tree. Poor species selection and site choice can lead to conflicts with public infrastructure, such as power lines, which often leads to severe and unsightly pruning.
- Risk/Public Safety - Overall risk of failure and potential for endangering public safety are dependent on many of the other factors of forest sustainability. Poor condition, structural defects, and an aging canopy are just a few variables that can increase risk. Trees can disrupt sidewalks and present an obstacle or a tripping hazard for pedestrians. A tree that puts the public at risk is more likely to be significantly pruned which may reduce the health of the tree and potentially lead to premature removal.
- Insects and Disease - Insects and disease, though often a natural part of the ecosystem, can threaten the future health of a forest. The damage from insect and diseases creates weaknesses in the tree's crown and protective bark that can lead to infestations from other pests and diseases, creating a cycle of susceptibility and decay. Without intervention, which is often costly in terms of both time and money, an invasive pest or disease can destroy the structural integrity and vitality of a tree within a few short years, often causing tree death and presenting a risk to public safety.

- Invasive Species - Invasive species biology is a relatively new field, and as such our knowledge of what an invasive species is can change rapidly. There are many plants that were once celebrated for their beauty, ability to grow quickly, or grow in poor conditions that are now considered invasive. Invasive plants present risk to the sustainability of a forest by out competing native species for available natural space. Additionally, they often grow out of control and can be a burden to try to maintain at an acceptable level. Hillsides in Northern Kentucky have been taken over by both honeysuckle and Callery pear, degrading the native ecosystem, disrupting natural beauty, and sometimes obstructing views.
- Species Diversity - Species diversity is integral to the sustainability of any forest. A forest with low diversity is far more susceptible to pests and diseases and doesn't provide as many ecosystem services. For example, ash trees are a beautiful tree and were planted widely throughout many cities, but because of the emerald ash borer and the over-population of the ash species, owners now have to contend with either expensive and repeated treatment or removal. For overall sustainability, the "10-20-30 Rule" should be followed; where the forest is comprised of no more than 10% of one species, no more than 20% of one genus, and no more than 30% of one family.
- Size/Age Distribution – On a citywide scale, it is important to have a variety of different-aged trees to get the maximum benefits from a forest. Additionally, having younger trees and new plantings are important to maintaining the overall number of trees whenever trees are lost from death or removal. A forest with trees of all the same age risks having to remove and replace all the trees at once.
- Benefits/Aesthetics - Many people embrace trees simply for the natural beauty they provide for the city, without knowing the full extent of benefits trees provide. Some benefits link directly to the ecology of the tree - carbon sequestration, improved air quality, intercepting storm water runoff and providing wildlife habitat. Trees also provide energy savings to property owners by reducing heating and cooling costs. Cities with higher tree canopy see an increase in property values, more successful business districts, and improved public health. Trees provide an array of economic, health and ecological-related benefits, and a sustainable urban forest maximizes these important benefits.
- Life Expectancy – The life expectancy of a tree is dependent on a number of factors, primarily the species of the tree, the growing conditions, and the level and type of maintenance it receives. Typically, large stature, slower-growing tree species have longer life-spans, while ornamental trees and species that grow very quickly have shorter life spans. However, less than ideal growing conditions can reduce a tree's service life; repeated topping, insufficient root space, and compacted soils are all common problems that can lead to a shortened lifespan.

3. THE CONDITION AND SUSTAINABILITY OF THE DIXIE HIGHWAY TROLLEY LINE TREE POPULATION

Using the current tree inventory data, objective discussions about the overall viability and value of the tree population can occur, and reasonable decisions about management of the area in the short and long terms can be made.

In general, the positive aspects of the Dixie Highway Trolley Line trees are that most are currently in Fair condition, pose minimal safety risks, and have few structural defects. Aspects of the trees that negatively affect sustainability and value to the community are that the trees are comprised primarily of short-lived species, are invasive species that threaten the native habitat, and are subject to structural limb failure and insect and disease infestations.

Table 5 is an evaluation of the Dixie Highway Trolley Line tree population based in the inventory data in terms of individual sustainability factors. The ratings range from Low to High, where a Low rating means that the tree population has serious or more negative characteristics associated with that factor and a High rating means that the population is sustainable in terms of a particular factor. Comments related to the rating derived from the inventory findings are also provided.

Urban Forest Sustainability Factor	Low	Medium	High	Comments
Condition		■		67% of the trees are in Fair or worse condition; they will likely have a shortened service life and/or require higher maintenance in the long term.
Structure	■			All the pear trees have inherently poor structure; trees have been repeatedly pruned for aerial line clearance; and several trees have trunk and branch defects.
Risk			■	75% of the trees are low risk
Species Diversity	■			Two species comprise almost 80% of the population; it is preferred that no one species comprise 10% of any tree population.
Size/Age Distribution		■		Although most of the trees are under 20" dbh, there is fair diversity in sizes and ages.
Life Expectancy	■			Pear and crabapple comprise almost 70% of the tree population. These species have service lives in urban areas between 15 and 25 years; currently the Dixie Highway trees likely only have 10 more years of service.
Insects & Disease		■		No insects or diseases were detected at the time of the inventory; however, older cultivars of crabapple and hawthorn (47% of the population) are subject to common fungal diseases. Callery pear is becoming subject to fireblight, a serious bacterial disease that can also spread to other trees and shrubs in the area.
Invasive Species	■			39% of the trees are Callery pear; the Kentucky Exotic Pest Plant Council classifies this species as a "severe threat."
Benefits/Aesthetics		■		Generally, the tree species present are attractive in various seasons; however, severe pruning and the defects of some trees reduces the aesthetics.
Totals	4	4	1	

Table 5. Dixie Highway Trolley Line Tree Evaluation

With 8 of the 9 factors evaluated as Low or Medium, overall the evaluation reveals that the Dixie Highway Trolley Line tree population is currently not sustainable; at least not without expensive and frequent maintenance and intervention. Of particular note is Low rating for the invasive species and life expectancy factors, and the Moderate rating for condition. Combined, these ratings indicate that actions should be taken in the near term if this corridor is to remain attractive, safe, and sustainable, and be an asset to the city.

DIXIE HIGHWAY TROLLEY LINE:
TREE INVENTORY

4. MANAGEMENT OPTIONS AND OUTCOMES

There are three general management options the city can take regarding the aesthetics, condition, and sustainability of the tree population along the Dixie Highway Trolley Line, and each option has distinct outcomes:

OPTION 1: DO NOTHING

Option 1, the city would not provide any maintenance (except emergency response) and would not necessarily grind the stumps or replace trees when they were removed. This option is the least expensive, and requires few other city resources. However, the effect would be that between 5 to 10 years in the future, most of the trees would be dead, or already removed, or in a condition that warranted removal. Until that time, trees would continue to be severely pruned by the utility company, the pear trees would continue to be able to invade open spaces in the neighborhood, insect and disease issues would thrive, also threatening neighborhood landscapes and citywide tree canopy, and the aesthetics of this major thoroughfare would gradually degrade.

OPTION 2: MAINTAIN THE TREES AND REPLACE THEM ONLY WHEN DEAD OR DAMAGED

Option 2, the city would provide the trees routine maintenance such as pruning, insect and disease treatment, and other plant health care. This action would extend the service lives of most of the trees for over 10 more years, but would be more expensive and would not change or improve the invasive species, utility clearance, and aesthetic issues.

OPTION 3: IMPLEMENT A PLANNED, PHASED REPLACEMENT PROJECT

Option 3, a more proactive management approach would be for the city to implement a planned and phased tree replacement project. A new landscape design that incorporates current industry standards and best management practices for tree species and site selection could transform the Dixie Trolley Line corridor into a showcase of sustainable forest management and be a source of civic pride. Over a period of no more than 2 to 3 years, the existing trees would be removed and trees would be replaced with new trees that meet the criteria for long-term sustainability – diverse species matched to the site conditions, low maintenance, insect and disease resistant, attractive, and providing multiple benefits. Initially, this option requires a greater outlay of funding and resources by the city, but over time that investment will be exceeded by lower maintenance costs and the combined annual value of the community benefits produced by the trees.

OPTION 3 (continued): PHASING OPPORTUNITIES

As part of the overall removal and replacement there are multiple phasing opportunities that can be implemented over a multi-year time frame.

1. **No-Phasing**, this option suggests the full removal and replacement of the entire corridor over the period of one season. This option would be dependent upon the City's budget and willingness to clear the entire corridor and replace the trees. This option offers the quickest and most instant improvement. This approach would alter the character of the corridor over an extended period of time during the grow in time frame, but in the end would provide a uniform and complete canopy. This is the most economical of the three options. See Apendix 6 for Full Tree Removal and Replacement opinion of probable construction cost.
2. **Block by Block Phasing**. This option suggests a phased approach over an extended period of time. The tree removal and replacements could take place over a 2 to 3-year period of time depending on the City's budget and willingness to clear and replace the tree canopy. This option could allow for a block by block approach, minimizing the impact of the replacement of mature tree canopy over the replacement time frame. See Apendix 6 for opinion of probable construction cost upon 2 year approach.
3. **Replacement based on Needs / Priorities**. This option suggests a phased approach but more closely integrated into the current tree canopy and condition of the trees. This option suggests a removal and replacement plan over 2 to 3 years but based upon individual tree group conditions and species throughout the corridor. All trees would be removed and replaced however in such a manner that would maintain the mature canopy mixed within the new canopy throughout the replacement time frame. Upon completion of the removal and replacement those trees planted at the earlier phase of the project would be more fully established and offer the start of a fuller tree canopy. See Apendix 6 for opinion of probable construction cost based upon 3 year approach.

A preliminary phasing approach may focus on the SunnyMeade block or areas that have been designated for construction (I.E. Buttermilk Intersection).

1. Plant Selection

The recommended tree palette is based upon the preliminary approved tree list provided by the Ft. Mitchell Tree Board. Trees were selected based upon their growth habits, shape and projected mature tree heights.

Large Trees	**Botanical Name**	**Suggested Alternatives**
Sugar Maple	*Acer saccharum*	
Ginkgo	*Ginkgo biloba (male only)*	Shagbark Hickory
Kentucky Coffee Tree	*Gymocladus dioicus*	
London Plane Tree	*Plantanus x acerifolia*	Sycamore
Willow Oak	*Quercus phellos*	Bald Cypress
Tulip Tree	*Liriodendron tulipifera*	

Medium Trees	**Botanical Name**	
Katsura Tree	*Cercidiphyllum japonicum*	
Black Gum	*Nyssa sylvatica*	
Japanese Tree Lilac	*Syringa Reticulata*	
Little Leaf Linden	*Tilia Cordata*	
American Yellowwood	*Cladrastis kentuckea*	
*Thornless Honey Locust	*Gleditsia triacanthos*	
*Red Maple	*Acer rubrum*	

Small Trees	**Botanical Name**	
Allegheny Serviceberry	*Amelanchier laevis*	
American Hornbeam	*Carpinus caroliniana*	
Eastern Redbud	*Cercis Canadensis*	
Dogwood	*Cornus Florida*	
Sweetbay magnolia	*Magnolia virginiana*	
Washington Hawthorn	*Crataegus phaenopyrum*	
Green Hawthorn	*Crataegus Viridis 'Winter King'*	
*Common Lilac	*Syringa vulgaris 'Sensation'*	

*Tree adaptable to moist conditions

2. PLANTING GUIDELINES

Planting of trees should occur in the spring or fall by licensed contractors following the recommendations provided here or direction of the City Tree Board specifications and standards. Spring planting is recommended for oaks, hawthorns, serviceberry, and red maple to ensure growth and increase survival rate through the first winter. Tree selection should be selected from the provided tree palette and based on the existing and potential future site conditions.

Criteria for determining tree placement:

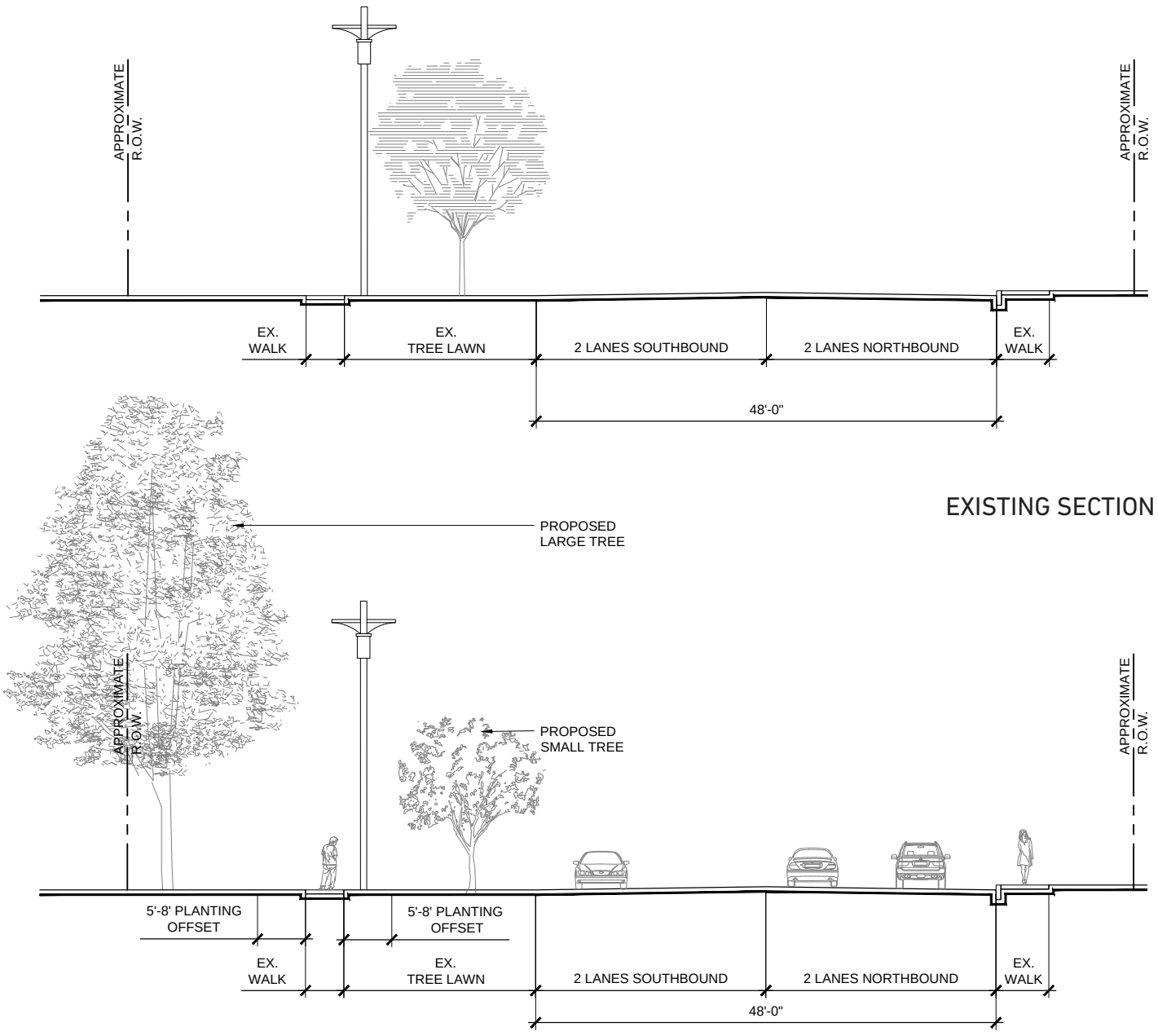
- A consistent spacing should be established between trees; trees will not be planted closer than 45ft for large trees, 35ft for medium trees, and 25ft for small trees from each other respectively unless the shape of the tree or specific site conditions warrants a change in spacing.
- If there are trees on private or public property that are growing too close to potential planting sites, tree spacing and layout should be adjusted to accommodate.
- Trees located near overhead wires will be chosen to minimize interference with wires and reduce potential maintenance needs.
- No trees to be planted within 30ft of a stop sign, traffic sign or signal to provide adequate site distance.
- No trees to be planted within 15ft of a street light.
- No trees to be planted within 5ft of identifiable underground gas utility or within 10ft of an underground water utility.
- No trees to be planted within 10ft of a fire hydrant, driveway or utility pole.
- Prior to final tree planting, all underground utilities and all utility easements to be located to avoid conflicts with final tree locations.

Factor	Recommended Offset	Explanation
Street Light	15-20ft	Variable based on luminary mounting height, overhang from curb and angle of light distribution
Utility Pole	10-15ft	Generally, trees should not be in the same alignment as utility poles, dependent on cross arms and transformers, do not locate directly below overhead utilities.
Fire Hydrant	10ft	Allows for access and visual identification.
Water Gate Valve	5-10ft	Allows for maintenance work
Gas Shut Off	5ft	Allows for maintenance work.
Driveway	10ft	Adequate sight line distance
Sidewalk	5ft	Minimize root damage
Street Sign	5ft	Adequate site line distance
Intersections	15-40ft	Depends on street width, traffic volume and position of traffic lights, and other safety conditions to provide adequate site line distance.
Yard Trees	20-40ft	Dependent on mature sizes of the yard tree and street tree

DIXIE HIGHWAY TROLLEY LINE:
KEY PLAN

TYPICAL STREET SECTIONS

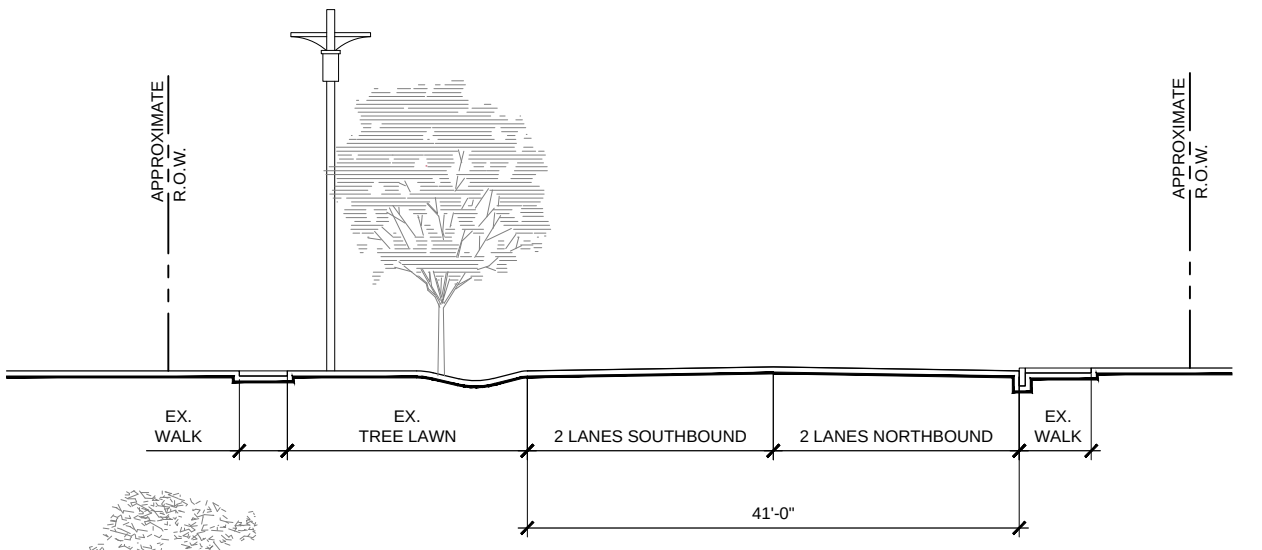
1. SECTION A



EXISTING SECTION

PROPOSED SECTION

2. SECTION B



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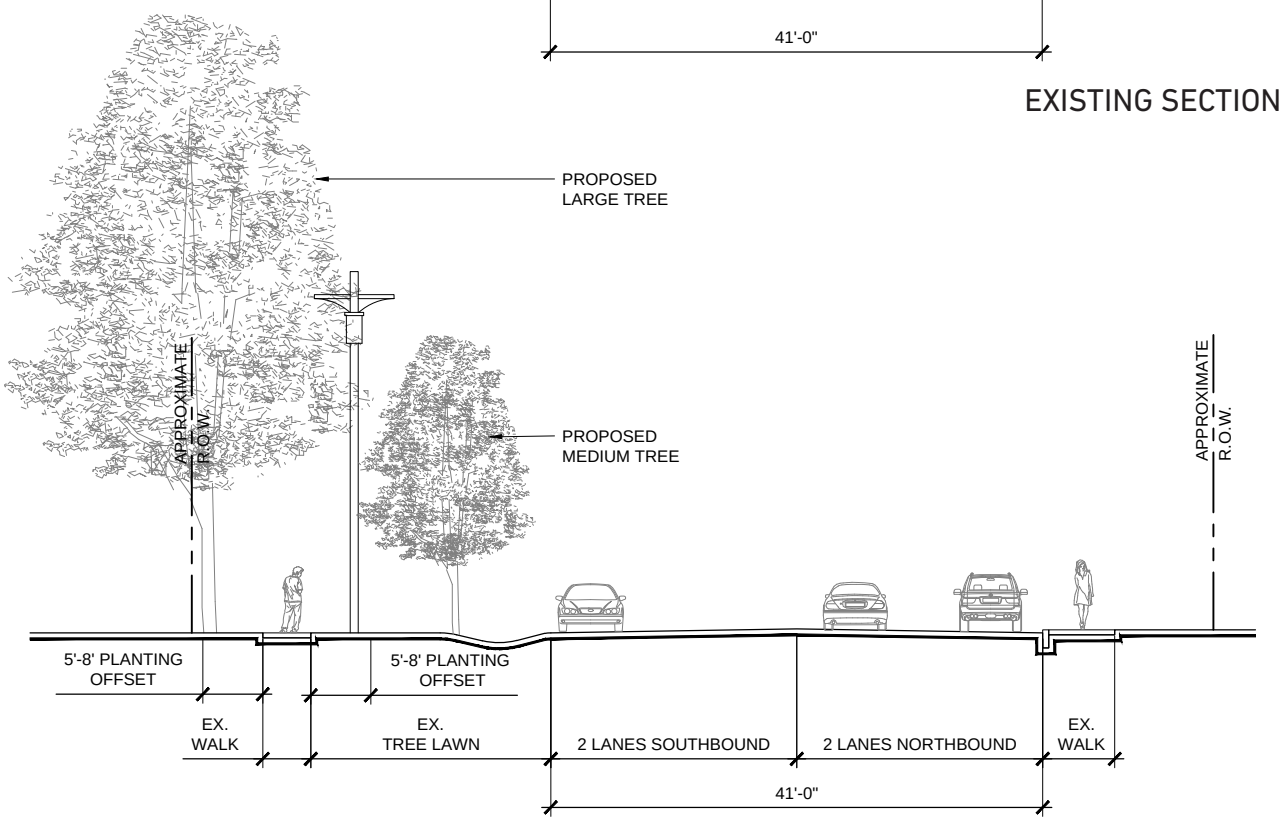

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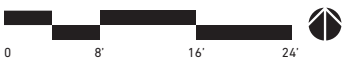

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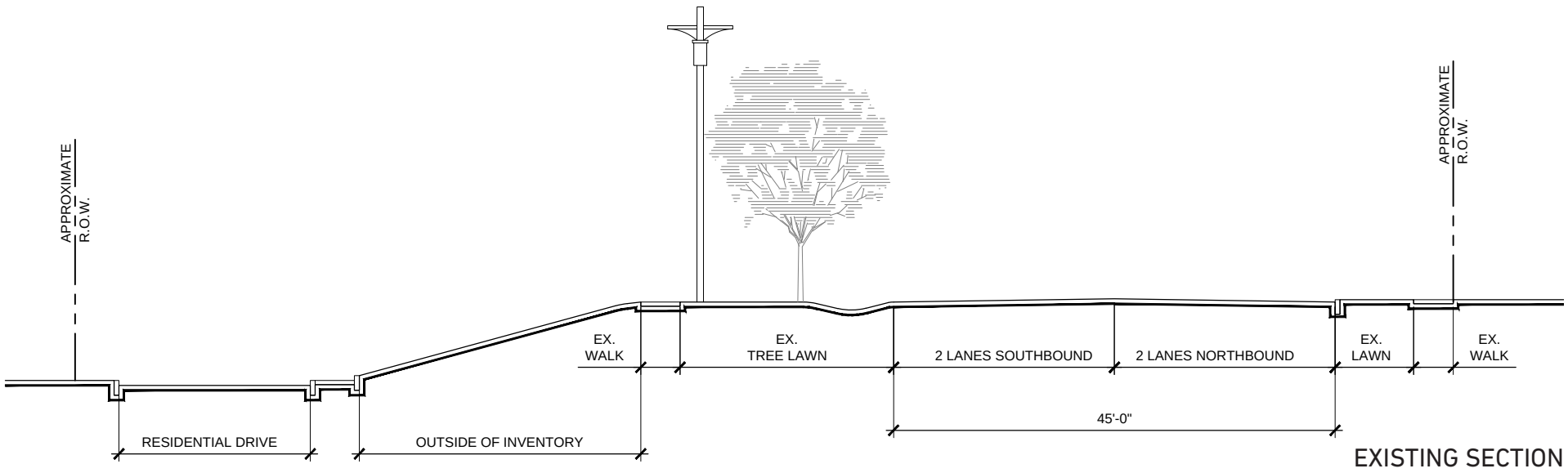

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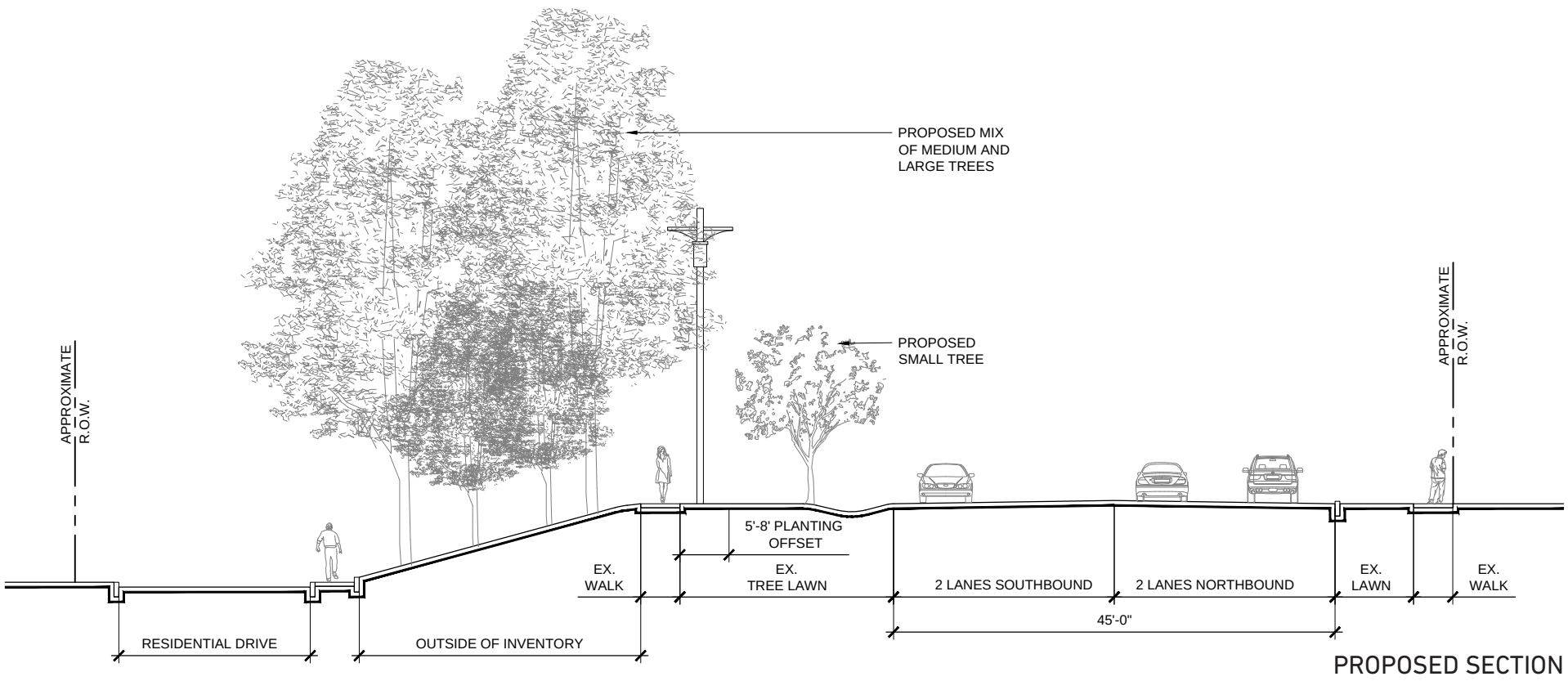
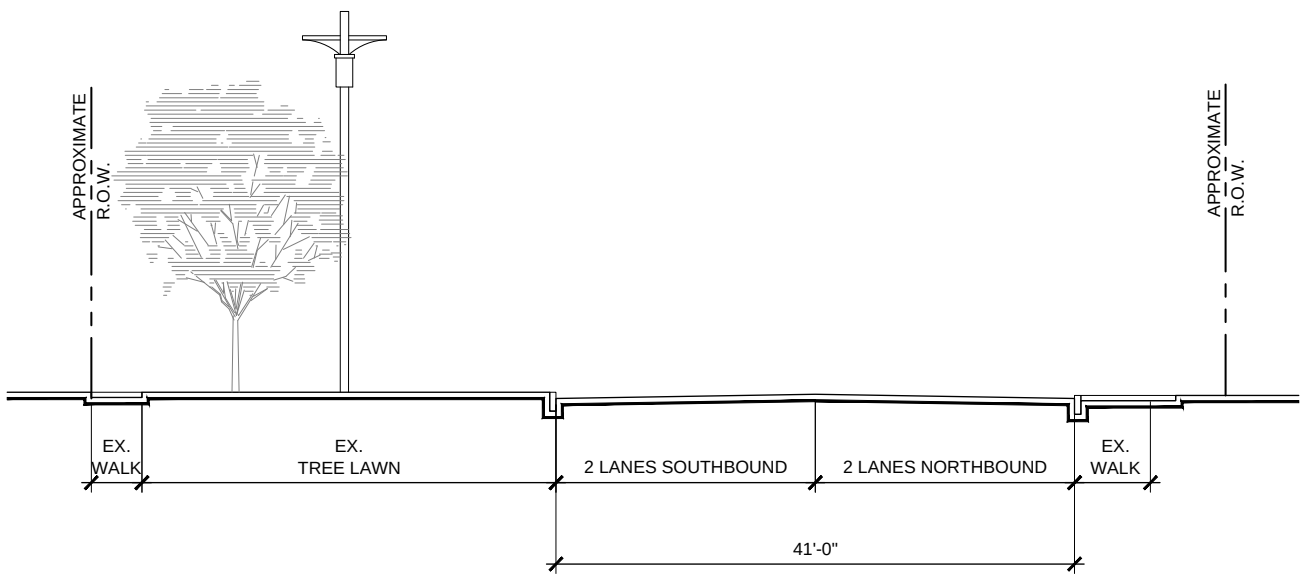


PROPOSED SECTION

4. SECTION D



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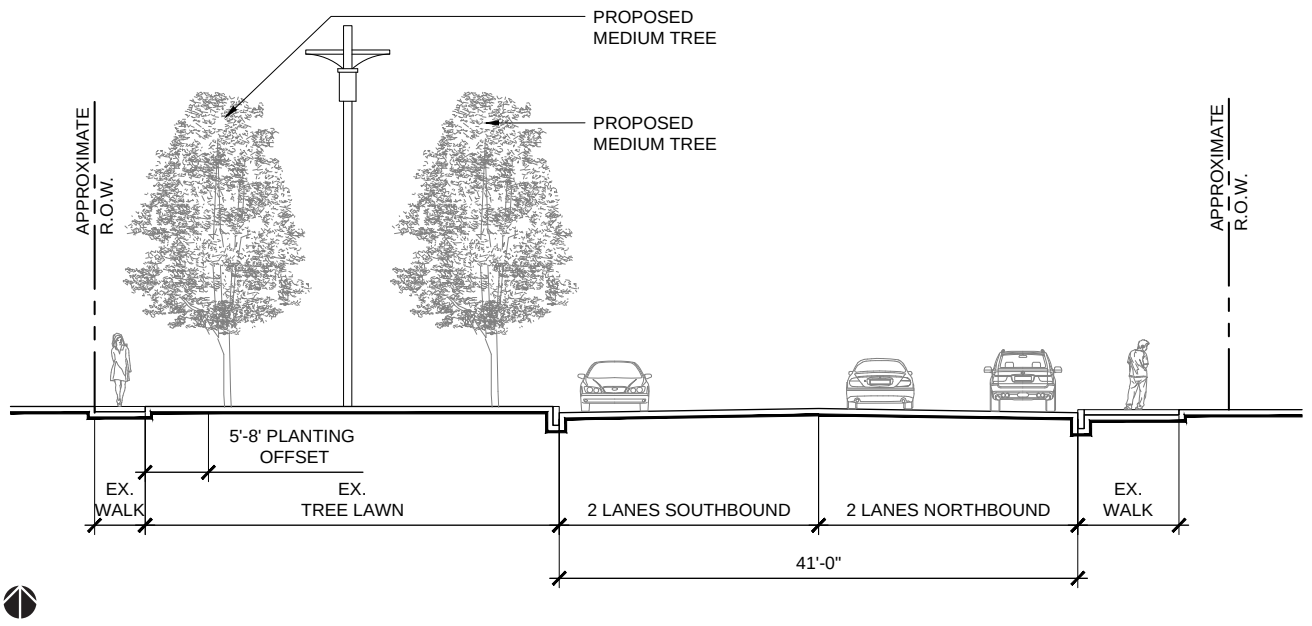


PROPOSED SECTION

0 8' 16' 24'

TREE PLANTING PLAN

PLANTING PLAN LOCATION BY BLOCKS:

	Location – Dixie Highway Blocks, as Designated by Side Streets	Number of Trees	Small	Medium	Large
A	Beechwood Rd. to Woodlawn Ave.	22	5	9	8
B	Woodlawn Ave. to Greenbriar Ave.	19	8	11	
C	Greenbrier Ave. to Burdsall Ave.	30	15	8	7
D	Burdsall Ave. to Superior Dr.	24	4	20	
E	Superior Dr. to Sunnymede Dr.	11	6	5	

MATCHLINE A

DIXIE HIGHWAY TROLLEY LINE:

TREE PLANTING PLAN - LOCATION A

MATCHLINE A

DIXIE HIGHWAY

GREENBRIAR AVENUE

LEGEND:

MEDIUM TREE

SMALL TREE

APPROXIMATE ROW

OVERHEAD UTILITY LINES

0 30' 60' 90'

MATCHLINE B

DIXIE HIGHWAY TROLLEY LINE:

TREE PLANTING PLAN - LOCATION B

MATCHLINE B

MATCHLINE C

DIXIE HIGHWAY TROLLEY LINE:

TREE PLANTING PLAN - LOCATION C

MATCHLINE C

MATCHLINE D

DIXIE HIGHWAY TROLLEY LINE:

TREE PLANTING PLAN - LOCATION D

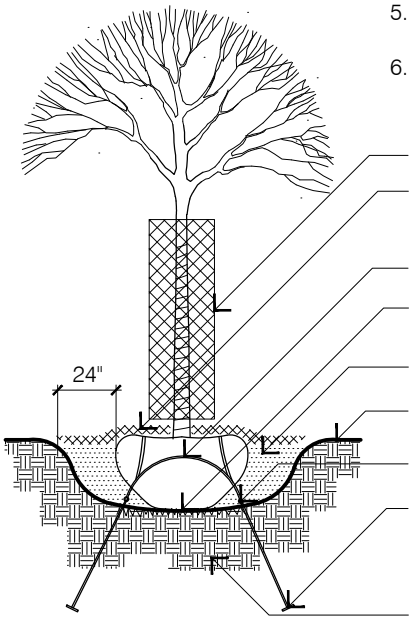
MATCHLINE D

DIXIE HIGHWAY TROLLEY LINE:

TREE PLANTING PLAN - LOCATION E

1. PLANTING DETAILS

NOTES:
1. SET ROOT BALL ON BASE OF UNDISTURBED SOIL
2. TOP OF ROOT BALL TO BE 2"-3" ABOVE ADJACENT FINISH GRADE
3. REMOVE ROPE AND BURLAP FROM TOP 1/3 OF ROOT BALL CUT TOP 1/3 OF WIRE BASKET FROM ROOT BALL. REMOVE ALL LABELS, TAGS OR OTHER FOREIGN MATERIALS FROM LIMBS.
4. BASE OF ROOT FLARE TO BE 3" ABOVE FINISH GRADE. REMOVE TEMPORARY SOIL COVER (IF PRESENT) TO EXPOSE ROOT FLARE
5. USE "EARTH ANCHOR" MODEL 88 ANCHOR SYSTEM WITH TENSION STRAP AND D-RING (OR APPROVED EQUIVALENT)
6. UTILITIES MUST BE LOCATED PRIOR TO PLANTING TO ENSURE SAFETY AND AVOID DAMAGE TO UNDERGROUND FACILITIES.



BLACK PLASTIC DEER PROTECTION MESH

3" SHREDDED HARDWOOD MULCH. KEEP MULCH 3" AWAY FROM TRUNK BASE

TENSION STRAPS ACROSS ROOT BALL

SCARIFY BOTTOM OF BED BETWEEN UNDISTURBED SUBGRADE AND NEW SOIL

PLANTING SOIL BACKFILL, NATIVE SOIL

FINISH GRADE

D-RING

"DUCKBILL ANCHOR" AND CABLE, TYPICAL OF 3 IN TRIANGULAR PATTERN. SEE MANUFACTURE'S INSTRUCTIONS.

UNDISTURBED SOIL OR COMPACTED BACKFILL

1 **PLANTING & G.U.Y. DETAIL**
N.T.S.

2. MULTI-YEAR MAINTENANCE PLAN FOR NEWLY PLANTED TREES

YEAR 1

AT PLANTING:

- Prune tree for codominant stems and broken or dead branches only.
- Create a watering dish or berm at the edge of the root ball, not the planting hole.
- Mulch a 4-foot diameter area under the tree - Maximum of 3-inches deep and nothing against the trunk of the tree.
- Water thoroughly. 20 gallons per tree within eight hours of planting.

THE SUMMER FOLLOWING PLANTING, FROM LEAF-ON TO LEAF-OFF(ONCE A WEEK):

- Water - 10 to 15 gallons: Applied at a rate less than 3 gallons per minute.
  Note: Watering will only be skipped if more than 1 inch of rainfall during that week.

FALL AFTER PLANTING, AFTER LEAVES FALL (LATE OCTOBER, EARLY NOVEMBER)

- Control weeds in mulched areas.

YEAR 2

SPRING BEFORE LEAF-OUT (LATE MARCH):

- Remove any staking, and all wire, tags, and twine.
- Control weeds in mulch bed.
- Refresh mulch to 3 inches. Mulch should be rotting about 33% per year by volume. Each tree should require about 1-inch of fresh mulch.
- Remove suckers, dead and broken branches.

FALL, AFTER LEAF FALL (LATE OCTOBER, EARLY MAY):

- Control weeds in mulched areas.

YEAR 3, 5, 6, 7, 8, 9

SPRING BEFORE LEAF-OUT (LATE MARCH):

- Control weeds in mulch bed.
- Refresh mulch to 3 inches. Mulch should be rotting about 33% per year by volume. Each tree should require about 1-inch of fresh mulch.
- Remove suckers, dead and broken branches.

FALL, AFTER LEAF FALL (LATE OCTOBER, EARLY MAY):

- Control weeds in mulched areas.

YEAR 4, 7, 10

SPRING BEFORE LEAF-OUT (LATE MARCH):

- Control weeds in mulch bed.
- Refresh mulch to 3 inches. Mulch should be rotting about 33% per year by volume. Each tree should require about 1-inch of fresh mulch.
- Begin structural pruning practices: prune to establish central leader; raise lower branches so the crown of the tree is on the upper 2/3 of the tree; establish good branching structure and remove suckers, dead and broken branches.

FALL, AFTER LEAF FALL (LATE OCTOBER, EARLY MAY):

- Control weeds in mulched areas.
- Fertilize as necessary.

3. TREE CONDITION DEFINITIONS:

Condition indicates the current state of a tree's health, structural soundness, overall shape, and growth rate. Symptoms of poor condition include discoloration, decay, dieback, decreased internodal length, and/or disfigured or necrotic stems or roots. To some extent, condition class is also a reflection of the life expectancy of the tree. Crown development, trunk condition, major branch structure, twig growth rate, insects/diseases, and root condition are all considered. In general, the condition of each tree is recorded as one of the following categories adapted from the rating system established by the International Society of Arboriculture® (ISA):

EXCELLENT: 100% – 90% condition class. The tree is nearly perfect in condition, vigor, and form. This rarely used category is generally applicable to small diameter trees that have been recently transplanted and are well established. It also applies to large trees that have established themselves successfully in the landscape.

VERY GOOD: 89% – 80% condition class. Overall, the tree is healthy and satisfactory in condition, vigor, and form. The tree has no major structural problems, no mechanical damage, and may only have insignificant aesthetic, insect, disease, or structure problems.

GOOD: 79% – 61% condition class. The tree has no major structural problems, no significant mechanical damage, may have only minor aesthetic insect, disease, or structure problems, and yet is in good health.

FAIR: 60% – 41% condition class. The tree may exhibit the following characteristics: minor structural problems and/or mechanical damage, significant damage from non-fatal or disfiguring diseases, minor crown imbalance or thin crown, or stunted growth compared to adjacent trees. This condition also includes trees that have been topped but show reasonable vitality and show no obvious signs of decay.

POOR: 40% – 21% condition class. The tree appears unhealthy and may have structural defects, such as codominant stems, severe included bark, or severe trunk and/or limb decay. A tree in this category may also have severe mechanical damage, crown dieback, or poor vigor threatening its ability to thrive. Trees in poor condition may respond to appropriate maintenance procedures, although these procedures may be cost-prohibitive to undertake.

CRITICAL: 20% – 1% condition class. The tree has a major structural problem that presents an unacceptable risk, has very little vigor, and/or has an insect or disease problem that is fatal and, if not corrected, may threaten other trees on the property.

DEAD: 0% condition class. This category refers to dead trees only.

4. INVENTORY SPREADSHEET

Tree #	Species	DBH	Location	Risk	Condition	Observations
1	Malus	11.2 MS	2450	moderate	poor	Insect damage, cracking, sapsucker
2	Koelreuteria paniculata	12.2	2450	moderate	fair	codominant stems, Included bark, no root collar visible
3	Koelreuteria paniculata	9.5	2450	moderate	poor	fruiting bodies, die-back, Insect damage, no root collar visible
4	Koelreuteria paniculata	12.1	2450	moderate	fair	rot around base, no root collar visible
5	Malus	8.4 MS	2450	low	fair	included bark, no root collar visible, insect damage
6	Malus	7.0 MS	2450	low	fair	rot around base, no root collar visible, included bark
7	Malus	11.7 MS	2450	moderate	poor	codominant stems, splitting, sapsucker
8	Malus	9	2450	low	good	Included bark, no root collar visible
9	Pyrus calleryana	8	2450	moderate	good	no root collar visible, included bark, fruiting bodies
10	Crataegus	4.9	2450	low	good	no root collar visible
11	Crataegus	6.6	2424	low	good	no root collar visible, minor insect damage
12	Pyrus calleryana	12.8 MS	2424	moderate	good	included bark, no root collar visible codominant stems
13	Hamamelis	1.1	2424	low	critical	severe deer rub, cambium damaged, branches stripped. No live buds remaining
14	Malus	5.0 MS	2424	low	good	no root collar visible, codominant stems
15	Malus	5.7 MS	2424	low	good	no root collar visible
16	Picea pungens	4.8	2424	low	good	no root collar visible
17	Pyrus calleryana	13.7 MS	2424	low	good	Included bark, no root collar visible, codominant stem
18	Pyrus calleryana	13.9 MS	2414	low	good	Included bark, no root collar visible, codominant stem
19	Malus	7.8 MS	2414	low	fair	damaged cambium, cracking, insect damage, no root collar visible
20	Crataegus	6.6 MS	2414	low	good	no root collar visible, codominant stems
21	Crataegus	7.6 MS	2404	low	good	no root collar visible, codominant stems
22	Pyrus calleryana	14.4 MS	2404	low	good	no root collar visible, codominant stems, included bark
23	Pyrus calleryana	13.4 MS	2400	low	good	no root collar visible, included bark
24	Pyrus calleryana	14.9 MS	2398	low	good	no root collar visible, included bark
25	Malus	4.4	2398	low	good	no root collar visible, included bark, sapsucker damage
26	Malus	5	2396	low	good	no root collar visible
27	Pyrus calleryana	14.5 MS	2396	low	good	no root collar visible, lots of inlcuded bark, codominant stems
28	Acer rubrum	1.2	2396	low	good	minor mechanical damage
29	Acer rubrum	12.8	2368	low	fair	Insect and sapsucker damage, Included bark, possible girdling roots
30	Malus	11.3 MS	2366	low	fair	no root collar visible, some decay around base, codominant stems
31	Pyrus calleryana	12.1	2366	low	good	Included bark, some mechanical root damage
32	Crataegus	6.9 MS	2366	low	poor	Insect damage, splitting, included bark, no root collar visible, main lead cambium damaged
33	Pyrus calleryana	10	2366	moderate	fair	decay at base, mechanical root damage
34	Acer rubrum	12.9	2364	moderate	fair	Insect damage, no root collar visible, discoloration at base, codominant stems
35	Pyrus calleryana	20.5	2362	moderate	fair	no root collar visible, insect damage and decay, splitting, some fruiting bodies
36	Pyrus calleryana	19.7	2362	low	fair	no root collar visible, insect damage, included bark, splitting
37	Pyrus calleryana	22.1	2360	low	fair	no root collar visible, insect damage, included bark, some cracking
38	Crataegus	10.0 MS	2360	low	fair	no root collar visible, included bark
39	Crataegus	10.1 MS	2358	low	fair	no root collar visible, included bark
40	Crataegus	8.6	2358	low	fair	no root collar visible, insect damage, included bark,codominant stems
41	Pyrus calleryana	7.2 MS	2356	low	poor	no root collar visible, insect damage, splitting, codominant stem

42	Pyrus calleryana	9.3	2356	low	fair	no root collar visible, included bark, codominant stems
43	Pyrus calleryana	10.2	2356	low	fair	no root collar visible, codominant stems
44	Pyrus calleryana	10.1	2356	low	fair	no root collar visible, codominant stem, some fruiting bodies
45	Pyrus calleryana	11.8	2328	low	fair	no root collar visible, included bark, codominant stems, some fruiting bodies
46	Malus	15.1 MS	2328	low	good	no root collar visible, included bark, codominant stem, mechanical damage
47	Pyrus calleryana	7	2328	low	fair	no root collar visible, included bark, sapsucker damage, some decay
48	Pyrus calleryana	12.4	2328	low	fair	no root collar visible, included bark, insect damage, some splitting
49	Malus	14.5 MS	2328	low	fair	no root collar visible, mechanical damage
50	Pyrus calleryana	9.6	2328	low	fair	no root collar visible, included bark
51	Pyrus calleryana	12.5	2328	low	fair	no root collar visible, included bark, insect damage, cracking
52	Malus	9.6 MS	2328	low	fair	no root collar visible, codominant stem, some splitting
53	Pyrus calleryana	11.8	2328	low	fair	no root collar visible, included bark, codominant stems, insect damage, sapsucker damage
54	Pyrus calleryana	20.5	2328	low	fair	no root collar visible, included bark
55	Pyrus calleryana	22.4	2326	moderate	fair	no root collar visible, included bark, insect damage and splitting
56	Pyrus calleryana	22.6	2318	low	fair	no root collar visible, insect damage
57	Malus	14.5 MS	2312	low	good	partial root collar visible, included bark, some insect damage
58	Malus	11.8 MS	2312	high	poor	no root collar visible, included bark, insect damage, decay/dying limbs, fallen limbs
59	Malus	14.0 MS	2312	low	fair	partial root collar visible, included bark, some insect damage
60	Crataegus	8.9 MS	2312	low	good	no root collar visible
61	Crataegus	9.2 MS	2276	low	fair	no root collar visible, codominant stem, minor insect damage
62	Crataegus	9.0 MS	2276	low	fair	no root collar visible, some splitting
63	Crataegus	9.6 MS	2274	low	fair	no root collar visible, some insect damage
64	Acer rubrum	14.6	2270	moderate	fair	included bark, some cracking, insect damage
65	Pyrus calleryana	7.4 MS	2264	moderate	fair	no root collar visible, included bark, insect damage, some splitting
66	Malus	10.6 MS	2220	low	fair	included bark, insect damage, cracking, some mechanical damage
67	Malus	12.2 MS	2220	high	poor	girdling roots with possible decay, mechanical damage, included bark
68	Malus	15.1 MS	2220	moderate	fair	included bark with possible crack, codominant stem, insect damage and decay, some fruiting bodies
69	Malus	13.0 MS	2220	moderate	poor	mechanical damage to root collar, some cambium damage, insect damage, included bark

5. EXISTING CONDITIONS PHOTOGRAPHS

Significant mechanical damage around root collar, including decay and trunk splitting further above ground.

Mechanical damage at base and excessive mulching (no root collar visible). Duct tape used to attach holiday decorations.

In compacted soil with girdling roots and no visible root collar.

Pear trees have poor structure with multiple codominant stems and are subject to severe utility pruning.

Dixie Highway Trolley Line

Opinion of Probable Construction Cost

MKSK

PROJECT NAME:	Tree Removal & Replacement Master Plan	PROJECT NUMBER:	k17333
LOCATION:	Fort Mitchell, KY	DATE:	05.01.2018
OWNER:		PREPARED BY:	hb/Davey Tree

LEGEND

SF - Square Foot
SY - Square Yard
CY - Cubic Yard
AC - Acre
LF - Linear Ft of Tread
FF - Face Feet
EA - Each
Allow - Allowance
LS - Lump Sum
LFT - Linear Ft of Tread

Spec Division	Description	Total Qty.	Unit	Unit cost ($)	Total Cost ($)	Remarks
FULL TREE REMOVAL AND REPLACEMENT						
TREE REMOVAL						
	Removal or Trees per Inventory (69)	1	LS	$12,300.00	$12,300	down to low stump, haul all associated brush & wood
	Grind Out Stump	1	LS	$1,750.00	$1,750	leave ground stump mulch in holes of 69 tree removals
	Haul Ground Stump Mulch	1	LS	$800.00	$800	from 69 tree removals
				Subtotal	**$14,850**	
LANDSCAPING						
	Large & Medium Trees	68	EA	$750.00	$51,000	
	Small Trees	38	EA	$500.00	$19,000	
				Subtotal	**$70,000**	
				Scope Total	**$84,850**	FULL TREE REMOVAL AND REPLACEMENT
2 YEAR PHASED PLAN: ONE-HALF TREE REMOVAL AND REPLACEMENT PER YEAR						
TREE REMOVAL						
	Removal or Trees per Inventory (34)	1	LS	$6,500.00	$6,500	down to low stump, haul all associated brush & wood
	Grind Out Stump	1	LS	$925.00	$925	leave ground stump mulch in holes of 34 tree removals
	Haul Ground Stump Mulch	1	LS	$450.00	$450	from 34 tree removals
				Subtotal	**$7,875**	
LANDSCAPING						
	Large & Medium Trees	34	EA	$750.00	$25,500	
	Small Trees	19	EA	$500.00	$9,500	
				Subtotal	**$35,000**	
				Year 1 Total	**$42,875**	ONE-HALF TREE REMOVAL AND REPLACEMENT
				Year 2 Total	**$42,875**	ONE-HALF TREE REMOVAL AND REPLACEMENT
				2 Year Phased Plan Total	**$85,750**	FULL TREE REMOVAL AND REPLACEMENT
3 YEAR PHASED PLAN: ONE-THIRD TREE REMOVAL AND REPLACEMENT PER YEAR						
TREE REMOVAL						
	Removal or Trees per Inventory (23)	1	LS	$4,450.00	$4,450	down to low stump, haul all associated brush & wood
	Grind Out Stump	1	LS	$675.00	$675	leave ground stump mulch in holes of 23 tree removals
	Haul Ground Stump Mulch	1	LS	$350.00	$350	from 23 tree removals
				Subtotal	**$5,475**	
LANDSCAPING						
	Large & Medium Trees	23	EA	$750.00	$17,000	
	Small Trees	13	EA	$500.00	$6,333	
				Subtotal	**$23,333**	
				Year 1 Total	**$28,808**	ONE-HALF TREE REMOVAL AND REPLACEMENT
				Year 2 Total	**$28,808**	ONE-HALF TREE REMOVAL AND REPLACEMENT
				Year 3 Total	**$28,808**	ONE-HALF TREE REMOVAL AND REPLACEMENT
				3 Year Phased Plan Total	**$86,425**	FULL TREE REMOVAL AND REPLACEMENT

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