Kansas City, Missouri: Urban Forest Master Plan – Fall 2018
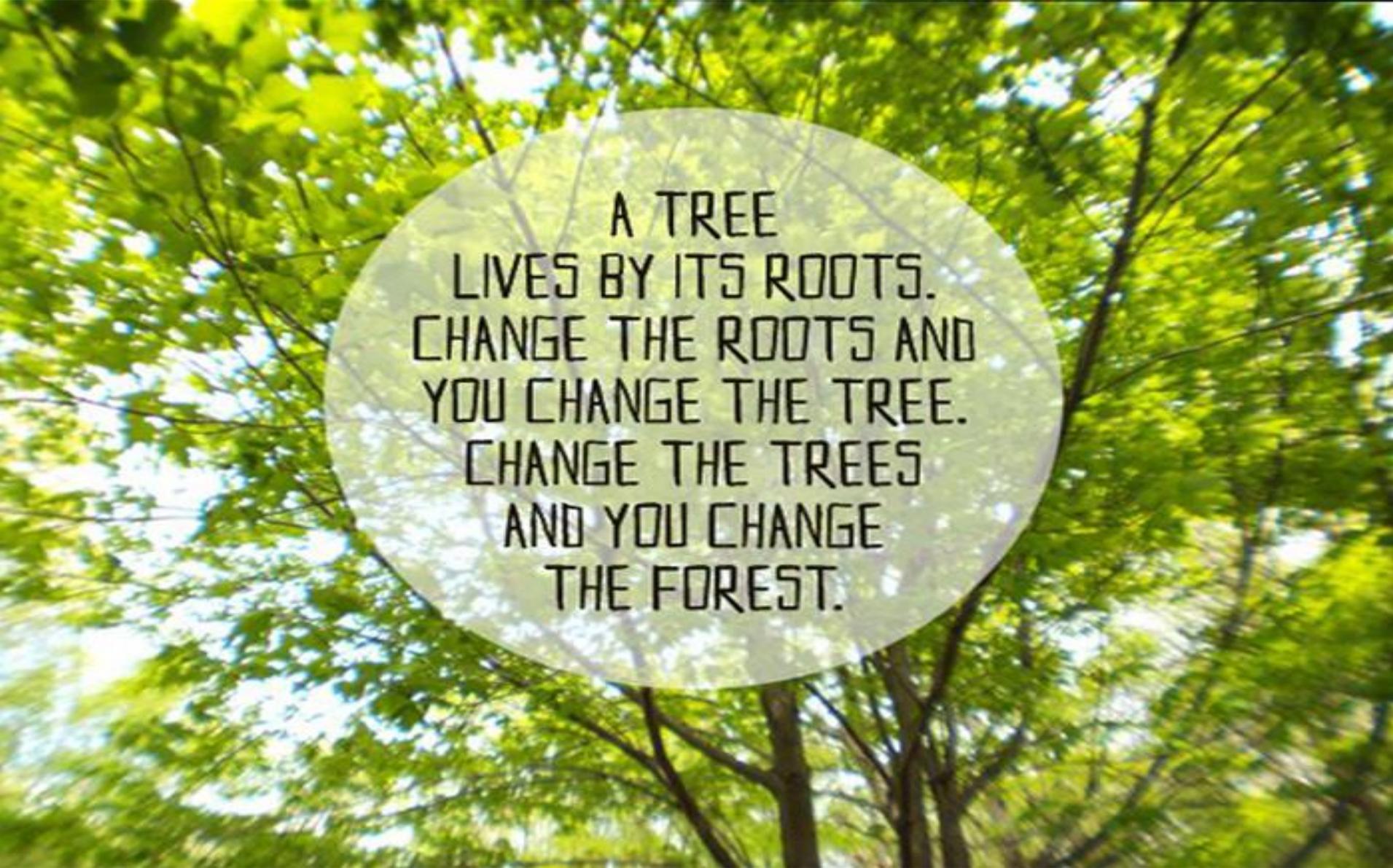
A TREE
LIVES BY ITS ROOTS.
CHANGE THE ROOTS AND
YOU CHANGE THE TREE.
CHANGE THE TREES
AND YOU CHANGE
THE FOREST.

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URBAN FOREST MASTER PLAN 2018

A City Within a Park

Kansas City, Missouri

Prepared for:

The City of Kansas City

In Cooperation With

Bridging the Gap

Prepared by:

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EXECUTIVE SUMMARY

Kansas City's Department of Parks and Recreation, Forestry Division is responsible for the management of a vast urban forest that provides over $28.2 million in annual benefits. This forest is a valuable municipal asset that appreciates over time and produces a positive return on public funds invested in its care. Proper management of this asset is fiscally prudent, as it results in safer city streets and parks, increases the quality of life, preserves the longevity and benefits that trees provide, and demonstrates a high degree of responsiveness to the needs of citizens. The City of Kansas City recognizes the value and services provided by its urban forest, along with the need for an integrated approach to its stewardship. To this end, in 2018 the city partnered with Missouri Department of Conservation to obtain matching funds toward financing the development of an urban forestry master plan. This master plan conveys analysis of existing urban forestry data and establishes a roadmap for the long-term management and improvement of the city's tree canopy.

Like many communities, Kansas City is working to balance improving its infrastructure while preserving its green spaces. This includes managing Kansas City's trees as a valuable component of the system, while also dealing with costly issues like stormwater management, increasing energy demands, public health crises, and continued economic development. Cities across the country now recognize trees as a low-cost, high-impact solution to these urban challenges. Kansas City, however, has not formally adopted a long-range, community-wide plan to strategically maximize tree benefits for the community. This document represents Kansas City's first urban forestry master plan.

> **What is an urban forest?**
> All trees within a municipality or community (on private and public lands) comprise the urban forest.
>
> **What is tree canopy?**
> All land covered by trees (with leaves on) when viewed from above.

The following key points are worth acknowledging:

- Kansas City tree canopy cover is currently at **31%** and facing significant risk from a variety of factors. As a proactive move, the city has set a goal of achieving a **35%** canopy cover.

- With such high proportions of ash trees (9% within public tree population and likely similarly large proportions amongst trees on private property), they city faces extreme risk of loss from the emerald ash borer. While the city is already actively engaging in an EAB management plan, it won't be enough to just plan for the removal of the trees compromised by the beetle, but there also needs to be a plan in place for replacing the significant amount of canopy that will be lost in the next 5–10 years.

- Changes in climate also put Kansas City trees at significant risk for the future sustainability of the urban forest. Now is the time to plan for the future of the canopy to be sure the species selected for planting can withstand both the anticipated changes to precipitation and temperature.

- The urban tree canopy cover is currently at about half of what the potential canopy could be for the city, given the amount of available land for planting. However, that canopy cover figure may be overestimated by the amount of honeysuckle throughout the city, which the current level of assessment is inadequate to separate from the more preferred taller canopy trees that provide more substantial ecological benefits.

- Additionally, around 60% of trees in the inventory were rated to be in fair or worse condition. With the lack of proactive care throughout the city, the trees are likely to continue to suffer and deteriorate.

- Since the inventory hasn't been consistently updated, much of the information may be outdated resulting in the inability of the city to make real management decisions based on what work is most needed.

- Considering such a large amount of available planting space is located on private property, it is integral for the city to take a proactive role in encouraging planting on private land.

- Kansas City should incorporate/allocate funding for private tree planting efforts into the current Smart Sewer Program.

- Kansas City should consider elevating their current forestry budget by $5,000,000, annually, to provide for:

  o Additional KC Parks-Forestry Tree Crews dedicated to proactive tree management and risk mitigation

  o A new Kansas City Community Conservationist position that advocates for KC trees and guides future outreach endeavors

The following paragraphs highlight the major findings of the performance rating associated with Kansas City's tree canopy – based on the matrix of a sustainable urban forest, these categories were largely rated as moderate. This puts the city in a delicate position – at the current level of monetary and time investment from the city, the urban forest will likely suffer and switch to an overall low performance rating. With all the upcoming challenges, both economic and environmental, this plan is the ideal opportunity for the city to refocus its priorities and prepare for a future that benefits both current and future citizens of Kansas City.

THE TREES: MODERATE Performance Ratings

Kansas City's tree performance is considered moderate because the recently completed canopy analysis shows that the city currently only has slightly more than half of the possible tree canopy. If action is not taken to protect existing trees and plants in available planting areas, the gap will continue to grow, existing canopy will continue to drop from the current 31%, and the performance rating could quickly slip to low. The data used for this analysis are over 15 years old; a new inventory may show less favorable results due to the aging tree resource, emerging tree health threats, and challenges which could be compounded by limited city budgets and capacity. In order to maintain a moderate performance rating, and ideally move to the high rating, the city will need to invest in new strategic efforts to understand and care for exiting trees as well as successfully establish new trees where possible.

THE PLAYERS: MODERATE Performance Rating

The players are all the people and organizations that influence the trees in a city. The players' contribution to Kansas City was evaluated as moderate. Participation and full support of the urban forestry program by different players within the community is mixed, with some support throughout the green industry, neighborhood groups and government departments. All these efforts create small successes; however, the lack of a citywide plan, common goals, and a coordinated strategy limit the larger regional impacts needed for high performance. In general, Kansas City residents are unaware of the full benefit that trees provide to city and thus may not take personal steps to invest in trees.

THE MANAGEMENT APPROACH: MODERATE Performance Rating

Kansas City's management approach is considered moderate, largely because the city cannot adequately make management program decisions based on the data provided, due to the inventory and canopy assessment being largely outdated. Urban forest management and plans are generally reactive as opposed to proactive, which results in both higher risk to citizens and lower longevity to the tree canopy. Risk mitigation and disaster management plans are in place but are mostly reactive in nature. There is no tree protection policy in place. Development and implementation of a more proactive management plan based off an updated public tree inventory would help the city make great strides towards achieving an improved performance rating.

Based on the results of the analysis of the total urban forestry and all components that may impact it, Davey Resource Group developed the following list of 10 strategies, which are organized into three different missions that are detailed later in the plan. These strategies should form the basis of moving forward with a more progressive plan for managing the city's urban forest and are integral to creating a more sustainable future for Kansas City.

Mission 1: Increase Tree Canopy Cover and Associated Benefits

Strategy 1: Officially Adopt and Incorporate Urban Forestry Goals

Strategy 2: Plan for a UTC Update

Strategy 3: Define a Strategic Planting Plan that Reflects City Goals

Strategy 4: Improve the Tree Protection Code

Mission 2: Progress through Outreach and Collaboration

Strategy 5: Encourage Tree Planting and Preservation on Private Property

Strategy 6: Create Plan Implementation Education and Messaging

Strategy 7: Develop a Plan Implementation Team

Mission 3: Improve Public Tree Management

Strategy 8: Complete an Updated Inventory and Management Plan of Public Trees

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INTRODUCTION

A City Within a Park: Promoting and Preserving a Living Legacy

Kansas City, Missouri is a community which values its culture, neighborhoods, and the quality of life for all its citizens. The challenge of today is to best ensure the continued success of these values, and to address the future challenges of redevelopment, a new economy, and climate change. Trees are an important component of these efforts, yet the city is losing tree canopy every year. Immediate action is needed to correct the dramatic declines. This Kansas City Urban Forestry Master Plan assesses Kansas City's current urban forest and delivers a roadmap to replenish the city's critical tree resource.

Around the time of its founding in 1838, Kansas City residents envisioned the community as a *City Within a Park* because they understood the value of the native trees that created a sense of place in the community. However, Kansas City has continued to lose canopy since that time. Just in the last six years, Kansas City tree cover has dropped from 32% in 2012 to 31% today.

Without intervention, canopy loss will continue at an estimated rate of 330 acres annually. At this rate, the canopy will drop to 25% by 2050. A comparison to other cities (Table 1) shows the range of canopy levels, along with goals set for increasing canopy in each city.

Therefore, it is important to assess the resource, players, and management approach of the city's urban forest to determine the resources essential to maintaining a safe, viable, and sustainable urban forest. Essentially, it is time to rebuild Kansas City's urban forest and re-establish *The City Within a Park*.

Table 1. Kansas City's Urban Tree Canopy (UTC) Compared to Other Cities

Location	Tree Canopy	Year	Canopy Goal	Goal Target Date
Pittsburgh, PA	40%	2011	60%	20-year plan (2031)
Cincinnati, OH	38%	2011	Increase	Ongoing
Louisville, KY	37%	2013	40%	Ongoing
Washington, DC	35%	2009	40%	20-year plan (2029)
Kansas City, MO	*31%*	*2018*	*35%*	*ongoing*
Boston, MA	29%	2006	49%	10-year plan (2016)
Lexington, KY	25%	2013	30%	ongoing
New York, NY	24%	2006	30%	2036
Chicago, IL	17%	2007	25%	ongoing
Indianapolis, IN	14%	2008	19%	10-year plan (2018)

Urban Tree Canopy Assessment

Results from Kansas City's 2012 Urban Tree Canopy (UTC) assessment enable the city to measure the amount and location of its tree canopy along with other land cover, including concrete and other impervious surfaces, open water, low vegetation like lawns and shrubs, and bare ground. This spatial data were utilized to quantify many of the services provided by Kansas City's existing tree canopy – *valued at over $28.2 million annually*. It also creates a measurement benchmark that can be used to track changes and trends in the city's tree canopy over time. A recent canopy model suggests the city has lost tree canopy over the past six years.

Master Plan Development

An urban forestry master plan involves an assessment of the existing urban forest, defining a future vision and mission, and the development of a successful urban forest continuum. Urban forestry master plan assessments improve upon the statistics and data on trees managed by the city. They analyze the sustainability of an urban forest overall by looking at both public and private tree canopies, multiple players actively impacting the urban forest, and management approaches for the entire urban forest system.

The Process

Bridging the Gap, a regional non-profit whose mission is to make the Kansas City region environmentally sustainable, and Kansas City's Parks & Recreation - Forestry Department worked with Davey Resource Group, Inc. to develop this plan by incorporating existing data from the city's tree inventory, the 2012 UTC results, and city policies and codes along with meetings with active community players. Public input was collected from meetings and discussion with city staff in the Department of Planning, Community Development/Code, and Parks, as well as utility staff. Additional input was incorporated via active participation from the diverse *Tree Champions* coalition, comprising neighborhood leaders, community business owners, concerned citizens, and government officials throughout the greater Kansas City area, along with the Mid-American Regional Council and Heartland Tree Alliance.

The resulting master plan is organized into four chapters which outline the value and services provided by trees in Kansas City, assess the sustainability of Kansas City's existing urban forest, convey a vision and mission for the future urban forest, and put forth 10 strategies for action on how to achieve that vision.

CHAPTER 1: WHY TREES?

Today's world is characterized by tight city budgets and fierce competition for city resources. So why focus attention on trees? Often considered just for parks, beautification purposes, or when there are unanticipated funding sources, trees are marginalized. However, thanks to new technology and scientific modeling in recent years, the importance of trees and their urban niche are becoming understood within the public realm. Their services are now largely quantifiable, and they are known as a cost-effective and critical city infrastructure that provides multiple and continuous benefits.

- Trees provide effective and low-cost solutions to a myriad of urban challenges. Urban trees have proven to be an effective tool across multiple city management areas, including planning, economic development, public health, and sanitation. They have been proven to alleviate water and air pollution, improve public health, increase property value, and enhance the success of business districts.
- Trees are a smart investment. On an annual basis, Kansas City's urban tree canopy provides over $28 million each year in services like stormwater management, air pollution control, and energy reduction (Table 2).
- Trees increase in value over time. Unlike man-made systems, trees are the only urban infrastructure that increase services and value over time. As trees mature, benefits increase, unlike more traditional city infrastructure such as roads and bridges that deteriorate with age.

Table 2. A Summary of Kansas City's Tree Canopy Benefits

Benefits of Existing Urban Forest In Kansas City			
Benefit	Quantity	Unit	Value
STORMWATER: Reduction of runoff	1,109,257,171	gallons	$11,092,557
AIR: Carbon monoxide removed	53,720	pounds	$35,693
AIR: Nitrogen dioxide removed	355,740	pounds	$75,246
AIR: Ozone removed	3,007,560	pounds	$3,593,643
AIR: Sulfur dioxide removed	422,860	pounds	$26,910
AIR: Particulate matter removed	842,880	pounds	$2,632,459
CARBON: Sequestration	8,250,562	tons	$10,780,215
		Total Annual Benefits:	$28,236,723
CARBON: Storage over lifetime of the canopy	247,000	tons	$32,800,000

Urban Trees Reduce Pollution Entering Waterways

As urban development continues to expand, the amount of land that naturally absorbs rainwater (e.g., lawns, parks, fields, woodlands) diminishes while impervious surfaces (i.e., roads, buildings, parking lots) continue to increase. Overland flow which contacts impervious surfaces also carries other contaminants such as fertilizers, oils, chemicals, grass clippings, litter, pet waste, and other pollutants. This contaminated stormwater flows into storm sewers reaching the local lakes and streams, resulting in reduced water quality for both wildlife and human consumption. In some urban areas, CSOs or combined sewer overflows also contribute significant pollutants to the potable water supply.

Kansas City's tree canopy covers 31% of the city and intercepts 1.1 billion gallons of stormwater of the annual rainfall in the Kansas City area. Models value this service at over $11 million annually to Kansas City.

Trees intercept overland flow by absorbing and slowing precipitation, which plays a major role in reducing the amount of stormwater that enters sewer systems. In fact, one mature deciduous tree can intercept over 500 gallons of rainwater a year, while a tree that holds leaves all year round (i.e., pines, spruce) can intercept up to 4,000 gallons per year (Seitz and Escobedo 2008).

Urban Trees Reduce Energy Costs

Demand and costs for energy are rising, with heating and cooling accounting for approximately half of residential energy bills (Department of Energy 2015). Trees provide energy savings by reducing these cooling and heating costs, both through their shade as well as transpiration. In fact, the cooling effect of one healthy tree is equivalent to 10 room-sized air conditioners operating 20 hours a day (North Carolina State University 2012). The shade of properly-placed trees can save homeowners up to 58% on daytime air conditioning costs, while mobile homeowners can save up to 65% (Smith 1999).

Urban Trees Alleviate Heat Stress

Built-up urban areas without trees often experience temperatures 15–25°F hotter than nearby less developed areas, often referred to as the urban heat island effect. Heat stress has been proven to cause significant public health problems and even mortality. In fact, each year more Americans die from extreme heat than all other natural disasters combined (i.e., hurricanes, floods, tornadoes, lightning) (CDC 2015).

Those over 65 or under age 5 are especially vulnerable to heat-related health problems, and these two age groups account for almost one-fifth of Kansas City residents (19.2%). According to the National Weather Service, there were 107 heat-related deaths nationwide in 2017, with a Missouri state average of just over 35 deaths annually, from 1980–2016 (National Weather Service 2018). Kansas City has experienced many deaths from extreme heat waves throughout its history, with the most devastating resulting in 1936 due to the lack of air-conditioning, and the most recent large-scale loss in 1980 with 176 deaths (Roe 2015).

Urban trees are widely accepted as one of the most effective long-term solutions to reducing the effects of urban heat islands. Tree canopy can lower ambient temperatures by 20°F to 45°F (EPA 2015).

Urban Trees Remove Carbon Dioxide from the Air

Most of the carbon dioxide (CO_2) in the atmosphere comes from human activities that involve the burning of fossil fuels. High levels of CO_2 result in climate issues, such as more frequent and severe storms, droughts, and other natural stresses across the country in recent decades. According to the National Weather Service, 161 reports of extreme weather events ranging from severe wind, hail, and flooding occurred in the Kansas City area in 2017, showing a steady increase from previous years (National Weather Service 2018).

In Kansas City, trees sequester over 8 million tons of carbon each year and store an additional 305,000 tons over their lifetimes. This annual sequestration service is valued at nearly $11 million annually, while the lifetime benefit of carbon storage is estimated at $291 million.

One single large tree absorbs as much as 48 pounds of carbon dioxide (CO_2) per year; one acre of trees consumes the same amount of carbon dioxide released by driving an average car for 26,000 miles (Megalos 2015).

Urban Trees Clean the Air

Air pollution creates significant public health issues. The very young and very old, those with heart disease or COPD, and those working outside are most susceptible to health issues from air pollution. Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term health problems (American Lung Association 2015).

Kansas City's urban forest removes over 4.6 million pounds of air pollutants every year, a service valued at $2.6 million. According to the Center for Disease Control, the incidents of chronic, lower respiratory disease mortality throughout Missouri have increased since 2005 (CDC 2017).

Trees can remove many components of street-level air pollution, including carbon dioxide, ozone, nitrogen dioxide, sulfuric dioxide (a component of smog), and small particulate matter (i.e., dust, ash, dirt, pollen, and smoke). In a single year, trees across the United States removed an estimated 17.4 million tons of pollution, valued at $6.8 billion, with most of those health benefits ($4.7 billion) concentrated in urban areas (Nowak 2014).

Urban Trees Improve Public Health

Poor air and water quality, heat-stressed environments, poor diet, and reduced activity level create public health problems in cities across the country. Trees have been shown to create healthy environments for people by improving air quality and reducing heat island effects. New York City saw a significant decrease of asthma in young children (-29%) after increasing its tree canopy through installation of over 300 trees for each square kilometer (Lovasi 2008). Studies have shown that individuals with views or access to green space tend to be healthier; employees experience 23% less sick time and greater job satisfaction, and hospital patients recover faster with fewer drugs (Ulrich 1984). Trees have also been shown to have a calming and healing effect on ADHD adults and teens (Burden 2008).

A 2015 study by the Kansas City Data Collective (KCDC) reported heart disease and chronic lower respiratory disease as leading causes of death in the city between 2007 and 2011.

Research now shows that tree loss in communities increases the number of deaths associated with these diseases (Donovan 2013). Protecting existing trees and new plantings would mitigate these effects.

Urban Trees Raise Property Values

Trees increase residential property and commercial rental values by an average of 7% (Wolf 2007). This is beneficial to both property owners and city budgets. Property values increase, and properties sell faster when communities become more desirable places to live; trees play a big part in establishing this desired aesthetic.

Urban Trees Make Streets Safer and More Walkable

In an age where walkability and pedestrian-friendly areas tend to draw the most people, tree cover is another powerful tool in revitalizing districts and

Photograph 1. Desirable neighborhoods found throughout KC are stocked with street trees.
Photo credit: KC Parks-Forestry

neighborhoods. Recently, Kansas City introduced the KC Streetcar to improve walkability and safety, and now incorporating trees only serves to bolster these efforts. Urban trees have been shown to slow traffic and help ensure safe walkable streets in communities. Traffic speeds and driver stress levels have been reported to be lower on tree-lined streets, contributing to a reduction in road rage and aggressive driving (Wolf 1998a, Kuo and Sullivan 2001b). According to the Federal Highway Administration, tree canopy along a street provides a narrowing speed control measure by creating a "psycho-perceptive sense of enclosure" that discourages speeding (U.S. Department of Transportation 2015). The buffers between walking areas and driving lanes created by trees also make streets feel safer for pedestrians and cyclists.

Urban Trees Provide Essential Wildlife Habitiat

Forests in urban areas are often fragmented (disconnected patches of trees) due to high levels of development, making sustained quality of life difficult for wildlife. Waterways near urban areas are also often highly degraded, partly due to a lack of vegetated buffers (trees) along water edges and polluted stormwater runoff.

Winter avian surveys performed by KC Wildlands – a partner of Bridging the Gap –have shown an increase in species diversity and number of avian sightings in the Blue River corridor in recent years after numbers began to decline in years 2013–2017. These numbers can be correlated to endeavors such as Kansas City Parks and Recreation – Forestry, which have made a concerted effort to focus on riparian tree plantings in these critical urban habitat areas.

Trees are an essential component to habitat and conservation in urban areas. They intercept and clean large quantities of polluted stormwater, preventing further degradation to vital aquatic habitats. Additionally, as smaller forests are connected through planned or informal urban greenways, trees provide essential habitat to a range of birds, pollinators, and other wildlife that feed on insects (Dolan 2015).

Urban Trees Make More Successful Business Districts

Trees contribute greatly to the success of business districts. Despite the common perception among some business owners that trees hide business signage, studies have shown that tree-covered commercial shopping districts are more successful than those without canopy. In multiple studies, consumers showed a willingness to pay 11% more for goods and shopped for a longer period in shaded and landscaped business districts (Wolf 1998b, 1999, and 2003). Consumers also felt that the quality of products was better in business districts surrounded by trees (Wolf 1998a).

Photograph 2. Country Club Plaza is a local example of a shopping area that is stocked with trees. Photo credit: Wikimedia Commons

With examples like The Plaza in Kansas City, it's clear that trees can make a huge difference in the appeal of a shopping district (Photograph 2).

Urban Trees Build Stronger, More Vibrant Communities

Tree-lined streets can create stronger communities and attract new residents. While less quantifiable, the tree benefits related to community building is no less important than other services. One study showed that residents of apartment buildings surrounded by trees reported knowing their neighbors better, socializing with them more often, having a stronger community, and feeling safer and better adjusted than did residents of more barren, but otherwise identical areas (Kuo 2001b). According to studies released by the Pennsylvania Horticultural Society, the greening of neighborhoods increases surrounding property values, encourages investment, reduces crime and vandalism, and encourages exercise (which in turn reduces stress). All of these improvements contribute to building a better community (PHS 2015).

Urban Trees Decrease Crime

Recent studies have shown that tree-lined streets have been linked to lower crime. A study out of Baltimore found that a 10% increase in tree canopy was associated with a roughly 12% decrease in crime. While low, dense brush was associated with an increase in crime, tall broad canopies were associated with a decrease in crime (Troy et al. 2012). It has also been shown that outdoor areas populated with trees tend to suffer from less graffiti, vandalism, and littering than their treeless neighbors (PHS 2015).

Kansas City residents have identified crime reduction as a priority for the community. Although trees alone cannot solve this problem, they can be a component of a comprehensive approach to better address the issue.

Urban Trees Provide Buffers for Noise and Pollution

Pollution and noise from busy roadways and rail lines can create unhealthy and undesirable conditions for those living nearby. The American Lung Association has found "growing evidence that vehicle emissions coming directly from major highways may be higher than in the community as a whole, increasing the risk of harm to people who live or work near busy roads" (ALA 2015). Buffers of trees reduce both noise and pollution. A 100-foot-wide, 45-foot high densely-planted tree buffer can reduce highway noise by 50% (NC State University 2012).

Summary

Trees provide effective solutions to many city challenges. Kansas City's tree canopy has been shown to provide over $28 million in services to the city annually. Many communities, after learning about the magnitude of these services, often want to start planting more trees right away. However, to effectively and efficiently make long-lasting improvements, it is important to first accurately assess the state of the existing urban forest, establish goals for the future, and use this information to map out the most effective ways to move forward.

CHAPTER 2: ASSESSMENT OF KANSAS CITY URBAN FOREST

How is an urban forest assessed? There are various schools of thought and systems to define, evaluate, and assess the health and sustainability of an urban forest. Because urban environments are man-made, a true assessment requires looking beyond just the tree data. Survival of an urban forest hinges greatly on human activity. For this reason, an urban forest assessment must include social and economic components.

What is a sustainable urban forest? For the purposes of this study, the concept of sustainability is defined as the ability to maintain the urban forest for some time into the future without compromising the ability of future generations to do the same (Clark 1997). Is the urban forest healthy enough to last into the future with minimum care? Are the financial requirements of the urban forest realistic for years to come? Is the value of the urban forest understood by all local players that actively impact trees of Kansas City?

To answer these questions, Davey Resource Group utilized a combination of James Clark's Model of Urban Forest Sustainability (1997) and Andy Kenney's Criteria and Indicators for Strategic Urban Forest Planning and Management (2011) to assess Kansas City's urban forest. Together, these formed the basis for a matrix-based system, which was customized to meet Kansas City's unique needs. The matrix evaluates the city performance levels in 28 "indicators of a sustainable urban forest," broadly categorized into three groups: The Trees, The Players, and The Management Approach. Each indicator received a low, moderate, or good performance level rating, based on a comparison to industry standards (See Appendix B).

This assessment used the city's existing urban tree canopy (UTC) data, the city's public tree inventory data, plus feedback from interviews and meetings with a variety of stakeholders.

Summary of Results

Indicators of a Sustainable Urban Forest in Kansas City MO		Performance Level		
		Low	Mod.	Good
The Trees	Urban Tree Canopy	■		
	Equitable Distribution	■		
	Size/Age Distribution		■	
	Condition of Public Trees - Streets, Parks		■	
	Trees on Private Property			■
	Species Diversity			■
	Suitability		■	
The Players	Neighborhood Action		■	
	Large Private and Institutional Landholder Involvement	■		
	Green Industry Involvement		■	
	City Department/Agency Cooperation		■	
	Funder Engagement	■		
	Utility Engagement		■	
	Developer Engagement	■		
	Public Awareness		■	
	Regional Collaboration	■		
The Management Approach	Tree Inventory		■	
	Canopy Assessment		■	
	Management Plan		■	
	Risk Management Program		■	
	Emerald Ash Borer Program			■
	Maintenance of Publicly-Owned Trees (ROWs)		■	
	Planting Program		■	
	Tree Protection Policy	■		
	City Staffing and Equipment		■	
	Communication		■	
	Funding		■	
	Disaster Preparedness and Response		■	

Assessment of the Trees: MODERATE

Assessing the trees in Kansas City involves looking at both the overall canopy across the entire city (public and private trees) as well as just the public trees managed by the city.

Urban tree canopy (UTC) covers 31% of the land in Kansas City. This canopy data (from a 2012 UTC analysis) reveal that Kansas City has achieved 53% of the possible canopy, with 60% total canopy being the maximum amount of canopy Kansas City could achieve. While Kansas City currently sits at a modest level of canopy compared to other cities (Table 3), high levels of honeysuckle may be artificially elevating the canopy percent; since honeysuckle is both invasive and provides less ecological benefits than shade trees, this is not ideal. Additionally, several factors may be overestimating the overall quality and sustainability of the canopy, including EAB and the high number of ash trees, high potential for losses from climate change, and high percentages of trees in fair or poor condition.

Table 3. City Canopy Comparison

| City/Province | Existing Canopy | | Population | Area (square miles) |
	UTC Cover	Year Assessed		
Winnetka, IL	53%	2010	12,417	4
Atlanta, GA	48%	2008	472,522	134
Charlotte, NC	47%	2012	842,051	298
Wilmette, IL	44%	2010	29,219	5
Cookeville, TN	40%	2017	32,622	22
Evanston, IL	37%	2010	74,895	8
Austin, TX	32%	2006	947,890	272
Kansas City, MO	**31%**	**2018**	**481,420**	**319**
Lexington, KY	25%	2013	318,449	286
New York, NY	24%	2006	8,538,000	305
New Orleans, LA	23%	2009	391,495	350
Miami, FL	20%	2016	453,579	55
Cleveland, OH	19%	2012	385,809	82
West Memphis, AR	18%	2012	25,284	29
Chicago, IL	17%	2007	2,705,000	234
Elgin, IL	16%	2004	112,123	38
Indianapolis, IN	14%	2008	864,771	368
Sacramento, CA	5.2–15.4%	1998	495,234	100

Comparing the urban tree canopy in Kansas City to the census data highlights the following socioeconomic trends:

- Areas with higher proportions of residents 17 and under, as well as higher percentages of residents 45 years of age or older, see higher proportions of canopy, while areas with higher proportions of residents aged 18–44 have lower percentages of canopy.

- Areas with higher proportions of high-school and associate degree level educations have higher canopy, while those with more advanced degrees (bachelors and beyond) have lower levels of canopy.

- Areas with higher proportions of homes built between 1950 and 1980 have the highest percentages of tree canopy. When homes from 1950–80 comprise the majority of the area, canopy exceeds areas with homes mostly built post–1980 by roughly 23%.

- There is slightly more canopy in areas with higher proportions of owner-occupied homes.

- There is no significant difference in canopy between areas with differences in median household income or by population density.

Map 1. Map of Kansas City tree canopy percent by census block.

More detailed tables of UTC findings can be found in Appendix A.

Based on the existing (15+ years old) tree inventory, the majority of public trees are in fair or better condition. Knowledge and management of tree condition is important not just for the longevity of the trees but for public safety management. This data estimates the total public tree population at over 135,000 trees and indicates that roughly 39% of trees (52,868) are in good condition, while 50% of the trees (66,403 trees) are in fair condition. These fair condition trees are in a particularly vulnerable position; appropriate care may result in improved condition, longer life, and additional ecological benefits, while neglect will likely lead to decline and a poor condition rating. The remaining trees (9%) are in poor to critical condition or dead, indicating a backlog of routine tree care (pruning or removals).

Based on the age of this data, frequency of extreme weather events, and lack of cyclical pruning, it is safe to assume that the tree population is likely in poorer condition than the inventory numbers show and even more susceptible to future losses in canopy.

Figure 1. Kansas City's Street Tree Condition

According to the existing inventory, the age distribution is close to the ideal, with the majority of trees in the smaller diameter (dbh) class, indicating a healthy stocking of younger trees and fewer established or maturing trees. Working towards an urban forest populated with larger trees is an important goal, as mature trees provide exponentially higher benefits.

For this reason, tree preservation should be highly prioritized in order to maintain this current distribution.
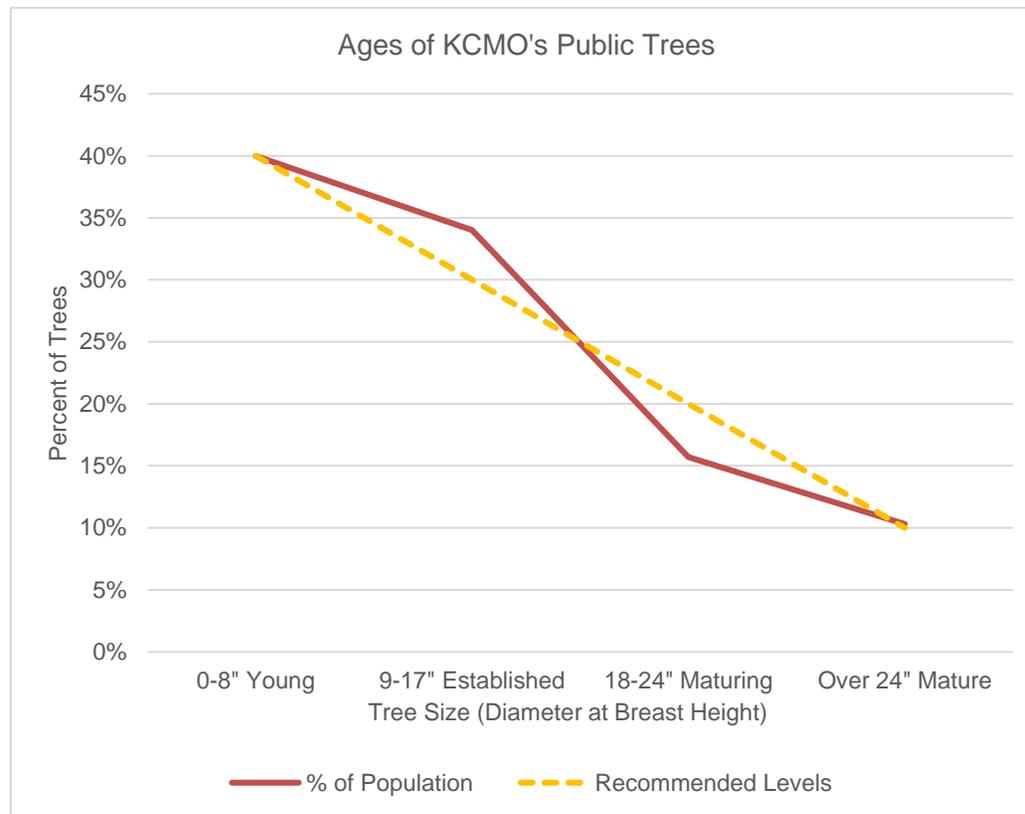
**Figure 2. Comparing Kansas City age distribution
to ideal age distribution.**

Species diversity is integral to the sustainability of an urban forest. A forest with low diversity is susceptible to much greater losses from pests and diseases, like emerald ash borer, while greater levels of diversity help to keep losses at a minimum. Diversity is close to ideal among city street trees, with no species exceeding the recommended 10% species limit. Sugar maple, pin oak, and white ash represent the largest portions of the population, each at 9%. The high percentage of ash is a particular concern considering the pervasiveness of EAB. Since intervention preventing loss by EAB is costly, this almost certainly ensure the loss of this 9% of public trees within the next ten years, and likely also would have a similar impact amongst trees on private property. Concerning genus diversity, maple (23%) are the only genus that exceeds the recommended 20%, with oak (15%) coming in at the next most common. It's recommended that no one tree family exceeds 30% of the population, and the most common family was *Sapindaceae* (includes maple and buckeye) at only 23%. A 2012 study of the 9-county regional area surrounding Kansas City suggests that American elm and northern hackberry may exceed recommended species diversity levels on private property throughout the city, but further study would be necessary to determine the extent of the issue (Nowak et al. 2013).

Species Diversity of KCMO's Public Trees
Goal <10%

- Sugar maple, 9%
- Pin oak, 9%
- White ash, 9%
- Sweetgum, 7%
- Red maple, 6%
- Honeylocust, 5%
- American elm, 4%
- Silver maple, 4%
- Callery pear, 3%
- Siberian elm, 3%
- Littleleaf linden, 3%
- American sycamore , 3%
- Common hackberry, 2%
- Norway maple, 2%
- Black walnut, 2%
- Eastern redbud, 2%
- Slippery elm, 2%
- Malus spp., 2%
- Other (175 species<2%), 23%
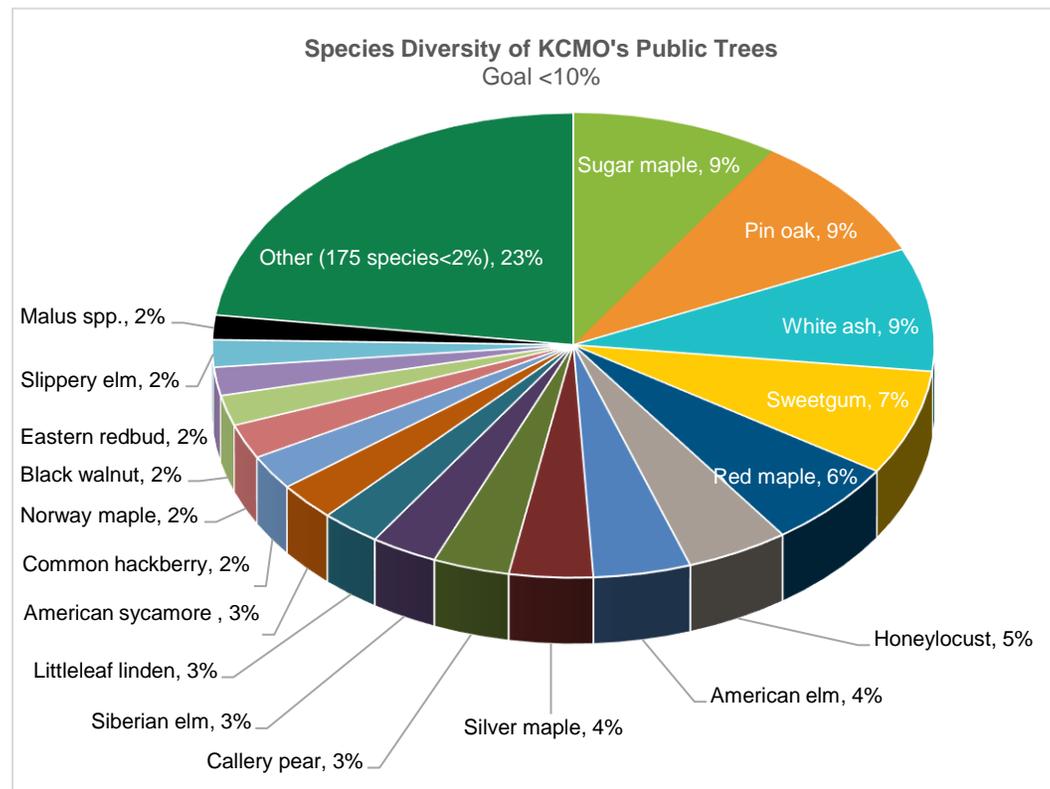
Figure 3. Kansas City Street Tree Species Diversity
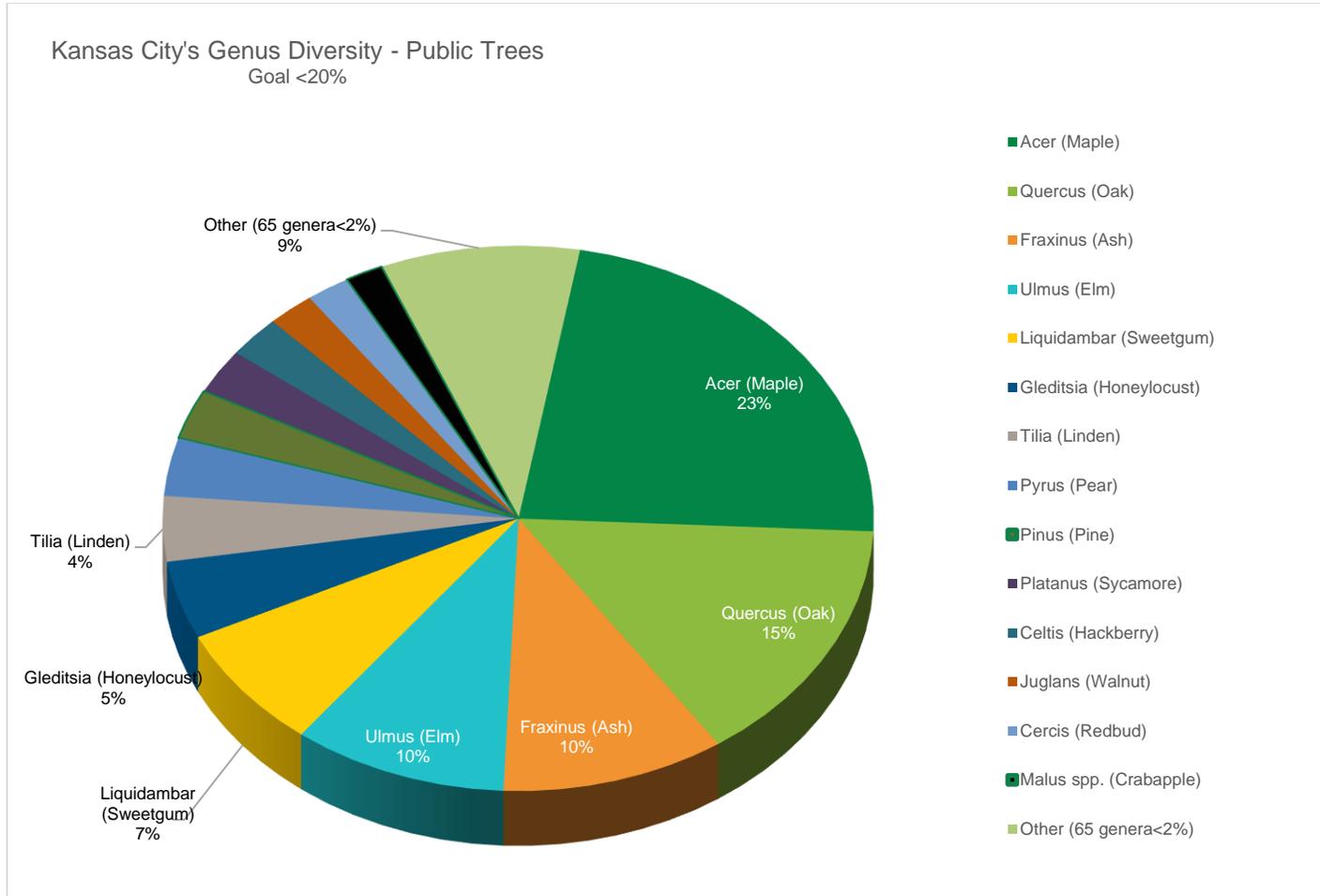
Figure 4. Kansas City Street Tree Genus Diversity

Kansas City's Family Diversity - Public Trees
Goal <30%

Legend
Sapindaceae
Fagaceae
Oleaceae
Ulmaceae
Altingiaceae
Fabaceae
Rosaceae
Malvaceae
Pinaceae
Platanaceae
Juglandaceae
Cannabaceae
Other (27 families<2%)

Pie chart labels:
- Sapindaceae 23%
- Fagaceae 15%
- Oleaceae 10%
- Ulmaceae 10%
- Altingiaceae 7%
- Fabaceae 7%
- Rosaceae 6%
- Malvaceae 4%
- Pinaceae 4%
- Other (27 families<2%) 6%

Figure 5. Kansas City Street Tree Family Diversity

Tree suitability is another factor to consider when analyzing the urban forest. Trees can be considered unsuitable for a variety of reasons, such as inadequate room for healthy growth (inhibited by infrastructure like powerlines or sidewalks), being susceptible to regional invasive pests, tree that are known invasive species and endanger local diversity, and trees that may be susceptible to long-term consequences of climate change. Based on the existing inventory, nearly a quarter of all street trees in Kansas City have growth conflict with sidewalks (24%), and less than 1% currently interfere with powerlines, but 93% of trees in Kansas City had the *potential to* interfere with powerlines (Table 4).

Table 4. Kansas City Street Tree Suitability

Suitability Risk Indicator	Percent
Current powerline conflict	1%
Potential powerline conflict	93%
Current hardscape conflict	24%
Potential hardscape conflict	86%
Invasive pest susceptibility	12%
Invasive tree species	7%
Climate change	23%

Twelve percent (12%) of street trees are susceptible to known regional invasive pests, including emerald ash borer, which is already damaging trees across the city. Invasive tree species, mostly Callery pear and Norway maple, make up 7% of Kansas City's street tree population. Davey Resource Group utilized the climate change atlas provided by the U.S. Forest Service to estimate future susceptibility of the tree population to climate change; under worst-case scenarios, 23% of Kansas City's street trees are at risk, with sugar maple considered the most vulnerable, at a potential loss of over 7,000 trees.

Climate change studies completed at Iowa State University cite these anticipated changes and the likelihood they'll occur (Hofstrand 2008).

Temperature-related changes:
- Longer frost-free period (high)
- Higher average winter temperatures, both daily maximum and daily minimum (high)
- Fewer extreme cold temperatures in winter (high)
- Fewer extreme high temperatures in summer in short term but more in long term (medium)
- Higher nighttime temperatures both summer and winter (high)
- More freeze-thaw cycles (high)
- Increased temperature variability (high)

Precipitation-related changes:

- More (~10%) precipitation annually and during the growing season

- Most of the increase will come in the first half of the year (wetter springs, drier or little change in summers) (high)

- More water-logging of soils (medium)

- More variability of summer precipitation (high)

  o More intense rain events and hence more runoff (high)

  o Higher episodic streamflow (medium)

  o Longer periods without rain (medium)

- Higher absolute humidity (Figure 6) (high)

- Stronger storm systems (medium)

- Snowfall increases (late winter) in short term but decreases in long run (medium)

- More winter soil moisture recharge (medium)

Photograph 3. Species selection for future tree planting endeavors needs to account for the anticipated changes brought on by climate change in order to maximize the impact of public and private tree planting endeavors. Photo credit: KC Parks-Forestry

Assessment of the Players: MODERATE

Many people and entities interact with an urban forest on a regular basis. Assessing the level of involvement and cooperation of all players is key to developing a sustainable urban forest.

Support from players in Kansas City is mixed, with some neighborhoods, organizations, etc. actively engaged in reaching forestry specific goals, while others are either uninterested in supporting forestry goals or unaware of the overall value of the urban forest.

Public awareness is mixed. Kansas City area citizens typically "like" trees, but do not feel activated to plant or protect them. There is a general lack of awareness of all the benefits (health, community, environmental, economic) trees provide.

Neighborhood level action is mixed, with some neighborhood groups highly engaged to accomplish urban forestry goals, and other neighborhoods unaware of forestry goals or even opposing the planting of trees. Those local groups that are motivated lack coordination and don't currently work to support any unified goals.

Engagement from local utility providers is mixed. The largest local energy provider, Kansas City Power and Light (KCP&L), has recently taken steps to include trees as a tool for meeting state energy efficiency requirements and cooperates with the city. Other local utility entities, particularly telecommunications providers, don't demonstrate that trees are an asset worth protecting.

Large private landholders and institutions have not demonstrated interest in trees as a valuable component of their infrastructure but could represent a valuable untapped resource for Kansas City. Developers are not engaged in urban forestry preservation initiatives. As there are currently no tree preservation requirements in development code, clear cutting land is common practice. Developers should be engaged in efforts to embrace additional tree preservation regulations and educated on the benefits trees provide to homes and housing values.

Green industry in Kansas City is becoming increasingly more involved in forestry-related projects, including plantings, outreach, and urban wood utilization. This group could be an even more effective partner for advancing local urban forestry goals if they were able to stay involved in long-term projects and work together towards united goals.

Interdepartmental cooperation is at a moderate level but could be improved. Interdepartmental teams like the Green Infrastructure and Stormwater Retention teams coordinate on a project-by-project basis. Improved lines of communication between departments would help bolster efforts to achieve common goals citywide.

Funder engagement is minimal. Multiple funders are located in the Kansas City area, but are unaware of, or don't see value in, urban forestry initiatives. Some funders may even have a desire to contribute to local forestry initiatives already, but simply aren't engaged with the right people to allow the process to begin.

Strong regional collaboration exists, but sometimes encounters additional challenges in trying to collaborate with organizations on both sides of the state line. Strong regional groups exist in Kansas City (like the Mid-America Regional Council, which did an i-Tree eco assessment of the 9-county regional area surrounding Kansas City in 2012), though there is no regional group that is continually working on collaborating towards urban forestry goals.

Assessment of the Management Approach: MODERATE

Kansas City has taken a proactive approach to managing the population of ash trees in response to the destruction by the emerald ash borer. There is a 100% inventory of all the ash in the city, as well as a plan which includes a combination of pesticide treatment and removals. The city also has an educational outreach program for the emerald ash borer. However, in areas beyond the ash management plan, the city has some progress to make to improve the overall management approach of the Kansas City Urban Forest.

Though a nearly complete inventory of the entire street tree population in Kansas City exists, it is largely outdated, much of the data are 15+ years old. This leads to difficulties in making management decisions, as much of the information regarding things like condition or risk may no longer be accurate enough to make informed management decisions. The ash inventory is a huge asset, but older inventory sets and i-Tree Eco sample from 2010 aren't enough information to make management plan prioritizations.

Kansas City is fortunate to have an urban tree canopy assessment completed using imagery from 2006–2012, but this is based on lower accuracy/resolution than current standards. This gives the city great information in terms of trends in canopy throughout the city and will be even more valuable once updated.

Kansas City does not currently operate under a comprehensive management plan. Therefore, the current management approach is largely reactive in nature, which has associated risks to public safety. The risk management program and maintenance of publicly owned trees are also primarily requested-based. Limited data for "hazard trees" exists, but without higher levels of staffing/funding there isn't enough capacity in place to move to proactive removals. Maintenance work is split evenly between in-house staff and contract tree services. The office of Emergency Management has a disaster plan in place, but there is no component that relates directly to trees currently in the plan. Tree planting has been regularly funded and implemented using volunteers with Bridging the Gap to help plant trees both along city streets and in the riparian zones of parks. The city is also working towards a contract growing system with local nurseries to maximize tree quality, desired species availability, and affordability.

For each of the past two years, the number of trees planted by Kansas City Parks & Recreation - Forestry has exceeded the number of trees removed, at almost two trees planted for every one tree removed. However, since the majority of benefits that the tree canopy provides come from more mature trees, even planting at a 2:1 ratio cannot make up for the benefits lost from mature tree removals, at least in the short term. Additionally, many of the trees planted are bare-root, which often have mortality rates ranging between 28–41% in the first two years post-planting (Cool 1976) and less than 50% survivability in riparian zones due in part to foraging (Keeton 2008). Essentially, large trees equal more benefits; newly planted trees have significant mortality rates, and if they survive will take decades to fill the gap left by the more mature canopy. So, tree planting is important to keep replenishing the urban forest, while preservation existing canopy should also be a high priority.

There is no tree preservation policy in place for private development or trees on public land, though the city is currently exploring options for implementing tree protection for public trees. Currently, the city focuses on maintaining canopy through landscape requirement for adding new canopy to private development. Enforcement for the landscape requirement is lacking and would need to be supplemented to be sure private and public entities are following protocol, particularly if additional development code is added to the city ordinance. This current lack of a strong ordinance to protect the trees is a lost opportunity to: 1) convey to the public the value of this city infrastructure through example; 2) boost tree fund revenues; and 3) protect the high-level of services provided by mature trees throughout Kansas City.

The city offers professional development opportunities for the 15 tree trimmers and four (4) foresters on staff, but current staffing levels only cover reactive maintenance. Additional employees or contract services will likely be necessary to fully implement a proactive tree care approach.

Funding for urban tree management is diverse and comes from a variety sources, including the general fund, state grants, private donors, and capital improvement plans, but is currently projected to be inadequate for reaching proactive care goals.

Communication avenues are in place through Bridging the Gap and interdepartmental collaboration does exist within the city, but level of communication between city staff and out to the public could be improved and made more transparent.

Using this Assessment

Through this assessment, areas of improvement needed to achieve a more sustainable urban forest begin to emerge. These results, when combined with a vision for Kansas City's future urban forest, have informed the strategies for action going forward. These indicators can also be used as benchmarks for measuring progress when the urban forest is reassessed in 5–10 years.
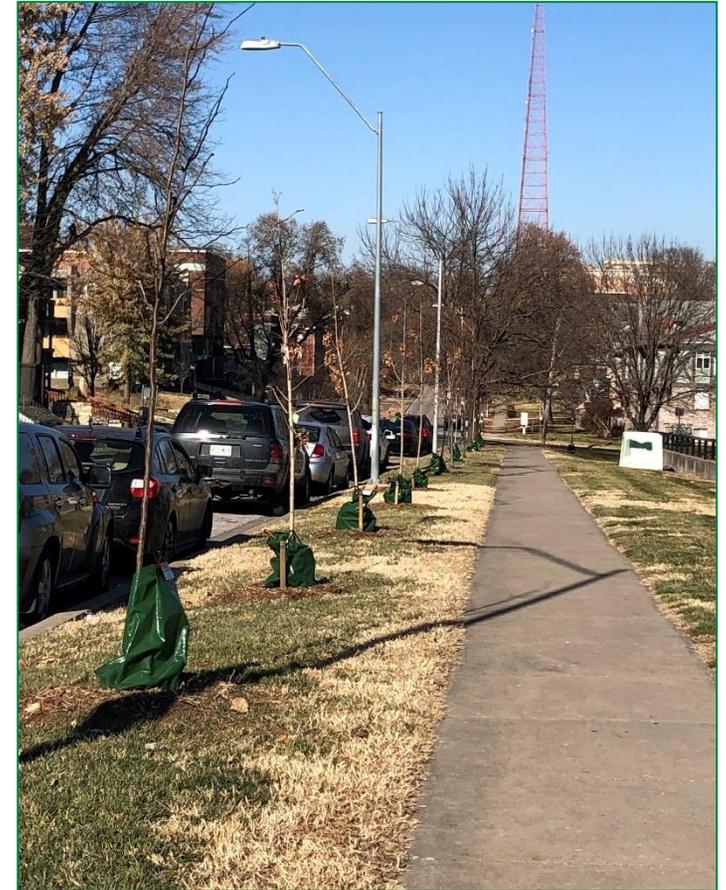
Photograph 4. Watering bags such as this are examples of proactive maintenance Kansas City needs to implement on a cyclical basis to better care for current and future trees.
Photo credit: KC Parks-Forestry

CHAPTER 3: A VISION FOR THE FUTURE

If Kansas City is going to prevent future loss and prepare for the future, the city needs to first clearly define a vision and goals to work as efficiently and effectively as possible.

Because Kansas City has a tree canopy at high risk of loss, including the loss of benefits to the community, Kansas City has taken the lead in an effort to address the challenges associated with the existing canopy for all residents. This work involved an extensive effort to understand the existing canopy structure and assess the tree canopy priorities of the community through a collaborative Tree Champions network.

Photograph 5. Kansas City's tree population needs a well-funded forestry department to provide the work force and equipment needed to better proactively care for current future trees. Photo credit: KC Parks-Forestry

Based on the work of this project, a vision and specific steps to reach that vision over the next 10 years were developed.

Resulting Vision

Kansas City's tree canopy will increase in coverage, quality, diversity, and strategic distribution in order to continue providing critical public benefits to all; the city's urban forest will be resilient to anticipated future challenges, including unpredictable climate stress, existing infrastructure repair, new development pressure, and invasive species threats. Protected, improved, and maintained through the collaboration of many partners, a vibrant urban forest ensures that Kansas City will remain a healthy, prosperous community for residents to live, work, and recreate.

This vision statement may be adjusted based on future public input. When coupled with the recommended future comprehensive assessment of the existing urban forest, a clear vision allows for the development of effective strategies for action.

For a plan to be successful, community engagement in the improvement and care of the urban forest is critical. The ability to preserve and sustain the city's urban forest over time depends on actions taken not just by the city, but by community organizations, businesses, and individual citizens as well.

CHAPTER 4: A PATH FORWARD – STRATEGIES FOR ACTION

Kansas City's vision can be achieved through three actionable missions and strategies:

THE TREES

Mission 1: Increase Tree Canopy Cover and Associated Benefits

Strategy 1: Officially Adopt and Incorporate Urban Forestry Goals

Strategy 2: Plan for a UTC Update

Strategy 3: Define a Strategic Planting Plan that Reflects City Goals

Strategy 4: Improve the Tree Protection Code

THE PLAYERS

Mission 2: Progress through Outreach and Collaboration

Strategy 5: Encourage Tree Planting and Preservation on Private Property

Strategy 6: Create Plan Implementation Education and Messaging

Strategy 7: Develop a Plan Implementation Team

THE MANAGEMENT

Mission 3: Improve Public Tree Management

Strategy 8: Complete an Updated Inventory and Management Plan of Public Trees

Strategy 9: Progressive Increase of Staff Resources

Strategy 10: Transition to Proactive Management

MISSION I: THE TREES – INCREASE CANOPY AND ASSOCIATED SERVICES

Increasing Kansas City's urban tree canopy increases the level of benefits and services trees provide, including (but not limited to) the interception of more stormwater, improvements to public health, and continued revitalization of neighborhoods.

How do we increase tree canopy and benefits?

Strategy 1: Officially Adopt and Incorporate Urban Forestry Goals

The work that went into this plan resulted in a community goal of maintaining canopy while increasing canopy quality, diversity, and strategic distribution. In order for the city to lead by example, this goal needs to be officially adopted by the city leadership and incorporated into several relevant documents and policies. This is critical to ensure that these efforts will last through changes in staff and elected officials.

It is important to set urban forestry goals. It can engage and motivate the public with specific targets (instead of a mandate to just increase canopy in general) and serve to unify actions of many different players. More specifically, goals targeting canopy can provide benchmarks to measure future progress and trends. Furthermore, a canopy goal can be an effective way to convey reasoning behind tree protection regulations. It demonstrates the conviction that the urban forest is a critical element of what makes Kansas City an amazing place to live, work, and recreate. Canopy goals should be set as a community and incorporated into public policy and outreach efforts.

Task 1.

Incorporate the canopy goal into outreach efforts.

Public engagement is required for real progress in increasing tree canopy. The newly-determined canopy goal should be incorporated into the outreach campaign, discussed in more detail in Strategies 5–7.

Task 2.

Incorporate canopy strategy into city policy.

The canopy goal should also be incorporated into city policy where applicable. This ensures its survival and momentum during transitions in leadership and/or staffing. Incorporate the goal into:

- **Kansas City's F.O.C.U.S. (Forging Our Comprehensive Urban Strategy) Plan.**

   At a minimum, the new canopy goal should be included in the city's next comprehensive plan (last one completed in 1997). For example, the City of Tampa, Florida's most recent comprehensive plan, Imagine 2040, discusses tree canopy goals at length in the Urban Forestry chapter. The plan also calls for the UTC to be regularly updated. This conveys a clear and official conviction of the importance of tree canopy in Tampa.

- **Adoption by City Council.**

   It is strongly recommended that city commission officially adopt the canopy goal in a proclamation.

- **Incorporate into Tree Ordinance.**

  City tree ordinances should include a general reference to the canopy goal. This aids in helping property owners and developers understand why the regulations are in place, and how the tree canopy is critical to a healthy community. It also serves to reiterate Kansas City's commitment to trees as city infrastructure. The City of Springfield, Missouri Public Works Policy 1.2.4 explains one of the intents of the policy (among other points) is to "provide a measured approach to tree canopy preservation and restoration and long-term tree canopy enhancement..." (Springfield, MO Public Works 2018). Note that an exact canopy goal number should not be used, as it may change over the years (see inset "Springfield, MO Internal Tree Preservation and Canopy Policy" discussed in Strategy 4).

Strategy 2: Plan for a UTC Update

Tree canopy assessments should be updated every 10 years to gauge progress and identify areas and reasons for any losses occurring. Current assessment imagery is from 2012 and is based on technology that is quickly becoming outdated. Current canopy data may be artificially elevated by high percentages of honeysuckle, which can't be separated out from more quality tree canopy given the level of technology used to assess the 2012 imagery. Many cities, including Tampa, require the regular update in their tree ordinance (Tampa Ord. No. 2006-74, § 9, 3-23-06). After the first update, the data will enable identification not just of trends of gains or losses in canopy, but where the largest canopy changes are actually occurring. The data will also help identify problem areas, along with ways to rectify losses and get back on track to reach future canopy goals.

Task 1.

Plan for a UTC update with current aerial imagery.

Kansas City's last UTC was completed using 2012 aerial data. The next UTC is recommended using 2018 (or more recent) imagery.

Task 2.

Explore partnerships and secure funding in advance.

Once the first UTC is completed, updates can be significantly less expensive to undertake. However, funding should be secured in advance. UTCs can also be implemented with partners on a larger scale, which also has the potential to save costs. Kansas City may want to explore partnering with larger regional entities like Clay County, Jackson County, Platte County, Cass County, private businesses, and the Mid-America Regional Council to share costs while providing the necessary land cover data to gauge progress and trends.

Strategy 3: Define a Strategic Planting Plan that Reflects City Goals

Planting efforts are a significant part of reaching city goals for tree canopy, public health advocacy, and climate resiliency. A plan for tree planting should be based on an end game/purpose as opposed to reactive, project-specific planting such as landscaping for development. Planting trees that thrive in the landscape requires appropriate selection, installation, and care throughout establishment. New trees need to be set up for success.

Task 1.

Increase Diversity.

Focus planting efforts in a manner that increases the overall diversity and resiliency of Kansas City's urban forest. Currently, maple exceeds the recommended diversity limits at 23% within the city, while American elm and hackberry exceed diversity limits regionally.

Task 2.

Better prepare Kansas City's tree population for climate change.

Prioritize the planting of species that are anticipated to fare better under upcoming climate conditions while avoiding heavy planting of those species that will suffer the greatest losses.

Task 3.

Identify prioritized planting locations.

Distribution of planting should be prioritized based on those areas most in need of the benefits that increased canopy can provide and any areas that have suffered losses as determined by the updated UTC assessment (Strategy 2). Discussed further in Strategy 10.

Comparison of Tree Preservation vs. Planting

It is no surprise that larger trees provide more services to the community. They intercept more stormwater, remove more air pollution, provide more energy savings, and sequester more carbon. However, it is important to understand that this increase in services *is exponential*, and therefore should be a priority for communities.

Consider the air pollution benefits alone: large healthy trees (>30" DBH) have been shown to remove *70 times* more air pollution a year than small healthy trees (<8" DBH) (Marritz 2012).

Consider comparing the number of new trees it would take to replace the services provided by one mature tree; 10–24 new swamp white oak (3" DBH) would be needed to compensate for the benefits lost from the removal of just one mature swamp white oak (30" DBH).

Because part of Kansas City's vision is to be resilient to future challenges, such as existing infrastructure repair and new development, prioritizing care for existing trees (over planting new trees) is critical for a healthy community.

*Data Source: National Tree Benefits Calculator. Exact replacement equivalent depends on the specific tree benefit to be matched.

Strategy 4: Improve the Tree Protection Code

Current tree protection regulations are marginal and are not adequately enforced. The city should "lead by example" and officially adopt an internal tree protection policy, along with improving the current tree protection language focused on private development.

Official ordinance adoption is needed to achieve the dual goals of reducing net loss (quantity of the UTC) and improving the condition (quality of the UTC).

Kansas City's public tree inventory reveals that a significant percentage (31%) of all public trees are young (less than 6 inches DBH). This is positive in that it is a sign of recent tree planting. However, the large pay-off of services from trees comes as trees mature. A larger percentage of more mature trees can increase the services provided exponentially (see Comparison of Tree Preservation vs. Planting inset) without the costs associated with planting and establishment. For these reasons, Kansas City's first priority should be to care for existing trees by:

Task 1.

Improve the management of public trees to ensure trees reach mature sizes.

This is addressed in Strategies 8–10.

Task 2.

Ensure the pathway to adopt and implement effective tree protection policy is in place.

Accomplish this by educating city staff, contractors, and the public on best management practices (BMPs) in tree planting and tree care (addressed in Strategy 7).

Task 3.

Adopt an internal tree protection policy.

Noncompliance with this policy should be compensated through funds for the canopy lost, which should go to a fund meant only for the planting and improvement of the city's urban forest (See the inset "Springfield, MO Internal Tree Preservation and Canopy Policy).

Springfield, Missouri Internal Tree Preservation and Canopy Policy

Purpose Statement

Provide a measured approach to tree canopy preservation and restoration and long-term tree canopy enhancement based on accepted arboricultural standards, Public Works and/or Parks project requirements, by starting preservation and restoration efforts at the concept phase of the design process and assigning responsibility to future enhancement efforts. This policy designates trees as part of the existing infrastructure.

Policy

Existing tree canopy will be measured for each significant Public Works or Parks project that occurs within the urban area, excluding tax bill sewer district projects, certain grants, private development, and certain specially stipulated funding. Tree canopy evaluations will only be conducted when tree canopy loss is expected, or tree preservation methods are necessary. Any tree canopy that is not preserved due to construction or necessary site improvements will be replaced or funding reserved at a value that doubles the canopy that is lost. First preference of canopy replacement will be on the corresponding Public Works or Parks project site.

Task 4.

Strengthen the current development code and enforcement.

If a developer chooses to clear-cut a property or ignore tree-related landscape requirements, there should be a clear financial penalty, which should go to a fund meant only for the planting and improvement of the city's urban forest.

Currently, Kansas City sets a $500 fine for any code infraction. Compare this to Cincinnati or Atlanta (see Examples from Other Cities inset) where tree removal or damage is much costlier to violators. Low penalties are not typically effective, as it can often be easier to remove a tree in violation and pay the $500 fine than comply with regulations. Fines are not just about the loss of a tree, but the loss of the benefits that trees provide to the community.

According to ISA's study of over 160 tree ordinances, multiple types of penalties have been used in tree ordinances, including fines, jail terms, and forfeiture of performance bonds. These penalties are also often accompanied by specific replacement requirements. Penalties appear to deter offenders, but only if consistent enforcement and authority are set in place early on (ISA 2001). This source may not generate a great deal of money, but it is a legitimate and often under-pursued source of funds that can be used to better manage and protect public trees.

Task 5.

Implement a landmark tree program.

Landmark trees, often located on private property, can have an impact on the community's perception of trees. This type of program can convey to the public the value of large, more significant trees in Kansas City, making it less likely they will be removed. Tree appreciation programs are an effective way to educate residents on the benefits these large trees provide and are often promoted by the tree owners themselves. This type of program can be implemented in two general avenues: either an official city designation with associated legal tree protection or a more informal appreciation program with no legal implications or requirements.

Examples from other Cities

Tree Damage as Defined in Miami-Dade Ordinance. In Miami, fines are instituted for violations of *any tree abuse* including "damage inflicted upon any part of a tree, including the root system, by machinery, construction equipment, cambium layer penetration, storage of materials, soil compaction, excavation, chemical application or spillage, or change to the natural grade. Hatracking <topping>, girdling or bark removal of more than one-third (1/3) of the tree diameter, and tears or splitting of limbs."

Rates in Atlanta for Tree Ordinance Violations. Atlanta, Georgia assesses penalties for tree damage and removal with steep fines for violations. The first violation is a minimum of $500; the second violation is $1,000. If the violation cannot be tied to an exact number of trees (for example in a natural area), fines are set at $60,000.00 per acre of land affected (Atlanta 2015).

Additional Remedial Action for Tree Damages in Sunrise, FL. Tree Code Sec 16-173: "In the event a person abuses a tree in violation of this section, the violator, in addition to being subject to the penalties found in section 1-15 of the City Code, shall be responsible to undertake pruning and other remedial actions that the city determines are reasonably necessary to protect public safety and property, and to help the tree survive the tree abuse damage. If the natural habit of growth of the tree is destroyed, the violator shall remove the abused tree and install a replacement tree."

Tree Permits and Costly Consequences in Raleigh, North Carolina. Raleigh requires a $100 tree impact permit for any work done in the right-of-way where trees are located. Activities that require this permit include heavy equipment use or storage of soil, stone, or mulch in the critical root zone. Raleigh reminds its citizens "remember, you can greatly reduce costs by protecting a tree at the beginning of a project rather than paying up to thousands of dollars for removal and replacement at the end of a project when an impacted tree becomes hazardous" (Raleigh 2015).

Cincinnati Utilizes CLTA Assessed Value to Set Violation Fee. In Cincinnati, if a property owner or contractor significantly damages a public tree, they are charged the assessed landscape value (set by Council of Tree & Landscape Appraisers) of the tree. A 20" DBH maple, for instance, has a landscape value of over $2,000. In addition, they are charged the cost of its removal and new replacement planting. These penalties make tree protection and preservation a priority for both the public and contractors. All revenue is deposited into a dedicated urban forestry fund (Gulick 2015).

MISSION II: THE PLAYERS – PROGRESS THROUGH OUTREACH AND COLLABORATION

The use of public outreach and partnerships to maintain long-term increases in tree canopy is essential. City actions alone have limitations to increasing canopy because public land accounts for only a small percentage of municipalities. Fortunately, Kansas City residents have expressed a satisfaction with Parks and Trees (see KC Parks Survey inset), which could produce an additional desire to get involved. Positive public sentiment and a collective sense of priority for tree canopy can also result in more support/funding for public tree care budgets, and outreach efforts often unearth new partners and funding sources that otherwise can go untapped.

An education and outreach campaign will:

- Foster an understanding of and connection between trees and the services they provide to the community, leading to a prosperous, high quality of life.
- Prompt residents and businesses to take action in tree preservation and planting (or other determined needed actions) on private and public lands.
- Cultivate support of public tree funding and management.
- Convey the city's priority of trees as essential city infrastructure (leadership by example).
- Allow the city to "lead by example" by showcasing and role modeling best industry practices and new, applicable technology such a structural soil.

KC Citizens Survey

Results from the 2017–18 Kansas City Citizens Survey provides unique insight into how KC Parks and Trees are viewed by KC residents

Amongst services with the highest levels of satisfaction, based upon the combined percentage of "very satisfied" and "satisfied" responses among residents, who had an opinion, were: the maintenance of city parks (70%).

There were significant increases in satisfaction ratings of the parks and recreation services that were rated on both the 2005 and 2017–18 survey.

Two of which were:

- Maintenance of city parks (+20.9%)

- Tree trimming & other tree care along city streets and other public areas (+6.4%)

Planting and maintaining tree canopy can be difficult, if not a complete waste of funds and efforts, without supportive policies and partnerships in place. Problems can arise through conflicting city department goals and work, policies that don't support canopy goals, lack of enforcement of existing policy, and lack of public and municipal education and support. The following strategies identify ways to create a supportive environment for urban forestry efforts.

How do we engage the players (government, citizens, businesses, visitors) and develop a plan to work collaboratively on this effort?

Strategy 5: Encourage Tree Planting and Preservation on Private Property – A Shade Tree for Every Building and Street!!!

As an average, only 20% of a city's tree canopy is located on publicly owned land. Therefore, the amount and quality of the city's UTC is extremely dependent on the existence and longevity of trees on private properties.

Task 1.

Launch and maintain a public education program.

Spread the message about the importance of trees, how to properly plant them, and how to maintain them as they are establishing. The city could partner with businesses and nonprofits to initiate a tree give-away or cost-share programs for property owners, targeting properties where there are gaps in canopy coverage and/or where equity goals need to be met.

Throughout the Tree Champions meetings, the rallying cry "A Shade Tree for Every Building and Street" was recommended.

Task 2.

Provide easy public access to data and related urban forest information.

Easy access (preferably online) to multiple types of information and data can encourage those interested in urban forestry to take action. This can include information and diagrams on how to plant and care for trees, in-person tree planting training sessions, and access to tree inventory and UTC results. Urban forestry web pages on the city website should answer the most commonly-asked questions: how to get a tree, what to do if a limb is falling, how to get involved, how the city processes work, etc. There are many informative urban forestry websites that detail how residents can get involved. For example, New York City's page (see inset) provides a good description of city services.

Collaborate with large landholders individually on this topic, focusing on the benefits that the trees can provide that are in alignment with the landholders' established goals. Local hospital groups such as St. Luke's would be an example of a greta local partner to cummounicate the beneifts trees provide for health.

Task 3.

Encourage and assist in neighborhood-led tree campaigns.

Communities can provide the labor and enthusiasm for local tree planting campaigns, but often need support and technical assistance to implement campaigns. This can take the form of logistical support, access to data and maps from the recent UTC to help in planning or raising funds, and/or education and training on tree planting best practices. Consider developing incentives for tree planting and care, potentially in the form of matching funds, tax breaks, or discounts on stormwater fees. Incentives could be provided upon completion of a planting campaign, survivability, or based on whether the neighborhood achieves its canopy goal by the next UTC update.

Work with groups like the Heartland Tree Alliance and the TreeKeepers Network in Kansas City to provide information on best practices for tree planting to Kansas City residents. Additionally, Kansas City should work with the Missouri Department of Conservation's State Nursery to provide reduced-cost, bare-root seedlings for private tree planting endeavors.

Task 4.

Participate in regional tree planting initiatives and programs.

From time to time, regional tree planting initiatives arise via watershed groups, regional planning organizations, or state-wide programs. Staying connected and aware of what is happening in neighboring areas can open up access to pre-built, ready-to-go private tree planting campaigns that can be promoted and implemented within Kansas City. For example, the Missouri Department of Conservation is encouraging partnership with the Arbor Day Foundation (ADF) to provide Missouri communities with access to ADF's Community Canopy program. This program combines an online tree ordering system with an easy-to-use online mapping tool that helps property owners calculate where to specifically and strategically plant trees on their property for the greatest savings.

Strategy 6: Create Plan Implementation Education and Messaging

As multiple partners will be needed to achieve real progress in Kansas City, implementation will occur via many players and individual volunteers. With this many moving parts, it is critical that, at the minimum, all involved are relaying the same messages. For this reason, it is strongly encouraged to develop pre-defined messaging to encourage the desired actions that all partners in this effort can put out to ensure a consistent unified voice. This is the foundation of the entire effort, so it should be done well.

Task 1.

Identify your target audience.

Targets of education and outreach should include those who work within the city (to educate on why the canopy is so important as a resource of the city), developers (to educate on how they can support achieving the city's canopy goal), and the public (to educate on benefits of trees, proper maintenance, alleviate fears, etc.).

Consider the groupings below. Each of these groups and their respective subgroups will likely have different priorities, but all have a stake in the urban forest. Groups should be defined by the advisory team with help from the professional marketing firm, and targeted approaches identified for each.

NEIGHBORHOODS	**DEVELOPERS**	**LARGE PRIVATE LANDHOLDERS**
Brookside, Waldo, River Market, Crossroads, etc.	Homebuilders and other construction companies, engineers, architects.	Often large businesses, but also city, county, and state entities.
BUSINESS DISTRICTS	**GREEN INDUSTRY**	**NON-PROFITS/NGOS**
Community Redevelopment Districts, business associations.	Grounds managers, landscapers, tree companies, landscape architects, engineers.	Green Works in Kansas City, Keep Kansas City Beautiful, Kiwanis, etc.
ELECTED OFFICIALS	**CITY STAFF**	**GENERAL PUBLIC/CITIZENS**
City commission, county leadership, and state representatives.	All levels of city staff.	Residents, employees, visitors.

Kansas City-specific audiences that Tree Champions have already prioritized include children and neighborhoods. Educational material that connects with both parents and children, collectively, and neighborhood designations for "Tree Champion Neighborhoods" are viable pathways to reach these audiences.

Task 2.

Create a brand.

A brand is the face of the campaign; and its purpose is to capture and hold the attention of the target market to allow further education. It should be professional, credible, and designed to look good within multiple applications. Educational outreach should focus on the perception, protection, and planting of trees. Additionally, messaging/branding development should include some kind of rallying cry - examples include "50% by 2050" (Charlotte, NC) and "Yes, we canopy!" (See Green Macomb - Macomb County, Michigan inset for examples of their outreach campaign).

The Tree Champions group has already identified a couple of rallying cries that they are considering utilizing which are:

"A Shade Tree for Every Building!" and "Every Major Street Lined with Trees!" These are both great examples of rallying cries with which individual homeowners can identify. Consider the adoption of additional rallying cries in an expanded campaign to also engage other target audiences

Task 3.

Develop messaging.

Today's society is characterized by sound-bites and short attention spans. Combine this with the fact that the human brain does not retain a lot of information all at once, and the need for limited and concise messages becomes evident. Focus messages on what people care about (benefits that trees provide) rather than the trees themselves. Choose a limited number of message topics and drill down to what is important to people (livable neighborhoods, public health, heat stress alleviation, etc.). Using a professional firm to help craft messages in terms of existing input into what people want for their communities and what the public needs to know. This includes making the connection between trees and solutions to urban problems. Messages can also address some of the more emotionally-based tree perception issues. The most common of which is fear (i.e., trees, houses, and ice storms together), but also the perception that trees are mostly work (messy, dirty, leaf clean-up).

Strategy 7: Develop a Plan Implementation Team

A comprehensive public outreach campaign cannot realistically be sustained by city staff on a long-term basis. The city is, however, well-positioned to spark community involvement by bringing stakeholders together, providing an avenue for citizen involvement and neighborhood level action, and building a supportive environment for their work. It is recommended that the city create and engage an advisory team to help spearhead this initial outreach initiative. There are several forms this advisory group can take. With city support, this effort can be a project of the city's existing Tree Champions or the local Tree Board. Alternatively, outreach can take the form of a new city-initiated, but publicly-run committee made up of community activists, business community leaders, and/or neighborhood representatives. No matter the form it takes, an advisory team support structure is essential for the longevity and success of a public outreach campaign. Outreach and implementation are where the brand and messages are put to work. It involves defining audiences, partnerships, and reaching out to the public, with the goal of getting the audience to work on the tasks described in strategies 1–5.

This plan suggests many improvements for the management of public trees, but without a team in place for implementation a plan like this can just as easily collect dust on a shelf.

Macomb County, Michigan – Tree Campaign
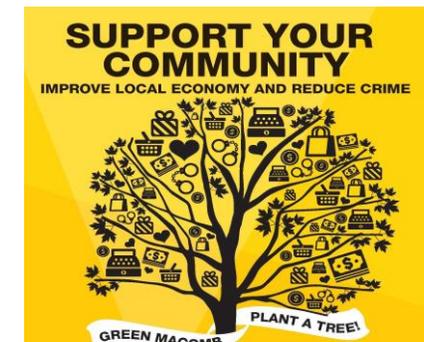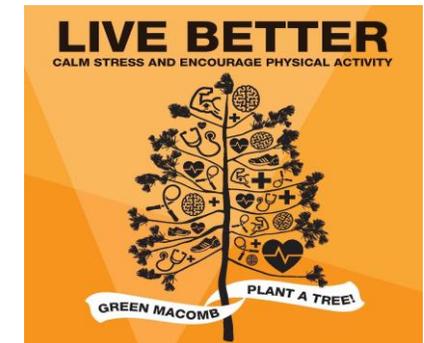
Task 1.

Utilize the existing Tree Champion network.

This informal team/group can reconvene and build working groups based on their strengths. New members can be invited based on the players identified as missing from the process or lacking engagement. Regardless of the form it takes, the team can be initially started from participants from the Tree Champions and members of Bridging the Gap. Topical, focused work teams could be created to then tackle certain recommendations. They can also provide a way for the public to get involved (as a team volunteer).

Photograph 6. Kansas City's Tree Champions Group established a vast network of industry professionals who have interest in their community tree resource. Continue to utilize this established network to aid in outreach and education efforts.
Photo credit: Davey Resource Group

MISSION III: THE MANAGEMENT – IMPROVE PUBLIC TREE MANAGEMENT

Public trees need to be effectively managed for public safety, but allow them to reach maturity, and thus provide the community with the greatest amount of services. Public trees are already a good investment. For every $1.00 Kansas City spends on its public tree program, it receives $3.01 in benefits. As public tree management improves, this already impressive return on investment will continue to grow.

How do we improve public tree management?

Strategy 8: Complete an Updated Inventory and Management Plan of Public Trees.

Currently the data for public trees is only partially updated due to ash tree mapping. Inventory data are the backbone of all management efforts and define the appropriate funds and other resources needed for proactive management. Data-driven asset management has become a standard operating practice that results in greater effectiveness and efficiency. A management plan better defines what resources are needed for the urban forest management program to function using best management practices such as having a full inventory, providing cyclical maintenance, updating the UTC analysis again in 2022, incorporating a planting plan, etc.

Task 1.

Update tree inventory.

Effective management of public trees requires an accurate assessment of site data and the existing condition of the urban forest. In the past, Kansas City has wisely invested in a public tree inventory, but that data set is now in need of updating to better forecast a plan of action for Kansas City's forest. While the ash inventory is a fairly current data set, there are a number of sites in the comprehensive data (over 125,000) without current risk, condition, and maintenance data, which is critical information to have for ensuring public safety on an ongoing basis. Additionally, there are inconsistencies in the data on the existence of overhead utilities. While not as critical as condition data, utility presence is important for streamlining species selection and ensuring adequate grow space for trees.

Kansas City Parks is currently exploring the idea of completing a right-of-way corridor inventory through video imagery and the existing Cartograph system that has already been invested in. These endeavors could potentially capture basic species ID and size class information for the tree population. If coupled with an on-the-ground arborist, observations that assess tree condition, risk, and recommended maintenance an updated inventory could be achieved at a reduced interval and cost. If this effort doesn't continue to develop, an expedited way to update the inventory and management plan would be through forestry consulting services and would cost upwards of $500,000.

Task 2.

Develop a 10-year management plan.

Upon completion of the updated public inventory data, develop a 10-year management plan that will outline a realistic maintenance program to increase the amount of a proactive, annual tree care cyclical program. This involves prioritizing the most immediate needs and better assessing the maintenance budget to eventually fund a fully-proactive tree care program.

Strategy 9: Progressive Increase of Staff Resources

Once the inventory and management plan update have occurred, an assessment of current staff resources should be performed to transition and successfully implement a proactive management program and enforce regulations related to the tree protection ordinances (see Table 5 for public tree budget comparisons to other communities).

For Kansas City, this means assessing the level of appropriate staffing and expertise needed for cyclical tree care and maintenance, code enforcement for future adopted ordinances, and inventory and plan updates.

Table 5. Municipal Budget Comparisons for Public Tree Programs

	Kansas City	National Average	Cities with Population 250,000–499,000	Midwest Average
Total Municipal Budget	$1,660,000,000	$200,316,126	$780,007,436	$130,849,394
Annual Tree Budget	$3,800,000	$801,595	$3,074,165	$760,065
Budget per Street Tree	$29.09	$42.59	$29.91	$35.68
Budget per Public Tree	unknown	$37.50	$24.58	$32.61
Total Street Trees	130,624	26,234	103,361	24,912
Total Square Miles	319	~200	~250	~175
Per Capita Street Trees	0.30	0.27	0.20	0.34

Task 1.

Create a Community Conservationist position to advocate for Kansas City trees.

Prior to the inventory and management plan being developed, a staff position that advocates for Kansas City trees on both public and private property. This position would also be a big player in the continued outreach efforts outlined in Mission II and ensuring canopy goals are incorporated into city policy that's referenced in Mission I.

Cost estimates show that this position would likely cost approximately $100,000, annually, for salary, expenses, and equipment for the position.

Task 2.

Utilize the information from the updated inventory and management plan to develop a refined budget for KC forestry.

Once the inventory and management plan have been developed, a clearer picture of the financial needs to transition to a primarily proactive urban forestry program that incorporates cyclical tree care, assessments, and risk mitigation can be better determined. This process could include an operations review of current staffing levels or utilizing budgetary conclusions to advocate for increased levels of funding.

Task 3.

Develop a more accurate representation of return on investment for public trees.

Utilizing the updated inventory data, acquire benefit information (via i-Tree Streets or Eco) unique to publicly-owned trees. This will allow Kansas City to create a clearer picture of return on investment (ROI) for public trees and utilize that information to better assess staffing and resource allocation.

Strategy 10: Transition to Proactive Management

Currently, public tree care is largely reactive due to lack of updated inventory data and resources. Once staff resource assessments are addressed, management activities can be expanded and improved upon.

Proactive tree maintenance requires that trees are managed and maintained under the responsibility of an individual, department, or agency. Tree work is typically performed as part of a cycle. Individual tree health and form are routinely addressed during the cycle. When trees are planted, they are planted selectively and with purpose.

Task 1.

Prioritize the most immediate tree care tasks.

Identifying and ranking the maintenance needs of a tree population enables tree work to be assigned priority based on observed risk. Once prioritized, tree work can be systematically addressed to eliminate the greatest risk and liability first (Stamen 2011). Risk is a graduated scale that measures potential tree-related hazardous conditions. A tree is considered hazardous when its potential risks exceed an acceptable level.

Managing trees for risk reduction provides many benefits, including:

- Lower frequency and severity of accidents, damage, and injury

- Less expenditure for claims and legal expenses

- Healthier, long-lived trees

- Fewer tree removals over time

- Lower tree maintenance costs over time

Regularly inspecting trees and establishing tree maintenance cycles generally reduce the risk of failure, as problems can be found and addressed before they escalate.

Task 2.

Budget for a new tree crew dedicated to proactive tree care.

While awaiting better staff assessment outlined in strategy 9, Kansas City should invest in an additional tree crew that focuses on proactive tree management, including cyclical tree care and pruning, and risk mitigation courtesy of proactive tree removals. This temporary solution can allow Kansas City to begin the steps toward regular, proactive tree care while internal budget challenges are embraced.

Davey Resource Group estimates that this crew and equipment will cost approximately $500,000 annually.

Task 3.

Institute proactive, cyclical tree care.

Proactive tree maintenance has many advantages over reactive maintenance, the most significant of which is reduced risk to the public. Proactive systems ultimately reduce crisis situations in the urban forest because every public tree is visited, assessed, and maintained on a regular basis. Other benefits include more predictable budgets and projectable workloads, reduced long-term tree maintenance costs, and increased environmental and economic benefits from trees as more reach maturity.

Case Study – The Case for Proactive Tree Care

The City of Largo, Florida primarily plans tree work in response to request from citizens, often submitted via the eGov (311) system. Davey Resource Group analyzed two years of eGov tree-related service requests by comparing the requested service locations to locations of trees in poor condition.
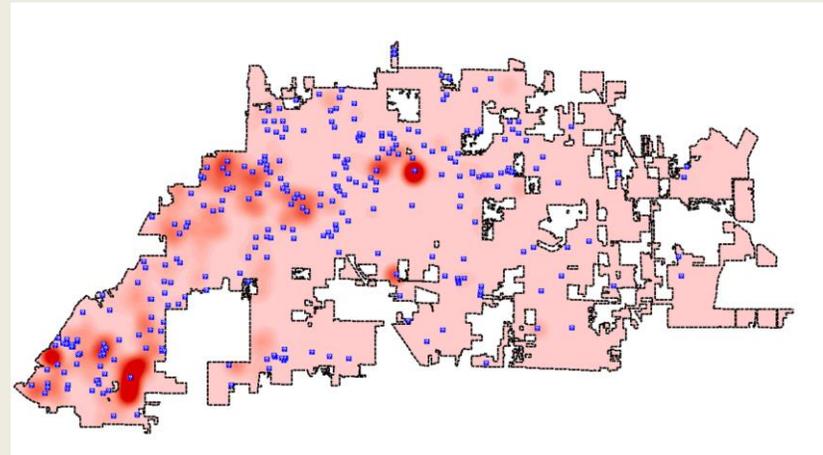
While the map shows that calls (blue dots) are coming from all over the city, most of the calls are not coming from the areas in highest need of pruning and care (shown in red) according to the city's tree inventory. This shows that Largo's request-based system does not effectively reach the trees with the highest need and is therefore an ineffective method for managing the urban forest. A proactive care plan is critical for real progress and effective maintenance.

Although some of the components of a proactive program are in place, such as the park's riparian corridor plantings, right-of-way plantings and contractor care for newly-planted trees, urban forestry efforts in Kansas City are largely reactive. At its current budget levels, the program is approximately 90% reactive, 10% proactive. This method of management is not ideal, primarily because work is often not being performed in areas of highest need by as determined by a certified arborist, but in highest need according to untrained citizens (via citizen requests). An analysis of Largo, Florida's citizen service request locations and the location of the trees in the poorest conditions (see The Case for Proactive Tree Care inset) highlights the ineffectiveness of this method of management.

- Regularly inspecting trees and establishing tree maintenance cycles or zones greatly reduce the risk of failure, as problems can be found before they escalate.
- Ultimately, proactive tree maintenance should reduce crisis situations in the urban forest, as every tree in the inventoried population is regularly visited, assessed, and maintained. Best practices of proactive tree maintenance include, but are not limited to, pruning cycles, inspections, and planned tree planting.

Ideally, municipalities should strive toward a five-year pruning cycle. Though in the real world, longer cycles are often necessary due to budget constraints. Kansas City should apply an appropriate cycle length based on the updated tree inventory, budget, and staffing assessments.

*Based on the old inventory data, Kansas City would need to increase its current forestry budgetary allotment from approximately **3.8 million dollars**, annually, to upwards of **8 million** to perform the necessary maintenance needed to reach cyclical, proactive tree care.*

Task 4.

Create a dedicated tree commission to secure a secondary funding source for tree-related projects and expenses.

Unsurprisingly, the biggest impediment to a proactive care plan is funding. Kansas City's urban forestry budget would require a significant increase to institute a cyclical funding program. Internally, it is often more realistic to gradually increase funds, but secondary funding sources can help to expedite this challenge. With Kansas City already having a valuable partner in Bridging the Gap, the addition of a Tree Commission or similar organization would serve to bolster the efforts needed to earmark finding for urban forestry endeavors.

Tree Des Moines

Tree Des Moines is a non-profit organization located in central Iowa that was created to activate citizens to protect, restore, and nurture our urban tree canopy. We are committed to re-building the urban canopy by advancing the education of tree stewards in our community and raising funds for new tree planting via partnerships with local experts, businesses, and city, state, and national organizations and government.

Tree Des Moines will regularly meet with the Municipal Arborist to gauge the level of logistical and financial support required to enact a shared agenda of increasing and protecting the urban forest canopy. Typical services provided will be educational events and publications geared to individuals and groups, trees planted in rights-of-way as a contribution to the public land, seed monies for neighborhood planting of public and private trees, and volunteer maintenance training.

Tree Des Moines also engages private citizens, foundations, corporations, and all levels of government to seek funding and logistical support for the procurement of a tree inventory. Tree Des Moines further engages the public through the publication of timely press releases and targeted print and internet bulletins.

(Tree Des Moines 2018)

Organizations such as Tree Des Moines provide a framework for these aspirations and have been recently successful in partnering with their communities in large-scale urban forestry projects including a city-wide street tree inventory that was completed in 2016-2017 (see Tree Des Moines inset).

Task 5.

Work to achieve canopy goal through strategic planting.

Planting and establishing more trees to increase canopy seems obvious. The city has been planting park and street trees on public lands annually for the last eight (8) years. However, only 20% of the land in Kansas City is publicly owned. Therefore, to make any real progress, tree planting needs to happen beyond annual city tree planting on private lands as well.

Develop a plan for filling the vacant available planting over the next 5–10 years. Prioritize the vacant sites based on a methodical, purpose-based end goal or strategy. This can involve using the new UTC's prioritized planting areas that focuses largely on maximizing stormwater interception and lessening heat stress.

Alternatively, planting sites can be prioritized based on a city-determined goal like better public health or equitable distribution of tree canopy and services to residents. Regardless of priority, planting sites should be planned with a purpose. Not only can street tree planting in some neighborhoods be a cost-effective way to make air healthier, it can also deliver these benefits to a significant fraction of urban residents (Planting Healthy Air 2016).

Photograph 7. Strategic tree planting efforts in areas throughout the city serve to maximize tree benefits. Kansas City should seek out partnerships with local healthcare providers and neighborhood associations.
Photo credit: KC Parks-Forestry

CHAPTER 5: NEXT STEPS

Through implementation of the 10 strategies of action, Kansas City can begin to move toward a more sustainable urban forest, and thus a more vibrant and healthy community for all residents. Often the biggest question now is "where to start?" It can be overwhelming and difficult determining where to begin with all the strategies of recommended action. To help Kansas City get started, a suggested general timeline for the first four years may clarify how all of these steps fit together. It is important to get multiple strategies started at once as many of them will take on their own momentum (especially as the public gets more involved).

Year 1 – 2019

- Update UTC with 2018 aerial imagery. Assess progress and benchmarks provided through the assessment matrices.
- Use results of UTC to reassess efforts needed to continue toward a more sustainable urban forest.
- Form advisory team for public outreach.
- Advisory team to plan public meeting to review master plan, set canopy goal together.
- Incorporate canopy goal into an upcoming comprehensive plan.
- City Council to officially support canopy goal in a city proclamation.

Year 1 – 2019 through Year 3 – 2021

- Update tree inventory through a combination of aerial imagery and on-the-ground arborist assessments.
- Start process of inspecting and possibly removing dead and critical public trees.
- Develop an outline of a 3-year plan of work (management plan).
- Develop proactive pruning cycle that fits in realistic budget.
- Complete staff assessment based of updated inventory and pruning cycle.

Year 4 – 2022

- Start implementation of management plan.
- Work with PR firm to develop messaging and brand for public campaign.
- Explore tree ordinance/policy change options.
- Start public engagement campaign implementation, especially start to reach out to targeted audiences.

Year 5 – 2023

- Tracking Progress…. Once the strategies are implemented, performance ratings will increase in each indicator.

Navigating the progress of this multi-year endeavor can be overwhelming. In that spirit, this series of "Action Sheets" can help Kansas City better gauge the progression in performance indicators as individual tasks are accomplished. A representation of the Action Sheet for Strategy 1 is shown below in Table 6. It should be noted that there are already two instances on this sheet where Kansas City has begun the process of moving the needle on certain performance indicators, most notably, investigation into the adoption of an internal tree protection policy. The potential changes in the indicators through action or, subsequently, inaction, are reflected in Table 7. Continued accomplishments of individual tasks can be reflected in these sheets and provided to the steering committee that is developed. Additional Action Sheets can be found in Appendix C.

Table 6. Action Sheet for Strategy 1

Mission #1	THE TREES

INCREASE TREE CANOPY AND ASSOCIATED SERVICES	
The work that went into this plan and that resulted in this community goal of maintaining canopy while increasing canopy quality, diversity, and strategic distribution needs to be official adopted by the city leadership and incorporated into several relevant documents and policies. This is critical to ensure that these efforts will last through changes in staff and elected officials.	

Strategy	Indicators Impacted	Task
Officially Adopt and Incorporate Urban Forestry Goals	Urban Tree Canopy Cover	Set canopy goal as a community - COMPLETE
	Trees on Private Property	Incorporate canopy goal into outreach efforts
	Urban Tree Canopy Cover	Incorporate canopy strategy into city policy
Plan for a UTC Update	Urban tree canopy cover	Complete UTC update with 2018 Imagery
	Trees on private property	Explore partnerships and secure funding in advance
Define a Strategic planting Plan that Reflects City Goals	Urban tree canopy cover	Increase tree population diversity
	Diversity	Better prepare your tree population for climate change
	Suitability	Identify prioritized planting locations
Improve the Tree Protection Code	Condition of publicly owned trees	Improve the Management of Public Trees
	Age distribution	Ensure effective tree protection policy is in place
	Condition of publicly owned trees	Adopt an internal tree protection policy
	Trees on private property	Strengthen current development code

Table 7. Potential Changes in Performance Indicators for Strategy 1

Indicators of a Sustainable Urban Forest: The Trees			
Indicator	Current	Expected Change with Task Completion	Expected Change with No Action
Urban Tree Canopy Cover	low	moderate	complete
Canopy Location	low	moderate	low
Age Distribution	moderate	good	low
Condition of Publicly Owned Trees	moderate	good	low
Trees on Private Property	good	good	moderate
Diversity	good	good	moderate
Suitability	moderate	good	low

CONCLUSIONS

Analysis from this report provides the basis for a better understanding of Kansas City, Missouri's urban forest resource, the values provided by this resource, and the impending threats that it will face. Additonally, recommendations made throughout this document lay the framework for the path forward to address these impending threats. Managers and citizens can use these tools to help improve long-term management plans and policies to sustain a healthy urban forest and maxmize ecosystem services for future generations. Through the application of improved planning and management, healthy tree populations can be sustained and lead to improved environmental quality and quality of life for residents throughout Kansas City, Missouri.

GLOSSARY

bare soil land cover: The land cover areas mapped as bare soil typically include vacant lots, construction areas, and baseball fields.

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

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

canopy spread: A data field that estimates the width of a tree's canopy in five-foot increments.

existing UTC: The amount of tree canopy present within the study boundary.

geographic information systems (GIS): A technology that is used to view and analyze data from a geographic perspective. GIS links location to information (such as people to addresses, buildings to parcels, or streets within a network) and layers that information to give you a better understanding of how it all interrelates.

greenspace: A term used in land use planning and conservation to describe protected areas of undeveloped landscapes.

impervious land cover: The area that does not allow rainfall to infiltrate the soil and typically includes buildings, parking lots, and roads.

land cover: Physical features on the earth mapped from satellite or aerial imagery such as bare soils, canopy, impervious, pervious, or water.

mortality: tree loss from insects, disease, natural tree decline/death, severe weather events, removals by human activities, etc.

open water land cover: The land cover areas mapped as water typically include lakes, oceans, rivers, and streams.

pervious land cover: The vegetative area that allows rainfall to infiltrate the soil and typically includes parks, golf courses, residential areas.

possible UTC: The amount of land that is theoretically available for the establishment of tree canopy within the study boundary. This includes all pervious and bare soil surfaces.

realistic plantable areas: The amount of land that is realistically available for the establishment of tree canopy within the town boundary. This includes all pervious and bare soil surfaces with specified land uses.

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

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

species: Fundamental category of taxonomic classification, ranking below a genus or subgenus.

transpiration: The passage of water through a plant from the roots through the vascular system to the atmosphere.

tree: A tree is defined as a perennial woody plant that may grow more than 20 feet tall.

tree benefit: An economic, environmental, or social improvement that benefited the community and resulted mainly from the presence of a tree. Has associated value.

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

urban tree canopy assessment: A study performed of land cover classes to gain an understanding of the tree canopy coverage, typically performed using aerial photographs, GIS data, or LIDAR.

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Appendix A
Urban Tree Canopy Results

Results from Kansas City's UTC assessment enables the city to measure the amount and location of its tree canopy along with other land cover, including concrete and other hard surfaces, open water, low vegetation like lawns and shrubs, and bare soil. Finding highlights from this assessment follow:

Overall Canopy & Land Cover

NAME	UNIQUE	ACRES	CANOPY ACRES	CANOPY PERCENT	IMPERVIOUS ACRES	IMPERVIOUS PERCENT	PERVIOUS ACRES	PERVIOUS PERCENT	BARE SOIL ACRES	BARE SOIL PERCENT	WATER ACRES	WATER PERCENT	PREFERRED PLANTABLE ACRES	PREFERRED PLANTABLE PERCENT	MAXIMUM UTC
KANSAS CITY	1	204,172.81	65,234.46	31.95	46,908.70	22.97	66,059.27	32.35	22,711.30	11.12	3,259.08	1.60	56,439.41	27.65	59.60

By Neighborhood

NEIGHBORHOOD	UNIQUE	ACRES	CANOPY ACRES	CANOPY PERCENT	IMPERVIOUS ACRES	IMPERVIOUS PERCENT	PERVIOUS ACRES	PERVIOUS PERCENT	BARE SOIL ACRES	BARE SOIL PERCENT	WATER ACRES	WATER PERCENT	PREFERRED PLANTABLE ACRES	PREFERRED PLANTABLE PERCENT	MAXIMUM UTC
Unnamed 1	1	1,574.32	978.71	62.17	149.29	9.48	399.37	25.37	7.58	0.48	39.37	2.50	274.40	17.43	79.60
Unnamed 2	2	589.69	162.30	27.52	255.83	43.38	154.27	26.16	17.26	2.93	0.02	0.00	157.10	26.64	54.17
Unnamed 3	3	82.24	1.73	2.10	62.88	76.46	14.61	17.77	3.02	3.67	0.00	0.00	9.52	11.58	13.68
Unnamed 4	4	4,233.11	674.78	15.94	1,584.32	37.43	1,180.58	27.89	533.42	12.60	260.01	6.14	1433.67	33.87	49.81
Unnamed 5	5	2,152.89	119.30	5.54	1,103.32	51.25	548.86	25.49	81.49	3.79	299.92	13.93	248.80	11.56	17.10
Unnamed 6	6	921.31	165.73	17.99	500.38	54.31	198.73	21.57	52.46	5.69	4.02	0.44	199.52	21.66	39.64
18th And Vine And Downtown East	7	261.71	24.78	9.47	166.99	63.81	63.17	24.14	6.75	2.58	0.01	0.00	65.68	25.10	34.56
Antioch Acres	8	556.01	186.04	33.46	214.46	38.57	155.09	27.89	0.00	0.00	0.43	0.08	145.57	26.18	59.64
Armour Fields	9	240.14	134.30	55.92	68.28	28.43	37.50	15.62	0.06	0.03	0.00	0.00	30.35	12.64	68.56
Armour Hills	10	237.59	126.82	53.38	78.02	32.84	32.20	13.55	0.56	0.23	0.00	0.00	29.71	12.50	65.88
Ashland Ridge	11	353.12	177.17	50.17	81.93	23.20	92.33	26.15	1.69	0.48	0.00	0.00	92.75	26.27	76.44
Bannister Acres	12	496.98	234.11	47.11	85.02	17.11	175.36	35.29	2.46	0.50	0.02	0.00	175.86	35.39	82.49
Barry Harbour	13	1,676.83	907.69	54.13	301.94	18.01	460.18	27.44	0.02	0.00	7.00	0.42	445.35	26.56	80.69
Beacon Hills	14	228.95	54.85	23.96	106.84	46.67	63.82	27.87	3.43	1.50	0.00	0.00	66.12	28.88	52.84
Birmingham Bottoms	15	7,510.48	434.54	5.79	1,134.33	15.10	1,624.32	21.63	3,900.62	51.94	416.67	5.55	1117.50	14.88	20.67
Blenheim Square Research Hospital	16	294.65	80.00	27.15	122.37	41.53	90.81	30.82	1.44	0.49	0.02	0.01	90.38	30.67	57.82
Blue Hills	17	722.55	295.36	40.88	266.32	36.86	158.34	21.91	1.14	0.16	1.39	0.19	152.91	21.16	62.04
Blue Hills Estates	18	548.36	242.88	44.29	104.82	19.11	195.73	35.69	1.48	0.27	3.45	0.63	84.67	15.44	59.73
Blue Ridge Farms	19	905.11	440.49	48.67	31.63	3.49	420.14	46.42	6.07	0.67	6.78	0.75	402.01	44.42	93.08
Blue Valley Industrial	20	1,248.48	216.95	17.38	513.19	41.11	378.04	30.28	99.22	7.95	41.08	3.29	475.68	38.10	55.48
Blue Vue Hills	21	722.04	353.13	48.91	113.42	15.71	244.10	33.81	7.16	0.99	4.23	0.59	231.72	32.09	81.00
Boone Hills	22	468.82	261.85	55.85	107.35	22.90	96.11	20.50	3.52	0.75	0.00	0.00	96.48	20.58	76.43
Boulevard Village	23	114.45	29.17	25.49	53.03	46.34	31.93	27.90	0.31	0.27	0.00	0.00	31.85	27.83	53.32
Breen Hills	24	766.74	349.36	45.56	252.23	32.90	157.54	20.55	0.56	0.07	7.04	0.92	153.99	20.08	65.65
Briarcliff And Claymont	25	782.30	405.09	51.78	246.65	31.53	130.31	16.66	0.00	0.00	0.25	0.03	126.83	16.21	67.99
Briarcliff West	26	370.13	127.20	34.37	179.40	48.47	62.59	16.91	0.00	0.00	0.93	0.25	61.87	16.72	51.08
Bridlespur	27	330.77	146.49	44.29	94.75	28.65	88.73	26.82	0.80	0.24	0.00	0.00	82.90	25.06	69.35
Broadway Gillham	28	179.47	19.01	10.59	132.24	73.68	27.00	15.04	1.22	0.68	0.00	0.00	18.50	10.31	20.90
Brookside Park	29	45.04	21.68	48.15	13.02	28.92	10.08	22.38	0.25	0.55	0.00	0.00	9.94	22.07	70.22
Brown Estates	30	929.07	575.14	61.90	124.08	13.36	198.02	21.31	24.58	2.65	7.24	0.78	208.09	22.40	84.30

NEIGHBORHOOD	UNIQUE	ACRES	CANOPY ACRES	CANOPY PERCENT	IMPERVIOUS ACRES	IMPERVIOUS PERCENT	PERVIOUS ACRES	PERVIOUS PERCENT	BARE SOIL ACRES	BARE SOIL PERCENT	WATER ACRES	WATER PERCENT	PREFERRED PLANTABLE ACRES	PREFERRED PLANTABLE PERCENT	MAXIMUM UTC
Calico Farms	31	791.20	466.22	58.93	85.08	10.75	190.79	24.11	5.47	0.69	43.64	5.52	172.59	21.81	80.74
CBD Downtown	32	396.57	9.82	2.48	361.14	91.07	21.47	5.41	3.86	0.97	0.27	0.07	24.44	6.16	8.64
Center City	33	79.56	15.45	19.42	45.25	56.88	17.82	22.40	1.04	1.30	0.00	0.00	18.47	23.21	42.63
Central Blue Valley And Park Tower Gardens	34	307.79	134.80	43.80	71.73	23.31	96.85	31.47	1.48	0.48	2.92	0.95	90.90	29.53	73.33
Central Hyde Park	35	169.41	69.71	41.15	66.49	39.25	33.03	19.50	0.19	0.11	0.00	0.00	31.41	18.54	59.69
Chaumiere	36	383.10	182.96	47.76	111.43	29.09	77.47	20.22	7.46	1.95	3.78	0.99	83.77	21.87	69.62
Chouteau Estates	37	657.97	263.84	40.10	204.92	31.14	151.35	23.00	2.62	0.40	35.25	5.36	147.12	22.36	62.46
Citadel	38	169.19	52.89	31.26	64.61	38.19	51.37	30.36	0.32	0.19	0.00	0.00	50.97	30.13	61.38
Clayton	39	740.46	358.59	48.43	225.51	30.46	154.22	20.83	0.00	0.00	2.14	0.29	153.38	20.71	69.14
Coachlight Square	40	164.86	75.75	45.95	36.53	22.16	52.47	31.82	0.11	0.07	0.00	0.00	44.34	26.89	72.84
Coleman Highlands	41	164.19	60.78	37.02	81.82	49.83	19.00	11.57	2.59	1.58	0.00	0.00	20.38	12.41	49.43
Colonial Square	42	126.73	34.80	27.46	60.65	47.86	30.98	24.44	0.00	0.00	0.30	0.24	30.35	23.95	51.41
Columbus Park	43	145.38	27.50	18.92	80.68	55.50	36.49	25.10	0.70	0.48	0.00	0.00	36.59	25.17	44.09
Columbus Park Industrial	44	255.43	25.53	9.99	103.87	40.66	65.70	25.72	11.37	4.45	48.96	19.17	76.87	30.09	40.09
Cooley Highlands S	45	281.25	123.16	43.79	93.20	33.14	58.84	20.92	6.06	2.15	0.00	0.00	59.04	20.99	64.78
Country Club	46	80.58	48.18	59.79	23.20	28.79	9.17	11.38	0.03	0.03	0.00	0.00	8.19	10.16	69.95
Country Club District	47	144.56	86.33	59.72	35.04	24.24	22.78	15.75	0.13	0.09	0.29	0.20	21.54	14.90	74.62
Country Club Estates And Big Shoal	48	317.25	134.65	42.44	128.40	40.47	54.07	17.04	0.00	0.00	0.13	0.04	50.01	15.76	58.20
Country Club Plaza	49	57.98	2.13	3.67	50.25	86.67	4.10	7.08	0.55	0.94	0.95	1.63	3.32	5.72	9.39
Country Lane Estates	50	340.51	148.07	43.49	104.31	30.63	77.18	22.66	10.36	3.04	0.60	0.18	86.15	25.30	68.79
Country Valley-Hawthorn Square	51	568.61	215.12	37.83	97.61	17.17	227.34	39.98	25.67	4.51	2.88	0.51	205.76	36.19	74.02
Countryside	52	184.74	96.03	51.98	60.45	32.72	27.63	14.96	0.63	0.34	0.00	0.00	24.16	13.08	65.06
Coves North	53	1,778.54	272.23	15.31	725.02	40.76	657.95	36.99	108.50	6.10	14.85	0.83	664.56	37.37	52.67
Crestview	54	450.05	163.13	36.25	207.16	46.03	78.95	17.54	0.00	0.00	0.82	0.18	74.23	16.49	52.74
Crestwood	55	68.62	41.24	60.09	19.09	27.82	8.29	12.09	0.00	0.00	0.00	0.00	7.65	11.15	71.25
Crossgates	56	215.50	67.91	31.51	73.56	34.13	72.32	33.56	1.72	0.80	0.00	0.00	72.97	33.86	65.37
Crossroads	57	188.99	2.30	1.22	173.16	91.63	7.64	4.04	5.74	3.04	0.15	0.08	13.04	6.90	8.12
Crown Center	58	374.49	45.01	12.02	239.29	63.90	84.08	22.45	4.98	1.33	1.14	0.31	83.88	22.40	34.42
Cunningham Ridge	59	353.90	93.31	26.37	155.69	43.99	89.17	25.20	15.73	4.45	0.00	0.00	104.22	29.45	55.81
Davidson	60	1,176.17	461.90	39.27	437.69	37.21	270.11	22.97	0.00	0.00	6.47	0.55	261.12	22.20	61.47
Dunbar	61	186.94	99.64	53.30	37.88	20.26	48.49	25.94	0.93	0.50	0.00	0.00	48.73	26.07	79.37
East Blue Valley	62	237.28	88.31	37.22	106.95	45.07	40.27	16.97	1.74	0.73	0.00	0.00	39.39	16.60	53.82
East Community Team North	63	620.91	198.09	31.90	240.34	38.71	176.57	28.44	5.87	0.95	0.04	0.01	111.14	17.90	49.80
East Community Team South	64	465.53	195.82	42.06	174.67	37.52	94.07	20.21	0.97	0.21	0.00	0.00	90.05	19.34	61.41
East Meyer 6	65	335.30	164.81	49.15	99.73	29.74	69.92	20.85	0.85	0.25	0.00	0.00	67.75	20.20	69.36
East Meyer 7	66	298.07	154.72	51.91	81.17	27.23	61.19	20.53	0.99	0.33	0.00	0.00	59.83	20.07	71.98
East Swope Highlands	67	764.53	325.50	42.58	165.30	21.62	261.05	34.15	12.68	1.66	0.00	0.00	196.21	25.66	68.24
Eastern 49-63	68	327.46	114.20	34.87	141.45	43.20	69.31	21.17	2.50	0.76	0.00	0.00	61.32	18.73	53.60
Eastwood Hills East	69	1,027.51	573.77	55.84	194.70	18.95	252.97	24.62	6.07	0.59	0.01	0.00	237.57	23.12	78.96
Eastwood Hills West	70	993.37	416.02	41.88	290.52	29.25	240.58	24.22	25.01	2.52	21.25	2.14	236.35	23.79	65.67
Fairlane	71	1,089.51	477.90	43.88	329.39	30.24	271.29	24.91	5.74	0.53	4.84	0.44	252.64	23.20	67.07
Fairway Hills	72	367.48	151.99	41.36	77.29	21.03	136.94	37.27	0.86	0.23	0.40	0.11	136.54	37.16	78.52
Fairwood And Robandee	73	508.63	230.69	45.35	138.27	27.18	137.37	27.01	1.58	0.31	0.73	0.14	126.72	24.91	70.27
Forgotten Homes	74	75.06	10.63	14.16	35.83	47.74	28.35	37.78	0.25	0.33	0.00	0.00	28.32	37.73	51.89
Foxcroft And Glen Arbor	75	227.17	127.44	56.10	44.69	19.67	54.42	23.96	0.42	0.18	0.21	0.09	53.32	23.47	79.57
Foxtown East	76	149.98	80.73	53.83	32.49	21.66	34.17	22.79	1.39	0.92	1.21	0.80	24.21	16.14	69.97
Foxwoods-Carriage Hills	77	313.56	156.10	49.78	68.51	21.85	88.45	28.21	0.00	0.00	0.51	0.16	73.44	23.42	73.20
Gashland	78	2,084.38	717.47	34.42	511.61	24.54	848.29	40.70	0.00	0.00	7.01	0.34	732.34	35.13	69.56
Glen Lake	79	26.56	15.77	59.39	6.34	23.86	4.42	16.66	0.02	0.09	0.00	0.00	4.16	15.65	75.04
Glenhaven	80	218.95	89.03	40.66	87.82	40.11	38.05	17.38	0.00	0.00	4.05	1.85	37.59	17.17	57.83
Gracemor-Randolph Corners	81	528.95	229.10	43.31	174.12	32.92	121.89	23.04	3.73	0.70	0.11	0.02	118.06	22.32	65.63
Greenway Fields	82	88.49	51.96	58.72	25.94	29.32	10.54	11.91	0.05	0.05	0.00	0.00	9.58	10.83	69.55
Hanover Place	83	150.05	26.24	17.49	105.86	70.54	17.12	11.41	0.78	0.52	0.06	0.04	16.59	11.06	28.54
Harlem	84	308.67	52.59	17.04	171.45	55.54	30.34	9.83	0.00	0.00	54.30	17.59	30.08	9.74	26.78
Hawthorne And Picture Hills	85	297.73	70.03	23.52	137.40	46.15	89.30	29.99	0.78	0.26	0.23	0.08	89.37	30.02	53.54
Hickman Mills	86	767.20	287.82	37.52	237.53	30.96	229.82	29.96	12.04	1.57	0.00	0.00	231.08	30.12	67.63
Hickman Mills South	87	711.83	340.55	47.84	111.33	15.64	218.52	30.70	29.35	4.12	12.09	1.70	176.29	24.77	72.61
Hidden Valley	88	490.05	326.93	66.71	80.87	16.50	80.94	16.52	1.31	0.27	0.00	0.00	76.80	15.67	82.39
Highview Estates	89	2,347.62	1,228.22	52.32	188.45	8.03	871.45	37.12	25.27	1.08	34.22	1.46	748.88	31.90	84.22
Hill Haven	90	872.59	375.54	43.04	207.99	23.84	221.76	25.41	0.00	0.00	67.30	7.71	213.02	24.41	67.45

NEIGHBORHOOD	UNIQUE	ACRES	CANOPY ACRES	CANOPY PERCENT	IMPERVIOUS ACRES	IMPERVIOUS PERCENT	PERVIOUS ACRES	PERVIOUS PERCENT	BARE SOIL ACRES	BARE SOIL PERCENT	WATER ACRES	WATER PERCENT	PREFERRED PLANTABLE ACRES	PREFERRED PLANTABLE PERCENT	MAXIMUM UTC
Hillcrest	91	1,247.48	769.68	61.70	80.75	6.47	368.64	29.55	23.40	1.88	5.02	0.40	156.99	12.58	74.28
Holiday Hills	92	87.92	40.34	45.88	34.07	38.76	13.50	15.36	0.00	0.00	0.00	0.00	13.09	14.89	60.77
Holmes Park	93	198.15	58.88	29.72	93.91	47.40	43.23	21.82	2.12	1.07	0.00	0.00	38.79	19.58	49.29
Hospital Hill	94	300.74	15.77	5.24	236.40	78.61	36.28	12.06	12.23	4.07	0.06	0.02	47.60	15.83	21.07
Independence Plaza	95	274.94	64.51	23.46	146.01	53.10	63.54	23.11	0.89	0.32	0.00	0.00	56.23	20.45	43.91
Ingleside	96	180.59	57.10	31.62	71.88	39.80	50.81	28.13	0.81	0.45	0.00	0.00	41.21	22.82	54.44
Ivanhoe Northeast	97	139.49	40.64	29.13	64.05	45.91	34.28	24.57	0.53	0.38	0.00	0.00	33.98	24.36	53.50
Ivanhoe Southeast	98	281.52	96.31	34.21	105.17	37.36	77.46	27.51	1.88	0.67	0.70	0.25	76.69	27.24	61.45
Ivanhoe Southwest	99	202.97	67.24	33.13	78.67	38.76	54.54	26.87	0.44	0.22	2.08	1.02	53.46	26.34	59.47
Jefferson Highlands	100	663.48	252.36	38.04	251.29	37.87	159.09	23.98	0.00	0.00	0.75	0.11	147.12	22.17	60.21
Key Coalition	102	318.45	89.62	28.14	136.43	42.84	90.37	28.38	1.18	0.37	0.84	0.27	89.54	28.12	56.26
Kirkside	103	445.59	185.74	41.68	65.42	14.68	143.49	32.20	50.56	11.35	0.38	0.09	122.11	27.40	69.09
Knoches Park	104	408.21	175.55	43.00	113.79	27.87	115.24	28.23	3.64	0.89	0.00	0.00	109.09	26.72	69.73
Lakeview Terrace	105	445.21	200.71	45.08	111.84	25.12	130.27	29.26	0.00	0.00	2.40	0.54	130.40	29.29	74.37
Lea Manor	106	644.12	242.10	37.59	238.83	37.08	151.16	23.47	5.29	0.82	6.74	1.05	146.07	22.68	60.26
Leeds	107	806.09	143.07	17.75	338.90	42.04	277.94	34.48	35.29	4.38	10.89	1.35	310.73	38.55	56.30
Legacy East	108	1,015.55	341.06	33.58	357.70	35.22	266.42	26.23	41.30	4.07	9.07	0.89	279.23	27.50	61.08
Lewis Heights	109	309.96	134.89	43.52	74.56	24.05	89.97	29.02	10.55	3.40	0.00	0.00	99.50	32.10	75.62
Linden Hills And Indian Heights	110	789.36	468.22	59.32	146.81	18.60	152.85	19.36	6.05	0.77	15.44	1.96	139.60	17.68	77.00
Linden Park	111	191.26	62.67	32.77	77.49	40.52	48.82	25.52	0.26	0.14	2.02	1.06	45.94	24.02	56.79
Line Creek And Northern Heights	112	772.35	339.39	43.94	178.74	23.14	252.46	32.69	1.33	0.17	0.42	0.05	244.76	31.69	75.63
Linwood Homeowners-Ivanhoe	113	177.84	55.31	31.10	78.06	43.89	43.59	24.51	0.82	0.46	0.06	0.03	43.14	24.26	55.36
Little Blue	114	7,588.80	3,799.06	50.06	490.91	6.47	3,037.94	40.03	182.70	2.41	78.20	1.03	2476.27	32.63	82.69
Loma Vista	115	801.13	185.48	23.15	327.09	40.83	251.96	31.45	36.41	4.54	0.20	0.02	263.03	32.83	55.98
Longfellow	116	194.32	45.62	23.48	113.24	58.28	33.98	17.48	1.48	0.76	0.00	0.00	33.90	17.45	40.92
Longview	117	7,602.99	2,158.30	28.39	242.69	3.19	3,439.28	45.24	1,013.73	13.33	749.00	9.85	2600.24	34.20	62.59
Lykins	118	536.74	149.45	27.84	286.10	53.30	95.72	17.83	5.37	1.00	0.10	0.02	92.61	17.25	45.10
Manheim Park	119	159.15	63.42	39.85	71.84	45.14	23.16	14.55	0.73	0.46	0.00	0.00	22.23	13.97	53.82
Maple Park	120	467.11	213.54	45.72	117.16	25.08	136.40	29.20	0.00	0.00	0.02	0.00	130.78	28.00	73.71
Maple Park West	121	401.22	167.70	41.80	149.99	37.38	83.43	20.79	0.00	0.00	0.09	0.02	82.37	20.53	62.33
Marlborough East	122	892.01	314.30	35.23	203.42	22.80	348.14	39.03	17.73	1.99	8.42	0.94	225.65	25.30	60.53
Marlborough Heights/Marlborough Pride	123	477.07	243.55	51.05	129.06	27.05	102.76	21.54	1.71	0.36	0.00	0.00	100.12	20.99	72.04
Martin City	124	1,258.24	355.16	28.23	359.31	28.56	413.98	32.90	123.14	9.79	6.65	0.53	458.83	36.47	64.69
Meadowbrook Heights	125	860.64	202.37	23.51	340.20	39.53	316.94	36.83	0.00	0.00	1.12	0.13	307.72	35.75	59.27
Minneville	126	1,556.06	617.62	39.69	204.47	13.14	583.63	37.51	148.87	9.57	1.47	0.09	611.27	39.28	78.97
Mission Lake	127	1,835.39	1,072.89	58.46	200.75	10.94	523.95	28.55	7.65	0.42	30.16	1.64	407.29	22.19	80.65
Morningside	128	173.20	83.97	48.48	66.85	38.60	22.13	12.78	0.24	0.14	0.00	0.00	20.31	11.73	60.21
Mount Cleveland	129	200.23	40.18	20.06	94.60	47.24	49.31	24.63	3.77	1.88	12.38	6.18	52.54	26.24	46.31
Mount Hope	130	78.09	25.72	32.93	30.87	39.53	18.90	24.21	0.04	0.05	2.56	3.28	18.23	23.35	56.28
Nashua	131	1,263.60	329.76	26.10	295.33	23.37	526.36	41.66	110.28	8.73	1.86	0.15	471.44	37.31	63.41
Neighbors United For Action	132	339.57	122.63	36.11	71.42	21.03	144.87	42.66	0.64	0.19	0.00	0.00	41.09	12.10	48.21
New Mark	133	795.49	227.61	28.61	317.69	39.94	224.13	28.18	23.34	2.93	2.73	0.34	214.39	26.95	55.56
Noble And Gregory Ridge	134	566.20	319.12	56.36	113.64	20.07	129.42	22.86	1.10	0.19	2.92	0.52	103.07	18.20	74.57
North Blue Ridge	135	406.73	153.73	37.80	160.46	39.45	82.62	20.31	9.90	2.43	0.01	0.00	90.68	22.29	60.09
North Hyde Park	136	141.50	32.67	23.09	88.15	62.30	19.72	13.94	0.87	0.61	0.08	0.06	19.13	13.52	36.61
North Indian Mound	137	385.72	168.87	43.78	150.30	38.97	65.94	17.10	0.60	0.16	0.00	0.00	61.60	15.97	59.75
North Town Fork Creek	138	697.99	286.66	41.07	208.59	29.88	194.66	27.89	2.87	0.41	5.21	0.75	187.89	26.92	67.99
Northeast Industrial District	139	1,703.32	222.25	13.05	1,000.99	58.77	237.93	13.97	109.89	6.45	132.26	7.77	344.60	20.23	33.28
Oak Meyer Gardens	140	119.24	66.96	56.16	34.98	29.34	17.23	14.45	0.07	0.06	0.00	0.00	15.89	13.33	69.48
Oak Park Northwest	141	276.06	97.98	35.49	118.71	43.00	58.81	21.30	0.57	0.21	0.00	0.00	56.86	20.60	56.09
Oak Park Southeast	142	228.90	76.49	33.42	86.92	37.97	63.42	27.70	2.08	0.91	0.00	0.00	63.44	27.72	61.13
Oak Park Southwest	143	264.88	105.32	39.76	104.22	39.34	54.04	20.40	1.30	0.49	0.00	0.00	48.53	18.32	58.09
Oakwood	144	891.66	490.44	55.00	130.58	14.64	261.74	29.35	2.34	0.26	6.57	0.74	173.79	19.49	74.49
Old Westport	145	172.75	13.81	8.00	145.58	84.27	12.68	7.34	0.56	0.33	0.11	0.07	12.39	7.17	15.17
Oldham Farms	146	414.73	262.22	63.23	64.79	15.62	84.32	20.33	0.97	0.23	2.43	0.59	73.99	17.84	81.07
Outer Gashland-Nashua	147	4,391.95	652.65	14.86	513.42	11.69	1,416.34	32.25	1,789.32	40.74	20.22	0.46	1275.32	29.04	43.90
Palestine East	148	138.14	65.99	47.77	42.06	30.45	29.85	21.61	0.23	0.17	0.00	0.00	29.07	21.04	68.82
Palestine West And Oak Park Northeast	149	138.15	44.45	32.18	62.78	45.45	30.45	22.04	0.46	0.33	0.00	0.00	29.77	21.55	53.73
Park Central-Research Park	150	138.48	17.49	12.63	67.12	48.47	43.06	31.09	2.50	1.80	8.31	6.00	45.39	32.78	45.41
Park Farms	151	1,009.96	576.31	57.06	162.29	16.07	267.96	26.53	1.64	0.16	1.77	0.17	265.08	26.25	83.31

NEIGHBORHOOD	UNIQUE	ACRES	CANOPY ACRES	CANOPY PERCENT	IMPERVIOUS ACRES	IMPERVIOUS PERCENT	PERVIOUS ACRES	PERVIOUS PERCENT	BARE SOIL ACRES	BARE SOIL PERCENT	WATER ACRES	WATER PERCENT	PREFERRED PLANTABLE ACRES	PREFERRED PLANTABLE PERCENT	MAXIMUM UTC
Park Forest	152	672.00	203.39	30.27	257.85	38.37	208.51	31.03	1.28	0.19	0.97	0.14	189.63	28.22	58.49
Park Plaza	153	929.88	489.86	52.68	225.59	24.26	212.42	22.84	1.11	0.12	0.90	0.10	209.00	22.48	75.16
Parkdale And Walden	154	1,619.18	825.00	50.95	349.37	21.58	432.31	26.70	8.01	0.49	4.50	0.28	416.15	25.70	76.65
Parkview	155	130.60	11.20	8.58	80.70	61.79	34.89	26.72	3.81	2.92	0.00	0.00	34.49	26.41	34.98
Paseo West	156	205.27	12.63	6.15	149.98	73.06	33.59	16.36	9.07	4.42	0.00	0.00	41.78	20.35	26.51
Pendleton Heights	157	417.62	161.39	38.65	154.73	37.05	97.37	23.32	2.14	0.51	1.98	0.47	97.38	23.32	61.97
Platte Brook North	158	664.65	318.50	47.92	149.88	22.55	193.78	29.15	0.35	0.05	2.14	0.32	188.01	28.29	76.21
Platte Ridge	159	349.26	79.67	22.81	184.41	52.80	84.90	24.31	0.10	0.03	0.18	0.05	82.35	23.58	46.39
Plaza Westport	160	118.26	20.89	17.66	82.48	69.75	13.78	11.65	1.06	0.90	0.05	0.04	13.75	11.62	29.28
Prairie Point-Wildberry	161	960.33	228.24	23.77	340.11	35.42	350.70	36.52	39.00	4.06	2.29	0.24	331.79	34.55	58.32
Quality Hill	162	123.87	14.98	12.09	90.77	73.28	18.04	14.57	0.07	0.06	0.01	0.01	17.56	14.18	26.27
Ravenwood-Somerset	163	1,259.06	516.99	41.06	302.50	24.03	437.77	34.77	0.00	0.00	1.80	0.14	394.28	31.32	72.38
Red Bridge North	164	547.40	221.97	40.55	110.88	20.26	210.71	38.49	0.96	0.18	2.88	0.53	126.01	23.02	63.57
Red Bridge South	165	336.84	122.36	36.33	133.01	39.49	80.64	23.94	0.84	0.25	0.00	0.00	76.07	22.58	58.91
Richards Gebaur	166	5,184.76	1,249.52	24.10	597.41	11.52	2,574.74	49.66	686.62	13.24	76.48	1.48	2328.90	44.92	69.02
Ridgefield	167	987.34	401.82	40.70	343.60	34.80	241.43	24.45	0.00	0.00	0.49	0.05	235.33	23.83	64.53
Riss Lake	168	785.79	342.24	43.55	166.00	21.12	254.19	32.35	6.61	0.84	16.74	2.13	258.99	32.96	76.51
River Forest	169	368.51	180.58	49.00	116.28	31.55	71.18	19.32	0.00	0.00	0.47	0.13	70.22	19.06	68.06
River Market	170	223.65	16.15	7.22	137.72	61.58	23.75	10.62	5.40	2.42	40.63	18.17	28.56	12.77	19.99
River View	171	622.86	421.27	67.63	121.14	19.45	79.26	12.73	0.00	0.00	1.19	0.19	76.20	12.23	79.87
Roanoke	172	90.44	44.71	49.44	33.34	36.86	11.72	12.96	0.67	0.75	0.00	0.00	11.55	12.77	62.20
Robandee South	173	800.11	404.78	50.59	68.50	8.56	308.83	38.60	15.07	1.88	2.93	0.37	276.21	34.52	85.11
Rockhill	174	86.10	39.89	46.33	27.10	31.47	19.11	22.20	0.00	0.00	0.00	0.00	18.47	21.45	67.78
Rockhill Manor	175	119.92	44.08	36.75	47.09	39.26	27.94	23.30	0.82	0.69	0.00	0.00	23.81	19.86	56.61
Rolling Meadows	176	119.84	59.22	49.42	32.52	27.14	27.96	23.33	0.13	0.11	0.00	0.00	26.90	22.45	71.87
Romanelli West	177	144.19	97.23	67.43	30.63	21.24	16.07	11.15	0.25	0.18	0.00	0.00	15.07	10.45	77.89
Royal Oaks	178	421.26	160.36	38.07	122.92	29.18	137.29	32.59	0.70	0.17	0.00	0.00	133.70	31.74	69.80
Royal Oaks North	179	367.14	182.04	49.58	81.67	22.25	102.74	27.98	0.34	0.09	0.34	0.09	100.26	27.31	76.89
Ruskin Heights	180	513.91	286.83	55.81	118.35	23.03	108.05	21.03	0.68	0.13	0.00	0.00	101.11	19.67	75.49
Ruskin Hills	181	646.63	320.91	49.63	105.54	16.32	211.93	32.77	3.04	0.47	5.21	0.81	202.84	31.37	81.00
Santa Fe	182	197.73	66.85	33.81	89.64	45.34	40.76	20.61	0.49	0.25	0.00	0.00	39.52	19.99	53.80
Santa Fe Hills	183	322.77	158.47	49.10	91.24	28.27	71.47	22.14	1.14	0.35	0.46	0.14	56.30	17.44	66.54
Scarritt Point	184	530.08	261.43	49.32	181.22	34.19	86.36	16.29	1.07	0.20	0.00	0.00	82.25	15.52	64.84
Sechrest	185	614.73	133.23	21.67	82.31	13.39	180.61	29.38	218.58	35.56	0.00	0.00	386.53	62.88	84.55
Self Help Neighborhood Council	186	238.22	114.72	48.16	69.74	29.28	53.42	22.42	0.34	0.14	0.00	0.00	51.76	21.73	69.88
Sheffield	187	518.21	113.13	21.83	285.23	55.04	102.53	19.79	9.48	1.83	7.85	1.51	100.20	19.34	41.17
Sheraton Estates	188	40.52	16.28	40.19	13.50	33.32	10.69	26.38	0.05	0.11	0.00	0.00	10.38	25.61	65.80
Sherrydale	189	602.79	121.88	20.22	308.59	51.19	172.27	28.58	0.00	0.00	0.04	0.01	156.17	25.91	46.13
Sherwood Estates	190	276.86	105.18	37.99	101.02	36.49	70.44	25.44	0.00	0.00	0.22	0.08	68.09	24.59	62.58
Shoal Creek	191	20,769.36	4,286.93	20.64	3,668.93	17.67	10,555.11	50.82	2,118.37	10.20	140.01	0.67	8942.48	43.06	63.70
South Blue Valley	192	564.97	223.52	39.56	123.17	21.80	194.22	34.38	9.34	1.65	14.72	2.61	196.97	34.86	74.43
South Hyde Park	193	166.63	61.58	36.96	75.42	45.26	28.47	17.08	1.16	0.70	0.00	0.00	21.65	13.00	49.95
South Indian Mound	194	389.93	128.52	32.96	183.79	47.13	76.12	19.52	1.42	0.36	0.07	0.02	70.83	18.17	51.13
South Plaza	195	145.95	29.91	20.49	93.29	63.92	21.72	14.88	0.92	0.63	0.12	0.08	21.38	14.65	35.14
South Town Fork Creek	196	230.26	105.00	45.60	64.66	28.08	60.31	26.19	0.29	0.13	0.00	0.00	59.09	25.66	71.27
Southmoreland	197	264.43	69.23	26.18	136.31	51.55	57.24	21.65	1.24	0.47	0.41	0.16	53.71	20.31	46.49
Squier Park	198	78.82	29.06	36.87	35.06	44.48	14.51	18.41	0.19	0.24	0.00	0.00	13.94	17.69	54.56
St Catherines Gardens	199	1,009.00	574.14	56.90	149.34	14.80	263.48	26.11	4.24	0.42	17.81	1.76	248.07	24.59	81.49
Stayton Meadows	200	696.50	301.57	43.30	119.03	17.09	275.15	39.51	0.74	0.11	0.00	0.00	172.72	24.80	68.10
Sterling Acres	201	273.90	113.35	41.38	96.99	35.41	56.72	20.71	6.73	2.46	0.11	0.04	61.78	22.56	63.94
Sterling Gardens	202	186.75	88.45	47.36	48.24	25.83	49.79	26.66	0.27	0.14	0.00	0.00	48.88	26.18	73.54
Stratford Estates	203	554.40	291.66	52.61	128.16	23.12	133.08	24.00	1.49	0.27	0.00	0.00	131.50	23.72	76.33
Stratford Gardens	204	106.64	67.48	63.28	24.63	23.10	14.44	13.54	0.08	0.08	0.00	0.00	13.52	12.68	75.96
Strupwood	205	121.37	65.08	53.62	21.39	17.63	34.63	28.53	0.27	0.22	0.00	0.00	27.05	22.29	75.91
Sunset Hill	206	313.07	149.98	47.91	76.06	24.29	84.70	27.06	0.39	0.13	1.93	0.62	82.97	26.50	74.41
Sunset Hill West	207	114.18	72.13	63.17	22.14	19.39	19.48	17.06	0.44	0.38	0.00	0.00	18.30	16.03	79.20
Swope Park Campus	208	241.29	81.08	33.60	84.23	34.91	75.16	31.15	0.82	0.34	0.00	0.00	70.82	29.35	62.95
Swope Park Ridge-Winchester	209	344.44	146.56	42.55	64.47	18.72	124.88	36.26	8.54	2.48	0.00	0.00	126.79	36.81	79.36
Swope Parkway-Elmwood	210	787.54	384.03	48.76	216.33	27.47	169.27	21.49	8.79	1.12	9.12	1.16	173.37	22.01	70.78
Tanglewood And Regency North	211	410.28	116.39	28.37	185.77	45.28	107.72	26.25	0.00	0.00	0.40	0.10	107.44	26.19	54.56

NEIGHBORHOOD	UNIQUE	ACRES	CANOPY ACRES	CANOPY PERCENT	IMPERVIOUS ACRES	IMPERVIOUS PERCENT	PERVIOUS ACRES	PERVIOUS PERCENT	BARE SOIL ACRES	BARE SOIL PERCENT	WATER ACRES	WATER PERCENT	PREFERRED PLANTABLE ACRES	PREFERRED PLANTABLE PERCENT	MAXIMUM UTC
Terrace Lake Gardens	212	336.33	191.14	56.83	49.70	14.78	65.13	19.36	2.25	0.67	28.12	8.36	61.23	18.21	75.04
The Coves	213	824.81	234.01	28.37	339.57	41.17	232.20	28.15	1.10	0.13	17.92	2.17	231.52	28.07	56.44
Timber Valley	214	86.28	36.95	42.82	26.91	31.18	22.12	25.64	0.30	0.35	0.00	0.00	21.88	25.36	68.18
Tower Homes	215	639.67	281.85	44.06	234.09	36.60	120.57	18.85	3.16	0.49	0.00	0.00	105.57	16.50	60.57
Union Hill	216	109.40	26.01	23.78	58.36	53.35	23.94	21.89	1.08	0.99	0.00	0.00	11.72	10.72	34.50
Unity Ridge	217	578.30	292.30	50.55	72.36	12.51	199.38	34.48	6.60	1.14	7.66	1.32	201.13	34.78	85.33
Valentine	218	156.78	31.96	20.38	101.82	64.94	22.55	14.39	0.33	0.21	0.12	0.08	21.69	13.83	34.22
Verona Hills	219	459.95	216.44	47.06	116.21	25.27	122.76	26.69	2.01	0.44	2.52	0.55	114.49	24.89	71.95
Vineyard	220	438.53	237.86	54.24	95.31	21.73	102.87	23.46	2.49	0.57	0.00	0.00	101.71	23.19	77.43
Vineyard Estates	221	448.73	126.22	28.13	143.06	31.88	158.57	35.34	7.73	1.72	13.16	2.93	158.32	35.28	63.41
Vineyard Northwest	222	202.61	104.94	51.80	47.95	23.67	47.88	23.63	1.83	0.90	0.00	0.00	35.21	17.38	69.17
Volker	223	359.08	158.65	44.18	158.38	44.11	41.23	11.48	0.81	0.23	0.00	0.00	37.65	10.49	54.67
Waldo Homes	224	240.17	121.26	50.49	67.55	28.13	50.30	20.94	1.05	0.44	0.00	0.00	45.74	19.04	69.53
Ward Estates	225	91.80	58.61	63.85	19.11	20.82	13.96	15.21	0.11	0.12	0.00	0.00	13.39	14.58	78.43
Ward Parkway	226	475.50	248.52	52.27	153.76	32.34	72.18	15.18	1.04	0.22	0.00	0.00	68.26	14.35	66.62
Ward Parkway Plaza	227	104.28	46.07	44.18	38.39	36.81	19.32	18.53	0.51	0.49	0.00	0.00	19.02	18.24	62.41
Washington Wheatley	228	381.69	136.75	35.83	150.00	39.30	93.03	24.37	1.91	0.50	0.00	0.00	92.27	24.17	60.00
Wendell Phillips	229	434.18	112.38	25.88	202.96	46.74	116.33	26.79	2.51	0.58	0.00	0.00	116.41	26.81	52.69
West Blue Valley	230	228.27	92.36	40.46	90.09	39.47	45.35	19.87	0.47	0.20	0.00	0.00	43.63	19.11	59.58
West Plaza	231	262.14	73.57	28.06	158.21	60.35	28.77	10.98	1.45	0.55	0.14	0.05	26.98	10.29	38.36
West Waldo	232	240.69	123.23	51.20	65.97	27.41	49.52	20.57	1.97	0.82	0.00	0.00	35.67	14.82	66.02
Western 49-63	233	477.29	189.40	39.68	206.70	43.31	76.86	16.10	4.33	0.91	0.00	0.00	75.61	15.84	55.52
Western Blue Township	234	831.59	471.10	56.65	129.13	15.53	207.08	24.90	20.97	2.52	3.31	0.40	209.51	25.19	81.84
Western Hills	235	399.66	171.29	42.86	161.17	40.33	65.25	16.33	1.96	0.49	0.00	0.00	63.85	15.98	58.83
Westside North	236	312.82	89.01	28.45	165.09	52.78	56.26	17.98	2.46	0.79	0.00	0.00	50.58	16.17	44.62
Westside South	237	377.86	75.95	20.10	216.40	57.27	76.79	20.32	6.78	1.79	1.95	0.52	80.99	21.43	41.53
Westwood	238	100.52	45.00	44.77	32.53	32.37	22.52	22.41	0.46	0.46	0.00	0.00	12.87	12.80	57.57
White Oak	239	684.47	395.32	57.76	83.07	12.14	204.15	29.83	1.70	0.25	0.22	0.03	168.99	24.69	82.45
Willow Creek	240	494.00	214.07	43.33	155.75	31.53	117.30	23.75	1.51	0.31	5.36	1.08	105.80	21.42	64.75
Winnetonka	241	536.38	233.30	43.49	188.62	35.16	112.97	21.06	0.00	0.00	1.50	0.28	103.13	19.23	62.72
Winnwood	242	436.55	145.77	33.39	183.29	41.99	100.19	22.95	7.24	1.66	0.05	0.01	77.61	17.78	51.17
Winnwood Gardens	243	169.19	86.91	51.37	46.60	27.54	35.58	21.03	0.00	0.00	0.10	0.06	35.26	20.84	72.21
Woodbridge	244	152.55	67.72	44.39	41.50	27.20	41.13	26.96	2.03	1.33	0.17	0.11	42.35	27.76	72.16
Woodson Estates	245	80.94	37.55	46.39	25.57	31.59	17.67	21.83	0.16	0.20	0.00	0.00	17.04	21.05	67.44
Wornall Homestead	246	99.87	49.46	49.52	36.94	36.99	13.45	13.47	0.02	0.02	0.00	0.00	12.28	12.29	61.82

Other City Canopy Comparisons

Location	UTC	Year	UTC Goal	Goal Target Date
Pittsburgh, PA	40%	2011	60%	20-year plan (2031)
Cincinnati, OH	38%	2011	Increase	Ongoing
Louisville, KY	37%	2013	40%	Ongoing
Washington, DC	35%	2009	40%	20-year plan (2029)
Kansas City, MO	*31%*	*2018*	*-*	*-*
Boston, MA	29%	2006	49%	10-year plan (2016)
Lexington, KY	25%	2013	30%	ongoing
New York, NY	24%	2006	30%	2036
Chicago, IL	17%	2007	25%	Ongoing
Indianapolis, IN	14%	2008	19%	10-year plan (2018)

Kansas City Ecosystem Services

Air Quality	Units (lbs)	Value ($)
CO	53,720	$35,693
NO$_2$	355,740	$75,246
O$_3$	3,007,560	$3,593,643
SO$_2$	422,860	$26,910
PM$_{10}$	842,880	$2,632,459
Carbon	**Units (tons)**	**Value ($)**
Storage	305,775	$290,876,674
Sequestration	8,250,562	$10,780,215
Stormwater	**Units (gals)**	**Value ($)**
Avoided Runoff	1,109,257,171	$11,092,572
Annual Value		**$28,236,738**
Total Value		**$319,113,412**

Kansas City Hydro Data

Avoided Stormwater Runoff from 2005 to 2012			
Year	Rainfall	Total Runoff	Avoided Runoff
	(mm)	(m^3)	(m^3)
2005	852	221,529,290	3,809,597
2006	670	176,499,685	-1,449,069
2007	868	242,019,741	7,348,871
2008	964	274,502,196	2,810,850
2009	1,144	351,092,092	3,848,377
2010	991	313,220,632	3,523,357
2011	668	197,498,673	4,141,164
2012	489	133,112,887	9,558,821
Average	831	238,684,400	4,198,996

Canopy Percentage =	31.94
Canopy Acres =	65196.53
Storm Water Cost =	0.01
Total Reduction	4,198,996
Total Gallons	1,109,257,171
Gallons per Acre	17,014
Stormwater Contribution	$11,092,572

Appendix B
Full Assessment Matrices for a Sustainable Urban Forest

Indicators of a Sustainable Urban Forest **THE TREES**	Overall Objective or Industry Standard	Performance Levels			Kansas City Today
		Low	**Moderate**	**Good**	
Urban Tree Canopy Cover	Achieve the desired tree canopy cover according to goals set for the entire city and neighborhoods. Alternatively, achieve 75% of the total canopy possible for the entire city and in each neighborhood.	Canopy is decreasing, no data are available, or no goals are set.	Canopy is not dropping, but not on a trajectory to achieve the established goal.	Canopy goal is achieved or well on the way to achievement and/or relative canopy is over 75%.	Currently canopy cover is 31% within KCMO city limits. There is no well-known city goal currently set against which to measure progress. Relative canopy cover is 53%. Note that regional canopy was found to be 18% across all nine counties. Goal was to increase by 10%.
Canopy Location	Ensure that the benefits of tree canopy are available to all, especially for those most affected by these benefits. Achieve low variation between tree canopy and equity factors citywide by neighborhood.	Tree planting and public outreach and education is not determined by tree canopy cover or benefits.	Tree planting and public outreach and education is focused on neighborhoods with low tree canopy.	Tree planting and public outreach and education is focused in neighborhoods with low tree canopy and a high need for tree benefits.	Current canopy data on distribution are dated and/or unavailable. Current, relevant data need to be obtained and strategic goals related to canopy should be derived from that data.
Age Distribution	Establish a diverse-aged population of public trees across the entire city and for each neighborhood. Ideal standard: 0-8" DBH: 40% 9-17" DBH: 30% 18-24" DBH: 20% Over 24" DBH: 10%	Age distribution is not proportionately distributed across size classes at the city level.	Age distribution is evenly distributed at city level, though unevenly distributed at the neighborhood level or neighborhood level data not available.	Age distribution is generally aligned with the ideal standard diameter classes both city-wide and at the neighborhood level.	Based on existing public inventory, most of which is 15+ years old, age distribution of public trees appears to be on par with best practices. Diversity at neighborhood level has not been examined.
Condition of Publicly Owned Trees *(trees managed intensively)*	Possess a detailed understanding of tree condition and potential risk of all intensively-managed, publicly-owned trees. This information is used to direct maintenance actions.	No current information is available on tree condition or risk.	Information from a partial or sample or out-of-date inventory is used to assess tree condition and risk.	Information from a current, GIS-based, 100% complete public tree inventory is used to indicate tree condition and risk.	Condition data show that 89% of public trees are in fair or better condition. Again, inventory data are dated and thus may not be considered completely reliable.
Trees on Private Property	Possess a solid understanding of the extent, location, and general condition of trees on private lands.	No data are available on private trees.	Current tree canopy assessment reflects basic information (location) of both public and private canopy combined.	Detailed information available on private trees. Ex. bottom-up sample-based assessment of trees.	Sample inventory of combined public/private (iTree eco) was completed in 2010.
Diversity	Establish a genetically diverse population of publicly-owned trees across the entire city and for each neighborhood. Industry standards recommend that no more than 30% of any family, 20% of any genus, or 10% of any species dominate the urban forest.	Fewer than five species dominate the entire tree population citywide.	No species represents more than 20% of the entire tree population citywide.	No species represents more than 10% of the entire tree population citywide.	Based on existing public tree inventory (15+ year old data), only maple (23%) surpass the recommended diversity limits for genus. All other diversity levels are close to ideal. Note that *regionally*, American elm (29%) and hackberry (14%) exceed the recommended species diversity limits.
Suitability	Establish a tree population suited to the urban environment and adapted to the overall region. Suitable species are gaged by exposure or resilience to imminent threats (pests, storms, climate changes), are considered the "Right Tree for the Right Place" concept, and are non-invasive.	Less than 50% of trees are considered suitable for the site or data are unavailable to make this determination.	50% to 75% of trees are considered suitable for the site.	More than 75% of trees are considered suitable for the site.	Current efforts involving EAB mitigation and sidewalks replacement have eliminated numerous infrastructure comments and unsuitable species.

Indicators of a Sustainable Urban Forest **THE PLAYERS**	Overall Objective or Industry Standard	Performance Levels			Kansas City Today
		Low	**Moderate**	**Good**	
Neighborhood Action	Citizens understand, cooperate, and participate in urban forest management at the neighborhood level. Urban forestry is a neighborhood-scale issue.	Little or no citizen involvement or neighborhood action.	Some active groups are engaged in advancing urban forestry activity, but with no unified set of goals or priorities.	The majority of all neighborhoods are organized, connected, and working towards a unified set of goals and priorities.	Some localized groups are engaged in tree-related projects at the neighborhood level. These independent efforts accomplish project-specific goals but do not support unified-regional objectives.
Large Private & Institutional Landholder Involvement	Large, private, and institutional landholders embrace citywide goals and objectives through targeted resource management plans.	Large private land holders are unaware of issues and potential influence in the urban forest. No large private land management plans are currently in place.	Education materials and advice is available to large private landholders. Few large private landholders or institutions have management plans in place.	Clear and concise goals are established for large private land holders through direct education and assistance programs. Key landholders and institutions have management plans in place.	Large private landholders and institutions have not demonstrated interest that trees are a valuable component of their infrastructure.
Green Industry Involvement	The green industry works together to advance citywide urban forest goals and objectives. The city and its partners capitalize on local green industry expertise and innovation.	Little or no involvement from green industry leaders to advance local urban forestry goals.	Some partnerships are in place to advance local urban forestry goals, but more often for the short-term.	Long-term committed partnerships are working to advance local urban forestry goals.	Multiple partners are engaged in green industry projects including: tree planting, outreach, and urban wood waste utilization. The majority of these partners operate in their own individual silos, with marginal collaboration and no conjoined goals.
City Department and Agency Cooperation	All city departments and agencies cooperate to advance citywide urban forestry goals and objectives.	Conflicting goals and/or actions among city departments and agencies.	Informal teams among departments and agencies are communicating and implementing common goals on a project-specific basis.	Common goals and collaboration occur across all departments and agencies. City policy and actions are implemented by formal interdepartmental and interagency working teams on all city projects.	Interdepartmental teams such as the Green Infrastructure and Stormwater Retention are coordinating on a project-by-project basis. Improved communication would serve to bolster current endeavors.
Funder Engagement	Local funders are engaged and invested in urban forestry initiatives. Funding is adequate to implement citywide urban forest management plan.	Little or no funders are engaged in urban forestry initiatives.	Funders are engaged in urban forestry initiatives at minimal levels for short-term projects.	Multiple funders are fully engaged and active in urban forestry initiatives for short-term projects and long-term goals.	Multiple potential funders are located in the KC area but are unaware, or don't see value in, urban forestry initiatives. These parties need to be engaged.
Utility Engagement	All utilities are aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.	Utilities and city agencies act independently of urban forestry efforts. No coordination exists.	Utilities and city agencies have engaged in dialogues about urban forestry efforts with respect to capital improvement and infrastructure projects.	Utilities, city agencies, and other stakeholders integrate and collaborate on all urban forestry efforts, including planning, site work, and outreach/education.	The largest, local electrical provider (KCP&L) has taken steps to include trees as a means to meet state energy efficiency levels. Other local utility entities, particularly telecommunications providers, don't see trees as an asset worth protecting.
Developer Engagement	The development community is aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.	Little or no cooperation from developers in (or awareness of) municipality-wide urban forest goals and objectives.	Some cooperation from developers and general awareness and acceptance of municipality-wide goals and objectives.	Specific collaborative arrangements across development community in support of municipality-wide goals and objectives.	Tree preservation requirements for new development are currently not in place. 100% land clearing is common practice. Engagement with this group should align with efforts to embrace additional tree preservation regulations.
Public Awareness	The general public understands the benefits of trees and advocates for the role and importance of the urban forest.	Trees are generally seen as a nuisance and thus, a drain on city budgets and personal paychecks.	Trees are generally recognized as important and beneficial.	Trees are seen as valuable infrastructure and vital to the community's well-being. The urban forest is recognized for the unique environmental, economic, and social services it provides to the community.	KC area citizens recognize that trees are an important component of their city. Yet, don't fully grasp the roles trees play and how they specifically serve to benefit the greater community.
Regional Collaboration	Neighboring communities and regional groups are actively cooperating and interacting to advance the region's stake in the city's urban forest.	Little or no interaction between neighboring communities and regional groups.	Neighboring communities and regional groups share similar goals and policy vehicles related to trees and the urban forest.	Regional urban forestry planning, coordination, and management is widespread.	Strong regional groups exist in KC but tree-specific projects are infrequent. Collaboration between Counties and Municipalities is lacking, although many have similar goals as they relate to trees.

Indicators of a Sustainable Urban Forest THE MGMT APPROACH	Overall Objective or Industry Standard	Performance Levels			Kansas City Today
		Low	**Moderate**	**Good**	
Tree Inventory	Comprehensive, GIS-based, current inventory of all intensively-managed public trees to guide management, with mechanisms in place to keep data current and available for use. Data allow for analysis of age distribution, condition, risk, diversity, and suitability.	No inventory or out-of-date inventory of publicly-owned trees.	Partial or sample-based inventory of publicly-owned trees, inconsistently updated.	Complete, GIS-based inventory of publicly-owned trees, updated on a regular, systematic basis.	Street tree ash inventory and new tree plantings (2016); new subdivision inventory (2012); iTree Eco sample inventory (2010); street tree inventory (2001)
Canopy Assessment	Accurate, high-resolution, and recent assessment of existing and potential city-wide tree canopy cover that is regularly updated and available for use across various departments, agencies, and/or disciplines.	No tree canopy assessment.	Sample-based canopy cover assessment.	High-resolution tree canopy assessment using aerial photographs or satellite imagery	Existing UTC assessment was completed with 2006-2010 imagery with lower accuracy/resolution than currently accepted standards suggest. The land cover data are good enough to capture canopy percentages fairly well to make assumptions, but this product is quickly becoming outdated.
Management Plan	Existence and buy-in of a comprehensive urban forest management plan to achieve city-wide goals. Re-evaluation is conducted every 5 to 10 years.	No urban forest management plan exists.	A plan for the publicly-owned forest resource exists but is dated and limited in scope, acceptance, and implementation.	A comprehensive plan for the publicly owned forest resource exists and is accepted and implemented.	KC has an old plan from 2012. Plan was adopted by the Parks Board but never adopted by City Council. It is not actively being used to make management decisions and is now outdated.
Risk Management Program	All publicly-owned trees are managed for maximum public safety by way of maintaining a city-wide inventory, conducting proactive annual inspections, and eliminating hazards within a set timeframe based on risk level. Risk management program is outlined in the management plan.	Request-based, reactive system. The condition of publicly-owned trees is unknown.	There is some degree of risk abatement thanks to knowledge of condition of publicly-owned trees, though generally still managed as a request-based reactive system.	There is a complete tree inventory with risk assessment data and a risk abatement program in effect. Hazards are eliminated within a set time period depending on the level of risk.	Mostly request-based, but they do have good data on what dead trees or potential "hazard trees" that exist in the system. Just don't have the staffing level to proactively remove trees.
Emerald Ash Borer Management Program	Comprehensive and accurate ash tree inventory for public trees with adopted and publicized management strategy.	No defined ash programs.	Ash program in place based off of existing tree inventory.	Proactive ash program that includes management strategies and public awareness and outreach campaign	100% ash tree inventory (2016); ash treatment plan, outreach campaign
Maintenance Program of Publicly-Owned Trees *(trees managed intensively)*	All intensively-managed, publicly-owned trees are well maintained for optimal health and condition in order to extend longevity and maximize benefits. A reasonable cyclical pruning program is in place, generally targeting 5- to 7-year cycles. The maintenance program is outlined in the management plan.	Request-based, reactive system. No systematic pruning program is in place for publicly-owned trees.	All publicly-owned trees are systematically maintained, but pruning cycle is inadequate.	All publicly-owned trees are proactively and systematically maintained and adequately pruned on a cyclical basis.	Removal and pruning program that is primarily request-driven. Budget is 50/50 in-house and contract tree services but is currently inadequate to support proactive pruning cycles.
Planting Program	Comprehensive and effective tree planting and establishment program is driven by canopy cover goals, equity considerations, and other priorities according to the plan. Tree planting and establishment is outlined in the management plan.	Tree establishment is ad hoc.	Tree establishment is consistently funded and occurs on an annual basis.	Tree establishment is directed by needs derived from a tree inventory and other community plans and is sufficient in meeting canopy cover objectives.	Working on contract growing with local nursery and utilizing volunteers with Bridging the Gap to plant.
Tree Protection Policy	Comprehensive and regular updated tree protection ordinance with enforcement ability is based on community goals. The benefits derived from trees on public and private property are ensured by the enforcement of existing policies.	No tree protection policy.	Some policies are in place to protect trees, but the policies are not well-enforced or do not cover all trees.	Protections policies ensure the safety of trees on public and private land. The policies are enforced and supported by significant deterrents and shared ownership of city goals.	No tree preservation policy in place for private development or city projects, currently. Efforts to look into an internal TPP for city projects are occurring, and landscaping requirements for adding new canopy to private development are in place. Enforcement for the landscaping requirements has been lacking.
City Staffing and Equipment	Adequate staff and access to the equipment and vehicles to implement the management plan. A high-level urban forester or planning professional, strong operations staff, and solid certified arborist technicians.	Insufficient staffing levels, insufficiently-trained staff, and/or inadequate equipment and vehicle availability.	Certified arborists and professional urban foresters on staff have some professional development but are lacking adequate staff levels or adequate equipment.	Multi-disciplinary team within the urban forestry unit, including an urban forestry professional, operations manager, and arborist technicians. Vehicles and equipment are sufficient to complete required work.	15 tree trimmers, 4 foresters, and 1 administrative assistant (plus contract services for tree care and planting). These staffing levels are inadequate for proactive management (based on the fact that current efforts are all reactive). Professional development opportunities for staff are available and encouraged.
Communication	Effective avenues of two-way communication exist between the city, departments, and its citizens. Messaging is consistent and coordinated, when feasible.	No avenues are in place. City departments and public determine on an ad-hoc basis the best messages and avenues to communicate.	Avenues are in place, but not maximized and without coordination or only on a one-way basis.	Avenues are in place for two-way communication, and are well-used with targeted, coordinated messages.	Bridging the Gap partnership provides some avenues for communication to external partners and volunteer groups; some interdepartmental collaboration with the city but needs to be improved and more transparent; HOA groups and neighborhood groups engagement needs improved.

Indicators of a Sustainable Urban Forest **THE MGMT APPROACH**	Overall Objective or Industry Standard	Performance Levels			Kansas City Today
		Low	Moderate	Good	
Funding	Appropriate funding in place to fully implement both proactive and reactive needs based on a comprehensive urban forest management plan.	Funding comes from the public sector only and covers only reactive work.	Funding levels (public and private) generally cover mostly reactive work. Partial risk management and planting in place.	Dynamic, active funding from engaged private partners and adequate public funding are used to proactively manage and expand the urban forest.	Funding from general fund, state grants, private donors, and CIP; diverse funding sources but current levels are projected to be inadequate for reaching KC's goals.
Disaster Preparedness & Response	A disaster management plan is in place related to the city's urban forest. The plan includes staff roles, contracts, response priorities, debris management, and a crisis communication plan. Staff are regularly trained and/or updated.	No disaster response plan is in place.	A disaster plan is in place, but pieces are missing and/or staff are not regularly trained or updated.	A robust disaster management plan is in place, regularly updated and staff are fully trained on roles and processes.	Plan is in place through the Office of Emergency Management but does not include direct references to urban forestry. Citywide awareness of plan details is limited.

Appendix C
Action Sheets for Kansas City Missions and Strategies

Mission #1	THE TREES

INCREASE TREE CANOPY AND ASSOCIATED SERVICES

The work that went into this plan and that resulted in this community goal of maintaining canopy while increasing canopy quality, diversity, and strategic distribution needs to be official adopted by the city leadership and incorporated into a number of relevant documents and policies. This is critical to ensure that these efforts will last through changes in staff and elected officials.

Strategy	Indicators Impacted	*Task*
Officially Adopt & Incorporate Urban Forestry Goals	Urban Tree Canopy Cover	Set canopy goal as a community
	Trees on Private Property	Incorporate canopy goal into outreach efforts
	Urban Tree Canopy Cover	Incorporate canopy strategy into city policy
Plan for a UTC Update	Urban tree canopy cover	Complete UTC update with 2018 Imagery
	Trees on private property	Explore partnerships and secure funding in advance
Define a Strategic planting Plan that Reflects City Goals	Urban tree canopy cover	Increase tree population diversity
	Diversity	Better prepare your tree population for climate change
	Suitability	Identify prioritized planting locations
Improve the Tree Protection Code	Condition of publicly owned trees	Improve the Management of Public Trees
	Age distribution	Ensure effective tree protection policy is in place
	Condition of publicly owned trees	Adopt an internal tree protection policy
	Trees on private property	Strengthen current development code

Indicators of a Sustainable Urban Forest: The Trees			
Indicator	Current	Expected Change with Task Completion	Expected Change with No Action
Urban Tree Canopy Cover	low	moderate	low
Canopy Location	low	moderate	low
Age Distribution	moderate	good	low
Condition of Publicly Owned Trees	moderate	good	low
Trees on Private Property	good	good	moderate
Diversity	good	good	moderate
Suitability	moderate	good	low

Mission #2	THE PLAYERS

Strategy	Indicators Impacted	Task
Encourage Tree Planting & Preservation on Private Property	Neighborhood Action	Launch and maintain a public education program.
	Large Private Landholder Involvement	Provide easy public access to data and related urban forest information.
	Public Awareness	Encourage and assist in neighborhood-led tree campaigns.
	Neighborhood Action	Participate in regional tree planting initiatives and programs.
Create Plan Implementation Education & Messaging	Public Awareness, Engagement	Identify your target audience.
	Public Awareness, Engagement	Create a brand.
	Agency/Regional Collaboration	Develop messaging.
Develop a Plan Implementation Team	Agency/Regional Collaboration, Green Industry/Private & Institutional Land Owner Involvement	Utilize existing Tree Champion Network.

Indicators of a Sustainable Urban Forest: The Players			
Indicator	Current	Expected Change with Task Completion	Expected Change with No Action
Neighborhood Action	moderate	good	moderate
Large Private & Institutional Landholder Involvement	low	moderate	low
Green Industry Involvement	moderate	good	moderate
City Department and Agency Cooperation	moderate	good	moderate
Funder Engagement	low	moderate	low
Utility Engagement	moderate	good	moderate
Developer Engagement	low	moderate	low
Public Awareness	moderate	good	moderate
Regional Collaboration	low	moderate	low

Mission #1	THE MANAGEMENT

Strategy	Indicators Impacted	Task
Complete an Updated Inventory and Management Plan of Public Trees	Tree Inventory	Update tree inventory.
	Management Plan	Develop a 5-year management plan.
Progressive Increase of Staff Resources	City Staffing & Equipment	Utilize the information from the update inventory and management plan to develop a refined budget.
	Funding	Develop a more accurate representation of return on investment
Transition to Proactive Management	Management Plan	Prioritize the most immediate tree care tasks.
	Risk Management Program	Institute proactive, cyclical tree care.
	Maintenance Program	Create a tree commission to secure a secondary funding source.
	Maintenance Program	Work to achieve canopy goal through strategic (purposeful) planting.

Indicators of a Sustainable Urban Forest: The Management			
Indicator	**Current**	**Expected Change with Task Completion**	**Expected Change with No Action**
Tree Inventory	moderate	good	low
Canopy Assessment	moderate	good	low
Management Plan	moderate	good	low
Risk Management Program	moderate	good	low
Emerald Ash Borer Program	good	good	moderate
Maintenance Program of Publicly-Owned Trees (trees managed intensively)	moderate	good	moderate
Planting Program	moderate	good	low
Tree Protection Policy	low	moderate	low
City Staffing and Equipment	moderate	good	moderate
Communication	moderate	good	moderate
Funding	moderate	good	moderate
Disaster Preparedness & Response	moderate	good	moderate

Appendix D
Tree Policy Recommendations

Policy on trees in cities cover private and public lands. An assessment of Kansas City's current policy and recommendations for adjustments follow.

Public Tree Care and Protection. Public trees (along streets, in parks, in rights-of-way) are governed and managed based on structure provided through Tree Ordinance chapters in cities' codes of ordinances. The City of Kansas City's Code of Ordinances does not have a dedicated tree ordinance. Rather, it mentions public trees in two separate locations: Chapter 64; Streets, Sidewalks and Public Places, and Chapter 88; Zoning and Development Code; 400 Series Development Standards.

Chapter 64: Streets, Sidewalks, and Public Places. Article XI. - Trees.

Chapter 88: Zoning and Development Code: 400 Series; 88-425 Landscaping and Screening

According to the ordinance, any violation constitutes a maximum $450 fine, as described in the code's fee schedule:

88-615-05-J. PENALTIES

1. Any violation of this zoning and development code is punishable by a fine combined with court costs as follows:

    (a) For the first violation within the twelve-month period preceding the violation date, no more than $200.00;

    (b) For the second violation within the twelve-month period preceding the violation date, no more than $275.00;

    (c) For the third violation within the twelve-month period preceding the violation date, no more than $350.00;

    (d) For fourth and any subsequent violation within the twelve-month period preceding the violation date, no more than $450.00.

2. For any violation found to endanger the health or welfare of others, fines as set forth in subsection 1 of this section, and/or a jail sentence of not more than 10 days for each and every day such violation continues.

3. Every day that a violation continues shall be considered a separate offense, for which the violator may be tried and convicted without necessity of further notice.

Tree Ordinance Basics

In its most basic form, a tree ordinance *establishes standards and sets guidelines for the management of public trees.* It is the legal framework which governs local tree management activities. It also sets the standard for tree care, serving as a solid example of how Largo residents should manage all trees within the community (both public and private).

Although ordinances may vary widely in form, content, and complexity, an effective public tree ordinance should cover and define the following:

1. Goals should be clearly stated and ordinance provisions should address these goals.

2. Responsibility should be designated, and authority granted commensurate with responsibility.

3. Basic performance/proactive standards should be set.

4. Flexibility should be designed into the ordinance.

5. Enforcement methods and penalties for violations should be specified.

Two additional criteria reflect the background in which the ordinance is developed:

1. The ordinance should be developed as part of a comprehensive management strategy.

2. The ordinance should be developed with community support.

Although an ordinance meeting these criteria is not guaranteed success, ordinances lacking one or more of these elements will definitely be challenged to achieve its goals.

Private Trees Care & Protection. Trees on private lands are typically only regulated before and during development projects, through requirements spelled out in Kansas City's Development Code. Chapter 88: Zoning and Development Code: 400 Series; 88-425 Landscaping and Screening, covers landscaping standards in private development projects. This code does a good job of relaying why trees and canopy are important and describing the requirements for new trees during large site development projects, and also offers credits for preserving existing trees. Submitted site plans are reviewed by a code compliance officer and certified arborist. According to the code, fees are incurred for violation of the code based on the fee schedule also listed above.

Strategy: A Tree Protection Ordinance. As it stands today, the code requires additional planting of trees during development. A few tweaks related to tree preservation requirements and changes have been recommended, but overall the development code is comprehensive and well written. However, the city has very little regulation (almost nothing) that dictates the management and protection of *public* trees for which the city is actually responsible and liable for. Well-written tree ordinances, even in their most basic form, create a formal communication around all tree activity (via permits, best practices) and result in a proactive program that lessens threats to public safety. This reduces the liability of the city while creating a revenue stream for future tree management. Additionally, the little regulation that does exist is located in multiple Chapters and Sections throughout the Code. Because of this "decentralized" organization of tree regulations, the city's authority or responsibility is unclear (what they can and cannot do regarding public trees) and the urban forest does come across as a priority for the city (as viewed by citizens and businesses). Therefore, it is recommended that Kansas City create a simple but separate Tree Ordinance chapter that consolidates and clarifies tree regulations.

Current Tree Ordinance. Kansas City's ordinance already addresses:

1. Define and set the authority of the city over public trees (it can reference the Development Code concerning trees on private property).
2. State the goals for the community forest. Those might include goals ranging from maintaining a safe urban forest to climate-change sustainability to working to achieve canopy cover goals (whether no net loss or a referring to a canopy gain goal defined in the city's comprehensive plan).
3. Define activities, both allowed and disallowed, regarding the removal, pruning, planting, damaging, or other treatment of public trees.

Future Tree Protection Ordinance. Kansas City's future tree preservation ordinance should:

1. Require a "public tree work permit." This doesn't need a fee associated with it. It is important primarily for keeping the urban forestry managers informed on what is going on in the city affecting trees.

   a. The general public for removing, pruning, or planting a public tree.
   b. Routine, annual aerial utility line clearance pruning by power and telecommunication companies.
   c. Non-municipal infrastructure and utility repair, improvement, or new construction projects in the right-of-way.

2. Define penalties and require compensatory payments (based on appraised tree value) for damage to public trees and violations of the tree ordinance and/or tree work permits granted. For example, as it stands currently, a homeowner could remove a large public street tree in front of their house for only $450 in fines which is often well-worth the fee to the homeowner. With a well-written tree ordinance, that fee could change to $2,000–$5,000 based on the assessed value of the tree. This is a solid way to protect the existing canopy while creating a more significant revenue stream to fund urban forestry initiatives.

3. Aspire to preserve existing canopy public property, private property, and new development. Recall that established, mature trees provide the maximum canopy benefits. Taking measures to ensure preservation of existing canopy has clear, defined pathways will aid Kansas City in achieving their canopy goal. Establishing an internal and external policy will also lessen the potential pushback that should be expected form the development industry.

4. Include resources for implementation, enforcement, and education. Any tree protection and regulation require an overall strategy for implementation, enforcement, and public education. Without these supports in place, inefficient and ineffective management is likely, and the community forest will suffer. This master plan can serve as a strategy document, impetus, and foundation for the effective implementation of a new public tree ordinance.

Ordinance Examples

From Atlanta Tree Ordinance on Fines…excerpt from Article II Tree Protection (Sec 158)

"A fine imposed for the first violation shall be no less than $500.00, and the fine imposed for each subsequent violation shall be $1,000.00. Each tree upon which a violation occurred shall be deemed a separate violation of the tree protection ordinance. Where the tree conservation commission is unable to determine the exact number of trees upon which a tree protection ordinance violation occurred, the commission shall assume a density of 1,000 inches DBH of trees per acre, and specifically shall assume that the lot contains 60 trees of 16.67 inches DBH per acre, and shall impose a fine of $60,000.00 per acre of land where the offense(s) occurred. Where the subject property is smaller than one acre, the fine shall be pro-rated. Each day's continuance of a violation may be considered a separate offense…

(b) In addition to paying the penalties set forth in subsection (a) above, any tree of six inches or larger DBH except pines, or any pine tree of 12 inches DBH or larger, that is removed or destroyed in violation of this article shall be replaced or recompensed by the violator, as set forth in section 158-103."

Pasedena CA… All public trees are afforded protection in the ordinance and it is a violation to prune, remove, injure, or plant a public tree. No attachments (wire, rope, sign, or nail) to public trees, tree supports, shrubs or plants in public places are permitted. The Public Works Department will review out-of-cycle pruning and planting request submitted by a property owner. Violators of the ordinance and/or approved tree protection plan may be charged with a misdemeanor or infraction. A misdemeanor can result in up to six months imprisonment and a maximum $1,000 fine. An infraction can result in a $250.00 fine. In addition, there may be civil penalties, late payment penalties, administration fees, and tree replacement costs charged to the violator.

Appendix E
Proactive Management Budget Projections

Note: these numbers are derived from the dated inventory data set and should only be considered a framework

Estimated Costs for Each Activity			Year 1		Year 2		Year 3		Year 4		Year 5		Five-Year Cost
Activity	Diameter	Cost/Tree	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	
Severe and High Risk Removals	1-3"	$28	177	$4,868	0	$0	0	$0	0	$0	0	$0	$4,868
	4-6"	$58	27	$1,553	0	$0	0	$0	0	$0	0	$0	$1,553
	7-12"	$138	95	$13,063	0	$0	0	$0	0	$0	0	$0	$13,063
	13-18"	$314	70	$21,945	0	$0	0	$0	0	$0	0	$0	$21,945
	19-24"	$605	37	$22,385	0	$0	0	$0	0	$0	0	$0	$22,385
	25-30"	$825	24	$19,800	0	$0	0	$0	0	$0	0	$0	$19,800
	31-36"	$1,045	10	$10,450	0	$0	0	$0	0	$0	0	$0	$10,450
	37-42"	$1,485	3	$4,455	0	$0	0	$0	0	$0	0	$0	$4,455
	43"+	$2,035	5	$10,175	0	$0	0	$0	0	$0	0	$0	$10,175
Activity Total(s)			**448**	**$108,693**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$108,693**
Moderate and Low Risk Removals	1-3"	$28		$0	178	$4,895	178	$4,895	178	$4,895	178	$4,895	$19,580
	4-6"	$58		$0	28	$1,610	28	$1,610	28	$1,610	28	$1,610	$6,440
	7-12"	$138		$0	95	$13,063	95	$13,063	95	$13,063	95	$13,063	$52,250
	13-18"	$314		$0	71	$22,259	71	$22,259	71	$22,259	70	$21,945	$88,721
	19-24"	$605		$0	38	$22,990	38	$22,990	38	$22,990	38	$22,990	$91,960
	25-30"	$825		$0	25	$20,625	25	$20,625	24	$19,800	24	$19,800	$80,850
	31-36"	$1,045		$0	11	$11,495	10	$10,450	10	$10,450	10	$10,450	$42,845
	37-42"	$1,485		$0	4	$5,940	4	$5,940	3	$4,455	3	$4,455	$20,790
	43"+	$2,035		$0	5	$10,175	5	$10,175	5	$10,175	5	$10,175	$40,700
Activity Total(s)			**0**	**$0**	**455**	**$113,051**	**454**	**$112,006**	**452**	**$109,696**	**451**	**$109,383**	**$444,136**
Stump Removals	1-3"	$18	0	$0	73	$1,278	73	$1,278	72	$1,260	72	$1,260	$5,075
	4-6"	$28		$0	56	$1,540	56	$1,540	56	$1,540	55	$1,513	$6,133
	7-12"	$44		$0	139	$6,116	138	$6,072	138	$6,072	138	$6,072	$24,332
	13-18"	$72		$0	154	$11,011	154	$11,011	154	$11,011	154	$11,011	$44,044
	19-24"	$94		$0	82	$7,667	82	$7,667	81	$7,574	81	$7,574	$30,481
	25-30"	$110		$0	60	$6,600	60	$6,600	59	$6,490	59	$6,490	$26,180
	31-36"	$138		$0	34	$4,675	34	$4,675	35	$4,813	35	$4,813	$18,975
	37-42"	$160		$0	31	$4,945	31	$4,945	30	$4,785	30	$4,785	$19,459
	43"+	$182		$0	28	$5,082	28	$5,082	29	$5,264	29	$5,264	$20,691
Activity Total(s)			**0**	**$0**	**657**	**$48,913**	**656**	**$48,869**	**654**	**$48,808**	**653**	**$48,780**	**$195,370**

Activity	Size	Price											Total
High Risk Pruning	1-3"	$20	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	4-6"	$30	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	7-12"	$75	1610	$120,750	0	$0	0	$0	0	$0	0	$0	$120,750
	13-18"	$120	2145	$257,400	0	$0	0	$0	0	$0	0	$0	$257,400
	19-24"	$170	1466	$249,220	0	$0	0	$0	0	$0	0	$0	$249,220
	25-30"	$225	924	$207,900	0	$0	0	$0	0	$0	0	$0	$207,900
	31-36"	$305	418	$127,490	0	$0	0	$0	0	$0	0	$0	$127,490
	37-42"	$380	206	$78,280	0	$0	0	$0	0	$0	0	$0	$78,280
	43"+	$590	237	$139,830	0	$0	0	$0	0	$0	0	$0	$139,830
Activity Total(s)			**7006**	**$1,180,870**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**$1,180,870**
Routine Pruning (5-year cycle)	1-3"	$20	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	4-6"	$30	0	$0	0	$0	0	$0	0	$0	0	$0	$0
	7-12"	$75	5125	$384,375	5125	$384,375	5125	$384,375	5126	$384,450	5125	$384,375	$1,921,950
	13-18"	$120	5093	$611,160	5093	$611,160	5093	$611,160	5093	$611,160	5093	$611,160	$3,055,800
	19-24"	$170	2837	$482,290	2837	$482,290	2838	$482,460	2838	$482,460	2838	$482,460	$2,411,960
	25-30"	$225	1470	$330,750	1470	$330,750	1470	$330,750	1470	$330,750	1471	$330,975	$1,653,975
	31-36"	$305	491	$149,755	491	$149,755	492	$150,060	492	$150,060	492	$150,060	$749,690
	37-42"	$380	167	$63,460	167	$63,460	167	$63,460	168	$63,840	168	$63,840	$318,060
	43"+	$590	103	$60,770	104	$61,360	104	$61,360	104	$61,360	103	$60,770	$305,620
Activity Total(s)			**15,286**	**$2,082,560**	**15,287**	**$2,083,150**	**15,289**	**$2,083,625**	**15,291**	**$2,084,080**	**15,290**	**$2,083,640**	**$10,417,055**
Young Tree Training Pruning (3-year cyle)	1-3"	$20	7776	$155,520	7776	$155,520	7776	$155,520	7776	$155,520	7776	$155,520	$777,600
	4-7"	$30	7140	$214,200	7140	$214,200	7140	$214,200	7140	$214,200	7140	$214,200	$1,071,000
Activity Total(s)			**14916**	**$369,720**	**14916**	**$369,720**	**14916**	**$369,720**	**14916**	**$369,720**	**14916**	**$369,720**	**$1,848,600**
Replacement Tree Planting	Purchasing	$170	3,676	$624,920	3,676	$624,920	3,676	$624,920	3,676	$624,920	3,676	$624,920	$3,124,600
	Planting	$110	3,676	$404,360	3,676	$404,360	3,676	$404,360	3,676	$404,360	3,676	$404,360	$2,021,800
Activity Total(s)			**7352**	**$1,029,280**	**7352**	**$1,029,280**	**7352**	**$1,029,280**	**7,352**	**$1,029,280**	**7,352**	**$1,029,280**	**$5,146,400**
Replacement Young Tree Maintenance	Mulching	$100	3,676	$367,600	7,352	$735,200	11,028	$1,102,800	14,704	$1,470,400	18,380	$1,838,000	$5,514,000
	Watering	$100	3,676	$367,600	7,352	$735,200	11,028	$1,102,800	14,704	$1,470,400	18,380	$1,838,000	$5,514,000
Activity Total(s)			**7352**	**$735,200**	**14704**	**$1,470,400**	**22056**	**$2,205,600**	**29,408**	**$2,940,800**	**36,760**	**$3,676,000**	**$11,028,000**
Activity Grand Total			**45,008**		**38,667**		**38,667**		**38,665**		**38,662**		
Cost Grand Total				**$5,506,323**		**$5,114,514**		**$5,849,100**		**$6,582,384**		**$7,316,803**	**$30,369,123**