Louisville's Olmsted Parkways

Eastern Parkway Transportation Plan

July
2020

Gresham Smith

Louisville's Olmsted Parkways
EASTERN PARKWAY

ACKNOWLEDGMENTS

The Honorable Greg Fischer, Mayor

Louisville Metro Council

Leadership Team

Louisville Metro

John Swintosky, *Project Manager*

Tammy Markert

James Graham

Kate Holwerk

Steve Kurowsky

Laura Mattingly

Mike King

KYTC

Carl Jenkins, *Project Manager*

Jackie Jones

Kevin Bailey

TARC

Aida Copic

Advisory Team

Derby City Run Club

Louisville Water Company

Schnitzelburg Business Association

Dairy Kastle

Cottage Inn Restaurant

Preston Area Business Association

Highlands Commerce Guild

Shuffetts Auto Center

Eastern Parkway Baptist Church

Jefferson County Public Schools

Louisville/Jefferson County Metropolitan Sewer District (MSD)

Louisville Metro Police Department 5th Division

Olmsted Parks Conservancy

Kosair Charities Main Office

Deer Park Neighborhood Association President

Bonnycastle Homestead Association

St. Joseph Neighborhood Association

Tyler Park Neighborhood Association

Germantown-Paristown Neighborhood Association

Highlands-Douglass Neighborhood Association

Cherokee Triangle Association

Rob Stein - Citizen

Transit Authority of River City

University of Louisville Business Services

University of Louisville Planning and Development Sustainability Council

Bicycling 4 Louisville

Prepared by

Gresham Smith

In Partnership with

Redwing Ecological Services

Corn Island Archaeology

Environs Inc.

Jones Landscape Architecture

Adam Kirk Engineering

Qk4

C2 Strategic Communications

Greenhaven Tree Care (d/b/a Tree Savers)

Gresham Smith

KYTC ITEM NO.: 5-3213.00

Purpose and Need Eastern Parkway Transportation Study

Introduction

Over the past 25 years, leadership across the City of Louisville has sponsored planning efforts to protect, preserve, revitalize, and enhance the Olmsted parks and parkways. In 2018, the Louisville/Jefferson County Metropolitan Government (Louisville Metro) leveraged a $500,000 federal Transportation Alternatives Program grant (TAP 4001 012), matched with $10,000 of Kentucky Transportation Cabinet toll credits to conduct the Eastern Parkway Transportation Study in support of these efforts. Louisville Metro partnered with Gresham Smith, Adam Kirk Engineering, C2 Strategic Communications, Corn Island Archaeology, Environs-Jones Inc., Greenhaven Tree Care, Qk4 Inc., and Redwing Ecological Services to complete this study in 2020.

The proposed project is part of the parkway system designed by Frederick Law Olmsted and it encompasses 3.35 miles of Eastern Parkway from the intersection with Hahn Street to its eastern terminus at Cherokee Park (MP 3.848 to MP 7.198). The majority of this portion of Eastern Parkway is a four-lane undivided roadway classified as an urban minor arterial, with an annual average daily traffic (AADT) of over 16,000 vehicles and speed limits of 25 mph and 35 mph. A four-lane divided section separated by a center median is present between Baxter and Barret Avenues (MP 6.105 to MP 6.441).

The project includes a planning-level analysis for the rehabilitation of Eastern Parkway to modern standards through various complete street alternatives, including possible lane reductions and complete street elements, such as additional bicycle lanes, shared use paths, and sidewalks.

The scope of the planning study includes the following:

- A detailed analysis of the context for bicycle/pedestrian facilities,
- A traffic study throughout the corridor, a Road Safety Audit, and site-specific analysis of proposed solutions,
- A thorough public participation process including individual property owners, user groups, and the general public,
- Consideration of the unique character to this Olmsted Parkway,
- An inventory of the current landscaping,
- Conceptual plans for drainage and curb improvements along the parkway, and
- An environmental overview in anticipation of a Categorical Exclusion in a future design phase.

Project Purpose

The purpose of the project is to improve and rehabilitate Eastern Parkway to modern standards for all transportation methods, improve connectivity of the sidewalk system, and improve the existing multimodal transportation along Eastern Parkway. The previously developed Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management includes identification of additional goals to guide project recommendations and improvements throughout the Parkway system, including Eastern Parkway (refer to Previous Studies). These goals were identified through an open process during the planning phase, which solicited review from a 50-member community advisory group.

These goals include:

- Ensuring that improvements are respectful of the historic Olmsted design
- Improving stormwater drainage within the project corridor
- Improving landscaping within the project

Project Need

Needs identified for the proposed project include rehabilitation of the parkway elements, improved connectivity, multimodal transportation, and reduced congestion along this portion of Eastern Parkway while maintaining the historic character of the corridor. Each of these interrelated project needs is discussed further below.

Connectivity

Eastern Parkway was designed as part of the Olmsted Parkways system to provide a park-like corridor to link the various Olmsted Parks and surrounding neighborhoods via a variety of transportation methods (e.g., vehicular, bicycle, and pedestrian). Subsequent to the design and construction of the parkway, the surrounding area has undergone significant residential and commercial development, leading to encroachments such as curb cuts, driveways, and signage. Pedestrian facilities are present with the project corridor; however, they are not continuous. Sidewalks along the parkway are varied and inconsistent, and crosswalks and signals are inadequate in several areas. The median between Baxter and Barret Avenues, which serves as the primary route for pedestrians and bicycles along this portion of the parkway, is difficult to access from other sidewalks along the corridor. Bike lanes are also absent from the parkway. The discontinuous sidewalks and lack of bicycle facilities impedes forms of transportation other than motor vehicles, which limits the usefulness of the parkway as a multimodal connection to resources.

Multimodal Transportation

The existing project corridor provides limited opportunities for modes of transportation other than motor vehicles. The Traffic Authority of River City (TARC) services numerous bus stops throughout the project corridor. Many bus stops are not ADA accessible, or connected to the existing sidewalk system.

There are no designated or separated bicycle facilities along the corridor. The roadway can also be an obstacle for pedestrians due to high-speed traffic and multiple travel lanes to cross with no refuge.

Character

The historic character of the original parkway design has been lost along much of Eastern Parkway. As previously discussed, various encroachments are present throughout the parkway, and removal or replacement of trees has occurred in many areas. Installation of ramps at the I-65 interchange and expansion of the Poplar Level Road and Crittenden Drive intersections to five lanes with free-flowing right turn lanes resulted in removal of the trees along the roadway in these areas. These changes, as well as other changes along the project corridor, have affected the parkway setting and changed the character of the area.

Drainage

Drainage along Eastern Parkway, with the exception of the portion from Crittenden Drive to Third Street, is provided by concrete gutters with elevations below road level that drain to catch basins. The gutters are 4 ft wide and up to 12 inches deep, which creates the appearance of a wider travel lane. The gutters have been impacted by the first row of trees, which have damaged the gutter through root and trunk growth. Driveway extensions of varying types have been installed to facilitate access from adjacent properties to the Parkway. These extensions block or impede drainage, collect trash and debris, and greatly reduce the effectiveness of the drainage system.

Landscape

Generally, Eastern Parkway has a 120-ft cross section with a central 40-ft roadway and 40-ft greenspace on each side of the roadway. The greenspace includes two rows of planted trees with sugar maplesand pin oaks being the dominant species planted along the roadway and other species, particularly sycamore, planted in the second row. Due to storms, construction, development, landowner encroachment, utility maintenance, and a variety of other reasons, portions of the tree canopy have been removed, which affects the character of the Parkway. Additionally, the health of numerous trees within the project corridor is declining.

Previous Studies

In 1994, the Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management identified five primary needs for preserving Louisville's Olmsted parks and parkways, including Eastern Parkway:

1. Provide serviceable infrastructure for active and passive recreational areas,
2. Restore and sustain plant and animal communities,
3. Reconcile conflicts among users,
4. Recapture the original vision for each park [and parkway], and
5. Develop programs and funding partnerships, upgrade Parks Department resources, and establish review policies to assure that proposed projects are fitting and maintainable.

Development of the 1994 Master Plan also included the facilitation of interviews and public forums in 1991 and 1992. These conversations revealed the following desires for Louisville's Olmsted parkways, including Eastern Parkway, as communicated by the public:

1. A continuous parkway system of interconnected bikeways and walkways,
2. De-emphasis of the use of the parkways as arterials for heavy vehicles, particularly heavy trucks which detract from the pleasure and safety of using the parkways,
3. Restoration of the residential character of the parkways,
4. Increased parkway safety for recreation,
5. A decrease of illegal parking on the right-of-way from aesthetic, environmental, and safety standpoints, and the
6. Rehabilitation and restoration of the parkway tree canopies.

Subsequent studies followed over the next 10 years to research, plan, and conduct community engagement efforts supporting the development of actionable recommendations to address these needs. These include the Parks and Open Space Master Plan (1995), a Feasibility Study to Re-Curb Eastern Parkway (1999), and the development of Louisville Olmsted Parkway Design Standards (2005), discussed in further detail in Chapter 1 of this report.

Preliminary planning efforts culminated in 2009, when the Olmsted Parkways Shared Use Pathway System Master Plan was prepared in partnership by Louisville Metro Parks, Louisville Metro Government, a dedicated Community Advisory Group (CAG), and the Olmsted Parks Conservancy to address the unique needs of each of the Olmsted parkways (including Eastern Parkway), distinctive from the Olmsted parks themselves, in response to recommendations set forth from the 1995 Parks and Open Space Master Plan.

In this 2009 Master Plan, it was noted that previous Olmsted Parkways planning projects included broad community engagement as a central focus of planning for a shared use path alignment, lane reconfiguration, and additional complete streets facilities. As such, Louisville Metro determined that an additional comprehensive study for Eastern Parkway should be conducted before recommending specific improvements to the corridor, including thorough public participation that would engage individual property owners, user groups, and the general public. This report summarizes the results of this additional study for specific improvement recommendations for Eastern Parkway.

This updated master plan builds on the successful efforts of the past to capture possible outlets for revitalization while still preserving the historic charm of Eastern Parkway. While this is a monumental effort, it would not have been possible without the input received from the public. Eastern Parkway is a local treasure, and the project team is appreciative of each and every person who shared their ideas and concerns as we document this journey.

Executive Summary

The Importance of Eastern Parkway

The story of the development of Louisville is one that began with a big vision. The city, nestled in the curves of the Ohio River and the gentle slopes of the river's southern shores, is replete with a unique natural beauty. For hundreds of years, heritage hardwood trees have provided both shade and a rooted record of Louisville's history, and streams and creeks have sculpted peaks and valleys in Louisville's land fabric. At the turn of the 20th century, a group of inspired citizens recognized the environmental treasures of Louisville, and they saw an opportunity to preserve these lands as parks for posterity. The group turned to Frederick Law Olmsted, Sr., the father of American landscape design, to preserve and enhance these features for the greater community good. Olmsted responded with a vision for something even bigger: a series of legacy parks interconnected by tree-lined parkways, one of only four such Olmsted systems in the world, which played a significant role in guiding the city's urban footprint. Today, Louisville celebrates its special historic park system, which now consists of its three flagship parks of Cherokee, Iroquois, and Shawnee; fourteen local neighborhood parks; and six green parkways spanning nearly 15 miles.

Over the last century, however, development has leapfrogged, and transportation networks have expanded to meet the needs of a growing population, often losing sight of Louisville's original, identity-defining Olmstedian vision. While the original design intent for the flagship parks has been well-preserved, the evolution of Louisville's parkways has not consistently maintained the Olmsted vision in implementation and practice. Olmsted intended the canopied Algonquin, Cherokee, Eastern, Northwestern, Southern, and Southwestern Parkways to provide pleasurable driving experiences for people traveling throughout the city, while offering safe, separated spaces for active recreation and celebrating the community's beautiful natural assets that make Louisville special. As the parkways matured to serve the needs of modern transportation, their visual identities steadily changed as well. The crosstown connectivity of

Today, Louisville celebrates its special historic park system, which now consists of its three flagship parks of Cherokee, Iroquois, and Shawnee; 14 local neighborhood parks; and six green parkways spanning nearly 15 miles.

the parkways led to increased vehicular traffic levels and to major transformations of the parkways' right-of-way, adding car-carrying capacity often at the expense of trees and planted medians. While functional roadway improvements to the parkways were necessary to provide service to a rapidly growing number of motorists, implementation at times lost sight of the original parkway concept so distinctive to Louisville.

At the turn of the 21st century, the Louisville/Jefferson County Metro Government embarked on a series of initiatives to restore the legacy of its Olmstedian landmarks, including the *Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management* prepared in 1994, *the Parks and Open Space Master Plan* prepared in 1995, *Louisville Olmsted Parkways Design Standards* prepared in 2002, the *Olmsted Parkway Shared-Use Pathway System Master Plan* prepared in 2009 and the Move Louisville 2035 Transportation Plan prepared in 2016. This groundwork has laid a foundation for Louisville to revive its Olmsted parkways in a way that is reflective of Olmsted's original vision and responsive to the current community's needs and desires.

In 2011, Louisville Mayor Greg Fischer began a robust visioning conversation with the people of Louisville with, in his words, a desire to "move our city forward while preserving what makes Louisville, Louisville." These efforts culminated with the *Vision Louisville* plan in 2013 which, among its holistic suite of vision themes for the city, promotes celebrating and cultivating Louisville's natural resources and parks. Investments in Louisville's park system and parkways, such as Eastern Parkway, will directly support this 2040 vision by (1) improving connectivity through the construction of network linkages and improved bike and pedestrian facilities; (2) promoting community health by providing facilities for active transportation and active recreation; and (3) supporting a positive community quality of life through the building of complete streets and the beautification of transportation gateways and corridors.

Move Louisville, the City's twenty-year multimodal plan published in 2016, was the first initiative borne out of *Vision Louisville* planning efforts. This long-range transportation plan takes a comprehensive approach to the city's transportation system. The plan sets forth two primary transportation priorities: (1) fixing and maintaining Louisville's existing transportation infrastructure, and (2) reducing the number of miles that Louisvillians drive by providing and improving mobility options. To achieve this vision, projects that make complete street design principles the norm, improve east-west transportation connectivity, and expand Louisville's bicycle and pedestrian network by retrofitting existing facilities have been prioritized. The rehabilitation of Louisville's Olmsted parkways, including Eastern Parkway, directly supports the successful realization of these priority goals set forth by the community in the *Move Louisville* plan.

To implement the vision of these earlier plans and accomplish multiple planning and transportation goals set by the community moving forward, Louisville Metro has initiated efforts to rehabilitate Eastern Parkway by reviving its original Olmstedian design intent, preserving its heritage trees and enhancing its functional connectivity for multiple modes of transportation and recreation. The 2009 Olmsted Parkway Shared-Use Pathway System Master Plan provided recommendations for improving pedestrian and bicycle access to Louisville's parkways, and from that plan it was determined that an additional study should be conducted before recommending specific improvements to the Eastern Parkway corridor. Additionally, previous Olmsted parkways bicycle and pedestrian improvement projects have included broad community engagement as a central focus of planning to discuss shared-use path alignment, lane reconfiguration, and additional complete streets facilities. As such, Eastern Parkway required further comprehensive study before moving forward with rehabilitation efforts, including thorough public participation engaging individual property owners, user groups, and the general public. This plan reflects that body of work. Building on planning activity over the last 25 years and continuing the ongoing conversation with the community, the Eastern Parkway Transportation Study has collected extensive feedback from Louisville residents, analyzed existing environmental, infrastructural, and cultural conditions, and conducted thorough road safety audits and traffic analyses.

This plan provides recommendations for the design of a rehabilitated and restored Eastern Parkway that serves modern needs of transportation while preserving its tree-canopied, Olmstedian heritage.

This planning report includes the following:

CHAPTER 01

Planning History to Date: Building on Historic Foundations

To begin developing planning recommendations for Eastern Parkway, this report first captures the guidance of the 1994 Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management; the 1995 Parks and Open Space Master Plan; the 1999 Feasibility Study to Re-Curb Eastern Parkway; the 2002 Louisville Olmsted Parkways Design Standards; the 2009 Olmsted Parkway Shared-Use Pathway System Master Plan ; and the 2016 Move Louisville 2035 Transportation Plan. These prior planning efforts reflect a wide array of historic research and many in-depth conversations with members of the community. The key findings and takeaways from those plans have served as the foundation for this iteration of planning development for Eastern Parkway.

CHAPTER 02

Summary of Project Efforts: Our Process

This project required extensive amounts of historic and planning research, technical analysis, and engagement with the broader community. The project evaluated current and future transportation conditions by collecting data, analyzing results, and modeling multiple alternative configurations for Eastern Parkway that meet the safety and usage needs for multiple transportation modes. Environmental analysis efforts completed a series of surveys and inventories to identify opportunities to preserve Eastern Parkway's heritage tree canopy while providing minimal impact mitigation strategies for aging or unhealthy flora. This section of the report will walk through the methodologies of each of these project components step-by-step.

CHAPTER 03

Setting the Stage: What We Saw and What We Observed

The results of the research and analysis efforts surrounding Eastern Parkway are summarized by what was seen along the entire corridor by both project team members and stakeholders, by review of the historic context for the corridor, and by the collection and analysis of new data. Project observations, however, also revealed the high degree of variation in transportation usage and surrounding land use along Eastern Parkway as it extends east-to-west. As such, this project explores the existing conditions unique to seven distinctive segments along Eastern Parkway.

CHAPTER 04

Developing Understanding from Knowledge: The Vision for Eastern Parkway as Communicated by the Community

At the heart of local planning is public participation. Without it, the project vision and the completed project itself would not truly reflect community needs and desires. The project planning efforts for Eastern Parkway have included three stakeholder and steering committee meetings, two public workshops, and a variety of online engagement opportunities to keep the channels of communication open between the public and the planning team throughout the project process. The feedback heard through all these engagement efforts provided clear direction for the future vision of Eastern Parkway.

CHAPTER 05

Putting It All Together: Comprehensive Recommendations for the Entire Eastern Parkway Corridor

The culmination of the project planning efforts has resulted in a series of recommendations to inform the design of a rehabilitated Eastern Parkway that will provide for a future transportation corridor that balances the safety and usage needs of multiple transportation modes, addresses drainage infrastructure issues, preserves the existing tree canopy to its greatest extent, and reflects the historic heritage of the parkway.

CHAPTER 06

Planning Report Summary: This Is Just the Beginning

A comprehensive summary of the historic research, project process and methodology, corridor context and existing conditions, community engagement feedback, and recommendations are included in the final chapter. An implementation plan with next steps and construction estimates is included to provide direction for how to turn this plan for restoring Eastern Parkway to its Olmstedian heritage into action.

01

CHAPTER 01

Planning History to Date

Building on Historic Foundations

"Parks would enable all citizens to pursue commerce less constantly, to acquire habits of healthy living and live happily from day to day."

—Frederick Law Olmsted, Sr.

The Olmsted parkways of Louisville have been a part of the city's fabric since the advent of the 20th century. These legacy landmark corridors are essential connectors that link Louisville residents with the city's iconic Olmsted parks. Recognizing the importance of the history of Eastern Parkway and the research, analysis, and planning that has been done thus far with the community to support its revitalization, this plan first contemplates Eastern Parkway's storied history and the extensive efforts that have been conducted to support the realization of its restored Olmstedian vision.

Corridor History and Context: Olmsted Intent and Historic References

With such a storied history, it is important to acknowledge the genesis and evolution of the Olmsted parkways, and Eastern Parkway itself, from its nascency to its current state. Eastern Parkway is unique among its peer parkways in that it was the last of the Olmsted parkways to be designed and developed and was influenced by a variety of factors. In order to rehabilitate Eastern Parkway with integrity, preserving its original vision while preparing responses to emergent transportation trends, the first step of this planning process has been to review the development of this corridor.

Connection of Public Recreational Grounds via 'Park Ways'

Frederick Law Olmsted Sr. and Calvert Vaux became partners in the planning for Central Park in New York City after submitting the winning design for the Central Park competition in 1857. This project became well known worldwide and emerged as the model for city park design in the late 1800s, catapulting Olmsted and Vaux to center stage for the public park movement in America. The goal of this movement was to make cities more livable and conserve the natural environment.

The greatest achievement for Olmsted and Vaux, however, was first envisioned while working on the park system in the city of Buffalo, New York in the 1860s and 1870s (Figure 1.1). Together they developed the concept of a park system linked by 'Park Ways' instead of freestanding parks as was common practice for the time (Figure 1.2).

The complex system in Buffalo of grand parks and public spaces, connected by 200-ft-wide green parkways with major circles at the parkway intersections, was reminiscent of boulevards seen in Paris, France. This park-and-parkway concept was simplified when Frederick Law Olmsted, Sr. was hired by Louisville's prestigious, all-male, 24-member social and literary circle, the Salmagundi Club. With an intention to preserve green space for the future for both its healthful and economic benefits, Olmsted's firm was hired to guide and design the park system in Louisville, Kentucky, which has one of only four such completed systems in the world. Together with the Olmsted firm, Louisville leaders in the Salmagundi Club envisioned linking different parts of the city with ribbons of green, breaking down environmental equity issues, and providing respite and access to parks and parklike settings for people living in urban settings.

When Olmsted was hired in 1891, plans had already been set in motion for the formation of Louisville's park system by the Board of Park Commissioners according to 'The Origins of Louisville's Olmsted Parks and Parkways' by Samuel W. Thomas. Olmsted was hired to guide and design that vision beginning with the parks and later the parkways. However, due to failing health in 1895, Olmsted retired, leaving his sons Frederick Law Jr. and John Charles with the task. The Olmsted Brothers, as the firm was renamed, were most involved with the projects in Louisville with John Charles as the lead contact. Eastern Parkway was envisioned to connect Eastern Park - later renamed Cherokee Park - westward to the House of Refuge (now the University of Louisville

Frederick Law Olmsted National Historic Plans

Figure 1.1 *'The Park & Approaches' Buffalo, NY - Olmsted Vaux & Co - 1865-1872. Courtesy the National Park Service, Frederick Law Olmsted National Historic Site.*

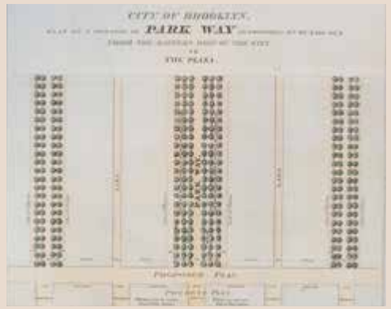


Figure 1.2 *"Plan of a Portion of Park Way as Proposed to be laid out from the Eastern Part of the City to The Plaza" Olmsted, Vaux & Co. From Brooklyn Park Commission, Eight Annual Report, 1868. Courtesy of the National Park Service, Frederick Law Olmsted National Historic Site, Image Courtesy of Paul Rocheleau as obtained from Frederick Law Olmsted: Plans and Views of Public Parks edited by Charles E. Beveridge, Lauren Meier, and Irene Mills, p. 115.*

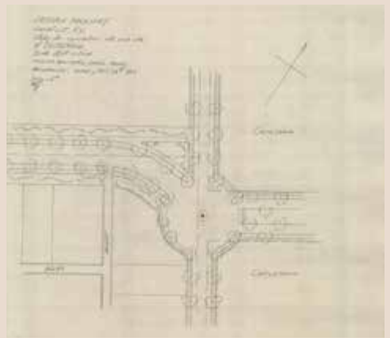


Figure 1.3 *"Eastern Parkway Louisville Ky: Study for connection with west side of Castlewood", Olmsted Brothers, 1907. Courtesy of the National Park Service, Frederick Law Olmsted National Historic Site.*

– Belknap Campus) and eventually to Southern Parkway and Iroquois Park. Due to a lack of funds, the Olmsted Brothers firm was never commissioned to develop detailed plans for Eastern Parkway. In fact, the actual route and rights-of-way for Eastern Parkway were prepared by local civil engineers. The Olmsted Brothers did prepare a few sketch studies, an example of which is shown in Figure 1.3 with the intersection of Eastern Parkway at Castlewood 1906. Later in 1912, they were requested to provide plans for a bridge at Beargrass Creek. Most of the information for Eastern Parkway can be found in the written correspondence between the Olmsted Brothers firm and the Board of Park Commissioners. Design information such as tree species, spacing, sidewalks and curbing as well as insight and opinions about the park system were found in multiple letters that are preserved in the Library of Congress.

Separation of Uses

As parkways were further developed by the Olmsted Brothers firm in locations across the U.S., different modes of transportation were rising in popularity. Whether travelling on foot or with assistance by horse, bicycle, carriage, and eventually by car, the Olmsted Brothers firm understood the value in providing separation between modes. Separation provides each type of mode its own dedicated space to safely enjoy the parkway, with improved predictability where modes intersect and converge. Double rows of canopy trees became an iconic method used by the Olmsted Brothers firm to provide this separation.

For precedent plans indicating the Olmsted methods of distinction between use areas, early designs for Buffalo, New York and Southern Parkway in Louisville are excellent examples (Figures 1.4-1.6). An early photo of a bicycle path on Lincoln Parkway in Buffalo shows the iconic line of trees on each side of the bicycle path separating the path from the main parkway travel lane. The South Park sketch for the Buffalo park system shows a walking path under the shade of a row of trees, a main lane of travel with people on horseback, and a lane for carriages separated by a double row of trees. The importance of the double row of canopy trees is evident from these two examples in figure 1.4 and 1.5.

On Southern Parkway in Louisville, an 1897 sketch by the Olmsted Brothers firm notes the separation of modes, illustrating space for horseback (bridle path), bicycle, a wide promenade in the center for leisurely travel, and the 'speedway' for through traffic. The regularly spaced 'dots' on the sketch indicate locations for new canopy tree plantings.

Though the existing site plans drawn by the firm for Eastern Parkway are limited, it is known that the Olmsted Brothers firm had similar goals for Eastern Parkway as indicated in letters from the firm to the Board of Park Commissioners between 1907 and 1935:

"I propose to have each side of the 40 ft drive a 10 ft [planting] strip rising a few inches and with row of trees in center, then a 6 ft cement walk, then a 2 ft level grass strip – then the terrace slope ramping in steepness according to height. I propose the trees be set at lot lines, I think usually 35 ft apart. If lots vary too much, we can adjust tree spacing from 30 ft to 40 ft apart... Where there are alleys the walks need not cross the tree strip but must not be blocked by tree or shrub."

—excerpt from a November 5, 1909 letter to Mr. Carl R. Parker from John Charles Olmsted, as obtained from the Library of Congress

Conflicts arose between different modes of transportation in the parks and parkways in the early 1900s with the introduction of the automobile to the City of Louisville. As such, the Board of Park Commissioners required "all owners of automobiles of any kind to obtain from this office a permit upon which should be presented the rules of the Park Board governing the use of automobiles in the parks and on the parkways," according to The Origins of Louisville's Olmsted Parks and Parkways by Samuel W. Thomas, p.206. These rules directed certain speeds and how to appropriately interact with horse users since this was a new mode of transport.

A review of the Louisville Park System by the Olmsted Brothers in 1906 gave a positive light to what had been accomplished to that date and discussed the importance of the parkways as connections within the entire system of parks:

"Reviewing the condition of the parks at Louisville and the progress which has been made since the termination of our contract for furnishing plans and advice (January 1898) we are much struck by the remarkable advances which have been accomplished with very moderate financial resources...

The City of Louisville is indeed fortunate that its parks can be truthfully designated a system of parks. System implies comprehensive underlying principles. It means that the selection of parks has been wisely done and is not merely a haphazard list of parks such as might have resulted from advertising for offers of land and selecting the half dozen cheapest tracts offered...

Pleasure driving connections between the principal parks have been planned and important sections of the system of parkways are completed or are under construction. With the cordial co-operation of land owners, it need not be long before the other essential parkways shall have been secured."

—excerpt from a March 28, 1906 letter to John B. Castleman (Board of Park Commissioners) from the Olmsted Brothers, taken from 'Olmsted Documentary Resource – Louisville's Park Legacy' compiled by Arleyn Levee and Charles Beveridge, 1992.

Frederick Law Olmsted National Historic Plans

Figure 1.4 *"Cycle Path, Buffalo Park" Lincoln Parkway, Buffalo, NY - Image Courtesy of The Buffalo & Erie County Public Library as obtained from Frederick Law Olmsted: Plans and Views of Public Parks edited by Charles E. Beveridge, Lauren Meier, and Irene Mills, p. 138.*

Figure 1.5 *South Park Sketch, Buffalo NY, circa 1887-1895. Courtesy the National Park Service, Frederick Law Olmsted National Historic Site.*

Figure 1.6 *Sketch at Ruff Memorial Fountain on Grand Boulevard (Southern Parkway) Louisville, KY, 1897 - F.L. & J.C. Olmsted. Courtesy the National Park Service, Frederick Law Olmsted National Historic Site.*

Figure 1.7 *Photograph of Southern Parkway looking toward Iroquois Park circa 1921. Image Courtesy of University of Louisville Archives.*

Figure 1.8 *Photograph of Eastern Parkway at Cherokee Park post tornado 1974.*

Scenic Character and Experience

The aforementioned double row of canopy trees had another effect on the parkways as designed by the Olmsted firm (Figure 1.7). The pleasant user experience created by passing between the rows of trees or strolling in the shade of those trees as they moved along the parkway was a high priority to the Olmsted Brothers firm. In describing the benefits of a Park-Way, Frederick Law Olmsted stated,

"... at no great distance from any point of the town, a pleasure ground will have been provided for, suitable for a short stroll, for a playground for children and an airing ground for invalids, and a route of access to the large common park of the whole city, of such a character that most of the steps on the way to it would be taken in the midst of a scene of sylvan beauty, and with the sounds and sights of the ordinary town business, if not wholly shut out, removed to some distance and placed in some obscurity. The way itself would thus be more park-like than town-like."

—Frederick Law Olmsted [signed Olmsted, Vaux & Co.] to William Dorsheimer, October 1, 1868, in Buffalo, N. Y., Park Commission, Preliminary Report Respecting a Public Park in Buffalo, and a Copy of the Act of the Legislature Authorizing Its Establishment. (Buffalo, N. Y. 1869), pp. 25-26

The scenic character set by the planting of a double row of trees on either side of the Olmsted parkways was popular for leisurely drives and therefore began to show economic benefits to the adjacent property owners as well. A good early example of the benefit of a treed roadway was that of nearby Cherokee Road, known as New Broadway in the late 1800s and early 1900s, and these benefits were acknowledged by the press:

"Many have noticed the remarkable suddenness with which the New Broadway road leading to Eastern (Cherokee) Park has sprung into favor with those of the city who are lucky enough to own carriages..."

—Courier-Journal article, June 1893, published in The Origins of Louisville's Olmsted Parks and Parkways by Samuel W. Thomas, p. 205.

By the mid-1930s, Eastern Parkway was firmly established as a linear park option for the city, and leisurely Parkway users were common. Many changes had been made from the original Olmsted intent, and on visiting the city, James Dawson, a partner in the Olmsted Brothers firm, reported on some suggested improvements to Eastern Parkway:

"At present there are only small stretches of side walks along this Parkway which permit people to walk parallel to road. The people now have to walk over the grass which has worn to such an extent that several dirt trails have been made which cannot help be muddy in wet weather and create an unkempt and neglected appearance.

We suggest therefore, that sidewalks be built the entire length of this parkway on each side."

—excerpt from 11/7/1934 letter to Joseph D. Scholtz from James F. Dawson, taken from 'Olmsted Documentary Resource – Louisville's Park Legacy' compiled by Arleyn Levee and Charles Beveridge, 1992.

Eastern Parkway was finally completed up to the House of Refuge property in 1913, after a long battle with adjacent landowners and insufficient funding, as reported below:

"Autoists and others who love beautiful driveways will have their opportunity today to inspect the gently rolling Eastern Parkway which traverses a beautiful country to reach Cherokee Park",

—according to the Louisville Herald on September 7, 1913, as obtained from The Origins of Louisville's Olmsted Parks and Parkways by Samuel W. Thomas p. 210.

The beauty of Eastern Parkway remained mostly intact even through the road improvements constructed over the years, such as the addition of curbing and sidewalks as well as installation and updates of sewer and drain lines. Sadly, on April 3, 1974, a tornado struck the City of Louisville nearly decimating the entire tree canopy within Cherokee Park and portions of Eastern Parkway (Figure 1.8). It is thought that only a handful of the original trees are present today along Eastern Parkway. Many efforts have been made over the years to preserve the integrity and original design intent as envisioned by the Olmsted Brothers and Board of Park Commissioners. Eastern Parkway's historic significance as part of the public park movement in America, and part of Frederick Law Olmsted Sr.'s crowning achievement in park and parkway system design, was recognized by its listing on the National Register of Historic Places in 1982.

Prior Planning Efforts Supporting the Preservation of Louisville's Olmsted Parkways

The City of Louisville has long recognized the legacy Frederick Law Olmsted left the city with its chain of landmark parks and elegant greenways. Over the past 25 years, leadership across the City has sponsored planning efforts to protect, preserve, revitalize, and enhance the Olmsted parks and parkways that make Louisville special. Recognizing this body of work and the continued planning work ongoing today, a review of these prior plans has been conducted to synthesize their observations, learnings, and recommendations in order to guide planning efforts today. The five studies are the cornerstone for current and future planning and design efforts for the Olmsted parkways system.

1. Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management (1994)

The Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management (1994) was commissioned by the Louisville Olmsted Parks Conservancy, Inc., in conjunction with the Louisville and Jefferson County Parks Department. This plan identified primary needs for preserving the Olmsted parkways, guiding principles for an interdisciplinary approach for meeting those needs, and specific recommendations to begin renewal efforts for the parkways. The vision set forth by the Master Plan has served as the primary point of guidance for all future planning efforts, fulfilling its recommendations for action and implementation. The broad vision set forth by this plan will continue to promote the achievement of the Master Plan's established goals.

2. Parks and Open Space Master Plan (1995)

The Parks and Open Space Master Plan (1995) was developed primarily by the Livability Committee for Cornerstone 2020, in response to the goals as set forth by the Cornerstone 2020 comprehensive plan. The purpose of the *Parks and Open Space Master Plan* was to develop an overall vision and identify potential implementation strategies for a comprehensive parks and open space system to serve the needs of current and future residents of Louisville and Jefferson County. The plan set forth multiple guiding principles for park and open space development, including the Olmsted parkway system, and established multiple goals, objectives, and policies to realize this vision.

3. Feasibility Study to Re-Curb Eastern Parkway (1999)

In 1999, the City of Louisville's Department of Public Works and Division of Architecture and Engineering commissioned a feasibility study to evaluate the re-curbing of Eastern Parkway to alleviate known flooding and stormwater management issues. The study reviewed proper management of Eastern Parkway's existing tree canopy, evaluated maintenance of traffic considerations, reviewed Eastern Parkway's curb and gutter and sanitary sewer infrastructure history, and analyzed six design alternatives for curb and gutter rehabilitation.

4. Louisville Olmsted Parkways Design Standards (2005)

In 2005, the Louisville Olmsted Parks Conservancy commissioned development of the *Louisville Olmsted Parkways Design Standards* to standardize the infrastructure and aesthetics compatible with the long-term vision set forth for the parkways by the 1994 *Olmsted Park and Parkways Master Plan* and 1995 *Park and Open Space Master Plan*. Now codified, the Olmsted Parkway Overlay District is subject to the common standards, parkway-specific standards, and character district standards set forth by the ordinance. The standards set forth guidelines for the following: landscaping; access and parking; roadways, curbs, and retaining walls; sidewalks, multi-use paths and transit; lighting; street furnishings and public art; signage; utilities; and historic preservation. The recommendations included within this plan reflect the vision as communicated by the community, both past and present, and are compatible and compliant with these design standards.

5. Olmsted Shared-Use Path Master Plan (2009)

The 2009 *Olmsted Parkways Shared Use Pathway System Master Plan* was prepared in partnership by Louisville Metro Parks, Louisville Metro Government, a dedicated Community Advisory Group (CAG), and the Olmsted Parks Conservancy to address the unique needs of the Olmsted parkways, distinctive from the Olmsted parks themselves, in response to recommendations set forth from the 1995 *Parks and Open Space Master Plan*. The most recent planning effort undertaken regarding the renewal and rehabilitation of the Olmsted parkways, this plan provided specific recommendations and design ideas for each of the parkways within the Olmsted system, including Eastern Parkway. Recognizing the character districts within each of the parkways documented by the 2005 *Louisville Olmsted Parkways Design Standards*, the 2009 plan distinguished seven zones along Eastern Parkway that have served as the framework for the development of this plan today. Recommended renewal strategies, inclusive of policy, programming, and design with high-level and preliminary alternative typical sections, were developed by the 2009 plan, acknowledging the need for additional community input and further engineering analysis. This plan fulfills the recommended implementation plan as set forth by the 2009 *Olmsted Parkways Shared Use Pathway System Master Plan*, conducting the extensive community engagement efforts and engineering analysis required to set forth detailed design recommendations and engineering solutions to realize the vision for rehabilitation for Eastern Parkway.

6. Louisville Urban Tree Canopy Assessment (2015)

In 2015, Louisville Metro Government and Metro Council, the Louisville/Jefferson County Metropolitan Sewer District and MSD Board, The Louisville Tree Fund, and Louisville Gas & Electric partnered together to sponsor an Urban Tree Canopy Assessment. Recognizing the importance of the tree canopy for Eastern Parkway and its continued legacy as an Olmsted parkway, the planning team has carefully reviewed the results of this study to ensure that the design recommendations set forth in the current plan reflect common values for preservation and expansion of the tree canopy.

7. Move Louisville 2035 Transportation Plan (2016)

In 2016, Louisville Metro Government and the Transit Authority of River City (TARC) collaborated with local and regional agencies, communities, and transportation advocacy groups as well as residents and businesses to develop the Move Louisville plan. Recognizing the importance of the Olmsted Parkways and building upon the recommendations laid out in the 2009 Olmsted Shared-Use Path Master Plan, the Move Louisville plan embraces smart, safe mobility and a complete streets approach to adapting Louisville streets for alternative modes of transportation.

Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management (1994)

In June of 1994, the Louisville Olmsted Parks Conservancy, Inc.—in conjunction with the Louisville and Jefferson County Parks Department—presented the *Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management* to the City of Louisville and Mayor Jerry Abramson. The plan first celebrated the artistry and gift of the Olmsted parkways, recognizing how they have helped to define the formation and growth of Louisville, how they have helped to preserve Louisville's natural resources, and how they have improved not only property values but Louisvillians' quality of life. Its authors, however, acknowledged how the parkways had fallen into disrepair since World War II, following a pattern of overuse, underinvestment, natural disaster, and inconsistent approaches to addressing these issues. The Master Plan was the first deliverable from the newly formed Olmsted Parks Conservancy, and it has created the foundational framework for the future of the Olmsted park and parkway system.

Development of the Master Plan resulted in the identification of **five primary needs** as communicated by the public:

1. Provide serviceable infrastructure for active and passive recreational areas;
2. Restore and sustain plant and animal communities;
3. Reconcile conflicts among users;
4. Recapture the original vision for each park; and
5. Develop programs and funding partnerships, upgrade Parks Department resources, and establish review policies to assure that proposed projects are fitting and maintainable.

The Master Plan then followed **five principles** to guide an interdisciplinary approach to meeting the five above needs:

1. The parks resources are based on natural processes which must be preserved and enhanced.
2. Renewal efforts must respect Olmsted's design values and plans.
3. The parks and parkways are a unique and crucial component of the city's fabric.
4. People of all ages and abilities should be able to enjoy the parks.
5. Management is the key to improvement, requiring a skilled and equipped work force, volunteer coordination, and stable funding.

While the Master Plan discussed planning for Shawnee, Iroquois, and Cherokee Parks, it also laid a foundation for renewing the parkways that are the linking feature that defines Louisville's Olmsted system. The Master Plan calls for linking parkways to one another and downtown by knitting together connecting city streets; adapting the parkways for multiple uses by providing recreational quality for pedestrians, joggers, and bicyclists; establishing a formal review process including various local parties; educating abutting property owners about the historic importance of the parkways and the responsibilities shared for their preservation; providing continual maintenance of the thousands of trees; and taking a consistent approach to signage, lighting, sidewalks and other common elements.

Chapter Six of the plan provides specific recommendations and guidance for the Olmsted parkways. The plan recommends that initial steps toward the renewal of the parkways should include a tree inventory, an analysis of missing linkages between the parks, parkways, and city streets, clarification of right-of-way ownership boundaries, and enhancement of wayfinding and neighborhood identification signage. Renewal strategies would then generally include the improvement of parkway infrastructure with repairs, upgrading of lighting and signage, undergrounding utilities, and removal of private parking on the right-of-way; the provision of separated multimodal paths; the renewal of parkway trees and planting of new trees to fill gaps; the screening of commercial uses along parkways with landscaping; and the linkage of parkways and city streets by extending parkway character to streets like Broadway.

The plan underscores the importance of viewing the parkways as a system that is valued above the desire to move through the city with greater speed and efficiency. Specifically for Eastern Parkway, the plan recommends the construction of separate, continuous, 8-ft-wide, multi-use paths on both sides of the central drive, which ideally would be a standard 40-ft width. Eastern Parkway generally features a 40-ft-wide central drive, but some intersections—such as that with Poplar Level—have nearly doubled this width and have lost the characteristic parkway tree canopy as well as bicycle and pedestrian connections. The plan provided three alternative options for restoring commercially-oriented segments of Eastern Parkway to their historic parkway character, the first of which returns extra-wide sections to the 40-ft ideal standard, the second of which separates drives and uses, and the third of which retains multiple drive lines but installs parkway trees and a separated multi-use path.

Development of the plan also included the facilitation of interviews and public forums in 1991 and 1992. These conversations revealed that the public desired a continuous parkway system of interconnected bikeways and walkways and that heavy trucks detracted from the pleasure and safety of using the parkways. The public recommended de-emphasizing the use of the parkways as arterials for heavy vehicles, to restore residential character and increase safety for recreation. Citizens were also concerned with the amount of illegal parking on the right-of-way, from an aesthetic standpoint, an environmental preservation standpoint, and from a safety standpoint, as parked vehicles detract from visibility for users entering and exiting the parkway. Additionally, the public wanted to see gaps in the tree canopy addressed and filled.

The public suggested the following projects for parkway renewal:

- Develop interconnections among the parkways to create a continuous, connected system
- Maintain integrity
- Restore trees and add botanical labels identifying tree species
- Develop a nursery operation to provide parkway trees; plant large trees, not saplings
- Trim trees and take deadwood away
- Connect parkways for bicycles, with separate bicycle trails and racks
- Add sidewalks where they are missing
- Improve maintenance of interstate highway interchanges
- Collect and remove fall leaves
- Install “no parking” signs so that restrictions can be enforced
- Add flowers

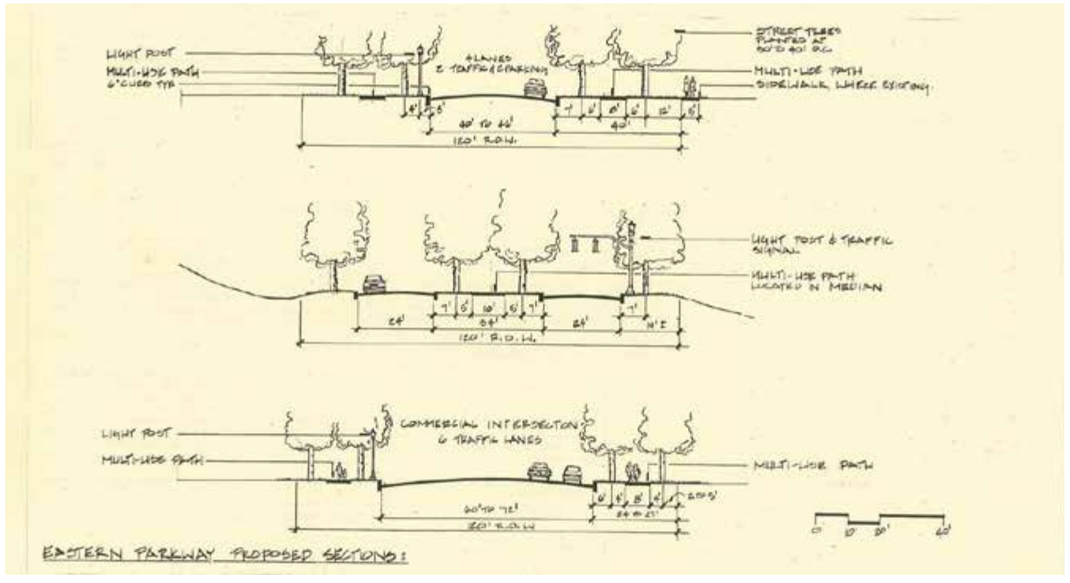


Figure 1.9 *Eastern Parkway Proposed Sections, Master Plan for Louisville’s Olmsted Parks and Parkways: A Guide to Renewal and Management (1994)*

2 Parks and Open Space Master Plan (1995)

In 1995, the Livability Committee for *Cornerstone 2020,* along with many partners, developed the *Parks and Open Space Master Plan*, which provides additional detail for the goals set forth in the *Cornerstone 2020* comprehensive plan. This was a joint effort with Louisville/Jefferson County Parks Department, Jefferson County, the Parks and Open Space Executive Committee, the Parks Department Advisory Committee, the Cornerstone 2020 Policy Committee, the Cornerstone 2020 Task Force, the Louisville Area Chamber of Commerce, the Greater Louisville Economic Development Partnership, the Jefferson County Department of Planning and Environmental Management, and the Louisville and Jefferson County Planning Commission. The plan recognizes the Olmsted parkways as major historic resources that were intended to link Louisville’s three major parks and provide tree-lined pleasure travel through the city, though they currently serve mostly as conduits for vehicular traffic and this vision was never fully realized.

The plan set forth multiple guiding principles for park and open space development, one of which prioritized the development of an interconnected, multifunctional system of parks and open spaces linked by greenway and parkway corridors to protect important natural, cultural, and visual resources while providing appropriate opportunities for recreation. The plan also held that the parks and open space system, including the parkways, should help to define future community form by functioning as an environmental framework within which urban growth occurs as discrete neighborhoods rather than undifferentiated suburban development. The plan further emphasized that the design of public parks, open space, and parkways should reflect the natural and cultural character of the site and its location within the Louisville region. These guiding principles are still relevant today for the renewal of the Olmsted parkways, such as Eastern. To realize this vision, the plan established four goals with their respective objectives and policies: (1) Recreation, (2) Natural Resources, (3) Open Space for Aesthetic, Cultural, & Educational Purposes, (4) Public Health & Safety, and (5) Design & Management.

Goal 1: Recreation promotes a system of well-maintained parks and recreation facilities which meets the needs of the residents of Louisville and Jefferson County and is most pertinent to the rehabilitation of Louisville’s parkways. To achieve this goal, Objective 1.3 sets forth the establishment of a comprehensive, coordinated bicycle and pedestrian system connecting parks, greenways, and recreational facilities by implementing the following policies:

1.3.1 – The Louisville/Jefferson County Parks Department (L/JCPD) will coordinate the development of pedestrian and bicycle paths within public parks with the Pedestrian and Bicycle Plan prepared by the Division of Planning and Development Services (DPDS) and the Greenways Strategy being coordinated by the Metropolitan Sewer District (MSD).

1.3.2 – The L/JCPD will coordinate with the City and County Public Works Departments, MSD, and other entities to create a loop trail around the perimeter of Jefferson County.

1.3.3 – The L/JCPD and other agencies as appropriate will coordinate with adjacent counties to establish inter-county trail connections

1.3.4 – The L/JCPD will coordinate with MSD to ensure that public access considerations are addressed in all greenway easement negotiations.

1.3.5 – DPDS will prepare and implement urban design guidelines identifying open space standards for issues such as site planning, lot configuration and setbacks, street design cross-sections, and public access connections between development areas and the greenway system.

In addition to Objective 1.3, other objectives for Goal 1 (Recreation) include (1.1) the provision of a network of parks of varying sizes and functions equitably distributed throughout Jefferson County, (1.2) the ensuring that people of all interests, age groups, and abilities have ready access to the recreational, cultural, and leisure facilities and programs of their choice, (1.4) to coordination of the provision of recreational facilities with other providers to help meet the recreational needs of the community, to optimize efficiency, and to avoid duplication of service, and (1.5) the increased public awareness and utilization of available recreational resources.

Goal 2: Natural Resources promotes a network of open spaces and greenway corridors which protects significant natural resources. Objectives supporting this goal include (2.1) the preservation and restoration of riparian corridors, wetlands, woodlands, and important groundwater recharge areas and (2.2) the preservation and enhancement of significant habitat for wildlife and threatened, endangered and special concern species.

Goal 3: Open Space for Aesthetic, Cultural, & Educational Purposes promotes a parks and open space system which preserves and enhances visual quality, protects historic and archaeological resources, provides opportunities for education, and accommodates production of agricultural and forest resources. Objectives supporting this goal include (3.1) the protection and provision of public access to scenic resources, (3.2) the preservation and restoration of cultural resources as a part of the parks and open space system, (3.3) the promotion of interpretive and educational programs and facilities within the parks and open space system to foster an understanding of natural and cultural resources and processes, and (3.4) the promotion of long-term preservation and economic viability of active farmland, prime agricultural soils, and productive woodland.

Goal 4: Public Health & Safety promotes an open space network which incorporates land needed to protect public health and safety. Objectives supporting this goal include (4.1) the management of floodplain areas and areas needed for stormwater management to minimize water and flood damage and preserve open space and (4.2) the protection of steep slope areas to minimize property damage and public costs resulting from inappropriate development.

Goal 5: Design & Management promotes a parks and open space system which is designed and managed to fulfill standards of excellence for appearance, durability, and safety, to sustain environmental resources and processes, and to facilitate affordable maintenance. Objectives supporting this goal include (5.1) the encouragement of appropriate public involvement in park planning, design, and management, (5.2) the development of an ongoing, proactive design and management program for the parks and open space system, (5.3) the design and management of parks to sustain environmental processes, to conserve energy, and to reduce waste, and (5.4) the integration of measures to promote safety and security in park design and management operations.

After enumerating and describing the five goals above, the 1995 Master Plan then recommended a program for acquisition and improvement of open spaces, parks and recreational facilities to be added to the existing parks system by 2020. The plan noted that the concept of an open space system is not one which has previously guided the development of Jefferson County. Olmsted had originally laid out a system consisting of three major parks and connecting parkways which helped define the recreational and aesthetic qualities of parts of the City of Louisville. A primary goal of this plan was to restore this Olmstedian vision and set a clear direction for the development of an integrated and interconnected open space system. The concept of an interconnected system implies that the various components of the parks and open space system would be geographically linked, with one of those types of linkages being Olmsted's parkways. The renewal of Eastern Parkway will support these initiatives and contribute to the creation of an interconnected parks system for Louisville and Jefferson County.

3 Feasibility Study to Re-Curb Eastern Parkway (1999)

In 1999, the City of Louisville commissioned a feasibility study to evaluate alternative designs and determine the costs for re-curbing approximately 2.1 miles of Eastern Parkway (from Crittenden Drive to Bardstown Road). This study acknowledged the importance of tree care and protection, improving existing conditions, and the maintenance of traffic during improvements. Multiple alternative curb and gutter designs were evaluated, and a recommended design was presented at the conclusion of the study.

Tree Care and Protection

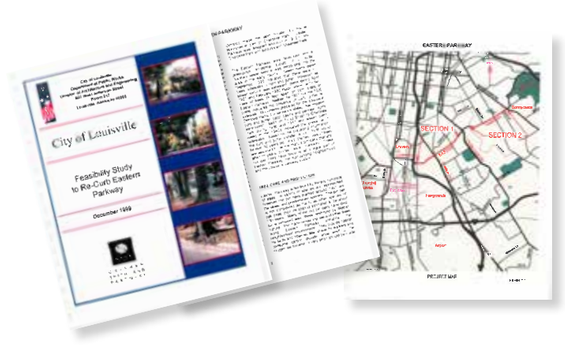
An Olmsted parkway, Eastern Parkway is bordered by hundreds of trees. The study recommended that every effort be made to protect and provide care for these trees during construction of new curb and gutter. Because the risk for tree and root damage is extremely high during construction operations for new curb and gutter, the study recommended that a certified arborist be available during construction efforts. Recommendations for protective measures included the following:

1. All trees near the end of their life cycle or already diseased or injured should be removed to preserve public safety and mitigate liability.
2. A tree thinning and pruning program for those trees immediately adjacent to the curb line should be initiated several months in advance of construction, because thinned and well-pruned trees require a smaller root system to survive.
3. The care and removal of roots, bark, and limbs inadvertently damaged during construction should be supervised by the arborist.
4. In order to prevent root damage from unnecessary soil compaction, the contractor's equipment and operations should be restricted to the street side of the curb. A temporary construction fence should be installed behind the curb for the full length of construction activities. Additionally, the contractor's equipment should only be allowed access to the work zone at street intersections and from the adjacent driving lane.
5. Should it become necessary to replace a tree, root barriers should be installed adjacent to the curb and sidewalk.
6. The installation of precast curb and gutter sections should be considered at locations where damage to a tree's trunk or roots may be caused by adjacent construction operations, and adjoining precast sections should not be allowed.
7. A stump grinder, worked longitudinally, should be used to remove roots that prevent the installation of precast curb sections and curb forms.
8. It is not recommended to either (1) leave the section or sections of existing curb and gutter that fronts the tree and root system or (2) remove and not replace the curb and gutter that fronts the tree and root system.

Existing Conditions

The feasibility study noted at the time of its writing that excepting the improvements at Crittenden Drive and Poplar Level Road, nearly all other curb and gutter sections were in poor to bad condition. The original curb and gutters are believed to be over 60 years old and have generally exceeded their useful life. The majority of existing curb and gutters are 48 in wide, and they have the same elevation at the edge of the driving lane as they have at the back of the curb. There is a 5 ½-in-deep roll curb into a valley-type gutter pan followed by a 5 ½-in-high roll curb back to the existing ground. There is a short section of existing 30-in-wide roll curb and gutter and a short section of superelevated pavement, both located just east of the Poplar Level Road intersection. The study noted that many residences have filled in the deep gutter pan at driveway locations to ease the impact on their cars.

The study also summarized the history of stormwater facilities along Eastern Parkway. Sanitary sewer systems were extended in to the Eastern Parkway suburbs around 1913. Stormwater runoff at that time drained into roadside ditches and swales. As the sewer systems continued to expand in the 1920s, stormwater runoff was drained into the sanitary sewers at isolated



locations, creating a combination storm and sanitary sewer system. Plans for the construction of curb, gutter, and storm sewers could not be located. It can only be assumed that when Eastern Parkway received curb and gutters around 1936, catch basins were installed and connected to the existing sewer system. Residential development continued to expand along Eastern Parkway and with the addition of commercial establishments, paving on streets and parking areas, flows from stormwater runoff have exceeded the combination sewer system's capacity. This study did not include a hydraulic analysis of the existing storm drainage system.

Maintenance of Traffic

The study discussed considerations for the maintenance of traffic during construction operations, including the heavy volumes of traffic carried during morning and afternoon peak hours, volumes during Derby season, the scholastic schedule of the University of Louisville, the expansion of Kentucky Kingdom, and activities facilitated at Freedom Hall and the Fair Grounds. Based on the aforementioned factors, the study recommended the months of June through October as likely construction season. Because of the length of the project, confined work zones, and the volume of incidental work, two or three construction phases could be considered.

Curb and Gutter Drainage Design

The primary reasons for constructing curbs and gutters are for delineation of the edge of pavement and to collect surface water runoff. In order to generate design alternatives, a pavement cross slop of 2% combined with a gutter cross slope of 4% was used, with longitudinal gutter slopes and the contributing drainage areas determined from aerial LOJIC mapping (noting that LOJIC data is not of sufficient accuracy for final design). Additionally, while slotted drainpipes were evaluated as a design option, they pose a risk for flooding due to vegetative debris from Eastern Parkway's adjacent trees. Instead, the use of slotted drain curb box inlets and non-slotted drainpipe should be considered in final design.

Storm Sewer System

The original catch basins and storm sewers are over sixty years old. At the time of the feasibility study, several catch basins appeared to be clogged. Public drainage complaints of clogged catch basins, broken grates, cave-ins, and water running past catch basins were noted. The study recommended that the storm sewer system be cleaned and inspected for needed repairs prior to the re-curbing of Eastern Parkway.

Alternative Curb and Gutter Designs

The use of extruded curb and gutter was given brief consideration in all build alternatives, but eliminated because of the trenching required, impacts to the tree canopy, and the difficulty of achieving continuous grade line placement. Six other alternatives were considered. The study presented advantages and disadvantages for each of the alternatives along with a recommendation. A brief summary for each of these alternatives is included below.

1. **Precast Curb and Gutter** – Because of the volume of peripheral work required at driveways, entrances, intersections, and drainage structures, the use of continuous precast curb and gutter is not recommended. The potential of root damage caused by compacting equipment and the likelihood of curb and gutter misalignment in the future far outweigh any benefits that might be recognized from the speed of installation operations.
2. **Do Nothing** – The Do-Nothing Alternative does not achieve the project goals to replace worn-out curb and gutter and improve safety by removing obstructions in the gutter and prevent the ponding of water. The benefits that would be recognized by implementing the project goals far outweigh any cost savings or public disruption.
3. **Spot Improvements** – Because of the volume of spot improvements required and the continued need for spot improvements, a substantial increase in total project cost will occur. Also, transition sections into and out of spot improvements would be difficult and costly. The Spot Improvement Alternative would create an expensive and ongoing maintenance program to achieve project goals.
4. **Replace the Existing Curb and Gutter with Similar Design** – Replacing the existing gutter pan with similar design would be the most expensive alternative. Because of the increased cost and potential for extensive tree and root damage, this alternative is not recommended.
5. **Header Curb with No Gutter** – This alternative would most likely show an insignificant savings over the recommended alternative. However, the poor delineation, catch basin locations, and poor appearance outweigh any savings that might be recognized. The cost and compaction requirements for any necessary pavement widening would certainly offset any cost savings. Additional consideration of this alternative should be included in final design.
6. **Special Design Concrete Curb and Gutter and Pre-cast Sections (Recommended)** – In this alternative, sections can be formed and poured within the limits of the existing curb and gutter without the need for pavement removal. Compaction requirements would be minimal, and this design would add needed additional width to the inside driving lane for Eastern Parkway. It would also provide adequate delineation and contain existing and proposed catch basins. Because of the catch basin locations, shallow depth of excavation required, and the superior roadway edge delineation, this alternative is recommended.

Construction Sections and Phasing

The final section of the feasibility study included cost estimates based on the implementation of the recommended alternative, Alternative 6: Special Design Concrete Curb and Gutter and Pre-cast Sections. The study included a recommended construction phasing schedule as well.

4 Louisville Olmsted Parkways Design Standards (2005)

In 2005, the Louisville Olmsted Parks Conservancy commissioned the development of design standards for the Olmsted Parkway system, consisting of Northwestern, Southwestern, Algonquin, Southern, Eastern, and Cherokee parkways which link Iroquois, Shawnee, and Cherokee parks. In collaboration with a parkway steering committee, three products were delivered from these efforts: an Existing Conditions & Recommendations Report, the Louisville Olmsted Parkway Overlay District Ordinance, and the Parkway Construction Standards Manual. The Existing Conditions & Recommendations Report consists of the following sections: Historical Perspective, Existing Physical Characteristics, Administrative Oversight, and Existing Design Standards. Character Districts, areas distinguished by unique design features or land use patterns, were also identified within each parkway. The report also documents the current status of past recommendations for the parkways put forward in the 1994 Olmsted Park and Parkways Master Plan.

The report first discussed the history of Eastern Parkway (constructed from 1895-1912), which was intended as a broad, curving corridor from 3rd Street to Cherokee Park. Original plans showed the parkway intersecting the Cherokee Park at Willow Street whereas now it runs along the north side of Cherokee Park, and the plans called for the planting of dense shrubbery which was not planted. Rows of trees were planted, however, consistent with the other parkways, and walks were constructed along the parkway in the 1930s.

Physical characteristics for each of the parkways were also captured in the report. It was noted that Eastern Parkway was unique in that it features a central median (from Baxter Avenue to Barret Avenue) and that it does not feature a service drive. Eastern Parkway was observed as also predominately canopied with Sugar Maples, Pin Oaks, and White Ash trees, and its light fixtures were reported almost exclusively cobra heads, with a few box fixtures. Consistent across the parkways were issues with the curb and gutter system, along with curb cuts, and the treatment of the verges along the perimeter of the parkway, which were encroached upon by utilities and private parking.

The report further detailed the administrative agencies with accountability for the parkways. Partner agencies include the following:

- **Louisville/Jefferson County Parks Department** – oversee and maintain all parkway land on behalf of the City of Louisville. Includes tree maintenance, pruning, removal and replacement, creating and maintaining tree standards, design and capital improvements such as streetscape furnishings, master planning, and reviewing private development proposals.

- **Jefferson County Division of Planning and Development Services** – review any development proposal along the parkway system requiring action by the Planning Commission or Board of Zoning Adjustment (BOZA). Draft and maintain regulations within the Jefferson County Development Code.
- **City of Louisville, Public Works Department** – Administrative Services Division maintains facilities, including sidewalks and lighting, within the public right-of-way; Engineering and Architecture Division manages the city's capital construction work for transportation and urban design projects; Roads Division places and maintains street signs, lane markings, parking meters, traffic and pedestrian signs and signals, and repairs streets, alleys, and parking; City Arborist develops, implements and maintains a city street tree inventory and master plan (except for the Olmsted parkways).
- **City of Louisville, Department of Inspection, Permits and Licenses** – reviews and approves of all construction activity on privately-owned land that abuts the parkways, including new curb cuts; inspects structures and vacant lots; and serves as the city's enforcement arm for development code violations.
- **Kentucky Transportation Cabinet (KYTC), District 5 Office** – limited responsibility relative to the Olmsted parkway system; maintaining the roadway pavement on selected parkways in finite locations. KYTC and the City of Louisville have a traffic and maintenance agreement for highway roads within the city. Generally, the State maintains the pavement and markings of the roadways. The City Public Works issues utility and curb permits unless either a lane closure is involved, or the right-of-way is owned fee simple by the State. KYTC is responsible for the location and maintenance of State Route markers on the highway portions of the parkways, but no other form of signage.
- **Louisville Development Authority** – public authority created by the City of Louisville to promote the revitalization and growth of the City; supervises and coordinates capital projects in the downtown area, and represents the City's interests in other downtown projects; develops and implements downtown, neighborhood, area-wide and corridor plans and policies; administers design and related standards; and provides staff support for the Louisville Historic Landmarks & Preservation Districts Commission, the Urban Renewal Commission, the Downtown Development Review Overlay Committee, and the Bardstown Road/Baxter Avenue Corridor Review Overlay Committee.
- **Louisville Olmsted Parks Conservancy** – private, non-profit agency that provides master planning advice and raises private funds needed to implement renewal projects and programs within the city's Olmsted designed park system.

The report then summarized existing standards for the parkways along with the character districts common and unique to each of the parkways. A Wayfinding Program establishing standards for park and parkway signage has been proposed for the parkways and recommended by the LOPC's Construction Committee, for which Louisville Public Works Department will control the design of said signs and their placement. Driveway and curb cut standards, parking standards (off-street and surface), and standards for fixtures (benches/trash receptacles/water fountains/bike racks) were also included. The character of Eastern Parkway was summarized, noted as generally a 4-lane arterial roadway (a minor arterial from Cherokee Park to Bardstown Road and a major arterial for its remaining length). As noted in prior plans, Eastern Parkway demonstrated unique character traits in each of its seven distinctive zones, generally characterized as an ebb and flow from a traditional parkway with separated facilities and tree canopy to a commercial, uncanopied corridor lacking multimodal connections.

The Design Standards then set forth the verbiage supporting the creation of The Olmsted Parkway Overlay District, pursuant to KRS 82.660-82.670. Principles and Guidelines for the design standards are provided, noting that the standards are intended to preserve, protect and enhance the unique qualities and historic value of Louisville's Olmsted designed Parkways, recognizing these roadway corridors as linear parks that are an important component of Louisville and Jefferson County's parks and open space network. It is also noted that the Guidelines are not intended to discourage development but to encourage development that is compatible with the unique characteristics of the parkway.

The Olmsted Parkway Standards include Common Standards; Parkway Specific Standards; and Character District Standards. Common Standards apply to all activities subject to the ordinance, whereas Parkway Specific Standards and Character District Standards apply only to that Parkway and Character District defined within each Parkway where the regulated activity is occurring.

The Olmsted Parkway Standards are organized in ten groups:

- Landscape
- Access/Parking
- Roadways/Curbs/ Retaining Walls
- Sidewalks/Multi-Use Paths/Transit
- Lighting
- Street Furnishings/ Public Art
- Signage
- Utilities
- Historic Preservation
- Parkway Specific Standards

These Design Standards are an important reference for the future planning and design of the Olmsted parkway system, including Eastern Parkway. Future designs for revitalization and enhancement of Eastern Parkway will conform to these standards as set forth to ensure compliance and compatibility with the established vision for the Olmsted parkways.

5 Olmsted Parkway Shared-Use Pathway System Master Plan (2009)

The 2009 Olmsted Parkways Shared Use Pathway System Master Plan was prepared in partnership by Louisville Metro Parks, Louisville Metro Government, a dedicated Community Advisory Group (CAG), and the Olmsted Parks Conservancy. In 2005, Mayor Jerry Abramson announced Louisville's green initiative, and Louisville Metro has embraced the ambitious vision to become a "City of Parks." Borne out of recommendations from the 1995 Parks and Open Space Master Plan, two primary objectives to realize this vision include the acquisition and development of new park land, such as the Floyds Fork Greenway Project and expansion of Jefferson Memorial Forest in southwest Louisville, and the construction of a 100-mile paved loop trail around the perimeter of Jefferson County, connecting with the internal Olmsted parkways. An additional goal of the 1995 plan includes the creation of an integrated and interconnected open space system. The 2009 Olmsted Parkways Shared Use Pathway System Master Plan was commissioned to lay the foundation for a cohesive shared use path system linking the Olmsted parkways.

Specific recommendations and design ideas are presented in the plan that facilitate the integration of a shared use path system into the Olmsted parkway system. Key items addressed within the plan include the following:

- Locations for shared-use paths;
- Design details for the bike and pedestrian path system to accommodate walking, jogging and biking;
- Details for the preservation and renewal of the parkway character;
- Details for the addition of parkway trees and vegetation;
- Parkway infrastructure including curbs, utility lines and drainage;
- Parkway character and the creation of a sense of continuity, including visual separation from parking lots or other commercial uses inconsistent with the original Olmsted vision;
- Solutions for multimodal connectivity within the pedestrian and bicycle systems;
- Parkway amenities;
- Parkway lighting improvements;
- Linkages between the parks, parkways, schools, downtown and university; and
- Various design details to respond to concerns regarding safety or vandalism issues.

The plan provides a detailed analysis of each of the Olmsted parkways, including Eastern Parkway. The plan states that its overall design intent for Eastern Parkway would be to incorporate a shared-use path along one side of the parkway with pedestrian sidewalks on the opposite side. It then notes the diversity of Eastern Parkway in its feel, character, and surrounding uses, and it divides Eastern Parkway into seven distinct zones. Generally common to the parkway as a whole, the plan explains that Eastern Parkway experiences heavy traffic volumes during rush hour (the highest of all the parkways) and extensive queuing due primarily to vehicles making left turns. As such, the plan recommends a contextual, zone-specific road diet to encourage multimodal uses and slow parkway traffic, excepting for the section between Baxter and Barret Avenues with a central median. The plan also offers specific recommendations regarding various dedicated left and right turn lanes to alleviate poor levels of service at the intersections with Baxter Avenue, Poplar Level Road, Preston/Shelby Street, and Crittenden Drive. Further, the plan recommends comprehensively replacing the existing curb and gutter (noting the associated cost), addressing the crown (cross slope), and profile of the roadway which does not meet typical design guidelines and does not fit well with the surroundings, and making storm sewer connections to address poor drainage along Eastern Parkway.

The plan summarized these recommended renewal strategies and offered a suggested implementation plan with prioritization. Eastern Parkway projects were prioritized above those for Southern Parkway, Algonquin Parkway, Southwestern Parkway, and the "Hub Area" (representing the area between Algonquin, Southern and Eastern Parkways). The highest priority projects for Eastern Parkway, according to this plan, included a traffic study to verify traffic patterns, counts and movements; the construction of infrastructure alterations and remediations for Zone 1 (Cherokee Park to Bardstown Road); and the repair of the central median trail between Baxter Avenue and Barret Avenue. Near-term priority projects included construction of infrastructure alterations and remediations for Zone 2 (Bardstown Road to Baxter Avenue) and Zone 3 (Baxter Avenue to Barret Avenue). Long-term priority projects included construction of infrastructure alterations and remediations for Zone 4 (Barret Avenue to Poplar Level Road), Zone 5 (Poplar Level Road to Preston/Shelby Streets), and Zone 6 (Preston/Shelby Streets to Interstate 65). The construction of infrastructure alterations and remediations for Zone 7 (Interstate 65 to 3rd Street) were designated as a conditional priority that would be influenced by future interstate development.

Figure 1.10 *Eastern Parkway Zone 1: Cherokee Park to Bardstown Road*

Zone 1 includes the segment from Cherokee Park to Bardstown Road, and it is noted to be generally consistent with historic Olmsted design principles, with a 40-ft-wide central drive flanked by shared use paths surrounded by a double row of trees. The character of the roadway is interrupted, however, by the wide and commercialized intersection at Bardstown Road, by encroaching residential elements (such as fences and landscaping), and by gaps in the tree canopy. Modest arboreal renewal treatments were recommended. Zone 1 is also the only zone with public parking allowed along both sides of the roadway, and the plan does not recommend removing the parking.

Zone 2 includes the section of parkway from Bardstown Road to Baxter Avenue, and its character deviates further from the original Olmstedian vision, with a 40-ft-wide central drive and two external 6-ft-wide sidewalks with a singular row of trees. Typified by a singular row of trees competing with overhead utility lines, the parkway progressively becomes more commercialized heading west toward Baxter Avenue. Specific recommendations included the expansion of one sidewalk to an 8-ft-wide shared use path, the screening of commercial sites, the conversion and greening of surface parking lots, and the burial of overhead utility lines (or the relocation to parallel avenues).

Figure 1.11 *Eastern Parkway Zone 2: Bardstown Road to Baxter Avenue*

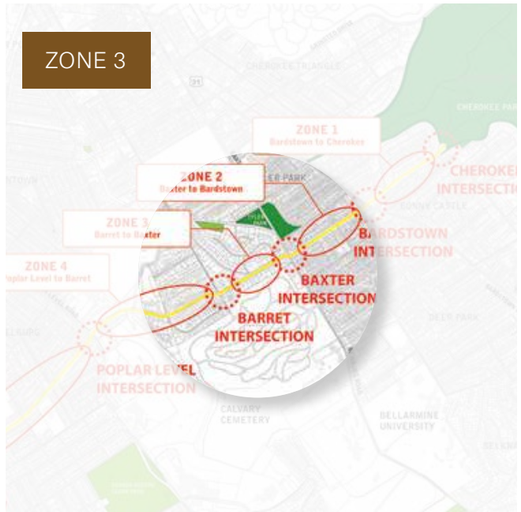


Figure 1.12 *Eastern Parkway Zone 3: Baxter Avenue to Barret Avenue*

Zone 3 includes the segment from Baxter Avenue to Barret Avenue, and it introduces the planted median with a 5-ft-wide sidewalk that is unique to the Olmsted parkway system, with two adjacent 24-ft-wide drives. Recommendations included undergrounding utilities and improving crossings and connections for shared path users in the central median along with high visibility crosswalks at the Baxter Avenue and Barret Avenue intersections.

Zone 4 includes the section of parkway from Barret Avenue to Poplar Level Road (Goss Avenue), and it returns the shared use path to a 5-ft-wide sidewalk either side of the 40-ft-wide central drive. With the original character generally retained, it is interrupted at the entries to the Medical Arts Building and Parkway Medical Building and at the intersection with Poplar Level Road where turning lanes are added. Recommendations include landscape screening for commercial properties, re-establishing the double row of trees by narrowing or removing the turning lanes at Poplar Level Road, and connecting to Beargrass Creek.

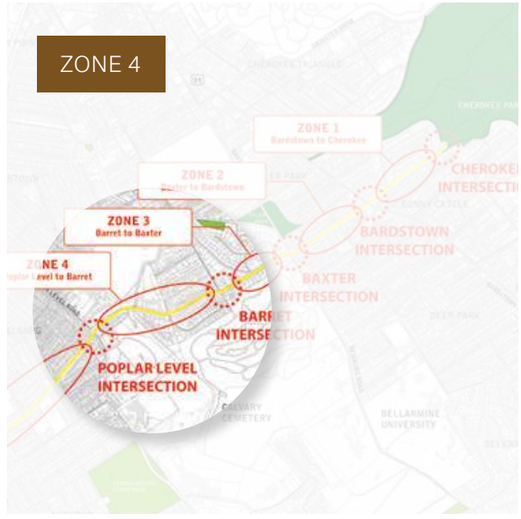


Figure 1.13 *Eastern Parkway Zone 4: Barret Avenue to Poplar Level Road (Goss Avenue)*

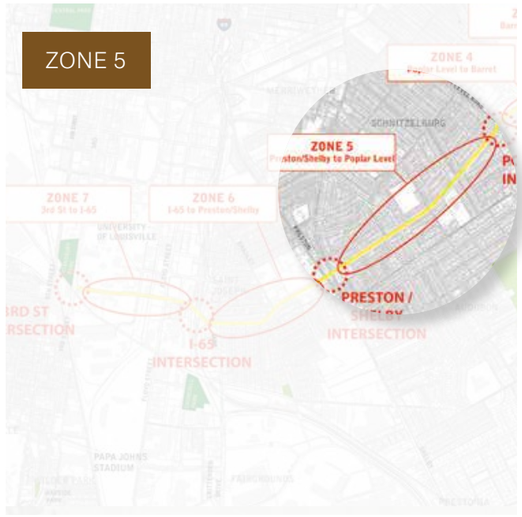


Figure 1.14 *Eastern Parkway Zone 5: Poplar Level Road (Goss Avenue) to Preston/Shelby Streets*

Zone 5 includes the segment from Poplar Level Road (Goss Avenue) to Preston/Shelby Streets, and it continues the 40-ft-wide central drive with a 5-ft-wide sidewalk on either side. This segment, while predominately residential, features numerous residential and commercial parking entries that disrupt the character of the parkway. Vegetative screening for the commercial spaces and their corresponding parking lots was recommended. The plan also recommends planting the missing second row of trees.

Zone 6 includes the section of the parkway from Preston/Shelby Street to Interstate 65, and it features a 40-ft-wide central drive with a 5-ft-wide sidewalk and double row of tree plantings. Recommendations include filling in the gaps in the tree canopy, rerouting commercial drives to rear alleys for parking access, screening remaining commercial parking lots, and addressing the parkway character at the intersections with Preston Street and Shelby Street. A restoration of the parkway character at the I-65 interchange is recommended as well, including the reduction of turning radii and supporting the reconfiguration of the I-65 ramp connection.

Figure 1.15 *Eastern Parkway Zone 6: Preston/ Shelby Streets to Interstate 65*

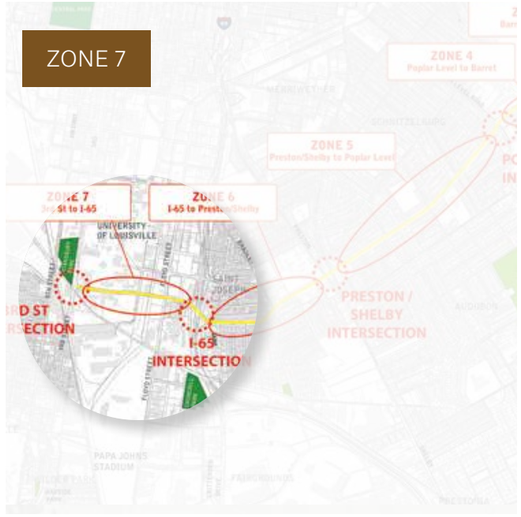


Figure 1.16 *Eastern Parkway Zone 7: Interstate 65 to 3rd Street*

Zone 7 includes the segment from Interstate 65 to 3rd Street, and it differs from other segments of the parkway with four travel lanes bisected by a 4-ft-wide concrete median with 5-ft-wide sidewalks on either side.[1] It greatly deviates from the character of other segments of Eastern Parkway. Given the direct connection to the University of Louisville, the plan recommends the planting of tree rows and upgrades to lighting to continue the Olmstedian parkway aesthetic and feel.

1 This section of Eastern Parkway was reconstructed by the University of Louisville following the Olmsted Parkway Shared-Use Pathway System Master Plan 2009 study.

6 Louisville Urban Tree Canopy Assessment (2015)

In 2015, Louisville Metro Government and Metro Council, the Louisville/Jefferson County Metropolitan Sewer District and MSD Board, The Louisville Tree Fund, and Louisville Gas & Electric partnered to sponsor an Urban Tree Canopy Assessment in response to action items identified in the 2013 Sustain Louisville plan. The results of the assessment and report showed that 37% of the city of Louisville (94,000 acres) is canopied, though canopy cover within the "old city boundary" (before the 2003 city-county merger) is 26%. While this percentage is higher than some neighboring cities (Lexington/St. Louis) and lower than others (Cincinnati/Nashville), the 37% result is lower than the American Forests recommendation of a 40% overall tree canopy. The assessment also acknowledged that when removing the tree canopy as provided in Louisville's large, protected parks, the urban tree canopy covers closer to 30% of the city, well below the target percentage. The plan also stated that tree cover has declined over the last decade. Declining at a rate of 820 acres per year, Louisville's future tree canopy is projected to drop to 31% by 2022 and 21% by 2052. As such, the Urban Tree Canopy Assessment has provided for recommendations to reverse these trends and preserve and expand Louisville's urban tree canopy.

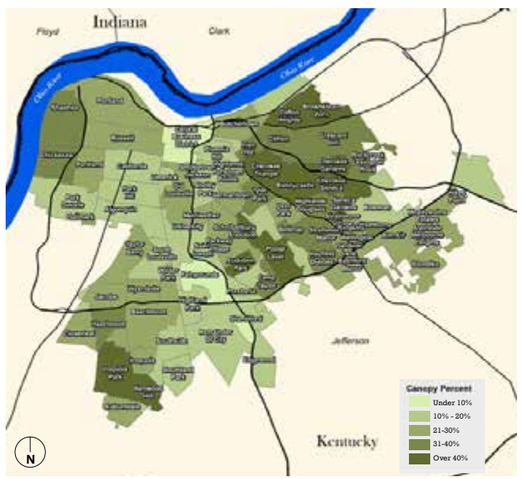


Figure 1.17 *Neighborhood Canopy, Louisville Urban Tree Canopy Assessment, 2015*

The report serves as a thorough resource describing external factors influencing the growth and decline of Louisville's tree canopy, along with the effects of its decline. Major issues identified by the plan include the following: urban heat island and its effects (both on human health and comfort and air quality), water pollution and stormwater flooding, and the steady loss of trees from extreme weather events (like Windstorm of 2008 and Ohio Valley Ice storm of 2009), insects and diseases, development, and lack of tree care. The report then identifies a broad spectrum of environmental, economic, and social benefits for preserving and expanding the City's tree canopy, including prevention of water pollution, temperature moderation, higher property values, successful business districts, less crime, safer streets, and wildlife habitat. The report also summarized key trends in Louisville's urban canopy including the following:

- Canopy coverage is greater in density in wealthier areas.
- Canopy coverage decreases as population density increases.
- Canopy coverage is greater in density in areas with higher percentages of older residents (ages 45 and older).
- Canopy coverage tends to be lower in areas dominated by rental properties, and higher in areas with majority owner-occupied houses.
- Canopy coverage is greater in density in areas with higher educated residents.
- Canopy coverage is greater in density in areas dominated by high-value homes.
- Canopy coverage potential increases as the concentration of newer homes increases.

In reporting trends surrounding Eastern Parkway, the assessment found that the urban tree canopy has been maintained in some areas but has declined anywhere from 5-15% in others (Figures 1.17 and 1.18). It was found that the Tyler Park neighborhood had the highest canopy percentage (31-40%), while other neighborhoods were 21-31% canopied. The rates of change in canopy, however, from 2004-2012, showed Tyler Park's canopy decreased in excess of 20% with other neighborhoods decreasing from 5-15%. The rate of decrease of Tyler Park's canopy was the fourth highest among Louisville's 78 recognized neighborhoods.

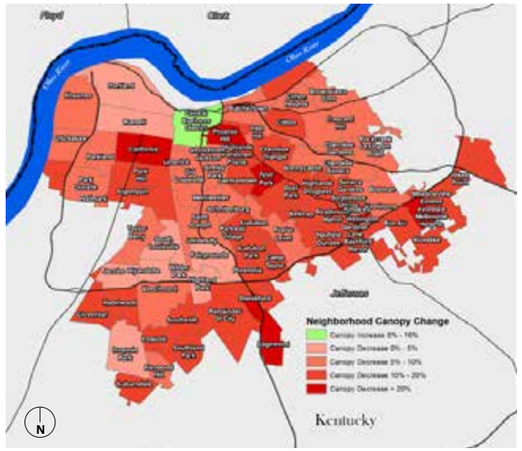


Figure 1.18 *Rate of Change in Canopy by Neighborhood (2004-2012), Louisville Urban Tree Canopy Assessment, 2015*

The assessment further discusses the interrelation of the urban tree canopy and the urban heat island effect (Figure 1.19). Based on surface temperature data, it was determined that 12% (approximately 31,000 acres) of Louisville is considered to be heat-stressed, where surface temperatures were recorded at 94.5°F or above on a cloudless summer day in July 2010. In relation to Eastern Parkway, the Schnitzelburg and Saint Joseph neighborhoods were among the top twenty Louisville neighborhoods with the largest hot spots, and while not ranked, Germantown and Merriwether temperatures were recorded as hotter among Louisville neighborhoods. The Audubon, Parkway Village, and Tyler Park neighborhoods were recorded, however, with temperatures closer to the mean and median of the sample set.

Additional discussion in the assessment captures the value of a rich urban tree canopy in intercepting stormwater (18.8 billion gallons annually) and expanding the urban ecosystem and improving its health (6.9 million pounds of pollutants removed from the air annually and 400,000 tons of carbon dioxide removed from the atmosphere annually). The assessment further promotes the economic benefits for Louisville residents: $5 million in annual energy savings for consumers and a $240 million increase in property values.

The Urban Tree Canopy Assessment then sets out recommendations and action items for increasing and growing Louisville's tree canopy. For the areas surrounding Eastern Parkway, the assessment reports a Realistic Plantable Area (excluding those pervious areas unsuitable for planting and including impervious areas where trees could realistically be added) of approximately 50-60%. The report does not set a goal for the overall tree canopy percentage for Louisville, but it does state that a combination of the American Forests goal of 40% in combination with the maximum canopy possible for the city would set a strong foundation. The assessment's recommendations are summarized as (1) caring for existing trees, through a variety of listed methods and with special emphasis given to the threatened ash tree; (2) planting new trees, through a combination of landscaping (special note is given that sapling-size native species will create canopy faster and less expensively), reforestation, and natural regeneration; and (3) supportive efforts including programming, policy, advocacy, and education.

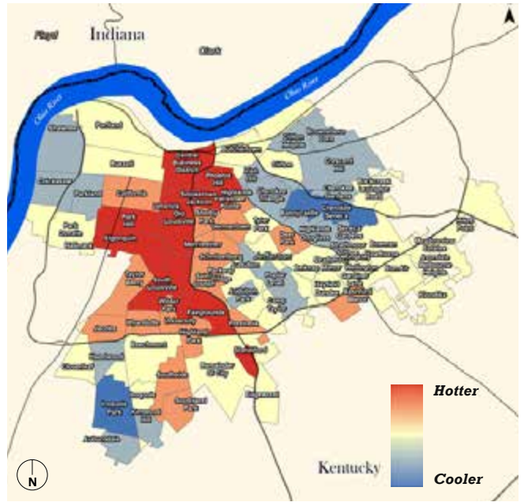


Figure 1.19 *Average Surface Temperatures by Neighborhood, Louisville Urban Tree Canopy Assessment, 2015*

Move Louisville 2035 Transportation Plan (2016)

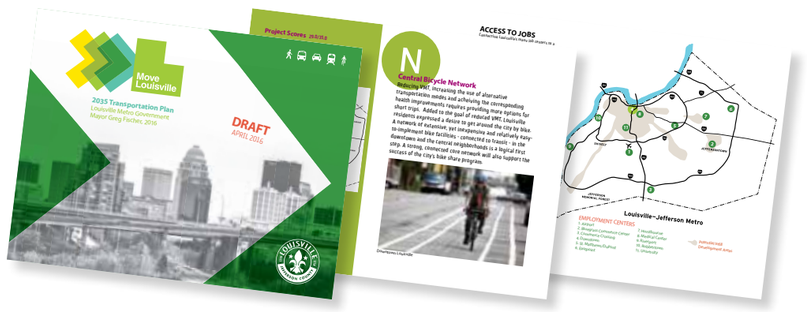
The Move Louisville 2035 Transportation Plan was published in 2016 as a collaborative effort between Louisville Metro Government, the Transit Authority of River City (TARC), and countless residents, businesses, advocacy and community groups, non-profits, and agency partners. To promote Louisville's continued success, the plan acknowledged that Louisville must be a city "where all citizens have safe, affordable, healthy and reliable options for how they move around, whether it is by driving, walking, biking, mass transit or shared mobility programs that make is easy for someone to live here without owning a car or use cars less." As such, the plan set forth policies and projects that will (1) reduce vehicle miles traveled, (2) preserve [the city's] existing streets and sidewalks, (3) provide better connectivity and real options for travel, (4) provide a better link between land use and transportation, (5) put Louisville in a position to enhance its transportation funding, and (6) identify opportunities for redevelopment through transit-oriented development.

Borne out of Vision Louisville, Move Louisville promotes the overall vision of a connected, creative, competitive, and compassionate city by providing specific policy- and project-based actions that together will reduce vehicle miles traveled and begin to create this vision-oriented future.

Move Louisville community goals were listed as the following:

- **Provide Connectivity Choices:** Create a transportation system that provides users with multiple options.
- **Improve Safety and Health:** Ensure that all future growth contributes to healthy living and good quality of life for all.
- **Promote Economic Growth:** Projects should help to promote economic opportunity and community prosperity.
- **Maintain Fiscal Responsibility:** Build a transportation system that future generations can afford to maintain.
- **Assure Environmental Sustainability:** Transportation projects and policies will seek to improve air and water quality.
- **Assure Equity for All System Users:** The transportation system of the future must address the needs of all potential users.
- **Enhance Neighborhoods:** All future growth should contribute to the creation of vibrant communities

Multiple priority projects were listed, including completing a low-stress central bicycle network and ensuring pedestrian connectivity, and many strategic policy approaches were presented, including making complete street design principles the norm and streamlining transit service on key corridors, to promote the accomplishment of these goals. As Move Louisville explained, reducing VMT, increasing use of alternative transportation modes and achieving the corresponding health improvements requires providing more options for short trips. A network of bike facilities - connected to transit - is a logical first step. The bicycle, pedestrian, and transit improvements recommended for Eastern Parkway directly support these principles. Move Louisville also addressed the importance of complete street design principles, namely that the multiple ways people get around are safe, comfortable, and integrated. The plan acknowledged that a Complete Streets Implementation Strategy to fix the design process for new streets and to retrofit existing streets would be the most feasible way to accomplish this goal. Promoting safety for all modes in the recommendations made for Eastern Parkway folds neatly into this implementation strategy. The transit recommendations made for Eastern Parkway also support the development of a more understandable and accessible system for current and future transit users, with well-coordinated services and appropriately spaced transit stops.



02

CHAPTER 02

Summary of Project Efforts

SUMMARY OF PROJECT EFFORTS

The Planning Process

As with previous studies, the project team has taken a community-led and holistic approach to identifying areas of preservation and opportunity for enhancement along Eastern Parkway in order to rehabilitate the corridor to modern standards. A methodical planning process has been applied to develop informed recommendations for the future of Eastern Parkway that include various complete street alternatives, including possible lane reductions and Complete Street elements, as well as the addition of bicycle lanes, shared use paths, sidewalks and better accommodations for access to transit.

This process has included the following:

- A reflective review of prior planning studies conducted;
- An analysis of existing conditions including the context for bicycle and pedestrian facilities; an environmental and ecological overview, including a tree inventory; a review of the historic and cultural context; and comprehensive traffic studies, forecasts, and safety analyses; and
- A thorough community participation process including individual property owners, user groups, and the general public.

The information, input, data, and results derived from these efforts have provided the framework for the development of design recommendations, along with additional alternative concepts, for the rehabilitation of Eastern Parkway.

"I envision a grand parkway of picturesque type... reaching from the heart of the city into the rural scenery of the suburbs.

—Frederick Law Olmsted

Planning Research

Many prior planning, research, and community engagement efforts have been conducted over the past 25 years to support the preservation and revitalization of Louisville's Olmsted parkway system. These studies have thoroughly reviewed the history and evolution of the parkways through the 20th century and into the 21st, capturing areas of strength for the corridors and documenting areas where the original parkway legacy has been compromised. Each of these prior planning efforts has steadily laid the groundwork and established a firm foundation for a shared vision for the future of the Olmsted parkways. As such, the first step in the planning process for the revitalization of Eastern Parkway included the thorough study and analysis of each body of work in this extensive library of valuable insight collected for and by the community for the preservation of its cherished Olmsted parkways.

The plans reviewed as a part of this analysis include the following:

1. Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management (1994)
2. Parks and Open Space Master Plan (1995)
3. Feasibility Study to Re-Curb Eastern Parkway (1999)
4. Louisville Olmsted Parkways Design Standards (2005)
5. Olmsted Shared-Use Path Master Plan (2009)
6. Louisville Urban Tree Canopy Assessment (2015)
7. Move Louisville 2035 Transportation Plan (2016)

Existing Conditions Analysis

CULTURAL AND HISTORIC ANALYSIS

As a part of the detailed planning analysis for Eastern Parkway, an archaeological and cultural historic overview study was conducted to inventory recorded resources within the project area that could potentially be impacted during implementation. The documentation of archaeological data and sensitivity also aimed to ensure compliance relative to requirements found in 36 CFR 800 and Section 106 of the National Historic Preservation Act (NHPA) (16 USC 470 f). The research conducted during this study complies with specifications for field surveys and investigations for National Register of Historic Places (NRHP) assessment as set forth in the Secretary of the Interior Standards and Guidelines for Archaeology and Historic Preservation (USDOI-NPS 1983); adheres to specifications for field investigations and reporting standards for archaeological overviews stipulated in EA-904 of the KYTC Division of Environmental Analysis's Environmental Analysis Guidance Manual (Commonwealth of Kentucky Transportation Cabinet 2014); and also conforms with Phase I archaeological survey reports as detailed in Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports (version 2.5, updated August 2006) prepared by the Kentucky State Historic Preservation Office (SHPO) seated in the Kentucky Heritage Council (KHC) in Frankfort, Kentucky (Sanders 2006).

The archaeological portion of the study was conducted consisting of a 1.2-mile buffer along either side of Eastern Parkway, and the study area for historic buildings and structures consisted of properties fronting Eastern Parkway. The intent of this thorough research was to determine the potential of the project corridor to contain archaeological deposits, the presence and significance of recorded historic buildings, and to identify observed unrecorded, but potentially significant, resources. These objectives were achieved by inventorying recorded archaeological and cultural historic resources, preparing resource maps, and analyzing the project corridor on-site.

The archaeological site records housed at the Kentucky Office of State Archaeology (OSA), as well as the historic structures files housed at the KHC, were researched to identify recorded (documented) archaeological and historic resources within the study area. Archaeological projects detailing previous studies along, and in the vicinity of, Eastern Parkway were reviewed to ascertain (1) the locations of all recorded archaeological sites; (2) those areas (if any) within and along the proposed corridors that have been previously examined by professional archaeologists and, therefore, would not require additional consideration or survey; and (3) cemeteries. Cultural historic documentation focused on (1) inventoried historic structures and buildings; (2) properties listed on the NRHP; (3) NRHP Districts; and (4) overlay districts.

ECOLOGICAL ANALYSIS

Ecological research was conducted by reviewing occurrence records maintained by the U.S. Fish and Wildlife Services – Kentucky Field Office (USFWS KFO), and the Office of Kentucky Nature Preserves (OKNP). The USFWS's Information for Planning and Conservation (IPaC) website was used to obtain a list of federally threatened/endangered (T/E) species that may occur within the project boundary. In-house research involved review of USGS topographic quadrangle maps, aerial photography, the Jefferson County soil survey, digital elevation model (DEM) maps, and FEMA floodplain maps. USGS geologic quadrangle maps, karst potential maps, and available mine maps were reviewed to identify caves, mine portals, sinkholes, and other underground features within the project boundary.

A field assessment was also conducted. During the field assessment, the presence of streams and open water bodies was evaluated based on ordinary high-water mark (OHWM), defined bed and bank features, and flow regimes. Potential wetland areas were investigated following the Routine On-Site Determination Method as defined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Model: Eastern Mountain and Piedmont Region – Version 2.0* (April 2012). The locations and extent of jurisdictional features and T/E species habitat presented in the summary section in Chapter 3 have not been formally delineated or verified by the appropriate resource agency, which holds the final authority over determination.

ROADWAY DATA COLLECTION

The Louisville/Jefferson County Information Consortium (LOJIC) provides access to Geographic Information System (GIS) mapping data for Jefferson County. LOJIC partners include Louisville Metro Government, MSD, the Jefferson County PVA, and Louisville Water Company, and the mapping data set provided covers a wide range of information such as roadway centerlines and edges, utilities, right of way, and public amenities such as transit stops. The planning team utilized this data to develop an initial map of the project corridor to identify gaps in information, overlay on-site existing conditions data collection efforts, as well as coordinate with project partners to provide additional in-depth data such as: roadway maintenance history, transit ridership data, light vehicle ridership for electric rental scooters, traffic counts, and collision data.

Utilizing custom applications developed specifically for Eastern Parkway, the planning team met with project stakeholders on March 26th, 2019 to perform on-site data collection. The data collected included both the physical data of the corridor, as well as user experience data. A total of 217 data points were recorded in the field, and data collected included: access management for both private and commercial drives; Americans with Disabilities Act (ADA) accessibility issues; location and condition of bicycle and multi-use facilities; drainage concerns, such as damage to the gutter, resident fill-in of gutter, and evidence of stormwater ponding such as sedimentation; encroachments into public right of way, including parking, signage, and retaining walls; intersection concerns; location of on-street parking, pavement deterioration; sidewalk location, condition, and gaps in sidewalk network; sight-distance constraints; street lighting; utility cuts; and vegetation encroachment onto sidewalks.

User experience data corroborates the physical data with emotional response to the surrounding context. For each zone walked, the agency stakeholder team was asked to rate questions relating to comfort, perceived safety, aesthetics or sense of place, amenities, and modal options in the existing state or with improvements. Cumulative response results were tabulated for both amenities and user experience across the corridor.

TRAFFIC ANALYSIS

Part of the initial feedback heard during public engagement was to ensure that the approach taken in this plan is balanced and measured. To do this, the project team invested in conducting a traffic analysis to ensure that existing uses for motor vehicular traffic can be supported while starting to provide more opportunities for emergent and historic transportation options. The traffic analysis compares the existing traffic conditions of the corridor against both the no-build future scenario as well as planned alternatives. First, a crash rate analysis was performed for the three segments for which Kentucky Transportation Cabinet (KYTC) Average Daily Traffic (ADT) counts was available. The crash rate analysis determines the current crash rate of the corridor and compares it to the statewide crash rate average for a similar roadway type. Then, 12-hour counts were obtained for the major signalized intersections along the corridor, as well as mid-block speed data for the three segments corresponding to the three crash rate analysis segments for comparison on speed-related issues. From the 12-hour traffic counts, a base traffic analysis model was developed as a platform to grow traffic to the future scenario and compare alternatives.

ROAD SAFETY AUDIT

A road safety audit is conducted independently of the project team and compares existing safety concerns and the planned improvements of the corridor to suggest further safety improvements for each area of concern in the corridor. The safety audit begins with a thorough crash analysis, identifying high-crash locations and areas of concern. Then, a team of safety experts, traffic engineers, and planners evaluate the corridor in the field, comparing the existing conditions with the planned improvements. Notes are gathered in the field to suggest safety improvements, which may include geometric changes to the roadway, new striping or signage, realignment of intersections, and signal timing. These suggestions are provided in a report to the project team, as a toolkit of improvements which benefit different roadway users from motorists to pedestrians. The design team has the final input on which improvements are included as they balance the needs of all users.

Public meetings were well-attended throughout the planning process.

Community Input

The best plans for a community's future and the best designs for a community's transportation network are those that include the people in the process. All healthy relationships are built on a foundation of trust, and transparent, shared conversation serves as the bedrock for that formation. Well-planned engagement builds trust between community members and participants, and it ultimately results in an end product that is a true reflection of the community's vision.

The project planning team has provided opportunities for stakeholders and community members alike to collaborate and share their feedback during every step of the plan development process. Three stakeholder and steering committee meetings have been held, along with three public meetings. These sessions have been interactive and on-site, and they have provided opportunity for people to share their thoughts, ideas, and opinions in a way that is most comfortable and accessible to them.

A dedicated project website[1] for Louisville's Parkways has served as the central hub for project information. With a project video explaining the project's history and intent, the website has offered insight into the project's origin and the planning process for community members. The exhibits presented at each of the public meetings, including station table boards and PowerPoint presentations, have been housed for easy reference. Further, opportunities to participate in online surveys and provide comment on the project's dedicated Wikimap have also been made available.

Finally, regular project updates were included on the project website and on the project's social media channels, Facebook and Twitter.

1 Dedicated Project Website: http://louisvilleparkways.org/eastern-parkway/

Alternatives Development

The planning process produced both corridor-wide and intersection-specific alternatives. Corridor-wide improvements that were analyzed included: a no-build alternative; a four-lane roadway with a multi-use path and a sidewalk; a two-lane roadway with light vehicle lanes (ex. scooters, bicycles, emergent people-powered devices), multi-use path, and a sidewalk; and a three-lane roadway with a center two-way left turn lane (TWLTL), light vehicle lanes, multi-use path, and a sidewalk. The no-build alternative does not meet the purpose and need of the project, as it does not provide safe, separated facilities for different modes of traffic, does not provide safety improvements, and does not allow for reclamation of green space or expansion of the tree canopy. While the four-lane roadway alternative most closely follows the existing traffic patterns, this is to the detriment of the project as it does not meet the project goals of additional green space, improving tree canopy, or providing safety improvements for all users. The two-lane roadway alternative provides the most travel lane reduction and allows for the most roadway reallocation to green space and tree canopy; however, the traffic impacts are significant, and do not provide dedicated space for left turning traffic. Therefore, the chosen alternative is the three-lane cross section, which is a known Federal Highway Administration (FHWA) safety counter-measure that still provides options for reclaiming green space and enhancing tree canopy.

Intersection-specific alternatives based on the chosen corridor-wide alternative ranged from intersection restriping to innovative intersection solutions such as roundabouts. Some intersections have more than one alternate solution, allowing for phased implementation as funding is available.

03

CHAPTER 03

Planning Foundations & Observations

Existing Conditions

In order to establish a firm foundation for future-oriented planning, the project team has evaluated and reviewed the context surrounding Eastern Parkway and its existing infrastructure conditions between Cherokee Park and the roadway reconfiguration in front of the University of Louisville beginning at Hahn Street, completed in 2010. Extensive research was conducted to understand (i) the history of Eastern Parkway and its surrounding area, (ii) areas of archaeological significance within the project limits, (iii) the existing cultural historic resources along the corridor, (iv) the environmental and ecological assets that may have influenced the cultural development of the Eastern Parkway project area, (v) the state of its existing and important tree canopy, and (vi) land use along the project corridor. The project team then conducted research in the field to generate a current understanding of Eastern Parkway's roadway characteristics. Aspects reviewed by the team include (i) general features as observed by zone, (ii) signalized intersections, (iii) curb cuts, (iv) private encroachments on public right-of-way, (v) lighting, (vi) bridges, (vii) multi-modal facilities, (vii) existing traffic, (ix) road safety audit observations, and (x) drainage, stormwater, and flooding. This comprehensive information regarding Eastern Parkway's existing conditions has served as the basis for facilitating dialogue with members of the public and project stakeholders and for generating creative ideas for rehabilitating Eastern Parkway for generations to come.

A. Surrounding Context

I. Historic Context

Before there was the Eastern Parkway we know today, the lands that we now recognize as Louisville were home to native populations. As the British continued their colonization of the southeast, the Ohio River Valley evolved and eventually settled as the American state of Kentucky. As new residents called this land home, they celebrated the natural beauty of the Blue Grass Region. With planned public parks coming into fashion, Louisville's leaders saw an opportunity to preserve its natural lands for posterity. Inviting Frederick Law Olmsted to realize this vision, an interconnected park and parkway system was envisioned, and Eastern Parkway, the youngest of Louisville's parkways, was born.

HISTORIC NATIVE AMERICANS

It has been nearly impossible to establish links between late prehistoric groups and historically known Native American entities in the Ohio River Valley (Muller 1986:264). Although most of the Kentucky region was devoid of major settlements by the time of the earliest European incursions into the area, the Cherokee, Shawnee, and Iroquois Confederacy (Haudenosaunee) all had land claims in what became Eastern and Central Kentucky, while the westernmost portion of Kentucky was claimed by the Chickasaw. With the Treaty of Fort Stanwix in 1768, the Iroquois Confederacy ceded its claims to the hunting grounds between the Ohio and Cumberland rivers to the British government. The Shawnee ceded their claims to most of Kentucky after their defeat in the brief Lord Dunmore's War (1774), and the Cherokee had land claims to the region until 1775. Today, there are no federally recognized Indian nations in Kentucky, although the Southern Cherokee of Kentucky are a group whose ancestors had been removed to Indian Territory on the Trail of Tears in 1838. Today their tribal lands are located in Henderson, Kentucky, and they were recognized and paid tribute by Gov. John Young Brown on December 26, 1983, and Gov. Ernie Fletcher in 2006 (The Southern Cherokee Nation of Kentucky 2012).

COUNTY FORMATION AND SETTLEMENT

Jefferson County, named for Thomas Jefferson, is one of the three original counties in Kentucky, having been created from a part of Virginia in May 1780 by the Virginia General Assembly (Morgan and Jett 2002). The county is situated mainly within the Outer Bluegrass Region of Kentucky, although a portion of the county is situated within the Knobs region, and it is considered part of the Bluegrass Cultural Landscape Region as defined by the Kentucky Heritage Council (KHC)/State Historic Preservation Office (SHPO).

In May 1778, General George Rogers Clark traveled from Pittsburgh with 175 militiamen and numerous settlers and their families, landing at Corn Island at the Falls of the Ohio. A year later, the settlers on Corn Island moved to the Kentucky mainland and established the town of Louisville. They named their settlement in 1779 after the French King Louis XVI, who allied himself and France with the colonial cause after the outbreak of the American Revolution (Kleber 1992:574). Two years after settling Louisville, Virginia granted the town a charter, and Louisville was designated the seat of justice for the county (Yater 1992). The population of the county concentrated around the Falls of the Ohio River and extended into tributary streams, notably Beargrass Creek. As reflected by the current project area, however, Revolutionary War grants spurred settlement in the far reaches of the county remote from the Ohio River.

PARKS HISTORY

The development of modern parks, parkways, and commuter suburbs in America were interrelated from their beginnings in the early-to-mid nineteenth century in the eastern United States and spread westward in the coming decades. The most influential early practitioners were Andrew Jackson Downing, Frederick Law Olmsted, and Calvert Vaux, Olmsted's collaborator on Central Park in New York. In addition to his role as the father of modern landscape architecture, Olmsted and his associates are largely responsible for the modern American suburb of zoned, semi-rural subdivisions connected by large feeder roads.

George Rogers Clark planned public parks and green strips for the City of Louisville at its founding, but these parks were not realized as settlers at the time were more concerned with survival and land disputes. In order to settle a title claim, the city gave the first land set aside for parks to John Campbell. The idea was not revisited, however, until the late antebellum period (Watrous 1977).

In 1848, the 296-acre Cave Hill Cemetery opened, featuring the newly emerging Rural Cemetery Garden-style, and it quickly became a recreational venue with its rolling hills, winding paths, ponds, and beautiful monuments. In 1851, city officials revisited park planning perhaps because of Cave Hill's popularity and set aside land on the present-day campus of the University of Louisville. Decades later in 1880, Mayor John G. Baxter finally dedicated the first city park, located at Eleventh and Jefferson streets and named in his honor. By 1887, a more comprehensive public parks system was conceived during a meeting of the Salmagundi Club, a prestigious all-male, 24-member social and literary club devoted to conversation and the exchange of ideas. Inspired by other major parks systems in America, businessman Andrew Cowan hosted a meeting on the topic of public parks, giving a speech that argued for the healthful and economic benefits of three large parks connected by tree-lined parkways. Following the meeting, the club appointed a committee to collate the argument with additional suggestions to present to the public. The committee appointed Cowan to write its report and Charles Hermany to prepare maps illustrating possible locations for future parks. Hermany drafted a map (Figure 3.1) showing West, East, and South Parks in a plan remarkably similar to the final

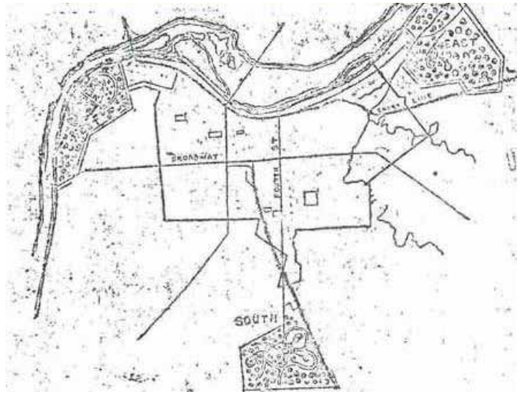


Figure 3.1 *Map of West, East, and South Parks created by Charles Hermany and published in the Courier-Journal June 5, 1887 (Transcribed by Steve Wiser).*

design, and the map was published in the Courier-Journal on June 5, 1887 (Cowan 1887).

After publication of Hermany's and Cowan's article, the Salmagundi Club was joined by the Commercial Club of Louisville and backed by Mayor Charles Jacob to create the legislation that established the Louisville parks system. A son of one of Louisville's first millionaires serving in his last of four non-consecutive terms, Jacob created controversy by buying the land for Iroquois Park without consulting the Salmagundi Club and selling it back to the city for the same as his purchase price. In 1890, the Kentucky General Assembly created the Board of Park Commissioners, which made the first of many official land acquisitions with a $600,000 bond (Clay 2002; Cowan 1887; Kleber 2002). In 1891, the Commissioners enlisted Frederick Law Olmsted to draft formal plans and continued to work with his firm and its successors through 1961. Olmsted Sr. worked with his son, Olmsted Jr., and young associate, Charles Eliot, the mastermind behind the forward-thinking Boston Metropolitan System of Parks (Newton 1971).

The Olmsted firm closely followed Hermany's 1887 plan for West, East, and South Parks, only moving East Park from the riverfront farther south into the Beargrass Creek valley so that the three parks represented three prominent geographic regions: river floodplains, rugged knobs with old-growth forest, and rolling hills and valleys. Popular in the mid-to-late nineteenth century, the sometimes arbitrary selection of Native American names for neighborhoods, parks, and various features of city life romanticized and memorialized the tribes and chiefs who once threatened early settlers. Reuben T. Durrett, a Louisville lawyer, editor, author, and primary founder and president of the Filson Historical Society, considered Native American names that were compatible with Kentucky and reflected the landscape. In 1891, he advised the names of Cherokee, Shawnee, and Iroquois and likely contributed to the naming of other features either directly or by influence (Durrett 1891). As for actual construction of the system, the process took much longer than anticipated.

> *Local leaders agreed in concept, but many complications arose and funding was short. Property had to be obtained that ran through open and built-up lands. Lack of local leadership, rivalries, private owner objections, lack of funding and other problems shifted routes and caused delays. Rising land values and prior development in the desired routes added to the complication of the task. Parkway development was an incremental process of securing property, with initial development completed in segments and later refinements or changes made by the Park Commission over a period from 1888 through the 1930s. Only partial oversight from the Olmsted firm was directed to these parkways during their construction over the 50-year period. Completed sections served as models for other areas of parkway as they were constructed. During the initial 50-year development period, a substantial portion of the parkway system was developed. The actual routes were redirected over time and some important connections were never made. More recent changes have been carried out under the aegis of the various municipal and state departments with jurisdiction within the parkways (HNTB 2010:3).*

In addition to the flagship parks, numerous smaller parks were designed or redesigned by the Olmsted firm. Olmsted Sr. upgraded Baxter Square in 1892 and worked on plans for Wayside Park and Chickasaw Park among others. Their smaller urban parks were more formal and sometimes symmetrical.

The Olmsted Park System of Louisville National Register of Historic Places (NRHP) nomination form states: "The Louisville Park System is an important example of Frederick Law Olmsted's urban landscape design. The system is also the city's most important recreational and open space area, enhancing the aesthetic and environmental quality of Louisville."

PARKWAYS HISTORY

The term "park way" was coined by Olmsted and Vaux when designing Central Park in New York. They planned parkways as connectors or ways to the parks, allowing the setting to extend through residential areas. They were intended to carry light, slow traffic and follow undulating topography and streams that public works normally straightened and flattened with gridiron plats (Newton 1971). Landscape historian Norman T. Newton quotes a preliminary report for Olmsted's plan of Riverside, Illinois, one of his first comprehensive community plans created in 1868:

> *In the highways, celerity will be of less importance than comfort and convenience of movement, and as the ordinary directness of line in town-streets, with its resultant regularity of plan, would suggest eagerness to press forward, without looking to the right hand or the left, we should recommend the general adoption, in the design of your roads, of gracefully-curved lines, generous spaces, and the absence of sharp corners, the idea being to suggest and imply leisure, contemplativeness and happy tranquility (Newton 1971:466-467).*

This notion of transportation became fully realized during the City Beautiful Movement after the Chicago World's Fair in 1892. Norman T. Newton continues:

> *City Beautiful principles, which were expressed in the writings of Charles Mulford Robinson and the creative genius of designers such as George E. Kessler and the Olmsted firm, resulted in the design and redesign of many American cities. They called for the coordination of transportation systems and residential development, and fostered improvements in the design of suburban neighborhoods, such as tree lined streets, installed utilities, and neighborhood parks, many of which were part of the city park systems...*
>
> *They also gave rise to grand landscaped boulevards such as Cleveland's Fairmount Boulevard and parkways such as Boston's Jamaicaway, which extending outward from the city center became a showcase of elegant homes and carriage houses on wide spacious lots, often built by the Nation's leading architects and echoing popular Beaux Arts forms. In more modest western cities such as [Louisville], boulevards became major corridors from which cross streets, following the city's grid, led to quiet neighborhoods of modest homes built by local builders.*
>
> *Subdivisions built for the upper-income and professional classes could be laid out according to Olmsted principles, with roads designed to follow the natural topography and natural features such as knolls or depressions shaped into traffic circles or cul-de-sacs. Deep ravines or picturesque outcroppings were often left undeveloped or retained as a natural park for the purposes of recreation or scenic enjoyment. The spacious layout of curving streets and gently undulating topography gave way, however, to more compactly subdivided tracts for rising middle-income residents by the 1890s (Ames and McClelland 2002).*

The Board of Park Commissioners invited Frederick Law Olmsted to visit Louisville in September 1891 to view the land acquired for park development. Plans for interconnected parks via parkways in Louisville had been proposed as early as 1887, when Andrew Cowan, Park Commission President at the time, spoke of it during a speech. Louisville's Olmsted Parks Conservancy website notes the significance of Olmsted's work in the city:

> *When Frederick Law Olmsted was commissioned to design a park system for Louisville, he was already the acknowledged father of American landscape design, famous for his work on Central Park in New York City, the U.S. Capitol Grounds, and the Biltmore Estate Grounds. Olmsted's greatest achievement, however, was his concept of creating a system of parks connected*

to tree-lined parkways, instead of freestanding parks as was the common practice of his day. His concept was most fully realized in Louisville, the ultimate and last park system of his career, and one of only four such Olmsted systems in the world (Olmsted Parks Conservancy 2019).

In a 1904 Courier-Journal article describing the planned construction of Eastern Parkway, the landscape was described as "one of the most beautiful in the country, and the smooth gravel surface will make driving a pleasure" (Courier-Journal Staff 1904).

II. Archaeological Context

The background research indicated that only a small portion of the project area has been subjected to previous archaeological survey, and no previously identified archaeological sites are located within the project area. Prehistoric Native American materials were mentioned by Webb and Funkhouser (1932), however, to have been located at the entrance to Cherokee Park. Additional prehistoric Native American land use may have occurred throughout the corridor, but another area of high probability is along the Beargrass Creek drainage. Previous surveys and site research indicated the corridor is likely to produce evidence of Early-Archaic, Late-Archaic, and Early-Woodland Native American land use.

The historical map review also indicated historical archaeological sites may be located within the project area. Historical materials are expected to include middens, artifacts, and features such as privies or cisterns associated with previous commercial and residential buildings, extant commercial and residential buildings, Kosair Crippled Children's Hospital (JFCZ-10), and the previous St. Joseph's Infirmary.

Potential locations of archaeological materials or intact grounds also include vacant lots, large lots, and the Eastern Parkway median. Disturbances that may have comprised the integrity of archaeological deposits include utility lines, contouring, large trees, channelization of South Fork Beargrass Creek, and landscaping. As indicated by the previously documented data research, family cemeteries—even those associated with prominent Louisville citizens such as founders and civic leaders—can be forgotten and developed within residential subdivisions with little to no above-ground indication of their boundaries.

RECOMMENDATIONS

Archaeological deposits are expected throughout the project area, and, in areas of little to no disturbance (or depending on the type of disturbance), a Phase I archaeological survey is recommended within areas planned for ground disturbance. Ground disturbances resulting from the project could include the main reconstruction areas as well as staging areas and separate borrow and spoil locations. Within these impacted areas, survey methods should include pedestrian survey throughout, near-surface shovel testing within undisturbed areas, and bucket augering within and along stream valleys that may contain cultural deposits at deeper depths.

Regardless of survey methods, if human remains are encountered, they must be reported to local law enforcement, the county coroner, and the KHC pursuant to KRS 72.020. Protective measures should be devised in consultation with the KHC and professional archaeologists.

III. Cultural Historic Resources Context

A total of 134 individual cultural historic resources in the immediate area of Eastern Parkway have been previously documented according to the KHC, but 105 of those survey forms have not been located at the SHPO or at the Metro Louisville Planning office. Based on the site numbers, the large majority of these missing forms are for resources within the Highlands historic district with some also missing from the Cherokee Triangle historic district. All of the missing forms have addresses on Eastern Parkway, but no other information is known other than the site number and historic name.

The known resources date ca. 1896 to 1974 and are predominantly single-family residential buildings, although there are also apartment buildings, commercial/retail/office buildings, and one historic hospital building.

NATIONAL REGISTER OF HISTORIC PLACES: HISTORIC DISTRICTS

While there are no National Historic Landmarks in the project area, Eastern Parkway itself is considered a large NRHP historic district as part of the Olmsted Park System of Louisville listing (JFL 270) (National Park Service Gallery 1982a). The Olmsted Park System of Louisville NRHP nomination form states: "The Louisville Park System is an important example of Frederick Law Olmsted's urban landscape design. The system is also the city's most important recreational and open space area, enhancing the aesthetic and environmental quality of Louisville." The full listing took place in 1982 and also includes Cherokee, Iroquois, and Shawnee Parks, as well as Algonquin, Northwestern, Southwestern, and Southern Parkways. The specific date of significance is 1891, when Olmsted was hired to design the park system in Louisville. Eastern Parkway also forms part of the boundary of two NRHP-listed historic districts: the south boundary of the Cherokee Triangle Area Residential Historic District (district code 049), which ends at Bardstown Road; and, after Eastern Parkway crosses Bardstown Road, both sides of the street are within the Highlands Historic District (district code 094) up to Barret Avenue. Eastern Parkway ends at Third Street and crosses part of the southern portion of the University of Louisville Belknap Campus Historic District.

Cherokee Triangle Area Residential Historic District
The Cherokee Triangle Area Residential District is located north of Eastern Parkway and was listed on the NRHP in 1976 (National Park Service Gallery 1976b). Both sides of Eastern Parkway between Cherokee Park and Bardstown Road are included within this district, which includes approximately 60 residences and apartment buildings in this area. The addresses in this section are between 2003 and 2127 Eastern Parkway. It is roughly bounded by Bardstown Road, Sherwood Road, Grinstead Drive, and Cherokee Road. The district is composed of the subdivisions of Craycroft, Henning, Speed, Slaughter, Longest, Norris, Baringer, and Barker.

Growth in the area began in the 1870s and continued as a post-Civil-War / pre-World-War-I streetcar suburb. The NRHP nomination states:

Although the suburbanization process is important, The Cherokee Triangle Area is important in visual terms because of the array of late nineteenth-century eclectic architectural examples linked by an interesting street format and copious trees and plantings. … Succinctly, the architecture reflects the period of historicism and revivalism which culminated in an attempt at a "modern" style (Arts and Crafts) mitigated by traditional preferences.

Some of the contributing resources that are eligible individually for architecture include residences with styles such as Neo-Tudor, Arts and Crafts, and Classical Revival.

HIGHLANDS HISTORIC DISTRICT

The Highlands Historic District is located both south and north of Eastern Parkway and was listed on the NRHP in 1982 with an expansion in 1984 (National Park Service Gallery 1982b). It is roughly bounded by Barret Avenue, Eastern Parkway, Fernwood, Bardstown Road, Woodbourne, Ellerbee, and Sherwood Avenue and includes the neighborhoods of Highland, Tyler Park, Deer Park, Bonnycastle, and Highland-Douglass. Residences on both sides of Eastern Parkway between Bardstown Road and Barret Avenue are included within the district, which includes approximately 110 residences and apartment buildings in this area. The addresses in this section are between 1300 and 1833 Eastern Parkway. At the time it was listed, the entire district contained nearly 3,000 contributing resources and approximately 200 considered non-contributing. Many of the streets were platted by the 1880s and the styles of residences vary across the district, including Queen Anne, Colonial Revival, Tudor Revival, Eclectic, Craftsman, and Victorian.

The NRHP nomination form describes the Eastern Parkway section of the district as follows (bold emphasis added):

Eastern Parkway, between Baxter and Barret Avenues, was the first section of the parkway to be platted, in 1895. General Castleman, one of the founders of the park system, donated the land for the parkway to the Park Board with the stipulation that a green space and horse path, be created between the roadways. This is the only section of the parkway system with such an easement. The lots along either side are spacious and the large houses represent a wide range of styles. Several fine Queen Anne style residences were the first houses to be built (ca. 1896). They display the excellent craftsmanship and picturesque design of this style. A pair of brick and stone dwellings, built in 1901, have outstanding classical detailing. Also in this block are several stuccoed residences with Mediterranean elements, a rustic Craftsman style dwelling, an excellent version of an English Tudor cottage and three large apartment buildings from the 1920s. Two modern buildings of the Church of Latter-Day Saints do not contribute to the district. Development along Eastern Parkway, between Bardstown Road and Baxter Avenue, began at Bardstown Road and moved west toward Baxter. Near Bardstown Road, the houses are mostly frame, either vernacular cottages and shotguns or two-and-a-half story American foursquares. They date from around the turn-of the-century and have the typical Victorian or Classical features. Approaching Baxter Avenue, many more brick veneer houses from the late 1910s and 1920s appear, showing the various Revival or Craftsman influences of that period.

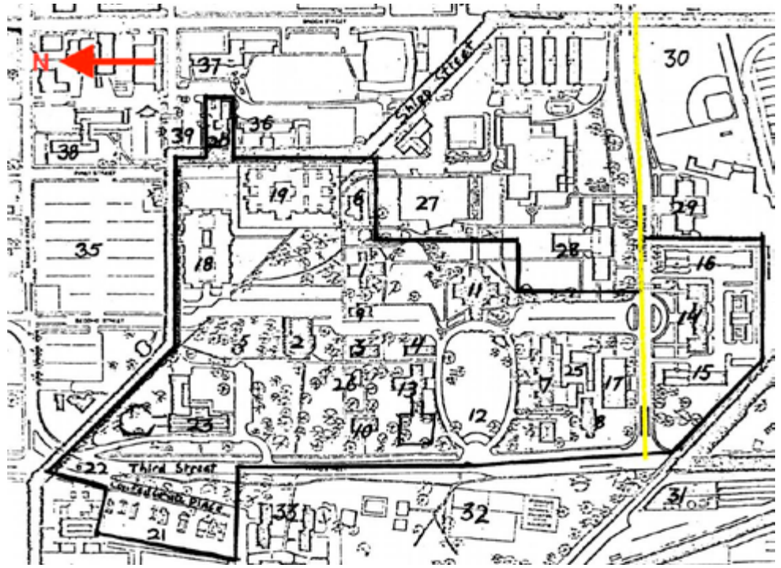


Figure 3.2 *Base map from University of Louisville Belknap Campus Historic District NRHP nomination; Eastern Parkway highlighted, and north arrow added by Corn Island*

UNIVERSITY OF LOUISVILLE BELKNAP CAMPUS HISTORIC DISTRICT (ADJACENT)

Eastern Parkway cuts across the southern portion of the University of Louisville Belknap Campus Historic District, which was listed in 1976 (National Park Service Gallery 1976a). Historically, it was the former Louisville House of Refuge and, later, the Louisville Industrial School of Reform. At the time of nomination, the buildings in the district had construction dates between 1872 and 1974.

The base map of Figure 3.2 is from the NRHP nomination (note the orientation) and Eastern Parkway is indicated in yellow. Within the historic district boundary (dark line), Eastern Parkway is adjacent to several 1940s-era buildings: (14) Speed Science Main Building, 1940-1942 (now called J.B. Speed School of Engineering); (15) Civil and Electrical Engineering Building, 1946 (now Frederic M. Sackett Hall); (16) Mechanical Engineering Building, 1948 (now William S. Speed Building); and (17) Naval Science Building, 1945 (now Dougherty Hall). Outside the district boundary, Eastern Parkway is adjacent to several 1960s-era buildings, including (28) the Natural Science Building, 1960s and (29) the Chemical Engineering Building, 1964 (now Ernst Hall or, officially, Robert Craig Ernst Hall Conn Center for Renewable Energy Research). At the end of Eastern Parkway with the intersection of Third Street is (31) the Reynolds Aluminum Building, which was built in 1964. Also note (30) which was indicated at the time of nomination as "Playing Fields." This was the former Parkway Field—named for Eastern Parkway—and built in 1923. The University of Louisville used it as a baseball field for many decades but abandoned it in 1998 when they moved to Cardinal Stadium at the Fairgrounds (Historic Photos of Louisville KY and Environs blog 2019). According to the Historic Louisville Weebly, the grandstand originally seated nearly 13,500 but was demolished in 1961. Now it is an empty field for sports practices (University of Louisville 2019).

NATIONAL REGISTER OF HISTORIC PLACES

One resource has been listed to the NRHP and, of the reviewed forms, seven resources were previously recommended eligible for individual listing in the NRHP. The Schuster Building (JFEH-1647), located at 1500-1512 Bardstown Road, is an NRHP-listed property in the project area at the intersection of Eastern Parkway with Bardstown Road. The Kosair Crippled Children's Hospital (JFCZ-10) at 982 Eastern Parkway has not been listed, but it has previously been recommended as eligible individually.

In addition to these two resources, six residences were indicated on previous survey forms as not only contributing resources to the Cherokee Triangle Residential Area Historic District, but they were also eligible individually for the NRHP.

Schuster Building (JFEH-1647)
Listed in 1980, the Schuster Building at the corner of Bardstown Road and Eastern Parkway is significant for being one of the earliest structures in Louisville designed in the Colonial Revival style (National Park Service Gallery 1980). The NRHP nomination states that when it was constructed in 1927, it "anticipated the renovation of Williamsburg by two years." It was designed by the local firm of Nevin, Wischmeyer & Morgan, who would go on to design the Pendennis Club in Georgian Revival style the following year. As originally designed, it was an early multi-use commercial building, with shops, offices, apartments, and the Uptown Theater (Figure 3.3 and Figure 3.4).

Figure 3.3 *The Schuster Building in 1928 (University of Louisville Digital Archives). Corn Island Report pg. 65*

Figure 3.4 *The Schuster Building in 2019 (Mathia Scherer, Corn Island).*

Kosair Crippled Children's Hospital (JFCZ-10)
JFCZ-10, the Kosair Crippled Children's Hospital at 982 Eastern Parkway, was last documented in 1980 and recommended eligible for listing due to its Tudor Revival architecture and its social and humanitarian significance as "Kentucky's first hospital solely dedicated to the treatment of crippled children." It was built in 1925 and designed by the local architectural firm Joseph and Joseph. The inventory form mentions that, at the time it was surveyed, "all children receive treatment regardless of their ability to pay." Today, it is the campus for the Sam Swope Kosair Charities Center and no longer a medical facility (Figure 3.5 and Figure 3.6) (Kosair Charities 2019).

Figure 3.5 *Kosair Crippled Children's Hospital, 1940 (University of Louisville Digital Archives). Corn Island Report pg. 66*

Figure 3.6 *Sam Swope Kosair Charities Center, July 2019 (Mathia Scherer, Corn Island). Corn Island Report pg. 66*

STATE AND LOCAL LANDMARK

The only state and local landmark within the project limits, The Grotto and Garden of Our Lady of Lourdes was dedicated on May 26, 1927 on the grounds of the former St. Joseph's Infirmary (Weeter 2001). This hospital building was located on the north side of Eastern Parkway between Bradley Avenue on the west and South Preston Street on the east. It expanded over several decades but was eventually sold to Humana in 1970 and demolished in 1980. The concrete apse can be viewed from Eastern Parkway across the green space, and the grotto is located approximately 61 m, or 200 ft, from the road (Figure 3.7 and Figure 3.8). It is cared for by the Saint Joseph's Area Association (Saint Joseph's Area Association 2019).

The Grotto and Garden of Our Lady of Lourdes at the Old St. Joseph's Infirmary Site was recognized as a local and state historical landmark in April 2001, but it is not listed in the NRHP. The Grotto and Garden site has local significance and was specifically mentioned at a planning charrette as being an area of importance. A Kentucky historical marker (Number 2179) is located at 2301 Bradley Avenue and reads:

> *The Grotto (D.X. Murphy & Bros., Architects) was dedicated in 1927 as a place for contemplation on St. Joseph Infirmary grounds. Two-story, half-domed, concrete apse is faced on inside with stones and rubble. Modeled on natural grotto at Lourdes, SW France, where Virgin Mary appeared to Bernadette Soubirous in 1858.*
>
> *(Reverse) Their statues adorned Louisville Grotto. Masonry walls enclose Grotto's Garden. Fourteen arched niches, since filled in, held mosaics of Stations of the Cross, events from end of Jesus' life. Dwane Beckhart painted modern replacements. Named state landmark by Ky. Heritage Council, 2001. (Kentucky Historical Society: Historical Marker Database Search 2019)*

LOCAL PRESERVATION & OVERLAY DISTRICTS

In all of Louisville, according to Metro's Planning and Design website, there are six local preservation districts and three overlay districts. According to Metro's website, "Overlay Districts are intended to promote compatibility of development with existing land use and design features.... Projects that propose exterior alterations to buildings that are landmarks or are located within designated local preservation districts are evaluated by Architectural Review Committees (ARC) and staff in accordance with design guidelines" (Louisville Metro Department of Planning and Design Services 2019). This committee will need to be consulted should there be any proposed changes to these particular areas.

Figure 3.7 *Historical aerial view (1927) of the hospital grounds. Grotto apse is located towards the lower left-hand corner. (Courtesy University of Louisville digital archives; circle added by Corn Island). Corn Island Report pg. 67*

Figure 3.8 *The Grotto and Garden in July 2019 (Jessica McCarron, Corn Island).*

One preservation district and one overlay district are located within the project area. Eastern Parkway forms the lower, southeastern boundary of the Cherokee Triangle Preservation District between Cherokee Park and Bardstown Road (Figure 3.9). Residences and apartment buildings on the north side of Eastern Parkway would be included.

Where Eastern Parkway crosses Bardstown Road, a block or two on either side is also included within the Bardstown Road / Baxter Avenue Corridor Overlay District (Figure 3.10).

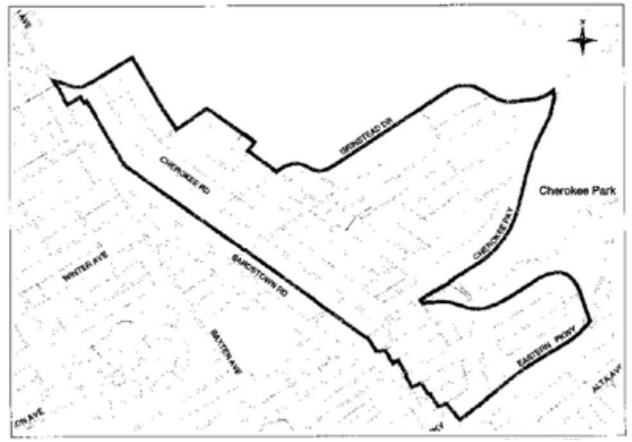


Figure 3.9
Eastern Parkway forms the southern boundary of the Cherokee Triangle Preservation District (Courtesy Louisville Metro).

Figure 3.10
The intersection of Eastern Parkway with Bardstown Road is included in the Bardstown Road / Baxter Avenue Overlay District (Courtesy Louisville Metro).]

CEMETERIES

No cemeteries have been identified within the Eastern Parkway study area. Three large cemeteries lie nearby, all between Baxter Avenue and Poplar Level Road. The closest is St. Michael's Cemetery, a corner of which lies 38.76 m, or 127.6 ft. from the northern border of the corridor. Calvary and Louisville Cemeteries lie one lot outside of the project area and are approximately 52 m, or 170.6 ft, from the southern border. Farther from the project area, separate Jewish Cemeteries appear as The Temple Cemetery on Google Maps and are over 300 m, or 984.2 ft, south of the project area, and Saint Louis Cemetery lies north of the project area approximately 660 m, or 2165.3 ft.

In addition to these, within the 2-km, or 1.2-mile buffer, two archaeological sites (15JF733 and 15JF811, Churchill-Armistead Graveyard and William Pope Jr. Cemetery [removed], respectively) have been documented as cemeteries and one site, 15JF734, contains a well-bounded cemetery within Joe Creason Park (Prather Cemetery). Others within this buffer include the Clark Graveyard at George Rogers Clark Park and the Saint Xavier Cemetery at Saint Xavier High School. None appear to have been evaluated for NRHP eligibility.

RECOMMENDATIONS

Because the entire length of Eastern Parkway itself is listed in the NRHP as part of the Olmsted Park System of Louisville and because the Eastern Parkway properties discussed above are listed in the NRHP, the entire historic district must be considered if part of the district is impacted. Should the project encroach on the property of, or impact, the buildings, character-defining features, or contributing elements in any way (including visual impacts), the effect of the project will need to be considered and possible adverse impacts mitigated in consultation with the KHC.

There are also resources in the lower section of the Eastern Parkway project area that may be potentially eligible with construction dates between 1970 and 1975. These buildings are approaching the 50-year age for historic properties. Property Valuation Administration (PVA) research was not completed for this overview but may be required in the future for this project to address these more recently built commercial entities. Apartment buildings, office buildings, and some retail establishments fall into this date range.

Figure 3.11 *Midcentury modern architectural details at the Medical Arts building (Jessica McCarron, Corn Island). Corn Island Report p. 99*

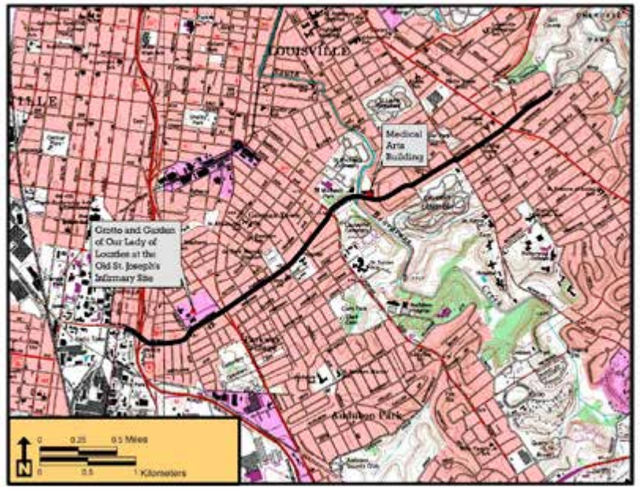


Figure 3.12 *Locations of the state and local historical resource and the potential cultural-historic resource; additional potential resources expected.*

If Federal money or permitting requirements are involved, a Section 106 cultural historic survey will need to be performed in consultation with KHC. If resources have been surveyed more than five years prior, updated survey forms may be needed. Additional design or drainage features significant to, or character-defining features of, the Olmsted plan should be considered at that time. The recommended Area of Potential Effect (APE) includes those properties directly fronting Eastern Parkway as well as the Grotto and Garden of Our Lady of Lourdes at the Old St. Joseph's Infirmary Site, based on the proposed impacts to the area and observations made during the site visit. In addition to this state and local historical landmark, the midcentury modern Medical Arts office building located at 1169 Eastern Parkway was built in 1957-1958 by A.J. Schneider (Figure 3.11). It is unknown if a survey form for this building exists, but this was identified as another potentially eligible cultural-historic resource. Locations of these two are shown in Figure 3.12.

IV. Route Designation

History of Eastern Parkway as US 60 Alternate

Eastern Parkway was originally envisioned and constructed as a local road, before the inception of the US Highway System in 1926 and well before the interconnected system of interstates that exists in Louisville Metro today. Historically, the main corridor of US 60 began as Midland Trail, from the south on Dixie Highway to Broadway, where it crossed through downtown Louisville. Then, US 60 continued on Cherokee Road, Grinstead Drive, and Lexington Road on the eastern side of the city. After extensive research of publicly available information, Eastern Parkway remained a local road between 1926 and 1929. The next publicly available Kentucky road map in 1937 shows Eastern Parkway as US 60A. The eight year gap in data may partially be attributed to the history of the Federal Highway Administration (FHWA), which changed name and organizational structure several times in its history until landing on the current structure in 1966.

Figure 3.13 *1928 road map from the Commonwealth of Kentucky State Highway Department.*

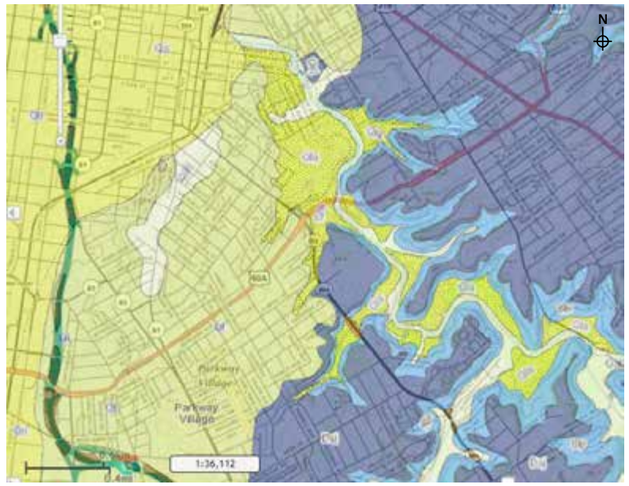


Figure 3.13
Geology map of surrounding area (Kentucky Geological Survey 2018)

Additionally, the 1937 flood in Louisville, KY devastated city storage locations throughout the downtown area, potentially contributing to the loss of information.

Today, Eastern Parkway is designated as US 60 Alternate (US 60A) from Willow Avenue to 3rd Street, which requires additional oversight and approvals by the Kentucky Transportation Cabinet (KYTC) for changes made to the parkway right-of-way. The interstate system in Louisville has developed in Louisville Metro such that the designation of Eastern Parkway as US 60A may no longer be necessary, and relocation or removal of the US 60A designation should be pursued as an option for greater local control over the Eastern Parkway right-of-way.

V. Environmental and Ecological Context

The following environmental context provides historic and current data on regional ecological patterns such as floral distributions and communities, regional geomorphology, soils, physiography, and hydrology. The discussion is aimed at identifying those aspects of the natural environment that may have influenced the cultural development of the Eastern Parkway project area.

SOILS

The following discussion interprets the environmental context of the project area with regard to five soil-forming factors: (1) parent material (geology); (2) time; (3) relief (landform); (4) climate; and (5) organisms. Overall, the general United States Department of Agriculture (USDA)-National Resources Conservation Service (NRCS) soil map units that formed within the project area are Urban land complexes. Representative soils mapped for the project area are summarized in tables included in the appendix. In addition to Urban land, components include Crider soil through the eastern to central areas and abut areas of Caneyville silt loam, 12 to 25 percent slopes, eroded, and very rocky soil at Cherokee Park.

1. Parent Material (Geology)

As documented on mapping by the Kentucky Geological Survey (KGS) (Figure 3.13), beds underlying Jefferson County are highly varied and span geological time from the Ordovician to the Pennsylvanian. Parent material of soils within the project area, however, are weathered from Ordovician, Silurian, and Devonian limestones, shales, and dolomites. Quaternary deposits include vast areas overlain by loess west of KY 864 (Goss Avenue/ Poplar Level, which, in non-urban areas develop into fertile Crider soils that have been used for extensive agricultural areas in the county.) Within the South Fork Beargrass Creek drainage, lacustrine deposits developed, which result as major streams such as the Ohio River and become choked with glacial outwash, damming tributaries and creating back swamps, ponds, or lakes. These deposits extend toward the west into the loess deposits rather than toward bedrock areas to

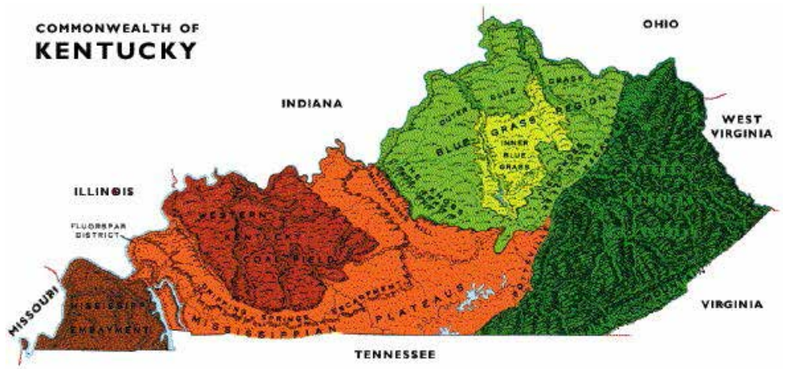


Figure 3.14
Physiographic regions of Kentucky (University of Kentucky 2014)

the east. Silurian Louisville deposits are exposed along margins of drainages, but the Devonian Sellersburg and Jefferson Limestones extend east of the South Fork Beargrass Creek drainage. These units could have provided many resources in addition to fertile agricultural land, including chert for Native American populations. Chert is recorded in the Geological Quadrangle 1203 within the Devonian Beechwood Member of the Sellersburg Limestone, the Devonian Jeffersonville Limestone, and Silurian Louisville Limestone.

2. Time
Since the deposition of parent material, several processes transformed the original material into soils that support plant life. Processes include chemical reactions such as the oxidation or reduction of iron as well as mechanical weathering of the parent material through freeze-thaw cycles. Clues to the age of soil include the stages of structure development, clay accumulation, acidity, Ca/Mg ratio, depth of leaching, and other signs of horizon development. Characteristics that may have influenced past human activities include soil fertility, soil drainage class, and accumulation of minerals such as clay.

3. Relief
The Bluegrass physiographic region is mapped by Fenneman (1938) as the Bluegrass Section of the Interior Low Plateau Province (Figure 3.14). It is comprised of the Outer Bluegrass and Inner Bluegrass subregions as well as the intervening Eden Shale belt and the low-lying Scottsburg Lowland. Hydrology of these regions depends on the Ohio and Kentucky rivers and their tributaries. During the historic period, the hydrology of the Bluegrass underwent vast changes. Channelization and emplacement of drainage tiles increased agricultural and residential land while also combating health problems. One perennial stream, South Fork Beargrass Creek, flows 150 linear feet within the Eastern Parkway project boundary, though the stream is not anticipated to be impacted by the project. This stream, which is located within the 100-year FEMA floodplain, has been completely channelized, lined with concrete, and receives sewage overflow during heavy rain events due to its connection to the Louisville/ Jefferson County Metropolitan Sewer District's Combined Sewer Overflow system. No other waters/ wetlands were found within the project boundary during the assessment, and the National Wetlands Inventory mapping shows no features within the project corridor, and as such no impacts to waters/wetlands are anticipated as a result of this project.

Significant historic deforestation was also due to increasing agricultural and residential land and logging activities as well as the manufacture of charcoal for furnaces. Salt, iron, and brick are noted as the predominant industries using furnaces (Parola et al. 2007). Effects of deforestation include extensive sheet erosion in the uplands, excessive deposition in the valleys, and transformation of forest species from k-selected to r-selected species, the r-selected species being those that are intolerant of shade and can, therefore, colonize disturbed areas more quickly. Iron, clay, and salt were important resources throughout the Bluegrass region.

Other examples of historic modifications include agriculture, in which the diversity of species in the valleys would have been replaced by monocrop plots; species extermination due to hunting (e.g. the passenger pigeon); and the demise of native species due to competition with introduced species such as Japanese honeysuckle, tree-of-heaven, and burning bush.

4. Climate
In recent history, the average temperature in the region of Jefferson County has ranged from 43°F in winter to 88°F in summer. Extreme temperatures occur but are relatively short in duration (Pollack, David 2008a). Precipitation averages 42 inches per annum and is relatively evenly distributed throughout the year. Snowfall averages 16 inches per year while the growing season extends from the last freeze in the spring (usually later than mid-April) and the first freeze in the fall (typically near the end of October) (Zimmerman 1966).

5. Organisms: Flora and Fauna
As the glaciers retreated farther north, average temperatures rose and the mixed hardwood forests in south-central Kentucky were gradually replaced by Oak-hickory forests. Oak-Hickory forests commonly contain a wide variety of flora and fauna. The trees that may have been present prehistorically include oaks, hickories, American chestnut (now an understory tree), dogwood, sassafras, hop hornbeam, and hackberry. Tulip trees, elm, sweetgum, shagbark hickory, and red maple also may have been present, especially in moist areas. The understory may have contained mountain laurel, a variety of blueberries, and deer berry among other plants. Herbs may have included species such as wintergreen, wild sarsaparilla, wood-sorrel, mayapple, rue-anemone, jack-in-the-pulpit, and trout lilies (Kricher 1988:57).

A wide variety of fauna would also have been present from the early Holocene to early historic times. Mammals that thrived in the forested environment may have included the gray squirrel, fox squirrel, whitetail deer, raccoon, beaver, woodchuck, and a variety of mice, striped skunks, mink, otter, fox, black bear, and bobcats. Bird species would likely have included red-tailed hawks, ruffed grouse, great horned and eastern screech owl, pileated woodpecker, wild turkeys, and blue jays among others (Kricher 1988:12). Fauna that are now gone from the area included the black bear, bobcat, elk, wolf, passenger pigeon, and buffalo. The populations of mink, fox, beaver, otter, and most other animals have been reduced, due to the loss of habitat and hunting (L.A. Williams & Company 1882:67-68).

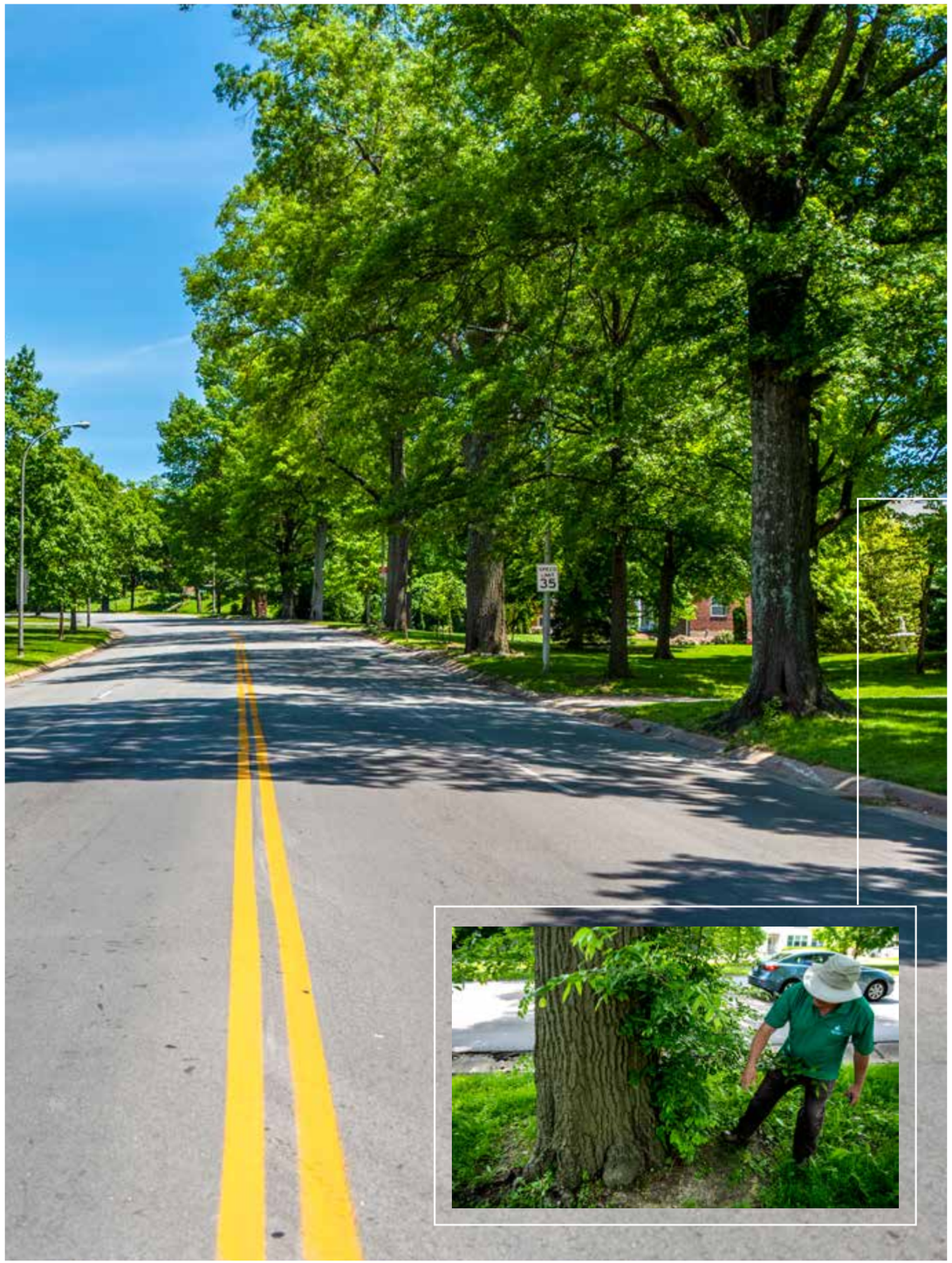
CURRENT ASSESSMENT OF TERRESTRIAL & AQUATIC RESOURCES

The U.S. Fish and Wildlife Service's Information for Planning and Conservation (USFWS IPaC) notes that there are no critical habitats within the project boundary. The Office of Kentucky Nature Preserves (OKNP) response did not note any federally listed T/E species within the project boundary. Suitable summer roosting habitat was identified for the Indiana bat (myotis sodalist) and northern long-eared bat (myotis septentrionalis) along the majority of the project boundary, particularly within Eastern Parkway's right-of-way and in the front yard of residences along the corridor, and as such future phases of Eastern Parkway rehabilitation design will require consultation with the USFWS to address potential impacts to these federally listed species. Impacts may be addressed following guidance provided in the Revised Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky (2016) and a contribution to the Imperiled Bat Conservation Fund (IBCF). The 4(d) Rule may be used to address impacts to the northern long-eared bat since the project is not located within 0.25 mile of known hibernacula or 150 feet of a known maternity roost tree.

Additionally, gray bats (myotis grisescens) utilize caves year-round for roosting and can utilize bridges for roosting as well. Commuting/foraging habitat consist of riparian areas over open water. South Fork Beargrass Creek is the only stream within the project boundary and does not provide foraging habitat due to degraded water quality and the absence of suitable substrate or pooled water for aquatic organisms; it also is located within the 100-year FEMA floodplain. Furthermore, the project spans South Fork Beargrass Creek utilizing an existing bridge that will not be impacted by the project. Habitat for the gray bat is not present in the corridor.

Potential habitat for federally-listed mussel species includes streams and small rivers with moderate to fast-flowing current and substrate consisting of sand, gravel, cobble, and boulders. South Fork Beargrass Creek, the only perennial stream within the project limits, is entirely channelized with concrete which does not provide suitable substrate for mussels; as such, they are considered likely absent from the project corridor. In addition, South Fork Beargrass Creek is not anticipated to be impacted by the project.

Suitable habitat for running buffalo clover includes rich, mesic forests with partial to filtered sunlight that have periodic occurrences of moderate disturbance. The maintained lawns found throughout the Eastern Parkway project boundary are regularly maintained and lack areas of periodic disturbance within wooded areas. These lawns consist largely of tall fescue *(Schedonorus arundinaceus)* and Kentucky bluegrass *(Poa pratensis)*, along with other non-native plants. Buffalo running clover is likely absent from the project corridor, as habitat for this species was not found.



VI. Tree Canopy

The tree canopy along Eastern Parkway is an integral component of this study. Its historic significance, as well as its functionality, acts as the framing component of the Parkway. These trees provide the shade and aesthetics that make the parkway pleasant and attractive to residents and visitors alike and memorable as a landmark Olmsted Parkway.

Growing, protecting, and maintaining trees along a vehicular corridor brings a unique set of challenges. Compacted soils and competition with utilities, curbs, roadways, and sidewalks all combine to make it difficult for mature trees to thrive and for new trees to be established. Additionally, trees are sensitive to disturbances, such as nearby construction and maintenance activities. As such, thoughtful planning and oversight is required to protect the tree infrastructure along Eastern Parkway.

As one of the first steps in the Eastern Parkway Planning Study, a thorough arboreal evaluation of the existing trees along the parkway was undertaken. This evaluation began with obtaining the existing tree inventory of Eastern Parkway, which is maintained by Louisville Metro Parks. Upon receipt of the inventory, it was understood that the inventory had not been updated for several years. As such the species, size, and location of all trees were either verified or updated during this study in the case of inaccuracies or out-of-date information in the original inventory. In addition to the objective tree specimen species, size, and location data that was collected, a professional assessment of tree condition was provided using terms consistent with the original inventory. 1199 trees were inventoried and assessed as a part of this study.

SPECIES

The two most commonly found species of trees on Eastern Parkway were found to be Acer saccharum (Sugar maple) and Quercus palustris (Pin oak). The fifteen most frequent tree species found along Eastern Parkway are included in Table 3.1.

Acer saccharum (Sugar maple)

Quercus palustris (Pin oak)

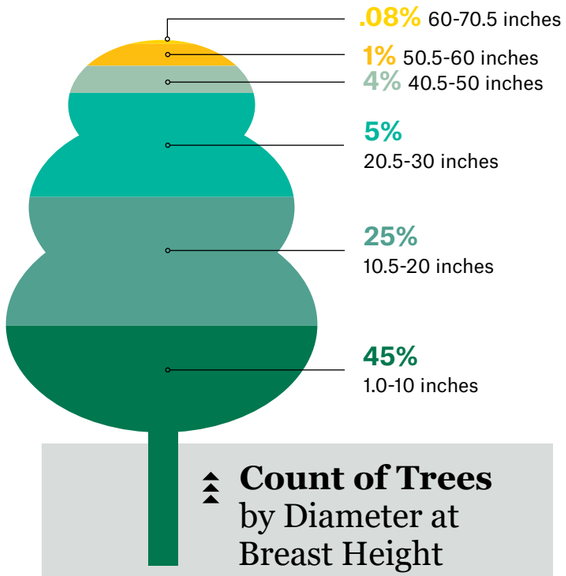
Top 15
Most Frequent Tree Species on Eastern Parkway

Tree Species	Count
Acer saccharum (Sugar maple)	**237**
Quercus palustris (Pin oak)	**159**
Acer rubrum (Red maple)	**56**
Quercus rubra (Northern red oak)	**43**
Quercus bicolor (Swamp white oak)	**39**
Quercus lyrata (Overcup oak)	**37**
Quercus coccinea (Scarlet red oak)*	**35**
Quercus muehlenbergi (Chinkapin oak)	**35**
Quercus macrocarpa (Bur oak)	**32**
Cornus florida (Flowering dogwood)*	**31**
Quercus shumardi (Shumard red oak)	**26**
Fraxinus pennsylvanica (Green ash)*	**24**
Quercus imbricaria (Shingle oak)	**24**
Quercus velutina (Black oak)	**24**
Quercus alba (White oak)	**23**

Table 3.1 *Top 15 Most Frequent Tree Species on Eastern Parkway*
**Poor Species Selection (genus or species that are not in accordance with the original Olmstedian design)*

SIZE

Second, tree size was measured by capturing the diameter-at-breast-height in inches. The largest tree measured on Eastern Parkway was a Quercus palustris (Pin oak) which measured at a 70.5"; this was the only tree to measure greater than 60". The average DBH measured was 15.0", but the most frequently measured tree DBH was 2.0". Approximately half of the trees (45%) on Eastern Parkway measured 10.0" DBH or smaller, and approximately half of the trees (44%) measured between 10.5"-20.0." Table 3.1 and 3.2 summarize the counts of tree diameter-at-breast-height measurements collected during this study.



Count of Trees by Diameter at Breast Height

DBH Range	Count	Percent
1.0"-10"	546	45.50%
10.5"-20"	294	24.50%
20.5"-30"	238	19.83%
30.5-40"	62	5.17%
40.5"-50"	50	4.17%
50.5"-60"	9	0.75%
60"-70.5"	1	0.08%

Table 3.2 *Count of Tree DBH Measurements*

CONDITION

Most trees (87%) were found to be in Fair or better condition. A summary of the condition ratings for the inventoried trees can be found in Table 3.3.

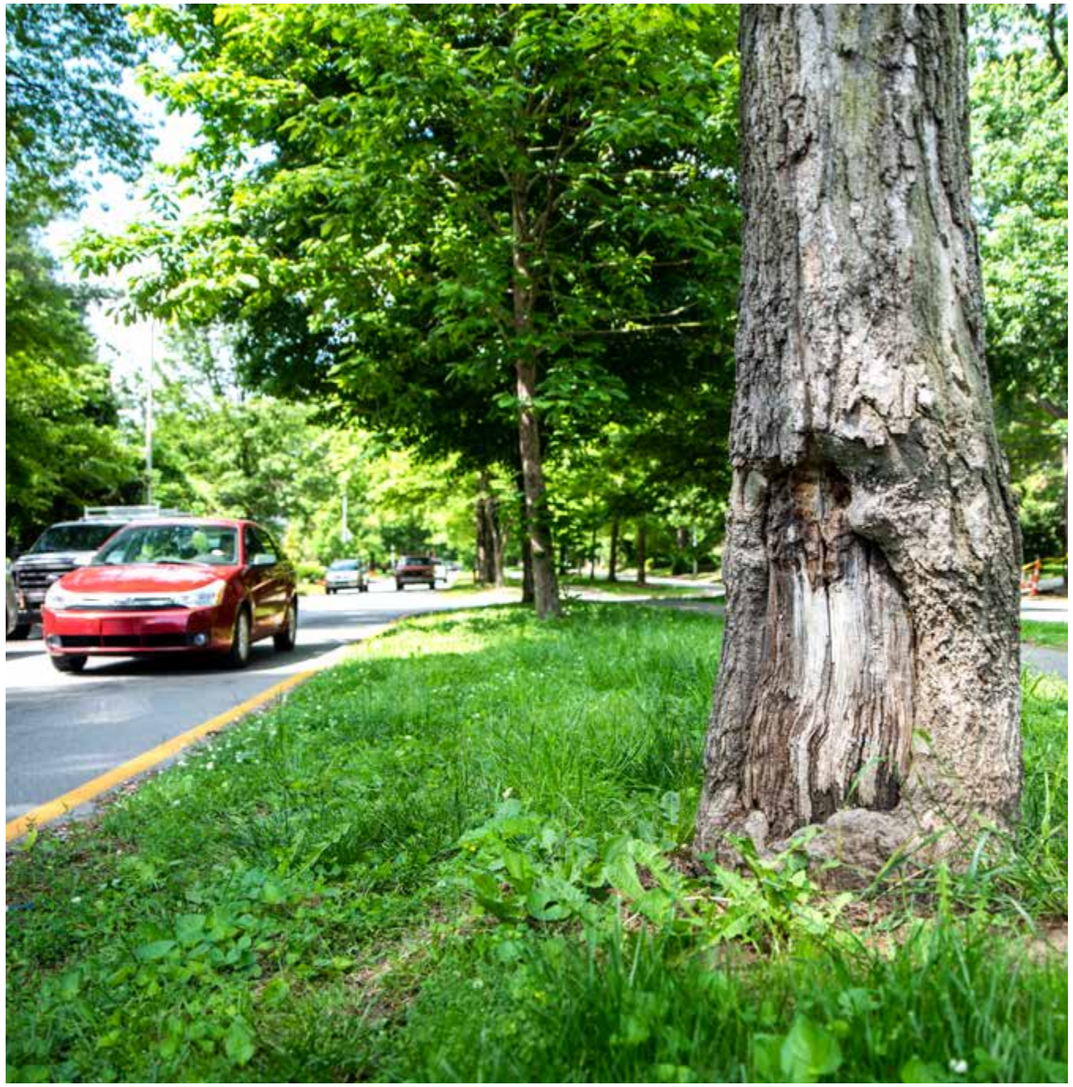
A thorough review of the existing condition for each of the trees along Eastern Parkway was conducted, with the numeric results included in Table 3.4. Trees were evaluated for an abnormal root system, auto damage, curb damage, extensive decay, girdling roots, potentially hazardous condition, history of limb failure, poor placement, poor species selection, tip dieback, and a weak crotch. An abnormal root system is a root system that has not developed with normal radial support roots that may or may not affect the life span or health of the tree. Auto damage is damage at the base of the tree leaving a wound that can affect the condition of the tree. Curb damage is damage to the concrete curbing due to the root growth that could affect stability of the entire tree. Extensive decay is decay present that is in excess of fifty percent. Girdling roots are roots that encircles the base of the trunk causing restriction through the tree's vascular tissue. A potentially hazardous tree is a tree in poor condition that could fall causing damage or harm. Tress with a history of limb failure are trees that have lost limbs in the past and should be monitored or pruned. Trees with poor placement are trees planted in the areas along the parkway that can block sight lines or are not in accordance with the original Olmstedian design. Poorly selected tree species are trees with a genus or species that are not in accordance with the original Olmstedian design. Also inventoried was a tip dieback of a tree's canopy, which indicates poor health or decline and trees with structurally weak crotches with included bark that are prone to splitting.

Table 3.3 *Tree condition rating*

Condition Rating	Total	% of Trees Assessed
Good	647	54%
Good-Fair	116	10%
Good-Poor	1	0.08%
Fair	285	24%
Fair-Poor	54	5%
Poor	95	8%
Dead	1	0.08%

Table 3.4 *Tree condition-type inventory*

Condition Type	Total	% of Trees Assessed
Abnormal Root System	27	2%
Auto Damage	111	9%
Curb Damage	96	8%
Extensive Decay	46	4%
Girdling Roots	131	11%
Hazardous	3	0%
History of Limb Failure	53	4%
Poor Placement	1	0%
Poor Species Selection	92	8%
Tip Dieback	51	4%
Weak Crotch	124	10%

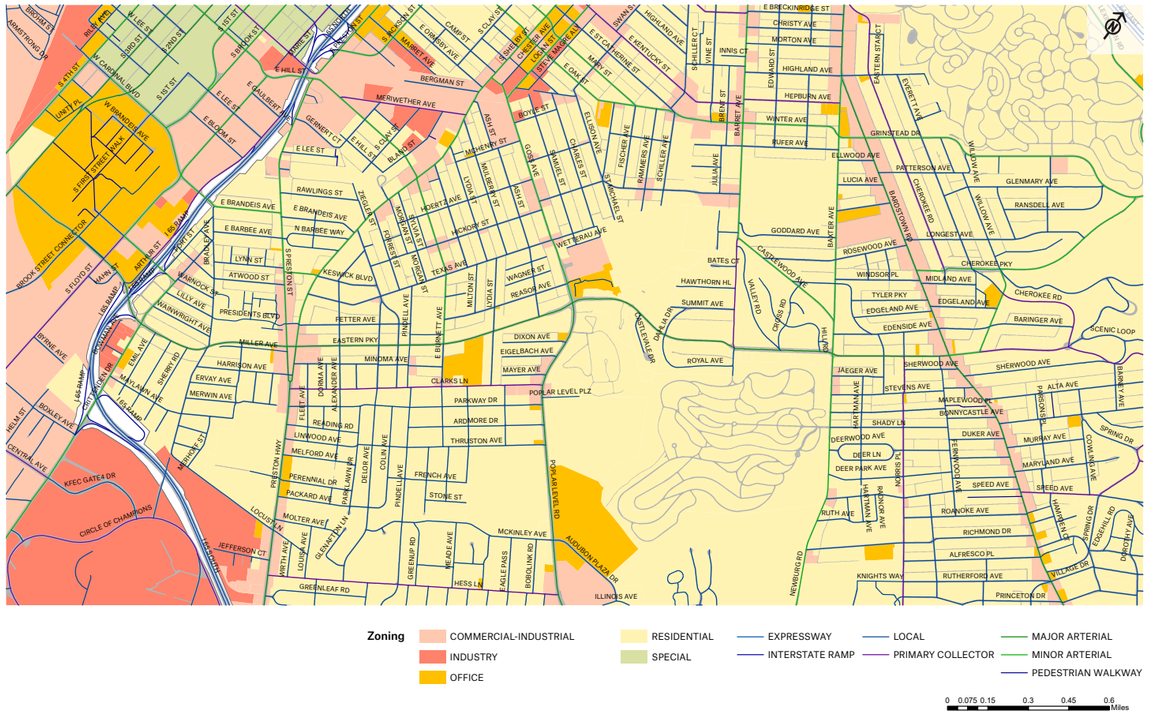


VII. Zoning, Form Districts, and Land Use

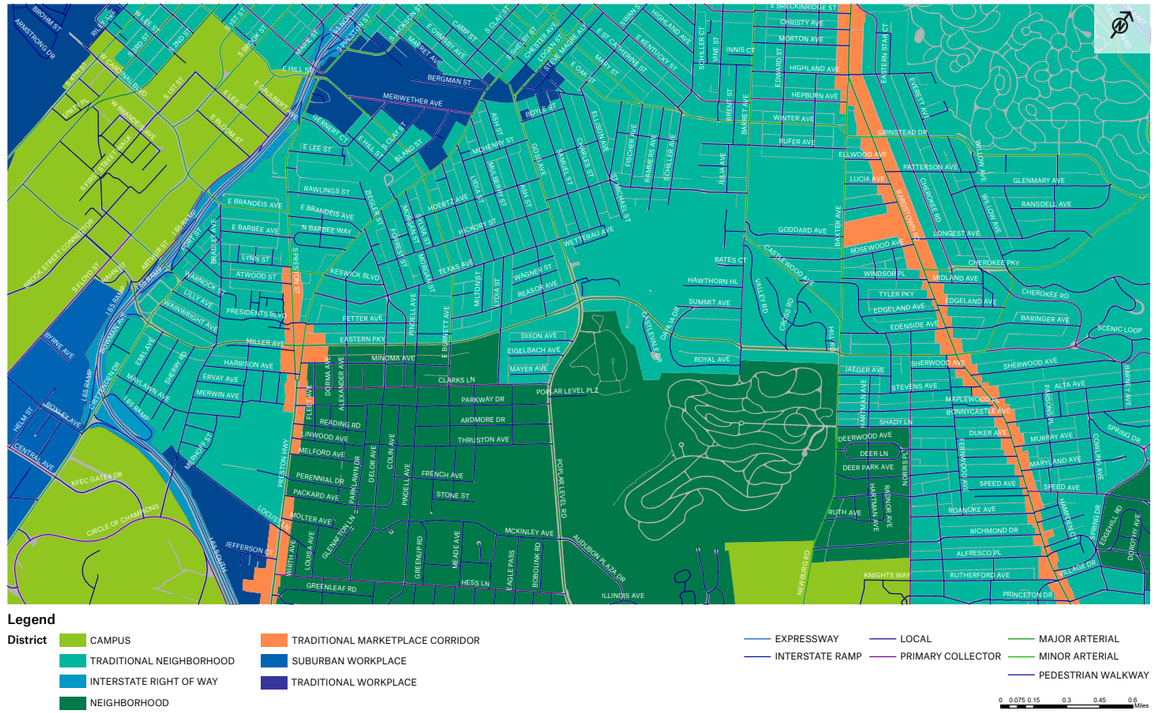
Zoning along Eastern Parkway administers the types of land use that may occur along the parkway. While the parkway is primarily zoned as a residential corridor, there are three notable areas that are zoned as Commercial-Industrial: the Bardstown Road Corridor, the S. Preston Street and S. Shelby Street corridor, and the area south of Eastern Parkway between Crittenden Drive and Hahn Street.

There are a few small areas designated with Office zoning. Larger concentrations of Office zoning are located at Poplar Level Road on the northeast corner, on the south side of the Parkway between Lydia Street and E. Burnett Avenue, and the north side of the Parkway between I-65 and Hahn Street.

Eastern Parkway **Zoning**



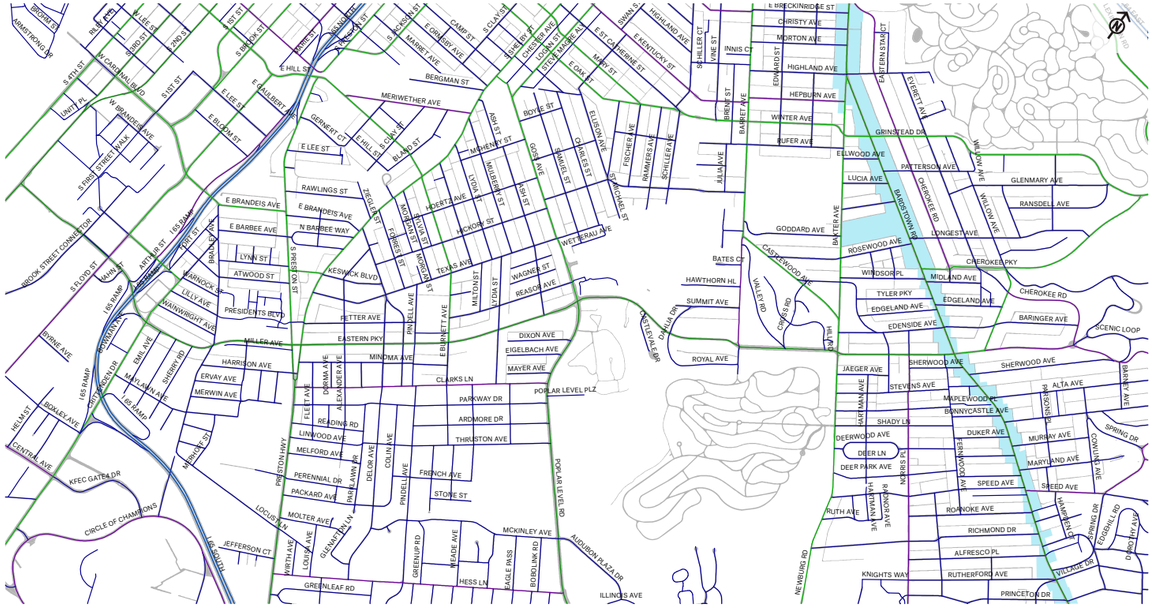
Eastern Parkway **Form Districts**



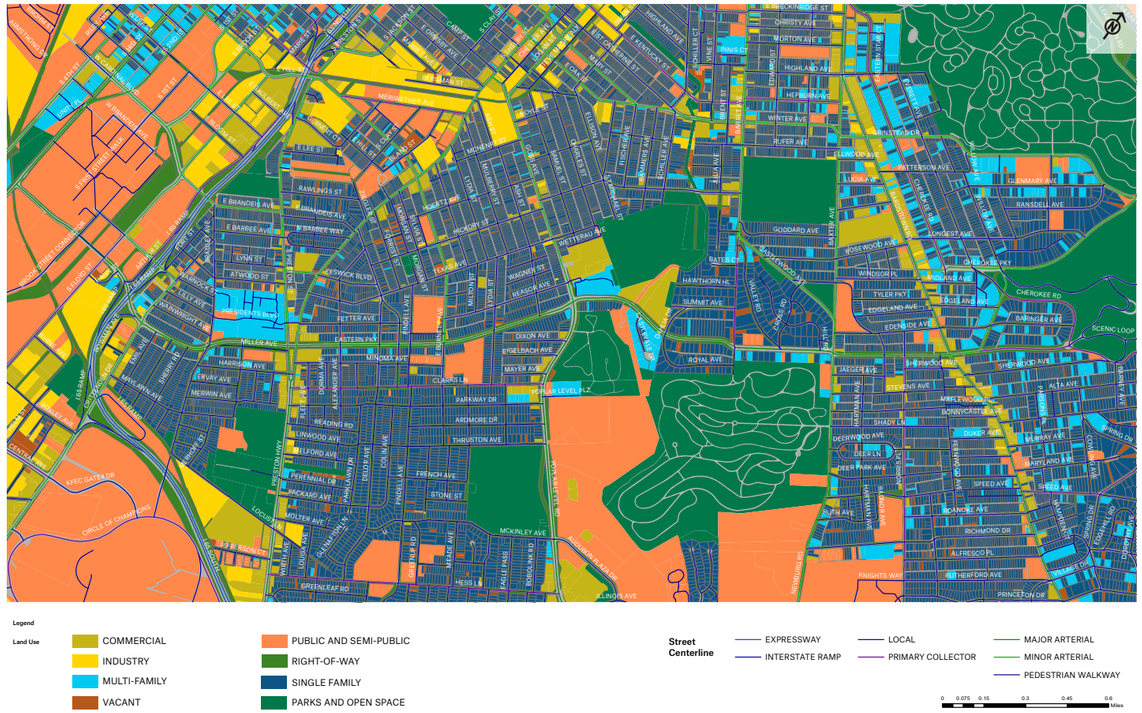
Form Districts place additional guidelines on property design, such as building facades and setbacks, along with commercial signage placement and design. While Form Districts vary along the parkway, most of the parkway (between Cherokee Circle and I-65) is under a Neighborhood or Traditional Neighborhood Form District jurisdiction. This is expected, given the residential nature of the parkway. Two segments of Eastern Parkway, however, are under the jurisdiction of the Traditional Marketplace Corridor Form District: the Bardstown Road segment and the S. Preston/S. Shelby segment. These two segments closely follow the boundaries of the Commercial-Industrial zoning areas as well. West of I-65, the areas on both sides of the parkway are in the Campus Form District for the University of Louisville properties.

Along with the different zones and form districts present along Eastern Parkway, there is an additional building and property design overlay for the Bardstown Road Corridor which establishes additional building and property design within the overlay boundaries. This is the only overlay that crosses the parkway. Eastern Parkway itself does not have a parkway-specific overlay regulating property design such as building facades, building setbacks, and signage design and placement.

Eastern Parkway **Zoning**



Eastern Parkway **Land Use**

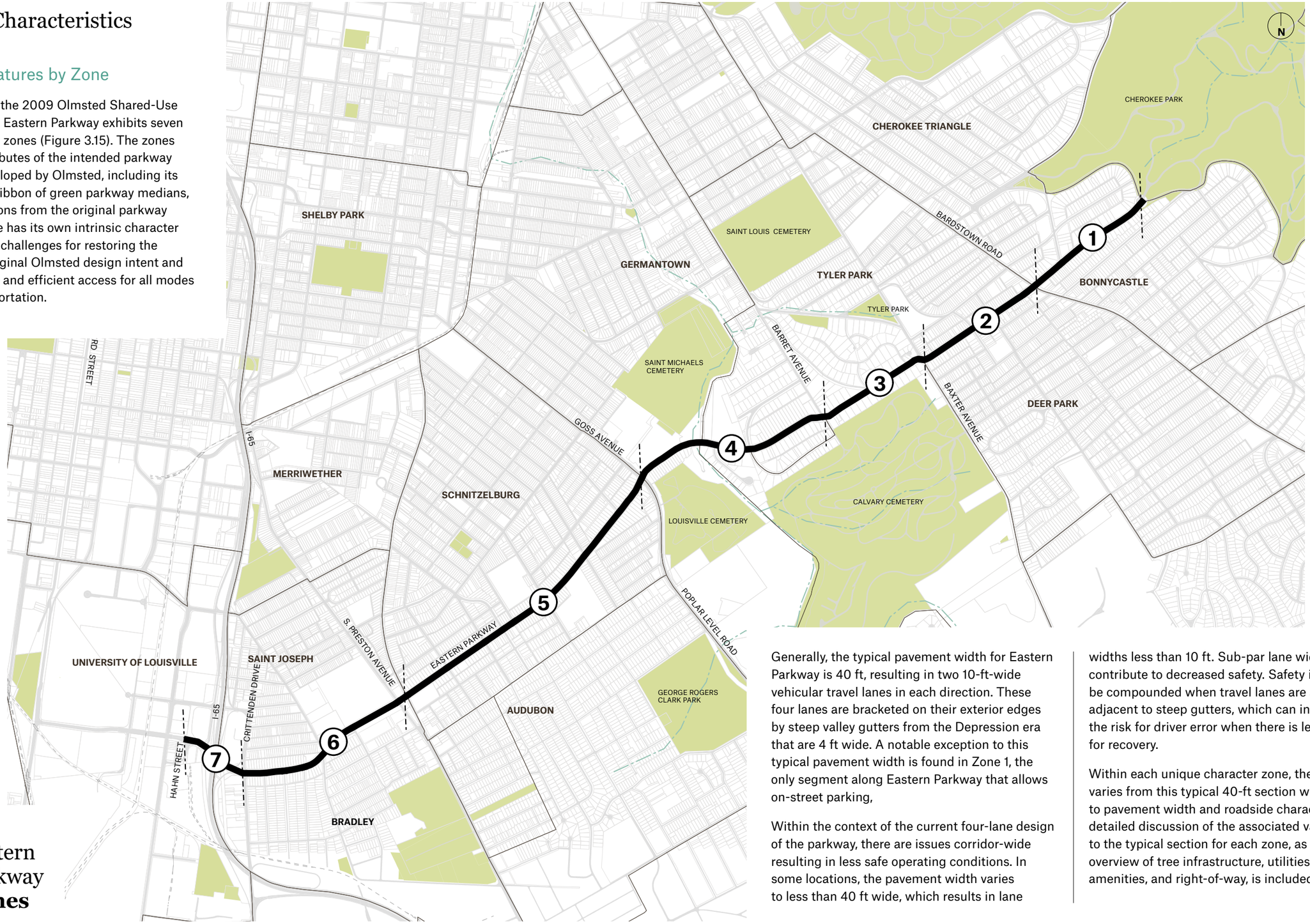


Specific land use along the corridor varies; however, single-family and multi-family housing are the primary land use on Eastern Parkway, this is not surprising due to the overall zoning of the corridor. Pockets of commercial and public properties are generally concentrated towards the commercial corridors of Bardstown Road, Poplar Level Road, and S. Preston Street/S. Shelby Street, although some pockets of these land uses are interspersed in the residential areas as well. Very little industrial land use is found on Eastern Parkway, and is concentrated in Zone 7 near the I-65 interstate corridor.

Roadway Characteristics

I. General Features by Zone

As established in the 2009 Olmsted Shared-Use Path Master Plan, Eastern Parkway exhibits seven distinct character zones (Figure 3.15). The zones reflect many attributes of the intended parkway character as developed by Olmsted, including its tree canopy and ribbon of green parkway medians, as well as deviations from the original parkway design. Each zone has its own intrinsic character and faces unique challenges for restoring the corridor to the original Olmsted design intent and for providing safe and efficient access for all modes of modern transportation.



Eastern Parkway **Zones**

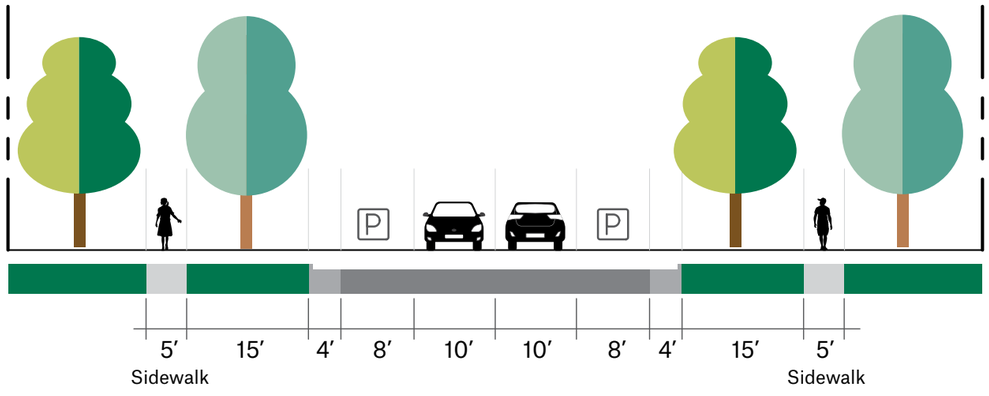
Figure 3.15 *Eastern Parkway Zones*

Generally, the typical pavement width for Eastern Parkway is 40 ft, resulting in two 10-ft-wide vehicular travel lanes in each direction. These four lanes are bracketed on their exterior edges by steep valley gutters from the Depression era that are 4 ft wide. A notable exception to this typical pavement width is found in Zone 1, the only segment along Eastern Parkway that allows on-street parking,

Within the context of the current four-lane design of the parkway, there are issues corridor-wide resulting in less safe operating conditions. In some locations, the pavement width varies to less than 40 ft wide, which results in lane widths less than 10 ft. Sub-par lane widths can contribute to decreased safety. Safety issues can be compounded when travel lanes are situated adjacent to steep gutters, which can increase the risk for driver error when there is less room for recovery.

Within each unique character zone, the parkway varies from this typical 40-ft section with respect to pavement width and roadside character. A detailed discussion of the associated variations to the typical section for each zone, as well as an overview of tree infrastructure, utilities, roadside amenities, and right-of-way, is included.

ZONE 1:
CHEROKEE PARK TO
BARDSTOWN ROAD



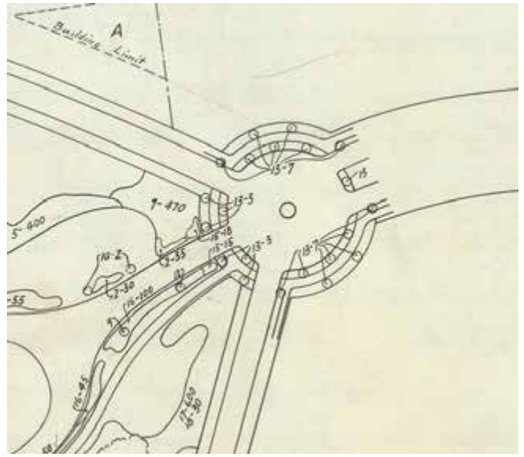
Zone 1 ExistingTypical Section
Two 10' travel lanes, two 8' parking lanes, 4' shoulder, 15' verge, and 5' sidewalk

This segment of Eastern Parkway, located between Cherokee Park and Bardstown Road, adheres closely to the original Olmsted vision for the corridor. Notably, Zone 1 is the only zone that contains on-street parking on Eastern Parkway, extending from Cherokee Park to Bardstown Road. A residential segment of Eastern Parkway, Zone 1 features the parkway's desirable green ribbon with a double row of trees. While it does provide direct access to Cherokee Park through a traffic circle, a clearly defining gateway feature for the park entrance is not present. Further, the existing traffic circle, which matches the historical documentation of the design of the circle as seen in Figure 3.16, is much larger than a modern roundabout. Because of its size, it is currently used primarily for parking. When observing the traffic patterns around the circle, traffic does not operate as it would in a modern roundabout design. This is because it does not provide a clear direction to motorists driving through the circle. Additionally, the lack of deflection through the circle encourages higher rates of speed through the intersection.

The right-of-way along this segment of Eastern Parkway is 120 ft, and the entire northern side of this segment is located in the Historic Preservation District. There are 5-ft-wide sidewalks located on both sides of the parkway, with large verges (strips of grass or plantings between a road and sidewalk) that support tree infrastructure. Overhead utilities are located behind the houses until the approach to the signal at Bardstown Road. Where alleys exist, the utilities are located in the alley right-of-way.

Sanitary sewer is located on the south side of Eastern Parkway. At Willow Avenue, the sanitary sewer connects with additional sewer facilities on the north side of the road, and transitions to run down the centerline of Eastern Parkway to Bardstown Road. Separate stormwater drainage facilities are located east of Willow Avenue on the south side of the parkway, parallel to the sanitary sewer system. Just east of Willow Avenue, the stormwater drainage facilities are connected to the combined sewer system, and inlets are located typically at side streets and other locations with points of connection with the main combined sewer line.

The US 60A designation on Eastern Parkway begins at Willow Avenue, and it continues for the remainder of the corridor to S. 3rd Street. At Bardstown Road, the Olmstedian parkway character begins to erode as the roadway transitions into a four-lane cross section without on-street parking. Although only one westbound Eastern Parkway lane travels through the intersection



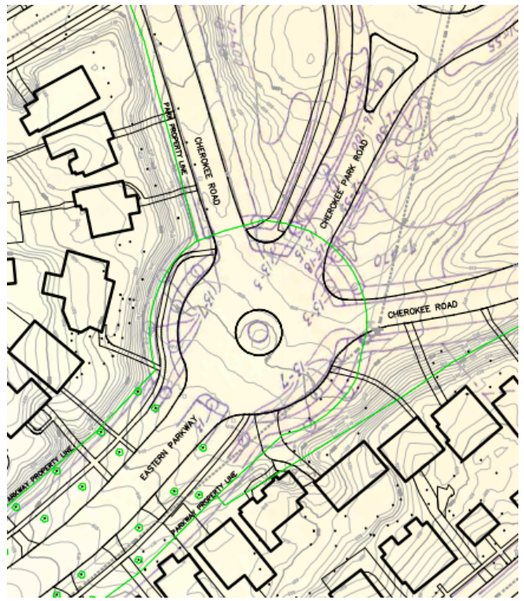


Figure 3.16 *Original layout of Cherokee Circle (top) overlaid with existing LOJIC data (bottom).*

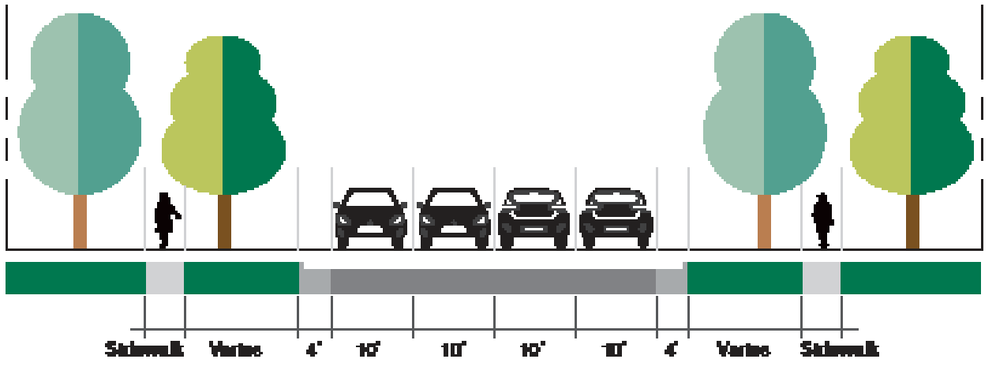
at Bardstown Road, two receiving lanes are provided on the west side of the intersection.

Eastbound and westbound bus stops in Zone 1 are located at Willow Avenue, with an additional eastbound stop at Cherokee Circle. The only accessible stop is the eastbound stop at Willow Avenue, and none of the stops contain a shelter or any other stop amenities.

Eastern Parkway **Zone 1**

Figure 3.17 *Zone 1 layout detailing parkway right-of-way, parcels, transit stops, sewer and drainage utilities.*

ZONE 2:
BARDSTOWN ROAD TO
BAXTER AVENUE



Zone 2 Existing Typical Section
Four 10' travel lanes, 4' shoulder, planted verge (width varies), and 5' sidewalk

The four-lane cross section continues from Bardstown Road to Baxter Avenue with two 10-ft travel lanes in each direction and 4-ft valley gutters on each side. While the parkway right-of-way is still 120 ft, in many cases the right-of-way is at the front of the residential structure on the property. This is further complicated with the businesses located on the northeast corner of the Eastern Parkway and Baxter Avenue intersection, where parking is also located in the parkway right-of-way. 5-ft sidewalks are still present on both sides of the parkway. The verge, however, has decreased dramatically from 14 ft to approximately 6 ft, and the inner row of trees are both crowded against the roadway and in conflict with overhead utilities. The reduced verge, gaps in the existing double row of trees, and conflicts with overhead utilities greatly reduce the Olmsted effect in this segment of the parkway.

Between Bardstown Road and Norris Place, overhead utilities exist on both sides of the parkway within the parkway right-of-way, and they continue on the north side of the parkway all the way to Baxter Avenue. From Norris Place to Baxter Avenue, the overhead utilities on the south side of Eastern Parkway are located behind the houses and in alley right-of-way, where they exist. Additionally, there are overhead utility crossings over Eastern Parkway between Norris Place and Quadrant Avenue.

Combined sewer facilities are located on the centerline of Eastern Parkway between Bardstown Road and Quadrant Avenue, then cross Eastern Parkway to the north and south to transition to the alleys. Stormwater drainage inlets are located sporadically on each side of the parkway, typically at side streets and points of connection with the main combined sewer line.

Eight bus stops are located throughout the zone; however, the only ADA accessible stops are located eastbound and westbound at Bardstown Road and westbound at Baxter Avenue. Bus stop amenities are sparse. Both of the Bardstown Road stop locations contain trash cans, but only the westbound Bardstown Road stop contains a shelter and bench. No other stops contain amenities.

Eastern Parkway
Zone 2

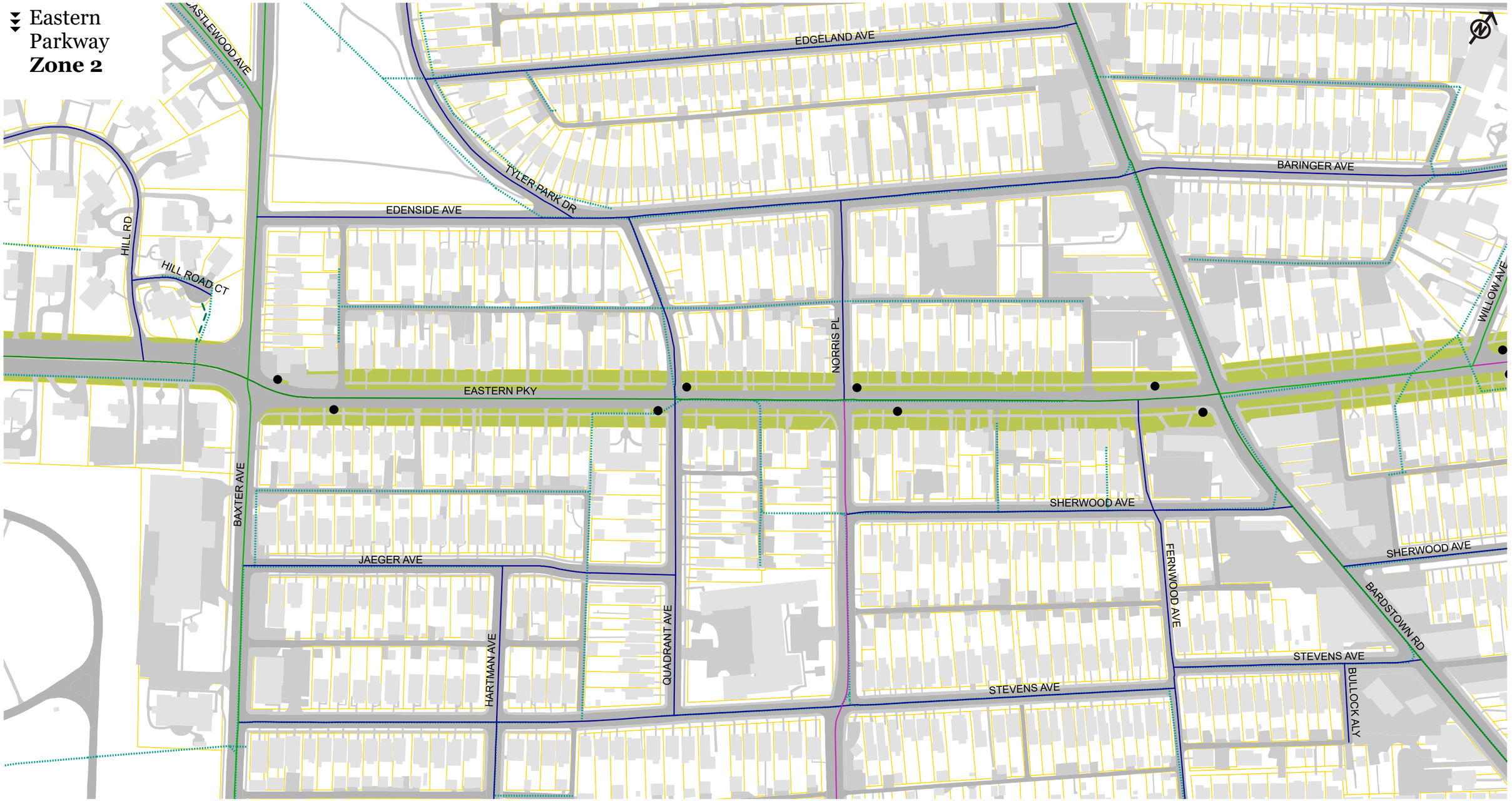
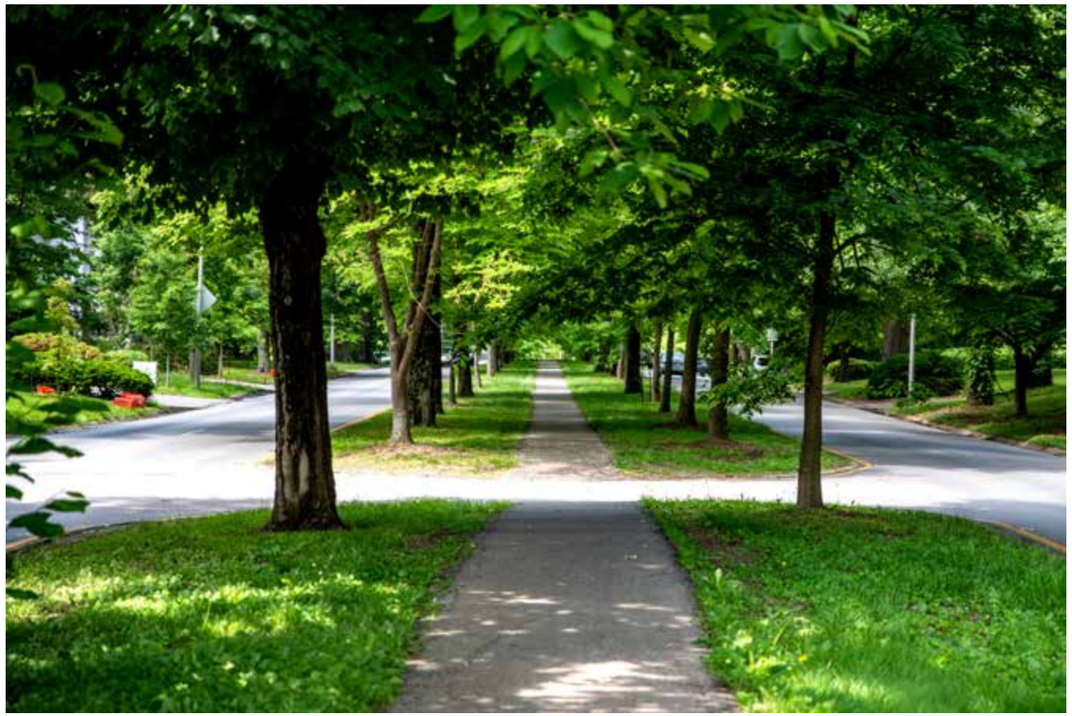
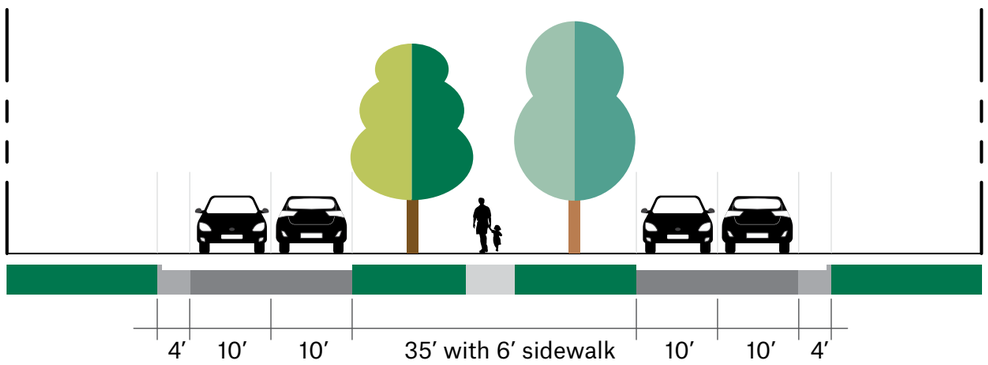


Figure 3.17 *Zone 2 layout detailing parkway right-of-way, parcels, transit stops, sewer and drainage utilities..*

ZONE 3:
BAXTER AVENUE TO
BARRET AVENUE





Zone 3 Existing Typical Section
Two 10′ travel lanes with 4′ shoulder on either side of 35′ center median with 6′ sidewalk

At Baxter Avenue, Eastern Parkway divides around a wide median, with two 10-ft travel lanes in each direction and 4-ft valley gutters on the outside lanes on each side. This segment is also residential, but it is less dense than in previous zones. A 6-ft-wide asphalt walking path is located in the center median from Baxter Avenue to Barret Avenue, and the path is only accessible at Baxter Avenue from the southwest corner of the intersection with Eastern Parkway. This 6-ft path is not a sufficient width to be considered a multi-use path. A verge 15-ft-wide is located on either side of the walking path with a row of trees in each verge, creating a 36-ft-wide green median. In most instances, only a single row of trees exists between the edge of the right-of-way and the edge of the road infrastructure. While the median section deviates from the original Olmsted vision of a double row of trees flanking the parkway without a center median, the inclusion of a row of trees to either side of the parkway and the double row of trees on the median contribute significantly toward the overall vision of a ribbon of green.

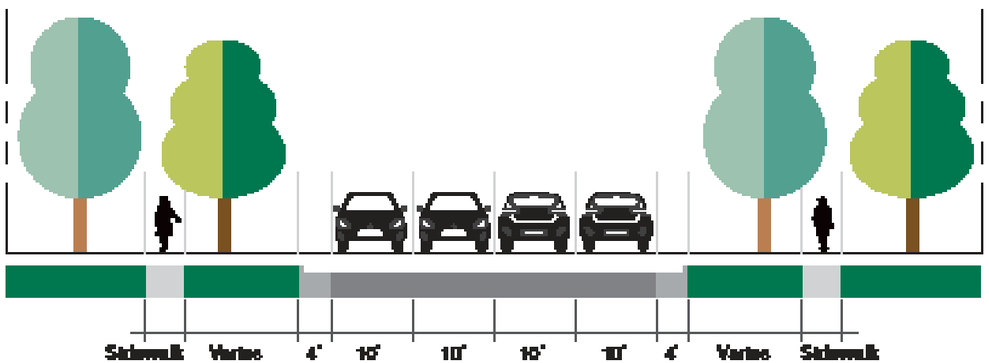
Right-of-way is less wide through this segment than in other locations, at only 100 ft. Overhead utilities are primarily located behind the houses along this segment, with some utility crossings over Eastern Parkway. Combined sewer facilities cross Eastern Parkway near Baxter Avenue, and they run along the curb line on the south side of the parkway. An additional combined sewer crossing is located at the intersection of Valley Road, and the sewer continues along the south side curb line until Barret Avenue. Stormwater drainage inlets are located sporadically on each side of the parkway, typically at side streets and points of connection with the main combined sewer line.

Eastbound bus stops are located at Baxter Avenue and Cross Road, with westbound stops located at Barret Avenue and Cross Road for a total of four stops in this zone. The eastbound Baxter Avenue and westbound Barret Avenue stops are the only ADA accessible stops. None of the stops contain shelters, and while the Barret Avenue stop is near both a trash can and bench, those amenities are not visible from the bus stop location and and are not within the sightline of the bus driver when making a stop.

Eastern Parkway **Zone 3**

Figure 3.18 *Zone 3 layout detailing parkway right-of-way, parcels, transit stops, sewer and drainage utilities.*

ZONE 4:
BARRET AVENUE TO
POPLAR LEVEL ROAD (GOSS AVENUE)



Zone 4 Existing Typical Section
Four 10' travel lanes, 4' shoulder, planted verge (width varies), and 5' sidewalk

From Barret Avenue to Dahlia Drive, this segment is residential. From Dahlia Drive to Poplar Level Road (Goss Avenue), the north side of Eastern Parkway transitions to mixed commercial and multifamily residential. The divided roadway with median ends at the Barret Avenue intersection, and the parkway converges into a 40-ft-four-lane cross section with 4-ft valley gutters from Barret Avenue to Castlevale Drive.

The portion of this zone between Barret Avenue and Dahlia Drive adheres well to the original Olmsted vision. The overall effect, however, is compromised between Dahlia Drive and Polar Level Road. Many of the trees on both sides of the parkway are notably missing, and wide stretches of paved parking lots disrupt the continued parkway effect. Additionally, the multimodal connections are lacking throughout the zone.

At Castlevale Drive, the pavement cross section transitions to a 40-ft pavement width with standard curb and gutter, in preparation for the introduction of a median west of Beargrass Creek on the approach to the intersection of Poplar Level Road (Goss Avenue) and Eastern Parkway. The pavement width expands greatly at this intersection to accommodate two 11-ft westbound through travel lanes, a westbound 11-ft left-turn bay, a westbound 12-ft right-turn bay, 5-ft concrete median, and two 10-ft eastbound receiving lanes.

Sidewalk is only located on the north side of Eastern Parkway in this segment, with a brief exception on the Beargrass Creek Bridge which includes a short segment of sidewalk from Castlevale Drive. In front of the Medical Arts Building and the Gardens of Eastern Parkway condominiums, located at the corner of Eastern Parkway and Goss Avenue, the sidewalk is located outside public right-of-way. The sidewalk is generally 5-ft-wide, with a notable exception at the newly constructed Beargrass Creek Bridge where it widens into an 8-ft path as it crosses the creek on a pedestrian bridge. The sidewalk narrows back down to 5 ft wide on the other side of the adjacent entrance.

The verge between the sidewalk and edge of pavement is wider through this section, typically 14 ft, with narrower exceptions at the Medical Arts Building and the approach of the intersection at Poplar Level Road (Goss Avenue).

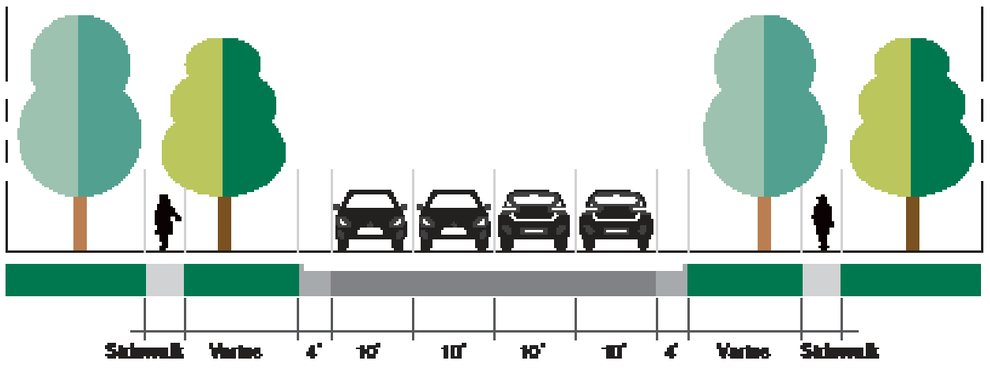
Right-of-way in this zone resumes the typical 120-ft width at Barret Avenue, and overhead utilities are generally located behind houses. Between Barret Avenue and Dahlia Drive, overhead utilities are located in the alleys to either side of Eastern Parkway. Combined sewer is located on both sides of Eastern Parkway within the parkway right-of-way from Barret Avenue to Dahlia Drive,. At Dahlia Drive, the southern line crosses the parkway and continues on the north side within parkway right-of-way to the corner of the Gardens of Eastern Parkway condominiums property, where it follows the property line outside of parkway right-of-way and then turns away from Eastern Parkway entirely. Sanitary sewer on the south side of the parkway is located behind the houses in this segment between Dahlia Drive (Royal Avenue) and Poplar Level Road (Goss Avenue). Stormwater drainage inlets are located sporadically on each side of the parkway, typically at side streets and points of connection with the main combined sewer line.

Five bus stops are located in this zone, with eastbound and westbound stops at Castlevale Drive and Dahlia Drive (Royal Avenue) and an eastbound stop at Barret Avenue. Both stops at Castlevale Drive are ADA accessible, as is the westbound stop at Dahlia Drive. The westbound stop at Castlevale Drive is the only stop with amenities, and it contains a shelter, bench, and trash can.

Eastern Parkway **Zone 4**

Figure 3.19 *Zone 4 layout detailing parkway right-of-way, parcels, transit stops, sewer and drainage utilities.*

ZONE 5:
POPLAR LEVEL ROAD (GOSS AVENUE) TO
S. PRESTON/S. SHELBY STREETS



Zone 5 Existing Typical Section
Four 10' travel lanes, 4' shoulder, planted verge (width varies), and 5' sidewalk

With a mix of residential and commercial use, this segment of Eastern Parkway feels less a parkway and more a busy thoroughfare. It links two major north-south corridors: Poplar Level Road (Goss Avenue) and Preston Highway. Preston Highway is split into one-way streets, S. Preston Street and S. Shelby Street, two blocks south of Eastern Parkway at Clarks Lane. While the majority of this zone adheres well to the original vision with wide green verges, there is a breakdown of the original Olmsted design intent at the major intersections bracketing this segment. The double row of trees along the roadway is generally intact, but there are holes in the original canopy and trees which have been removed near the intersections. West of the Poplar Level Road (Goss Avenue) intersection, the roadway tapers back down to a four-lane cross section, and the standard curb and gutter converts to the 4 ft wide valley gutters typical to the parkway. Sidewalk resumes on both sides of Eastern Parkway, with a width of 5 ft. Verges near the intersection of Poplar Level Road (Goss Avenue) are narrow at 4-ft-wide and negatively impact both tree health and sidewalk condition. As the 5-ft concrete median at Poplar Level Road (Goss Avenue) terminates just east of Ash Street, the pavement width is narrowed, and the verges extend to 14 ft in width.

Right-of-way continues to be 120 ft. Combined sewer lines are located along the south side of Eastern Parkway, closely following the sidewalk, and in the alleys to the north of the parkway. Overhead utilities are located behind the properties along the parkway, and they are located in the alley right-of-way where alleys exist on the north and south side. Alleys are nearly intact along both sides of this segment of Eastern Parkway, with notable exceptions near Lydia and Ash Streets. Stormwater drainage inlets are located sporadically on each side of the parkway, typically at side streets and points of connection with the main combined sewer line.

Seventeen bus stops are located throughout this zone, with eastbound and westbound stops located at Poplar Level Road (Goss Avenue), Ash Street, Lydia Street, midblock at Kosair Charities, E. Burnett Avenue, Pindell Avenue, Delor Avenue, and S. Shelby Street. There is a single eastbound stop at Alexander Avenue. Of these stops, only the two stops at Poplar Level Road (Goss Avenue), the single eastbound stop at Alexander Avenue, and eastbound S. Shelby Street stop are ADA accessible. Of these ADA accessible stops only the eastbound Poplar Level Road (Goss Avenue) stop and the eastbound S. Shelby Street stops have any amenities, with benches and trash cans at both and a single shelter at the S. Shelby Street stop.

Eastern Parkway **Zone 5**

Figure 3.20 *Zone 5 (1 of 2) layout detailing parkway right-of-way, parcels, transit stops, sewer and drainage utilities.*

Eastern Parkway **Zone 5**

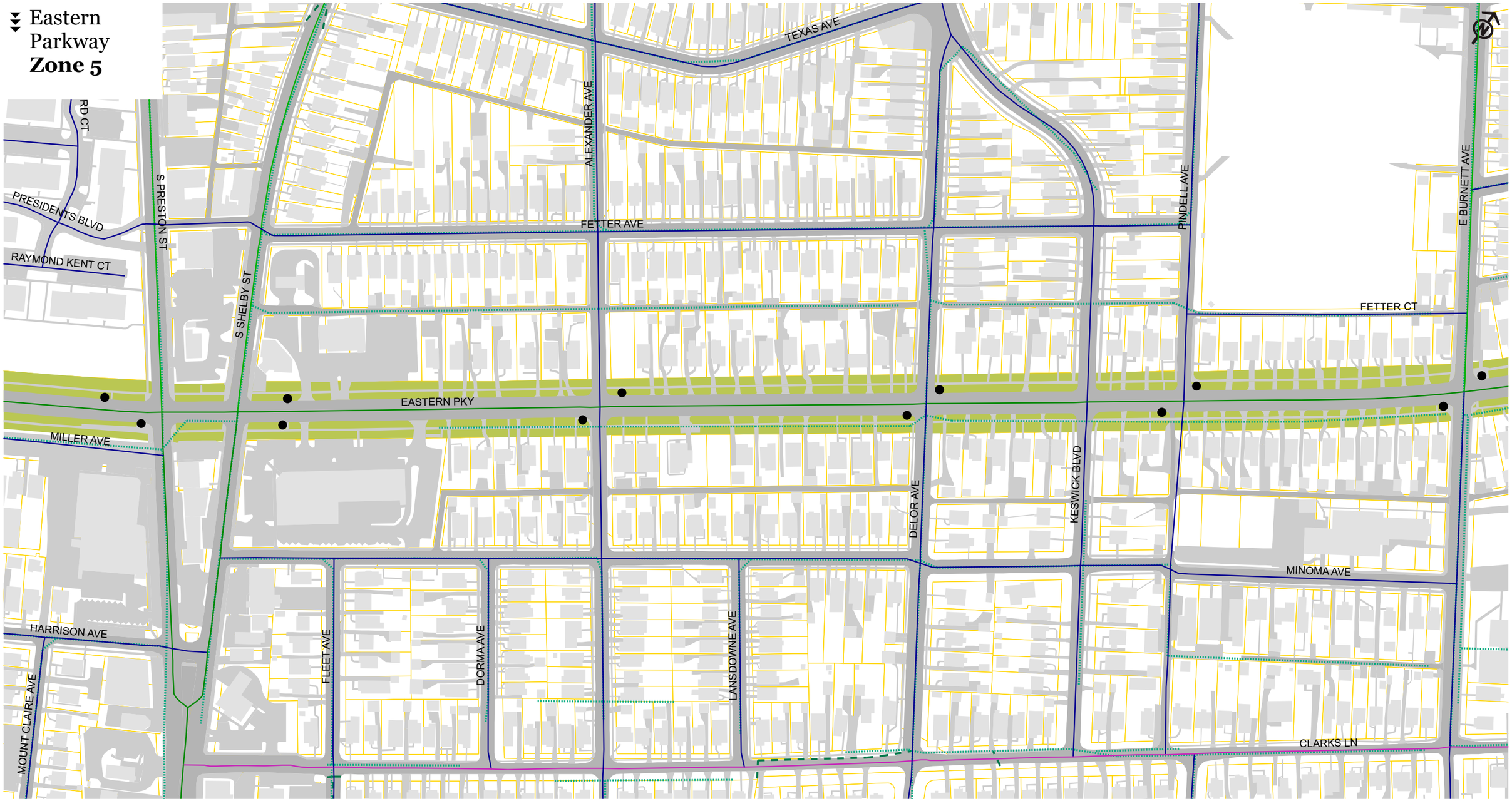
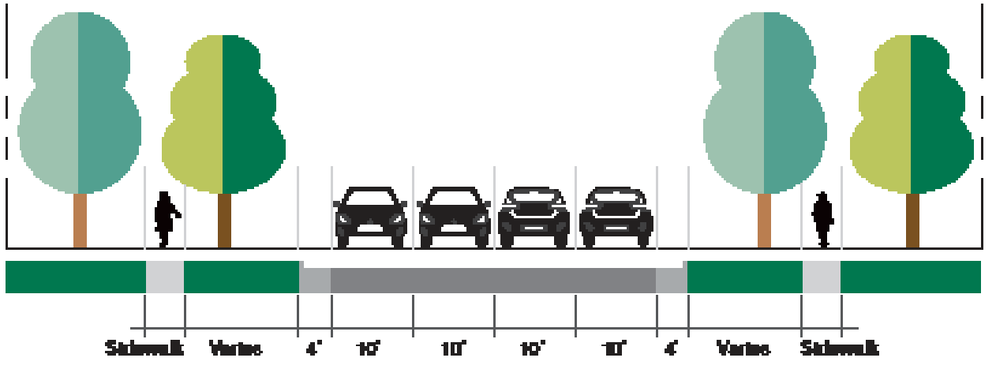


Figure 3.21 *Zone 5 (2 of 2) layout detailing parkway right-of-way, parcels, transit stops, sewer and drainage utilities.*

ZONE 6:
S. PRESTON/S. SHELBY STREETS
TO CRITTENDEN DRIVE



Zone 6 Existing Typical Section
Four 10' travel lanes, 4' shoulder, planted verge (width varies), and 5' sidewalk

Zone 6 of Eastern Parkway is much more commercial than previous segments, although residential housing is also still located along this stretch of the corridor. This segment continues the four-lane cross section, but it is heavily influenced by the split of Preston Highway, the offset intersection of Bradley Avenue, and the interstate access along Crittenden Drive. Due to sightline constraints at the offset intersection of Bradley Avenue, the tree canopy is significantly reduced. The canopy is further reduced at the intersection of Crittenden Drive as the pavement width becomes much wider to accommodate left-turn and right-turn bays, as well as a concrete median. A 5-ft-wide sidewalk is located on both sides of Eastern Parkway, and the verges are typically 14-ft-wide, except at intersections. Even with the wide verges, however, the tree canopy is greatly reduced throughout this segment, and it is directly impacted by the location of Miller Avenue which is parallel to Eastern Parkway and in close proximity to the south edge of the parkway. The overall effect is a significant departure from the original Olmsted vision for a green parkway in this zone. As the pavement widens on the east leg of the intersection with Crittenden Drive, the 4-ft-wide valley gutters transition to a modern-style header curb.

From S. Preston Street to Bradley Avenue, overhead utilities and combined sewer are located south of Eastern Parkway along Miller Avenue. Between Bradley Avenue and Crittenden Drive, overhead utilities and combined sewer are located in the alleys located on both the north and south sides of the parkway. Stormwater drainage inlets are located sporadically on each side of the parkway, typically at side streets and points of connection with the main combined sewer line.

Nine bus stops are located in Zone 6, with eastbound and westbound stops at S. Preston Street, Ellsworth Avenue, Bradley Avenue, and Concord Drive. There is a single eastbound stop at Emil Avenue. The two S. Preston Street stops and the westbound stop at Bradley Avenue are the only ADA accessible stops. While amenities are available at the two S. Preston Street stops, the only other stop with an amenity is located at Emil Avenue, where there is a trash can.

Eastern Parkway **Zone 6**

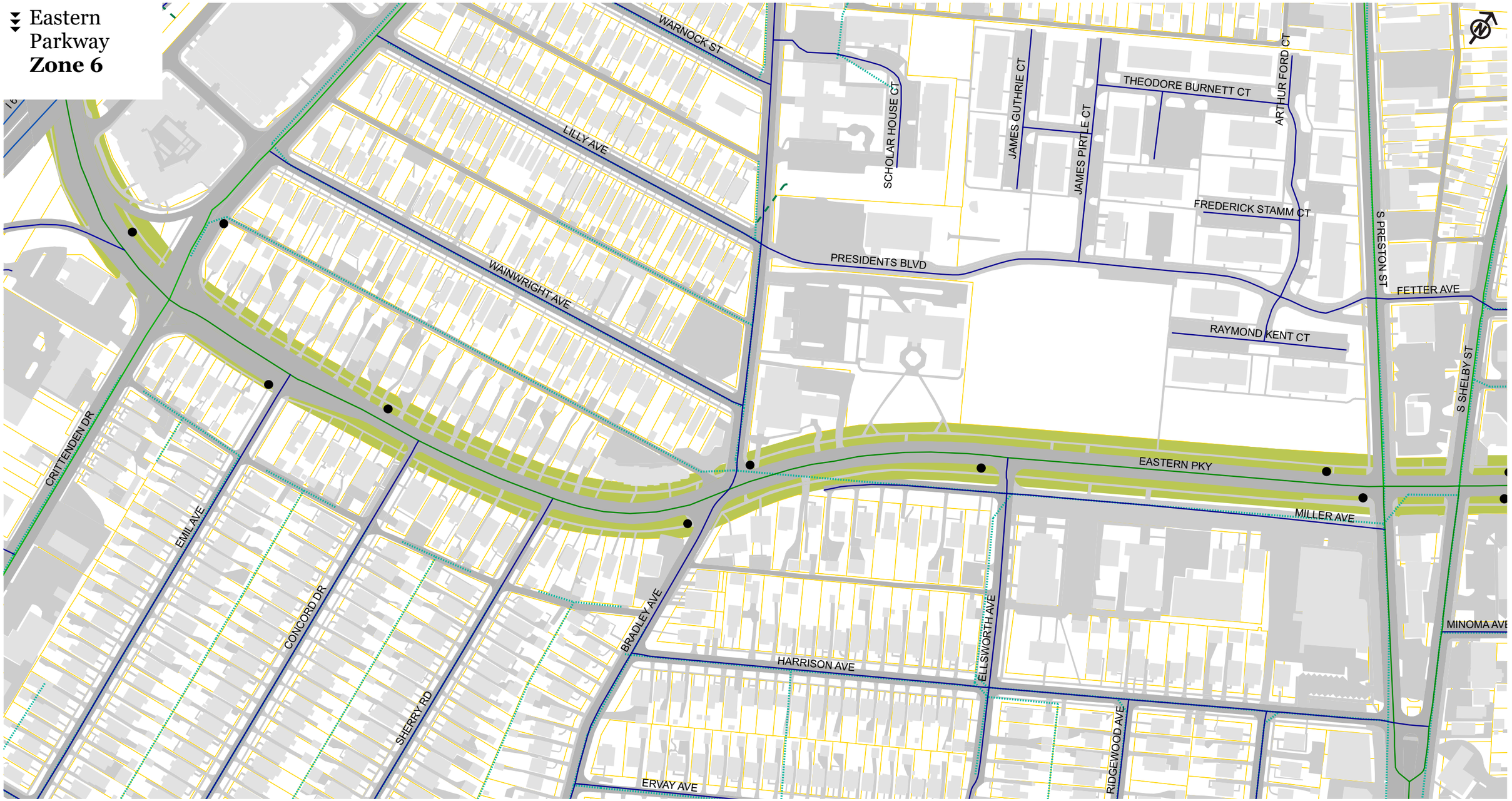
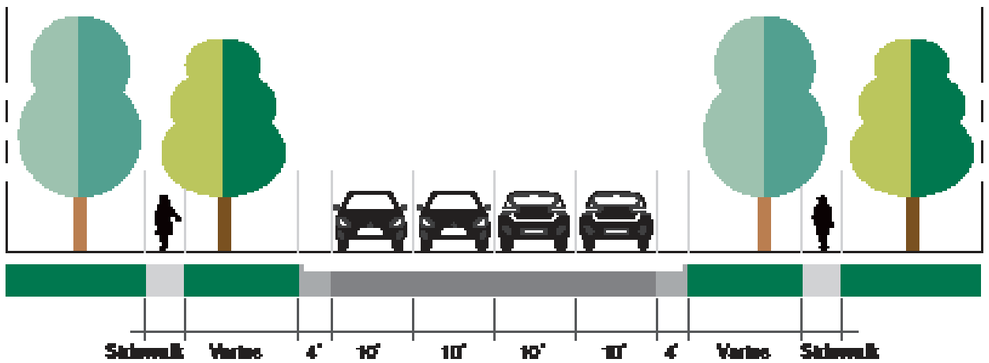


Figure 3.22 *Zone 6 layout detailing parkway right-of-way, parcels, transit stops, sewer and drainage utilities.*

ZONE 7:
CRITTENDEN DRIVE
TO 3RD STREET



Zone 7 Existing Typical Section
Four 10' travel lanes, 4' shoulder, planted verge (width varies), and 5' sidewalk

This complicated zone of Eastern Parkway provides two important points of connection between Crittenden Drive and Hahn Street. First, the parkway is a busy access point to I-65, with access ramps on the south side of Eastern Parkway. Second, the parkway transitions from a four-lane cross section to a two-lane cross section with a median to connect to the University of Louisville campus. This segment is a sharp departure from the original Olmsted vision, with the interstate overpass, inadequate multimodal facilities, and few trees.

Additionally, the pavement width is much wider throughout this segment to accommodate the four-lane cross section to the interstate overpass, as well as right turn and left turn lanes and a median. Sidewalk is located on the south side of the parkway, and a new 10-ft multi-use path is located on the north side. However, the sidewalk located on the south side is not continuous, with a gap between the I-65N access ramp to Eastern Parkway and Crittenden Drive. In addition to the gap in the network, the sidewalk width between the two interstate ramps is in poor condition and only 3 ft wide. This is the only zone of Eastern Parkway containing bike lanes, which are 6 ft wide and continue westward from the end of the study area through to the end of Eastern Parkway at 3rd Street. Additionally, green verges are either unable to support tree growth due to the narrow available width, or they are non-existent due to the sight line requirements at intersections and access ramps.

The 120-ft right-of-way is maintained to Hahn Street, which is the end of the study area. Existing utilities are buried in this section of Eastern Parkway, with a section of combined sewer located on the south side between the interstate and Hahn Street. Stormwater drainage inlets are located sporadically on each side of the parkway, typically at side streets and points of connection with the main combined sewer line.

A single bus stop is located westbound at Crittenden Drive. This stop does not contain any amenities, and it is not considered ADA accessible.

Eastern Parkway **Zone 7**

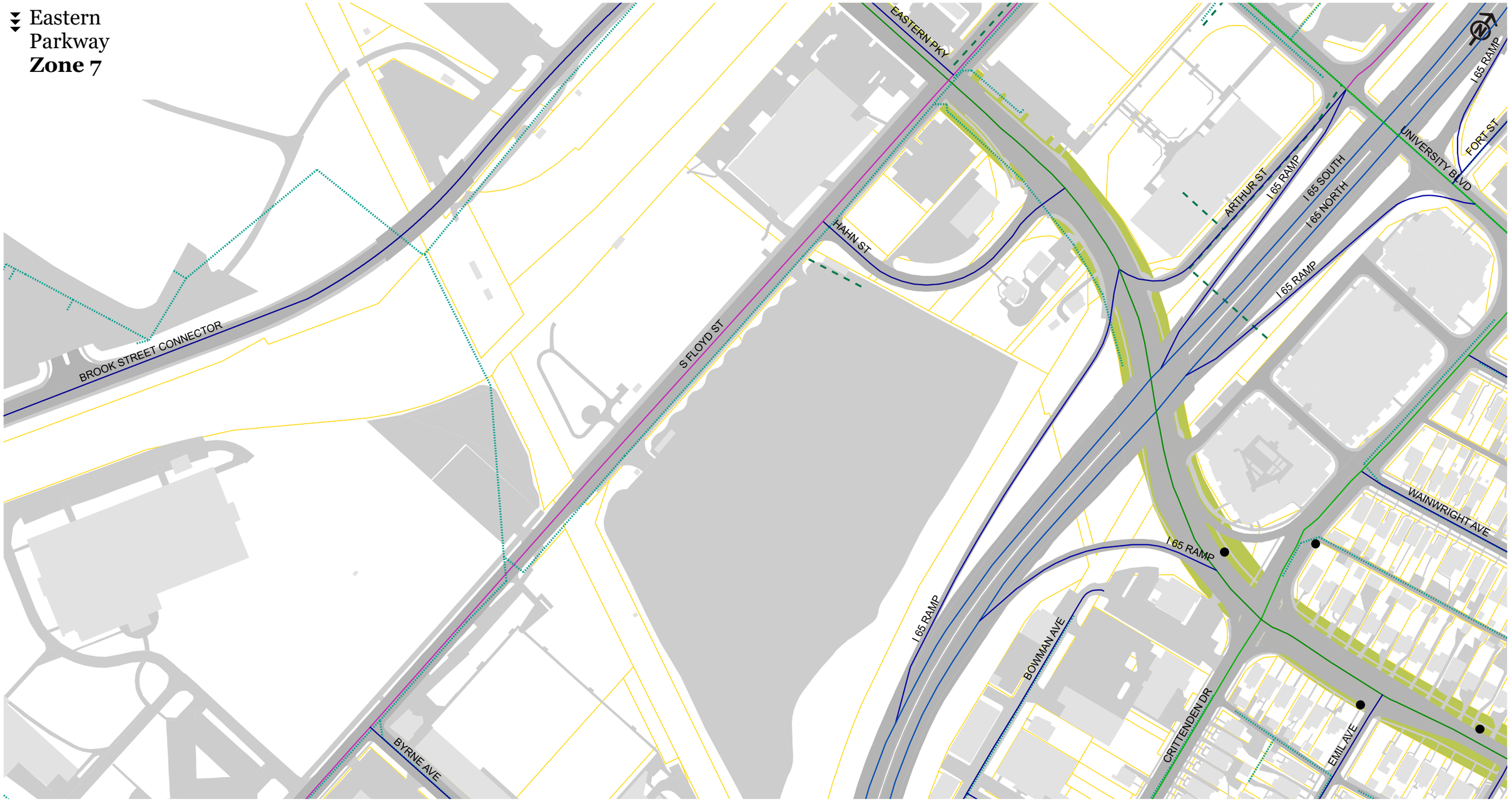


Figure 3.23 *Zone 7 layout detailing parkway right-of-way, parcels, transit stops, sewer and drainage utilities.*

II. Signalized Intersections

The study area encompasses ten signalized intersections. With a few exceptions, intersections transition from valley gutter to a modern curb design.

Bardstown Road

Bardstown Road is the first signalized intersection and marks a transition from a two-lane cross section with parking on both sides of the road to a four-lane cross section that will continue through the study area. Signals are mounted on steel strain poles. The east leg has a left turn lane and a through and right combined lane, and one westbound receiving lane. The west leg also has a left turn lane and a through and right combined lane; however, there are two receiving lanes for the single eastbound through lane. The north and south legs of Bardstown Road consist of four reversible lanes. The two most common configurations of these lanes consist of either two through lanes in each direction during peak hour conditions, or a single through lane with parking allowed in the outermost lanes.

Bus stops are located on both sides of Eastern Parkway on the west leg. The westbound, far-side stop contains a concrete landing pad with a concrete stub for curb access, shelter, bench, and trash cans. The eastbound near-side stop consists of a curbside concrete landing pad with benches and a trash can. High-visibility crosswalks and accessible ramps are located across all four legs, and they include audible pedestrian signals and push-button detectors. Leading pedestrian intervals exist for the crossing of Eastern Parkway.

In the five years of crash history evaluated during the planning study, three pedestrian crashes and two bicycle crashes have occurred at the intersection. Two of the three pedestrian crashes happened at night, and potentially correlate with a lack of adequate lighting at the intersection. Currently, only the crosswalks across Bardstown Road have overhead lighting.

Norris Place

Norris Place is a smaller signalized intersection due to the narrower two-lane cross section of Norris Place with two through lanes on both legs of Eastern Parkway. Signals are mounted on wood strain poles. Crosswalks, accessible ramps, and pedestrian signals with push-button detectors are located at all four legs; however, utility poles infringe on the pedestrian access to the sidewalks on the northeast and southeast corners.

The topography of the existing right-of-way, combined with large trees in narrow roadside verges, creates low sight visibility at the intersection. Bus stops are near-side and located on the northeast and southwest corners, with only a sign located in the grass verge.

Baxter Avenue

The Baxter Avenue intersection has restricted sight lines due to the skew of the intersection as the cross-section transitions to a median section. Sight lines are also restricted by the stone retaining wall and the dense vegetation located on the southwest corner of the intersection. The transition to a large median has the additional impact of creating a reverse curve across the intersection to shift vehicles to the new cross section, contributing to crashes. Left turns departing from Eastern Parkway are restricted on weekdays during peak hour operations: 7 a.m. to 9 a.m. and 3 p.m. to 6 p.m. A channelized right turn lane exists for southbound traffic on Baxter Avenue to turn right onto the parkway; however, sight distance to observe oncoming westbound traffic on the parkway is restricted due to the orientation of the lane and skew of the intersection.

Parking at the businesses on the northeast corner of the parkway and Baxter Avenue further complicates the intersection. Commercial parking is located within the parkway right-of-way and, in some locations, vehicles back directly into traffic on Eastern Parkway to exit the businesses. Circulation of motorists within the parking areas also contributes to the poor bus stop conditions observed on the near-side westbound bus stop located on the northeast corner of the intersection. The stop consists of a sign affixed to an existing utility pole at the edge of the parking lot for the current Cherokee Animal Clinic. There is not a clear landing for pedestrians to wait for the bus away or protected from circulating vehicles. Additionally, there is not an accessible stop location for a kneeling bus due to the roll curb access for the parking lot, and this stop does not contain any amenities. The far-side eastbound stop is equally poor, with only a sign located in the grass verge.

Sidewalk on both sides of Eastern Parkway transition to an asphalt walking path in the center of the median. This walking path is only accessible on the southwest corner of Baxter Avenue and Eastern Parkway, and this segment of ramp and sidewalk does not meet Americans with Disabilities Act (ADA) accessibility standards for sidewalk width. Additionally, restricted sight lines on this corner make pedestrians who are crossing the west leg of Eastern Parkway or the south leg of Baxter Avenue difficult to see for eastbound traffic on Eastern Parkway. No pedestrian crossing is located on the north leg of Baxter Avenue.

Barret Avenue

A similar design is located at Barret Avenue, where the median section transitions back to the four-lane cross section without median, creating a reverse curve shift across the intersection. This geometry contributes to crashes and creates a large intersection for a two-lane cross street. Two through lanes in each direction are located on both the east and west legs of Eastern Parkway. Signals are mounted on mast pole arms. At Barret Avenue the asphalt walking path connects to sidewalk on the north side of Eastern Parkway. A crosswalk connects to the south side of Eastern Parkway, but only a small landing exhibiting signs of drainage issues exists on this corner. A crosswalk is marked across the south leg of Barret Avenue; however, no ramp or connection to the sidewalk located on the north side of the intersection is provided across the west leg of Eastern Parkway.

Near-side bus stops are located on the northeast and southwest corners. The westbound bus stop on the northwest corner contains a bench; however, the location of the bench behind landscaping and the skew of the intersection make it difficult for bus drivers to see people waiting at the stop on the bench without pulling past the curb access. The eastbound stop on the southwest corner contains a curbside concrete landing pad and a trash can, but it does not connect to any sidewalk for access to the stop.

Castlevale Drive

The signalized intersection at Castlevale Drive serves the small cul-de-sac residential street of Castlevale Drive and the entrance to the Medical Arts Building. The entrance and street are skewed from each other, and the entrance contains a median which creates a larger intersection than necessary across the four lanes of Eastern Parkway. Signals are mounted on mast arm poles. Crosswalks for eastbound and westbound pedestrians are provided across the entrance to the Medical Arts Building and across Castlevale Drive, and they feature pedestrian signals and push button detectors. A crosswalk for northbound and southbound pedestrians across Eastern Parkway is only located on the east leg of the parkway, with pedestrian signals and push button detectors.

A near-side westbound bus stop contains a curbside concrete landing pad, shelter, bench, and trash can, and it connects to the continuous north sidewalk. The far-side eastbound bus stop contains only a curbside landing pad and connects only to a discrete segment of sidewalk between the bus stop and the Beargrass Creek Bridge on the south side of the parkway.

Poplar Level Road (Goss Avenue)

The footprint of Eastern Parkway widens considerably at the intersection of Poplar Level Road (Goss Avenue), primarily to accommodate right and left turn lanes. Eastern Parkway still contains two through lanes in each direction, and Poplar Level Road (Goss Avenue) also contains two through lanes in each direction. Eastern Parkway provides dedicated left turn lanes on both legs of the intersection, with a dedicated right turn lane on the east leg and a channelized right turn lane on the west leg for eastbound traffic to turn right onto Poplar Level Road, heading south. The skew of the intersection and steep grade restrict sight lines for oncoming traffic, contributing to crashes. This is particularly notable at the channelized right turn lane. Additionally, analysis of the traffic data (found in Appendix E) found that the right turn lane leading to the channelized right far exceeds the queue length needed for the right turning traffic, replacing potential green space on the eastbound approach to the intersection with unnecessary pavement. Poplar Level Road and Goss Avenue both provide dedicated right and left turn lanes onto Eastern Parkway, and dedicated bike lanes begin on Poplar Level Road just south of the intersection footprint.

Signals are mounted on steel strain poles, and crosswalks with pedestrian signals and push button detectors are located on all four legs of the intersection. Pedestrian crossings are long due to the pavement width accommodating the right and left turn lanes on all four legs. The far-side westbound bus stop only consists of a sign in the grass verge. The near-side eastbound bus stop is located in the triangle-shaped island created by the channelized right turn lane, and its amenities include a bench and a trash can. This stop does not have a curb-height concrete pad, due to its location in the island on the sidewalk.

E. Burnett Avenue

The signalized intersection at E. Burnett Avenue is smaller due to the two-lane cross section of E. Burnett Avenue and the lack of turn lanes on Eastern Parkway. The parkway has two through lanes in each direction. Signals are mounted on wood strain poles, and all four legs of the intersection have marked crosswalks with pedestrian signals and push button detectors. Most of the ADA accessible ramps contain evidence of drainage issues, such as sedimentation. Both eastbound and westbound bus stops are located on the near-side of the intersection, and they consist only of signs in the grass verge with no amenities.

S. Preston Street & S. Shelby Street

Although there are two signals at this location, due to their proximity to the intersections of Eastern Parkway and both S. Preston Street and S. Shelby Street, they operate as one large intersection. One-way northbound S. Shelby Street contains two through lanes, and dedicated right and left turn lanes, as does one-way southbound S. Preston Street. Eastern Parkway provides two through lanes in each direction at both intersections. Left turns are prohibited from Eastern Parkway onto both S. Shelby Street and S. Preston Street; however, while there is general compliance, occasionally the left turn restriction is ignored or parking facilities serving adjacent businesses are used to subvert the restriction.

High-visibility crosswalks and pedestrian signals with push button detectors are located at all eight crossings, as well as ADA-accessible ramps. Westbound bus stops are located on the near-side of S. Shelby Street and the far-side of S. Preston Street. While the near-side stop consists only of a sign in the grass verge, the far-side stop also includes a shelter, bench, and trash can on an accessible concrete pad. Eastbound bus stops are located on the near-side of S. Preston Street and the far-side of S. Shelby Street, with both stops containing an accessible concrete pad, shelter, bench, and trash can.

In the five year crash history evaluated in the planning study, seven pedestrian crashes occurred at either of the S. Shelby Street or S. Preston Street intersections with Eastern Parkway. These pedestrian crashes occurred primarily during the day in clear, dry conditions. Although there are high-visibility crosswalks and pedestrian signals, the proximity of the two intersections, subversion of the left turn restrictions, and multiple entrances near the intersections create complicated traffic patterns that are hazardous to pedestrians.

Bradley Avenue

Bradley Avenue is a heavily skewed intersection, as the legs of Bradley Avenue are skewed away from each other and are located in the middle of a reverse curve in Eastern Parkway. The intersection is further complicated by an alley located in the middle of the intersection skew that is not part of the signalization of the intersection. The alley is used to access rear parking serving homes and apartments located on both Eastern Parkway and Wainwright Avenue. Additionally, the alley is used to access parking at Dairy Kastle, which is limited and located within public right-of-way. Due to the heavy skew, motorists are observed waiting in the intersection for a left turn off Eastern Parkway onto Bradley Avenue, exacerbating the existing sight distance issues. This is also a heavily congested intersection, particularly in the warm weather months when Dairy Kastle is open.

The signals for the intersection are mounted on wood strain poles and include pedestrian signals with push button detectors. Crosswalks are marked on all four legs and across the alley and include ADA accessible ramps. Evidence of drainage issues around the ramps is seen through the deposit of sediment at the bottom of the ramps. Bus stops are located on the near-side both eastbound and westbound, and they consist of a sign in the grass verge eastbound and a sign located on a concrete stub from the sidewalk westbound.

Crittenden Drive

Crittenden Drive is the last signalized intersection within the study area, and it is complicated due to the nearness of the interstate access ramps. The intersection is large due to the four-lane cross section of Eastern Parkway, the dedicated left and right turn lanes on Eastern Parkway, and the dedicated left turn lanes on Crittenden Drive. These lanes accommodate heavy traffic due to the proximity to the University of Louisville and I-65. Additionally, a channelized right turn exists for westbound Eastern Parkway to northbound Crittenden Drive, from southbound Crittenden Drive to westbound Eastern Parkway, and from northbound Crittenden Drive to eastbound Eastern Parkway. Crittenden Drive currently provides one through lane southbound and two through lanes northbound.

Signals are mounted on steel strain poles and include pedestrian signals with push button detectors with marked crosswalks and accessible ramps at the major crossings. The channelized right turn on the northeast corner includes a marked crosswalk with accessible ramps, and it is controlled by a stop sign. The channelized right turn on the southeast corner includes a marked crosswalk with accessible ramps, and it is controlled by a yield sign. The channelized right turn on the northwest corner does not have a marked crosswalk at any of the sidewalk crossing locations, nor do the sidewalk connections within the island contain ADA accessible ramps.

The westbound bus stop is located on the large, landscaped island, with the University of Louisville entrance sign, that is created by the channelized right turn on the northwest corner. This stop consists only of a sign in the grass verge. The eastbound stop is located on the far-side of Crittenden Drive at the intersection with Emil Avenue and consists of a sign in the grass verge with a trash can.

III. Existing Signage

Eastern Parkway is currently designated US 60 Alternate (US 60A) from Willow Avenue to 3rd Street, encompassing the majority of the study area. Wayfinding signage at intersections and at the termini at both Willow Avenue and 3rd Street to direct motorists where to turn remain on US 60A. Additional wayfinding signage for state, US, and federal interstate routes along the corridor include: Bardstown Road (US 31E), Baxter Avenue (KY 1703), Poplar Level Road and Goss Avenue (KY 864), S. Shelby Street and S. Preston Street (KY 61), and the I-65 corridor.

In addition to the corridor signage, advance curve warning signs are located throughout the corridor, indicating to motorists that a sharp curve is approaching. In some cases, surrounding tree infrastructure blocks the existing signage, which prevents drivers from being warned ahead of the curve. The Manual on Uniform Traffic Control Devices does not require advance warning signs for deceleration on curves for the 35 MPH posted speed on Eastern Parkway; however, signage may be warranted on curves that experience a higher than typical roadway departure crash rate.

Wayfinding signage at Poplar Level Road and Goss Avenue intersection with Eastern Parkway for US 60A and KY 864.

Advance warning sign covered by tree canopy.

Residential entrances filling in valley gutter, blocking drainage along the Parkway.

IV. Curb Cuts

Both residential and commercial curb cuts impact the parkway right-of-way and create conflict points between motorists and alternate modes of transportation. Residential driveways are common throughout the corridor, even in areas where parking access is intended to be in the alleys to either side of Eastern Parkway. These residential drives are challenging to navigate given the deep valley gutters. Due to this, many residents have filled in the gutter causing sedimentation and debris collection, damage to curbs, and exacerbating existing flooding issues along the corridor.

Commercial entrances also pose a concern, particularly where there is no defined access. The lack of defined access poses a safety concern for pedestrians, bicyclists, and scooters, and this contributes to motor vehicle crashes when driver behavior at entrances is not predictable. These issues are compounded when parking is located in the right-of-way with little room for circulation.

Undefined parking entrances.

Wide commercial entrance with longer exposure to traffic conflicts.

V. Private Encroachments on Public Right-of-Way

Over the years, various encroachments have occurred on parkway right-of-way, with 8,040 square feet of combined commercial and residential encroachments. While some private encroachments may have gone through the permitting process, it is likely the majority of existing encroachments are unpermitted and have simply not been enforced over time. There are a wide range of encroachments along the parkway, and examples of encroachments include residential and commercial paved or gravel parking, signage, undesirable or invasive vegetation, and retaining walls. This is not an exhaustive list, and the encroachments create a variety of issues, such as blocking sight lines, reducing parkway green space, and overall negatively impacting the parkway context.

Perhaps one of the more common right-of-way encroachments along Eastern Parkway, parking has increasingly impacted the parkway right-of-way in a negative way. Over the years, businesses along the parkway have expanded to include paved parking areas to accommodate increasing demands from motor vehicle traffic reducing parkway green space and negatively impacting the tree canopy at these locations. Additionally, unpermitted parking pads or gravel parking areas adjacent to residential driveways are of great concern.

Retaining walls and commercial signage are other common encroachment issues along the parkway. While retaining walls may be useful in some locations with steep grades, they create an uncomfortable walking experience when adjacent to sidewalks and remove green space from the sightline of users enjoying the parkway. Additionally, retaining walls can significantly impact sightlines both at intersections and for residents seeking to exit driveways. Commercial signage continues to vary throughout the corridor, which impacts the character of the corridor to varying degrees. Currently, there are no cohesive signage guidelines specific to preserving and enhancing the park atmosphere of the parkway. Signage varies in placement, height, and design.

Commercial encroachments in the Eastern Parkway right-of-way account for 80% of the private encroachments along the Parkway, consisting primarily of parking stalls, landscaping, outdoor seating, and signage for a total of 6,420 square feet. The remaining 20% are considered residential encroachments for a total of 1,620 square feet. Nearly 86% of the residential encroachments (1,385 square feet) are concrete or asphalt parking pads, with one gravel parking pad. The remainder of the residential encroachments consist of fencing, private sidewalk, and ornamental landscaping.

Residential parking in Parkway right-of-way.

Residential retaining wall in Parkway right-of-way.

Example of cobra head style roadway lighting at an intersection, typically seen along Eastern Parkway.

VI. Lighting

Lighting along Eastern Parkway is predominately roadway lighting, such as the large overhead cobra-style lights. Roadway lighting is incredibly important because it improves safety by helping motorists see both the road and alternative users, such as pedestrians. In many cases, however, the overhead lighting is lost in the tree canopy and may not appropriately light the roadway in the warmer months when the leaf cover is full. Additionally, where overhead cobra-style lighting exists at intersections, it is often placed directly over or behind the crosswalk. This creates an unsafe pedestrian crossing as it backlights the pedestrians crossing, and motorists cannot distinguish the pedestrian shadow from the surrounding darkness.

Pedestrian-level lighting is equally as important as roadway lighting, providing improved sense of personal safety and access for other transportation modes along the parkway at night. Pedestrian-level lighting illuminates the sidewalks and pathways behind the curb, and it is established at a lower level and different light intensity than roadway lighting. Additionally, pedestrian level lighting at transit stops contribute to users feeling safe to utilize transit outside of daylight hours. Pedestrian-level lighting, however, is largely absent from the corridor at this time.

VII. Bridges

Three bridges are located along Eastern Parkway: the Beargrass Creek Bridge, the I-65 interchange, and the Brook and Floyd Streets overpass. The Brook and Floyd Streets overpass is outside of the corridor study area; however, aspects such as the impact to sight distance, transition lanes near the I-65 interchange, and multi-modal safety will be impacted by the close proximity of this bridge. This tee beam, concrete cast-in-place deck bridge was built in 1954 and underwent major rehabilitation in 2010. At the time of writing this report, it has a satisfactory (6) rating for the deck, superstructure, and substructure condition, with an overall structure rating of Fair from the inspection conducted in November 2017.

The I-65 interchange overpass bridge was built in 1957 as a stringer/girder design with a concrete cast-in-place deck. It underwent repairs in 2012, including asphalt waterproofing overlay, increasing the height of the median barrier, replacement of pier pedestals, and installation of asphalt plug joints; these were again rehabilitated in 2017. The structure at the time of writing this report has an overall condition rating of Fair, consisting of a Fair (5) rating of the deck condition, Satisfactory (6) rating of the superstructure condition, and Fair (5) rating of the substructure condition from the inspection conducted in October 2018.

The bridge over Beargrass Creek was completely replaced in 2019 with a prestressed concrete stringer/girder superstructure with a concrete cast-in-place deck. The replacement of the bridge included sidewalk on the south side of the bridge. It was last inspected during construction in November 2018. Since bridge inspections occur on a two-year schedule, the next scheduled inspection of the completed bridge is November 2020.

The Floyd and Brook Streets overpass

I-65 bridge

The new Beargrass Creek bridge

VIII. Multi-Modal Facilities

Multi-modal facilities are an integral part of Olmsted Parkways, and Eastern Parkway is no exception. The original vision for the linear parkways was to allow for all transportation modes to enjoy the corridor and provide safe separation for less-protected modes of transportation, such as bicyclists and pedestrians. In modern format, this also includes providing safe access to transit and establishing safe use of electric scooters separate from motor vehicles.

Sidewalk gap between I-65 and Crittenden Drive.

Sidewalk gap – facing west

Sidewalk gap - facing east

PEDESTRIANS

Sidewalks are generally located along both sides of Eastern Parkway. Notable exceptions include between Baxter Avenue and Barret Avenue (where the pedestrian path transitions to the center median to Barret Avenue), missing sidewalk on the south side of the parkway from Barret Avenue to Poplar Level Road, and disconnected segment of sidewalk on the south side of Eastern Parkway at the I-65 interchange (through the interchange ramp from northbound I-65 to eastbound Eastern Parkway). Wear patterns in the existing grass verge indicates that pedestrians are still making the connection to the southwest corner of Eastern Parkway and Poplar Level from the existing sidewalk that ends at the interchange ramp.

ADA inaccessible stop on Eastern Parkway at Royal Drive

Transit stop on Eastern Parkway at S. Preston St

TRANSIT

Eastern Parkway is an important corridor for the Louisville Metro transit network, with four routes utilizing 46 shared stop locations along Eastern Parkway: Line 2, Line 18, Line 27, and Line 29. These four networks have a combined weekday average ridership of 9,205 at the time of writing this report. The most active stops within the study area are at Bardstown, Preston, Shelby, and Poplar Level. The least active stops include the eastbound stop at Cherokee Circle and the eastbound and westbound stops at Dahlia Drive (Royal Avenue). The distance between these least active stops and the nearest stop is less than an eighth of a mile (less than 660 ft), near enough to warrant consolidation. Only one stop exceeds a quarter of a mile in distance to the next stop, which is the 0.28-mile distance between the Castlevale Drive stop and the Poplar Level (Goss Avenue) stop. In five locations, stops are less than a tenth of a mile (less than 528 ft) from each other: Norris Place and Quadrant Avenue, Lydia Street and Kosair Charities, E. Burnett Avenue and Pindell Avenue, S. Shelby Street and S. Preston Street, and Concord Drive and Emil Avenue. Another five locations are one-tenth to one-eighth of a mile (528 to 660 ft) between stops, and the remaining stops vary between one-eighth and one-quarter of a mile between each other. Consolidating very close stops would increase efficiency and improve service, as well as consolidating funding dollars for stop enhancements and maintenance.

The majority of the stops along Eastern Parkway consist only of a sign in a grass verge. Twenty-nine of the 46 stops (63%) are not considered ADA accessible, they are not connected to the curb from an ADA accessible sidewalk and lack a curbside concrete landing pad. ADA accessibility at transit stops is a critical component of providing transit service to residents and parkway visitors, allowing for ease of access from pedestrian thoroughfares onto buses. Additionally, only five stops (11%) contain a shelter, and of these stops four of the shelters are the older, domed-style shelter and need to be replaced. The overwhelming majority of stops do not have seating, an important aspect of people-oriented design in park spaces. None of the stops in the study area are located within a bus pull-off, therefore buses are stopping in traffic to pick up and drop off passengers. While this may not be an issue in locations with few boardings and alightings, busier stops may warrant a pull-off area.

Eastern Parkway **Transit Stops**

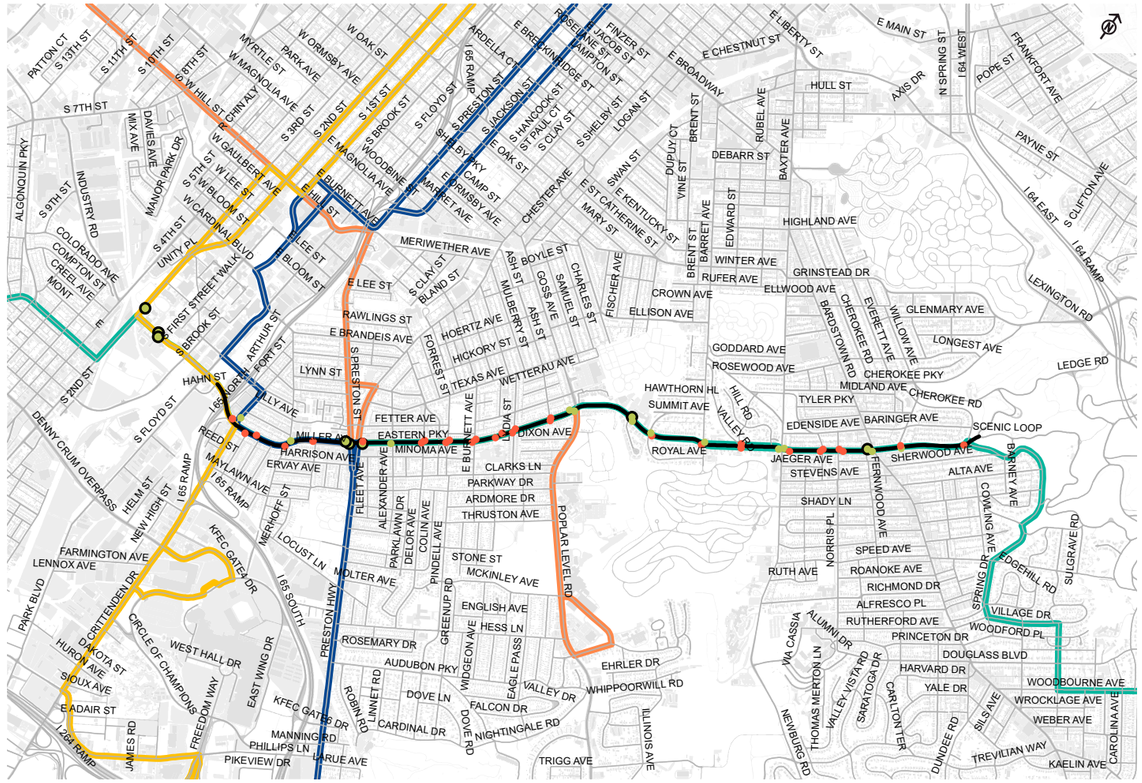


Figure 3.24 *Eastern Parkway transit stops*

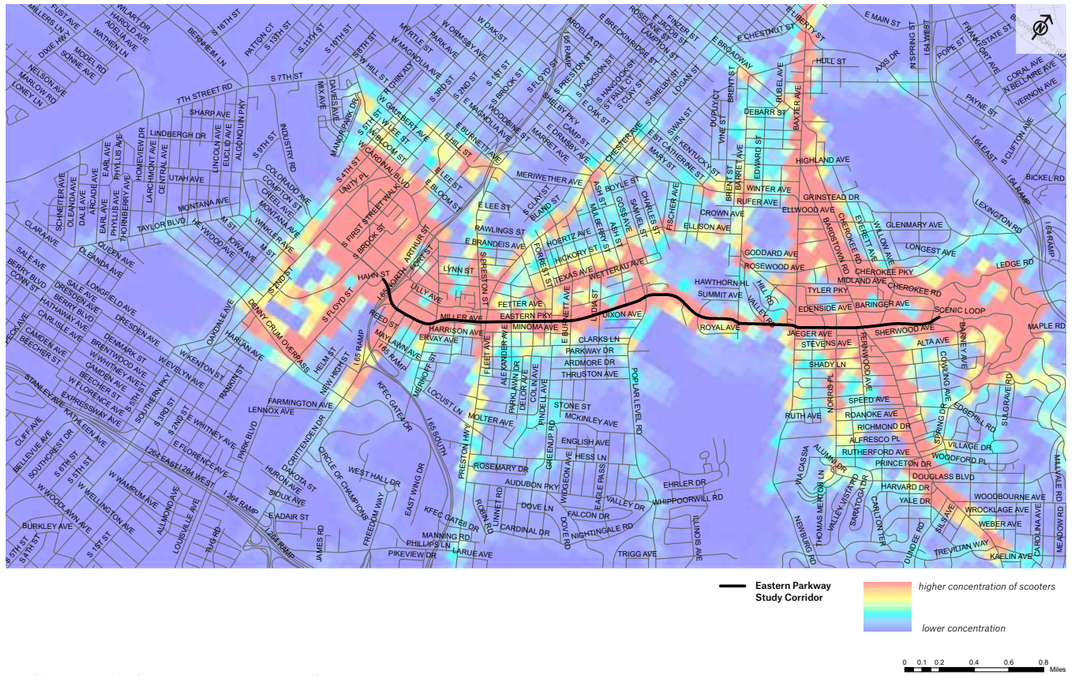
BICYCLES AND ELECTRIC SCOOTERS

On-street, 6-ft painted bicycle lanes currently exist on Eastern Parkway between the I-65 bridge and S. 3rd Street, and an 8-ft-wide multi-use path exists on the north side of Eastern Parkway from Crittenden Drive to S. 3rd Street. With the exception of the transition segment from the I-65 bridge to Hahn Street, both on- and off-street bicycle facilities are largely absent from the corridor study area. Eastern Parkway has the potential to be an integral east/west connector of Louisville's existing bike network, with marked bike lane connections to the south on Poplar Level Road, and nearby connections to downtown on 2nd and 3rd Streets. Additionally, Eastern Parkway connects directly to Cherokee Park, providing access to recreational riding trails.

Electric scooters and bicycle rental programs are becoming an increasingly important part of the transportation network in Louisville. These light vehicles are often used for shorter trips to destinations, as well as to access transit and other modes of transportation, and 12,625 scooter trips were taken on or across Eastern Parkway between November 2018 when they deployed to July 2019. Operationally, electric scooters and bicycles share similar riding speeds and safety concerns, and thus require similar consideration for safety and access to amenities. Eastern Parkway has become a popular location for electric scooters.

Since the launch of electric scooters in the Louisville Metro area, however, some concerning rider behaviors have been noted. Electric scooter riders on and near Eastern Parkway have been noted operating in an unsafe manner, such as darting through traffic to access businesses and restaurants. They have also been observed operating on sidewalks to the detriment of pedestrians due to the higher operating speeds of scooters. Additionally, scooters have been seen riding in the valley gutters, which are often not level or are filled in by adjacent property owners for driveway access. This creates a hazardous operating condition, particularly next to motor vehicles. Complaints from property owners have included abandoned or damaged scooters in alleys, yards, and sidewalks. These behaviors all indicate a need for improved education, guidelines, and enforcement on the operation of electric scooters, as well as clearly identified parking near areas popular for scooter pickup and drop-off.

Popular locations for electric scooters



Eastern Parkway
Existing Bike Paths

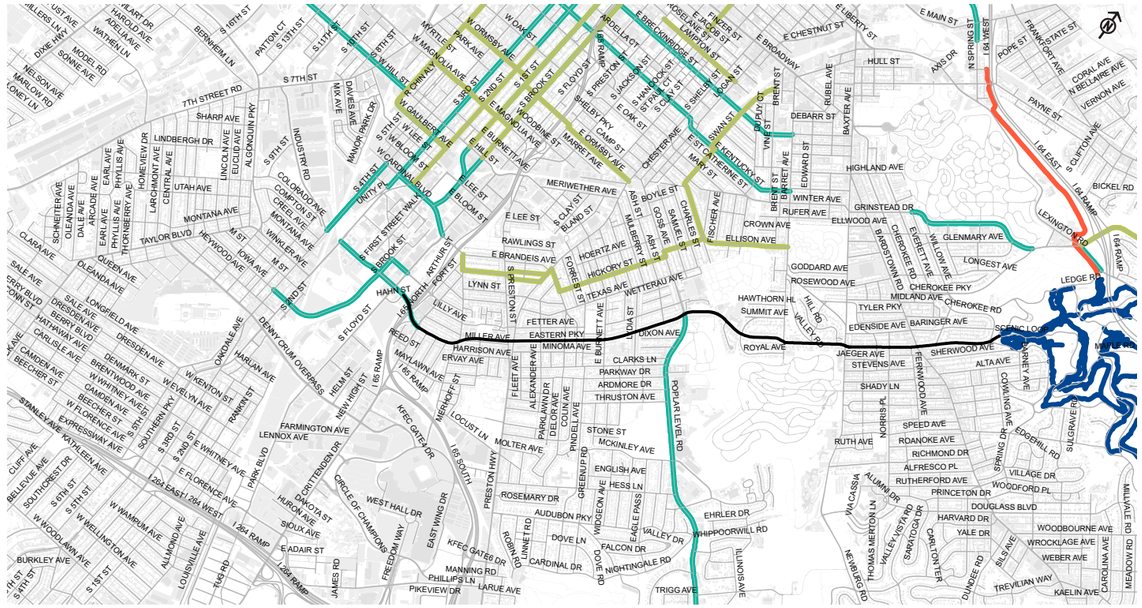


Figure 3.25 *Existing marked shared lanes, dedicated light vehicle lanes, and shared use paths.*

IX. Existing Traffic Analysis

COLLISION DATA

Collision data was collected from the Kentucky Collision Analysis Database, providing reportable crashes between 2014 and 2018. A collision analysis comparing three segments of Eastern Parkway to statewide expected crashes for a similar roadway type was performed. The segments were developed based on available Average Daily Traffic (ADT) volumes provided by the Kentucky Transportation Cabinet (KYTC). After performing the collision analysis at this level, it was determined that all three segments of Eastern Parkway experience a significantly higher overall crash rate than is expected when compared to the statewide averages.

This is particularly concerning given the lower ADT along all three segments of Eastern Parkway.

Additionally, crash data was tabulated by crash type for the corridor. According to the crash data collected, the most common crash types on Eastern Parkway are Rear End (37%), Angle (23%), and Sideswipe (20%), which are the typical crashes seen in a four-lane, signal controlled corridor. For more specific details on crash analysis, refer to Appendix E which includes additional information on crash summaries by signalized intersection.

Table 3.5 *Five year crash rates for each corridor segment.*

Corridor Section	Average Total Crashes	Average Total Crashes with Injury	Length (Miles)	ADT
I-65 to Preston St.	56	8	0.607	16,752
Preston St. to Lydia St.	67	13	0.973	15,494
Lydia St. to Bardstown Rd.	82	8	1.308	17,484

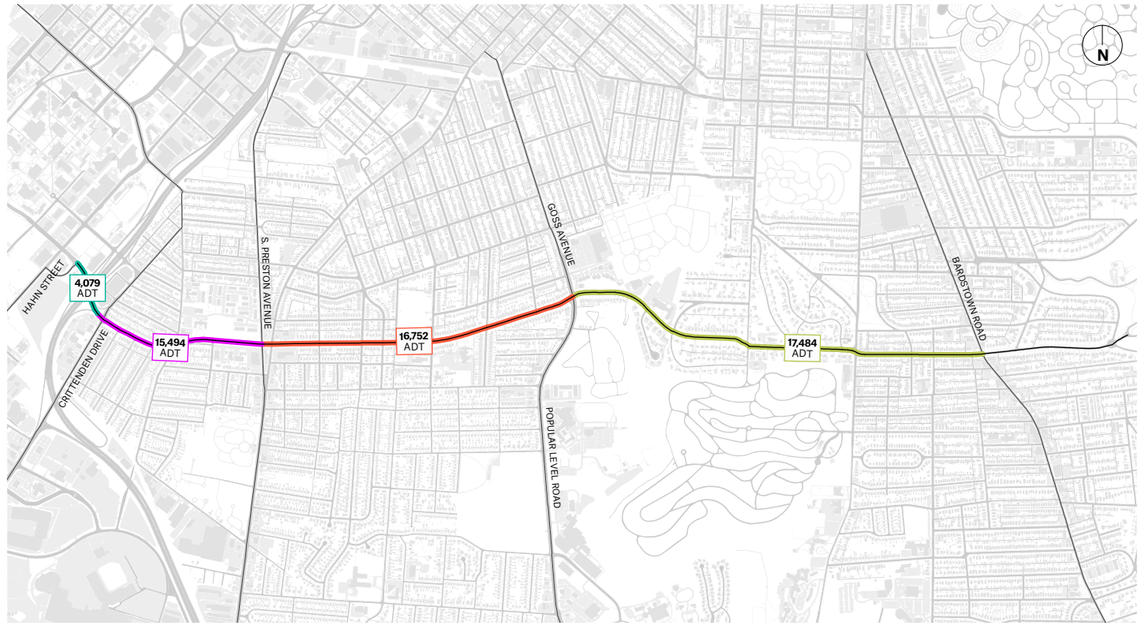
Table 3.6 *Five year crash rates for each corridor segment.*

Corridor Section	Corridor Crash Rate (crashes/HMVM[1])	Corridor Injury Crash Rate (crashes/HMVM)	2013-2017 Statewide Crash Rate (crashes/HMVM)	2013-2017 Statewide Injury Crash Rate (crashes/HMVM)
I-65 to Preston St.	1,503	216	578	91
Preston St. to Lydia St.	1,210	233	578	91
Lydia St. to Bardstown Rd.	978	96	544*	87*

**Weighted average accounting for four-lane median section between Baxter Ave. and Barret Ave.*

1 HMVM: Hundred Million Vehicle Miles

Eastern Parkway
Average Daily Traffic



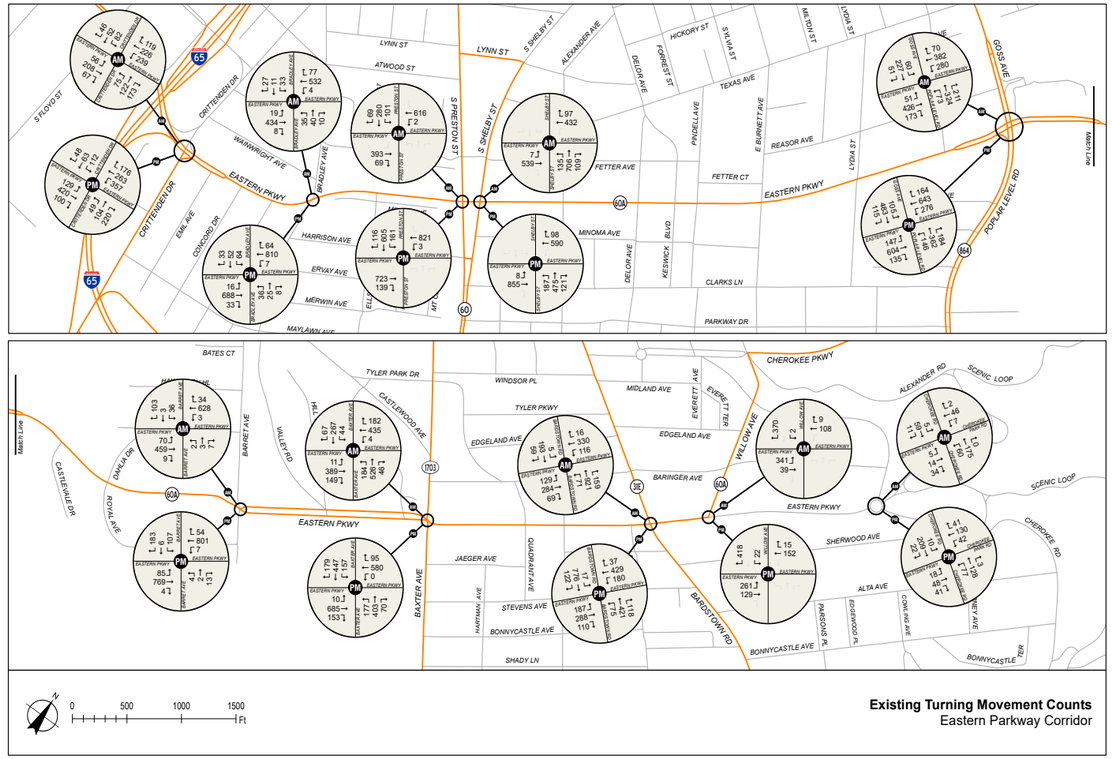


Figure 3.26 *Peak hour morning and evening traffic volumes by intersection.*

COUNTS

Turning movement counts for Eastern Parkway were obtained on May 5, 2019 for all intersections except Bradley Avenue; turning movement counts for Bradley Avenue were obtained on December 12, 2019. Twelve-hour counts were obtained for each intersection from 7 a.m. to 7 p.m., with counts for each fifteen-minute interval. Then, peak hour morning (a.m.) and peak hour evening (p.m.) volumes were tabulated for each intersection. These volumes consist of the sum of the top four consecutive 15-minute intervals for the morning and the evening.

The peak hour turning movement volumes were used to develop forecast volumes. Forecast volumes are what the future turning movement volumes are predicted to be for each intersection in a future design year.

SPEED

In addition to turning movement counts, mid-block speed data was collected in May and June 2019 to determine key speed metrics including 15th percentile speed, 95th percentile speed, and average speed for parkway zones that correlate to the three data collection locations developed for the collision analysis. This information is shown in Figure 3.27 along with the location of the three data collectors.

The average speed on Eastern Parkway is near the 35-mph posted speed limit. The 95th percentile speed, however, exceeds the posted speed limit in all three locations. Eastern Parkway near Sherry Road showed the most significant deviation from the posted speed limit, with a speed of 51 mph. Speed is a contributing factor to concerns about safety on Eastern Parkway, for both motor vehicles driving along the corridor as well as residents and parkway users on alternate modes of transportation. (Appendix E – Traffic Report and Addendum)

Mid-block Speed Data
Eastern Parkway Corridor
May/June 2019

Data:
Key Metrics at Count Locations and 95th Percentile Speeds, by Hour and Travel Direction

Figure 3.27 *Mid-block Speed Data*

FORECAST VOLUMES

The project team met with Louisville Metro Public Works and KYTC to establish the 2040 design year horizon. The team also met with the Metropolitan Planning Organization (MPO), Kentuckiana Regional Planning and Development Agency (KIPDA), to establish growth rates used to develop the forecast traffic volumes for Eastern Parkway. These forecasted growth rates were developed from a regional model, taking into consideration the existing development and potential traffic growth along the corridor and adjacent areas. Since growth rates were determined to be negative to zero percent for the length of the corridor, the traffic analysis team opted to use a zero percent growth rate to generate the most conservative operational analysis.

OPERATIONAL ANALYSIS

The operational analysis performed by the planning team investigated the following measures of effectiveness for both the existing four-lane configuration, and a potential three-lane proposed configuration at the identified analysis intersections:

- Corridor Travel Times
- Intersection Delay
- Intersection Level of Service
- Intersection Volume-to-Capacity Ratio
- Approach Queues

Typically, reconfiguring a four-lane cross section to a three-lane cross section does not significantly impact the capacity of a road, but it may impact the ability of cars to queue (wait at a signal) due to the removal of a through lane. Therefore, queues developed at each intersection were evaluated for each intersection to avoid undue impact on Eastern Parkway or queueing at the signal for the cross streets. A full analysis of each intersection is located in Appendix E.

All intersections were determined to operate comparably well with either a four-lane or three-lane configuration, with the exception of Poplar Level Road (Goss Avenue). Due to the high traffic volume on Poplar Level Road (Goss Avenue), the intersection requires a four-lane configuration on Eastern Parkway to manage the level of approaching traffic from Poplar Level Road to the north and Goss Avenue to the south.

Additionally, while S. Shelby Street and S. Preston Street operate today with two separate traffic signals, they function in tandem because their near proximity requires coordinated signal timing. As such, they are considered to operate as a single intersection. Even though left turns are prohibited at these intersections, left turns are often noted at these locations when there is a red light on the periphery of the two intersections but the interior between intersections still has a green light to clear traffic. Because of this, reducing Eastern Parkway to a three-lane cross section at this location would require consolidating the signalized intersections into a single intersection; otherwise, the parkway will require a four-lane cross section to accommodate traffic volumes on all approaches.

IX. Roadway Safety Analysis

A team of representatives from Louisville Metro Public Works, the Kentucky Transportation Cabinet, and the consultant team performed a Road Safety Audit (RSA) on August 21, 2019. This audit included a crash history analysis, an extensive field inspection, and summary report of findings and recommendations. The focus of the audit was to evaluate the existing conditions, review planned improvements, investigate potential safety issues with implementation, and develop solutions to mitigate identified issues. A full report is available in Appendix I, and a summary of those efforts is included.

As part of the RSA process, a detailed crash analysis was performed to look for trends in specific types of crashes. In the study period between 2016 and 2018, 598 crashes were reported, including 184 crashes in 2016 (31%), 224 crashes in 2017 (37%), and 190 crashes in 2018 (32%). The most frequent crash type was rear-end crashes (39%), followed closely by angle crashes (24%) and sideswipe crashes (19%). Nearly 13% of crashes were injury or fatal crashes, with the one fatal crash occurring at Baxter Avenue. The majority of all crashes occurred in dry conditions (76%), during daylight (75%).

More than 40% of all crashes and more than 35% of injury or fatality crashes occurred at a signalized intersection. The highest crash location was the intersection with Baxter Avenue (18%), followed by the S. Preston Street/S. Shelby Street combined intersection (16%), and Bradley Avenue (12%). Bradley Avenue has the highest likelihood of a crash resulting in injury, with a history of approximately one in four crashes resulting in injury.

As a result of the RSA, a few general conclusions about the crashes along the corridor emerged. The types of crashes, primarily property damage and rear-end collisions, are typically associated with congestion in a corridor. Additionally, many of the signalized intersections warrant further study. Finally, weather and dark conditions crashes had an average impact on crash history of the corridor as a whole; however, individual locations with drainage issues resulting in ponding on the roadway may be contributing to localized crashes.

After the crash analysis, the team met on-site to investigate both the corridor as a whole, as well as individual zones and intersections. Recommendations were rated based on safety benefit and cost on a high, medium, and low range basis. Costs developed were considered to be implemented outside of the planned improvements of the corridor. Site specific recommendations can be viewed in Appendix X.

As several trends emerged for the corridor as a whole, the RSA team developed a list of corridor-wide improvements. These included updating striping and signage to conform with the Manual on Uniform Traffic Control Devices (MUTCD) and current state traffic operations recommendations, upgrading mainline signal heads, improving drainage networks and inlets to handle clogging due to the tree-lined nature of the corridor, review channelized right turn lanes for conversion to a traditional right turn lane, enhance bicycle safety within conflict zones, provide ADA accessibility for all pedestrian facilities, improve lighting, and manage or remove dangerous private encroachments in the public right-of-way. These are further discussed in Chapter 5.

XI. Drainage, Stormwater, and Flooding

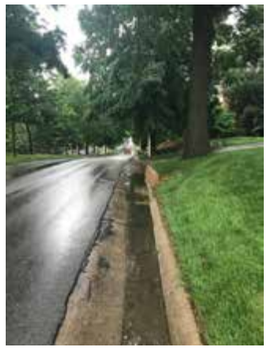
A significant concern along Eastern Parkway is drainage and flooding. The segment near South Fork Beargrass Creek is in a known FEMA Regulatory Floodway; however, there are also several known combined sewer overflow areas that are not part of the Regulatory Floodway. Of particular concern is the area between Bradley Avenue and S. Preston Street (approximately a third of a mile of flood-prone area on Eastern Parkway alone) which includes Bradley Avenue, Ellsworth Avenue, and S. Preston Street.

Another section of flood-prone area is near the South Fork Beargrass Creek Regulatory Floodplain, near Castlevale Drive. Outside of the study area, the intersection of Eastern Parkway and 3rd Street is also a known flood-prone area as well.

Tree root encroachment into the valley gutter and inlet.

The drainage infrastructure along Eastern Parkway has been a source of frustration for commuters, residents, and public officials for decades. While at one point, the ubiquitous Eastern Parkway valley gutter was likely an effective drainage solution, it has long passed its useful life cycle. The mode of failure varies along the parkway. Upheaval by tree roots is quite common, leading to cracking and infiltration into the subgrade, which in turn exacerbates the cracking of the gutter. This degradation often spreads to the adjacent pavement. Due to the geometry of the gutter, it can be quite difficult to negotiate with a vehicle when turning into a driveway. This has led many property owners to devise ways to bridge the gutter. Most of these attempts result in blockage of gutter flow causing ponding, siltation, and further degradation of the gutter. The depth of the gutter pan itself is also a cause. With as little as four inches of concrete, it is half the thickness of a modern gutter pan, leading to accelerated deterioration.

While it is tempting to blame improper tree placement for many of the gutter pan's ills, a look at the parkway's construction timeline reveals that the gutter pan came over two decades after the original macadam pavement and double tree rows. During the Great Depression, through a Works Progress Administration Project, the valley gutters were hand-formed along the original macadam pavement, with the back edge just a few feet from the then twenty-year-old trees.



Residents filling in the valley gutter over the years for vehicle access has contributed to drainage and flooding issues.

Eastern Parkway
Flood-prone Areas

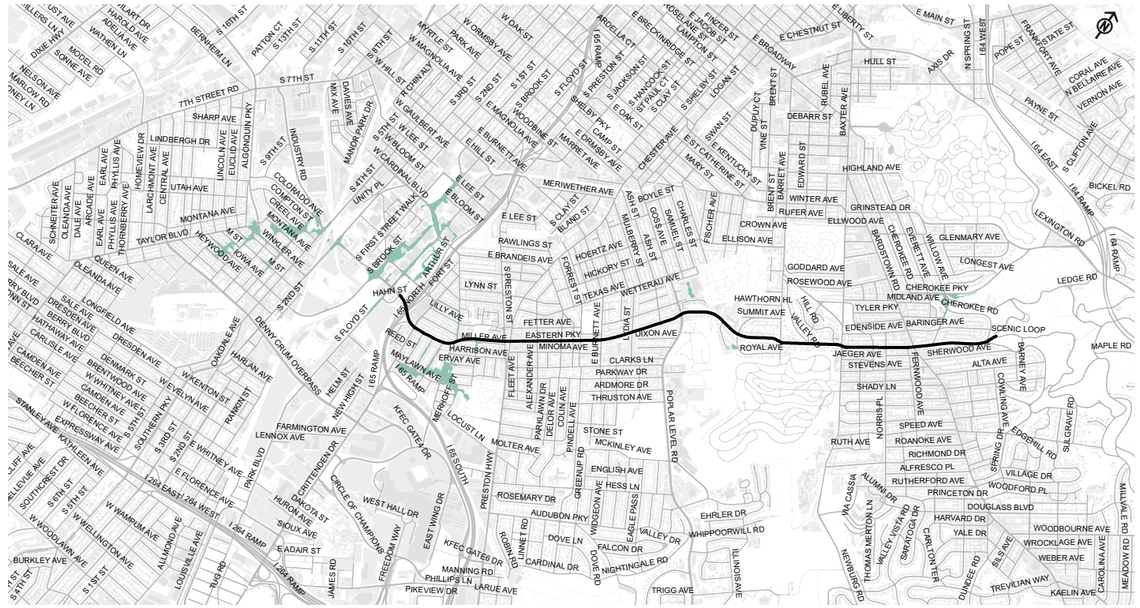


Figure 3.28 *Eastern ParkwayFlood-prone Areas*

Ponding along Eastern Parkway resulting in hydroplaning safety concerns.

Over time, as these trees grew into the giants that make the parkway what it is today, their roots found ways to grow under, over, and even through the gutter pan. Although the placement of the gutter with respect to the trees was unfortunate, a close look at the simple design indicates that it was meant to improve drainage while minimizing impacts to the trees. Had a grass swale been used, it would have necessarily been wider and deeper to provide a similar result. This would have had a more immediate impact on the trees. A more traditional curb and gutter system would have required additional storm sewer to be constructed along the edge of the parkway. The trenching involved to lay this storm sewer would have caused extensive damage to the nearby root systems. The chosen valley gutter was more compact than a swale at only 4 ft wide and 5 inches deep. That depth, however, gave it more flow capacity than a traditional curb and gutter system, allowing it to convey stormwater for longer distances between catch basins. This allowed for the placement of fewer catch basins taking advantage of the existing combined sewer system, requiring only short lengths of new pipe to be constructed. Even if the system allowed for occasional temporary ponding on the pavement during heavy rain events, the nature of vehicular travel in the 1930s meant that hydroplaning on ponding water was not the concern that it is today.

Since the construction of the gutter pan, several notable changes have been made to the parkway. The most distinct alterations are at Crittenden Drive and Poplar Level Road. These intersections were reconstructed in the mid twentieth century with curb and gutter. As such, while much green space was lost during these projects, drainage is no longer a problem. Just west of Barret Ave, superelevation was added to the curve in the 1950s. In this area, the high side of the pavement has a roll curb as the gutter is no longer necessary. One of the less noticeable changes has been in the tree replacement program. In recent years, as dead or declining trees were removed, replacement trees along the inside row were planted approximately eight feet behind the gutter pan, providing additional space for root growth and separation from potential automobile impacts.

The time with which it has taken to address the drainage issues along Eastern Parkway is not surprising. Twenty years ago, a study to re-curb Eastern Parkway recognized the need for such action, as well as the cost – both monetary and loss of trees. A traditional approach to design and construction would decimate the mature trees along the parkway. Even the thoughtful approaches from the previous study would not have been without serious impacts. This knowledge, combined with love the community has for Eastern Parkway and its signature trees, leaves little doubt that such an undertaking, whether warranted or not, would have been politically contentious no matter how delicately it was handled. In the years since that study, however, the parkway trees have taken a beating from the ravages of Hurricane Ike in 2008 and the ice storm of 2009. The combination of extreme storms, invasive insect attack (emerald ash borer) and natural life cycle have taken many of the trees that would have been most affected by construction. While there are still many large trees adjacent to the valley gutter, the reduced number makes it much more manageable to use targeted, low-impact construction techniques.

Additional drainage issues on Eastern Parkway.

04

CHAPTER 04

Developing Understanding from Knowledge

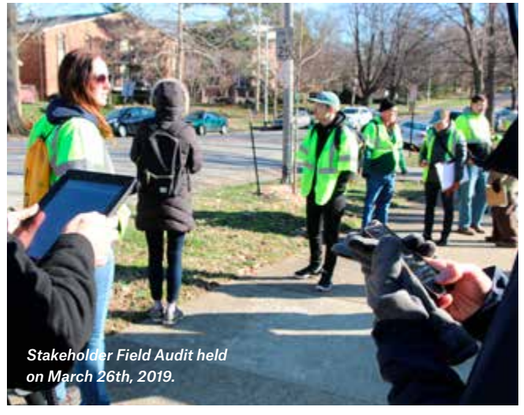
The Vision for Eastern Parkway as Communicated by the Community

Eastern Parkway is a heritage landmark for the people of Louisville. For Louisvillians heading east to stroll through Cherokee Park, to students and faculty heading west to the University of Louisville, for commuters enjoying the respite of Eastern Parkway's tree canopy, and for residents along the corridor who call Eastern Parkway home, the Olmstedian legacy of Eastern Parkway is celebrated and beloved by all. Each person has their own story to share about the parkway, whether it be where they live, work, shop, play, or go out for ice cream. With the advent of a bright future for the rehabilitation of Eastern Parkway on the horizon, the voices and stories of the people who take a deep interest in its preservation for generations to come have been an integral part of the planning process. The valuable feedback collected throughout this project has left an indelible, positive mark on the recommendations for Eastern Parkway's renovation and revitalization.

The planning process integrated opportunities for public feedback along every step of the way. Three stakeholder and steering committee meetings were facilitated, along with three public meetings. These meetings have been multi-faceted in their approach to ensuring open lines of two-way communication between the project team and the community, and they provided multiple avenues for people to share their suggestions and perspectives in a way that best served their preferences. Additionally, a project website established for Louisville's Parkways has served as the central online location for information regarding the Eastern Parkway project. A project video was recorded to explain the project's background and purpose and subsequently published on the website. Additionally, the information, presentations, and exhibits presented at each of the three public meetings were uploaded for easy reference for anyone interested in learning more and to ensure that people who were unable to attend the in-person sessions had access to the same information. Various feedback collection mechanisms were deployed, including surveys, which were available online and on paper at the public meetings; and an interactive Wikimap tool that collected geographically-located feedback on a variety of project themes, which was available on the project website and on a touchscreen computer at the public meetings. Finally, regular project updates were included on the project website and on the project's social media channels, Facebook and Twitter.

Throughout the duration of the project, public outreach efforts conformed with Louisville Metro Government's Roadway Public Information Policy. Notifications were made to the Mayor's Office and Metro Council members four weeks in advance of initial public outreach. Two weeks prior to any public meeting, press releases were advertised in the Courier-Journal newspaper, posted on Louisville Metro's website, posted on project social media channels, and emailed through the neighborhood notification system.

Included is a detailed summary of the three stakeholder meetings held on June 20, 2019, September 16, 2019, and February 18, 2020, and the three public meetings held on July 11, 2019, September 24, 2019, and January 28, 2020.

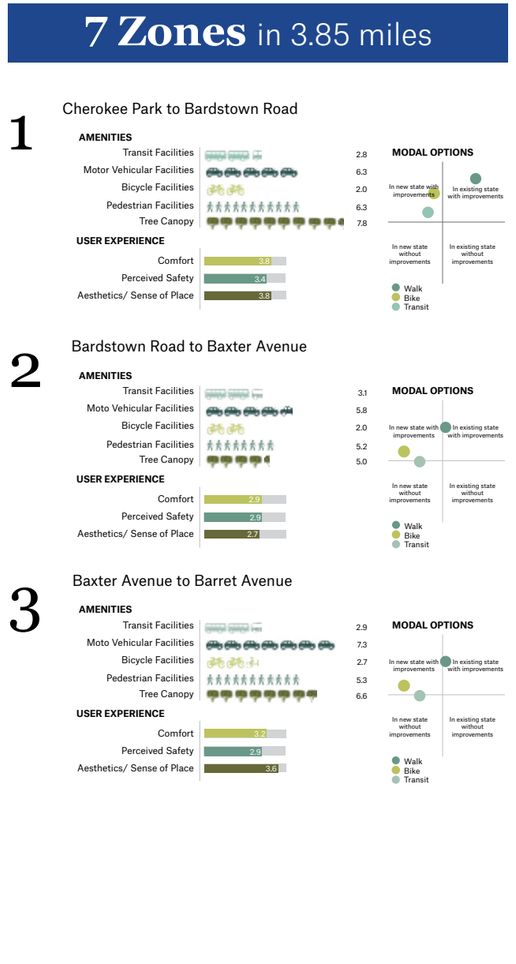


Stakeholder Field Audit held on March 26th, 2019.

Stakeholder Field Audit

On March 26, 2019, the Eastern Parkway project team led an agency stakeholder walking tour of the entire Eastern Parkway corridor. Attendees included representatives from Louisville Metro Public Works, the Kentucky Transportation Cabinet (KYTC), and Bicycling for Louisville. The stakeholder group discussed the features seen throughout each zone, including traffic volume, availability of sidewalk and biking amenities, transit amenities, tree canopy, and parkway character. During the walking tour, additional planning team members collected geolocated stakeholder observations and existing conditions data throughout the zone. After walking through each zone, the stakeholder team participated in a live user experience and amenities survey on mobile devices, with the results discussed in real time.

The data captured from each of the seven zones describe the collective experience of the stakeholder group in each zone individually. The results also illustrate how the availability of multimodal facilities and tree canopy directly impact user experience and perception of comfort, safety, and sense of place. When compared to each other, distinct opportunities arise for the inclusion of multimodal facilities and rehabilitating the tree canopy to balance the negative impact of motor vehicles on comfort and character.



Stakeholder Meeting #1

On Thursday, June 20, 2019, the project team facilitated a meeting of project stakeholders with vested interest in the Eastern Parkway project and planning process. The meeting began with a brief presentation and concluded with an open discussion regarding the project's goals and priorities.

The presentation began with an introduction of the project, a summary of the project's goals and vision, and an introduction of the project team. It continued with a history of the Eastern Parkway corridor, from its conceptual inception by Frederick Law Olmsted and Calvert Vaux and their priorities of separated uses and a scenic character and experience.

The legacy characteristics of Olmstedian design were summarized using seven "S's":

1. ***Scenery***
   Even in areas of active use
2. ***Suitability***
   Keeping with natural scenery/topography
3. ***Style***
   Design for specific styles
4. ***Subordination***
   To achieve the overall design effect
5. ***Separation***
   Styles, ways, and conflicting/incompatible uses
6. ***Sanitation***
   Adequate drainage and engineering
7. ***Service***
   Meets fundamental social and psychological needs

The general existing conditions of Eastern Parkway were presented, including sidewalk and drainage conditions. Methods for collecting data, including the traffic safety analysis and capacity analysis were discussed, and the timeline of public outreach events was shared with the stakeholder group.

Participants at the meeting voiced the importance of Eastern Parkway's tree canopy, and they wanted to ensure that commitments were made to preserving and adding to the tree canopy, with the removal of trees approached with the appropriate gravitas. Participants also advocated for improving discontinuous, inaccessible, and sub-par sidewalks, as well as improving markings and signage for wayfinding. Further, participants wanted the project team to evaluate and determine facilities for multi-use purposes versus pedestrian-oriented purposes.

Public Meeting #1

On Thursday, July 11, 2019, the project team facilitated a public meeting in the gymnasium at Audubon Traditional Elementary School from 5:00 pm – 7:00 pm. The meeting was structured informally and in-the-round, with four informational stations situated clockwise around the event space.

The informational stations each focused on one of the following topics:

1. Corridor History & Olmsted Vision
2. Tree Canopy & Results of Stakeholder Site Visit
3. Existing Typical Section, Roadway Conditions & Drainage
4. Traffic Data Collection, including speed, collision, and turn history

Each informational station included visual and graphic exhibits and was staffed by multiple members of the project team to answer questions. A fifth station was included that offered opportunity for attendees to submit their feedback either on paper, via an online survey, or interactively with an online WikiMap. Overall the meeting was very well attended. With well over a hundred attendees, the meeting was full through the duration of the scheduled event time.

Station 1

Station 1 provided information regarding Eastern Parkway's history and the original Olmstedian vision (Figure 4.2) for Louisville's parkways. Before planning for the future for Eastern Parkway, it is critical to understand its past. The project team provided background information for the general public regarding how the original design for Eastern Parkway created connections with distinct character, or Zones (Figure 4.3), as well as how it handled different modes of transportation.

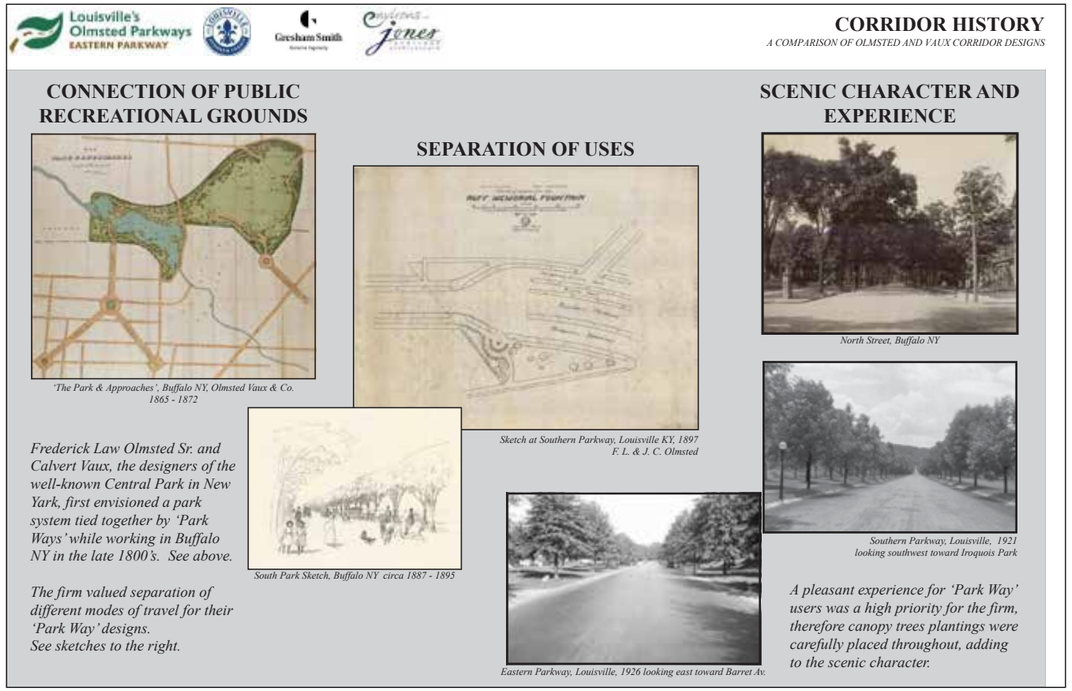


Figure 4.2 *Station 1 – Corridor History*

Figure 4.3 *Station 1 – Historic Connections by Zone*

Station 2

Station 2 elaborated on the current state of Eastern Parkway's existing tree canopy (Figure 4.4) and illustrated the results from the initial user experience field survey. Trees are one of the most valuable resources that exist along Louisville's parkways, and the project team set a goal of minimizing impacts to the existing tree canopy, while taking advantage of the opportunities to identify trees in poor condition and include a replacement plan as part of this process. Members of the public were able to provide feedback to the project team's arborist regarding their thoughts, opinions, and expressed desires for preserving Eastern Parkway's iconic tree canopy.

Additionally, the project team presented the results captured during the stakeholder field survey (Figure 4.5). Data was presented for each of the seven zones of Eastern Parkway, and survey participants shared their rankings for each of the zones for the quality of their amenities (transit facilities, motor vehicular facilities, bicycle facilities, pedestrian facilities, and tree canopy) and for the quality of their experience within each zone of the corridor (comfort, perceived safety, and aesthetics/sense of place). Survey participants further acknowledged under which condition they would most likely choose to use an alternative mode of transportation (walking, biking, or transit): (1) in existing state without improvements, (2) in new state without improvements, (3) in existing state with improvements, and (4) in new state with improvements. Finally, rankings of survey user corridor experience were cumulatively graphed along the corridor to illustrate the ebbs and flows of the user experience on Eastern Parkway from Zone 1 to Zone 7. This station generated meaningful and interesting dialogue with public meeting participants, as attendees were asked to share their own thoughts and opinions regarding the quality of amenities along Eastern Parkway and their experience traveling on Eastern Parkway, whether by car, foot, bike, or bus.

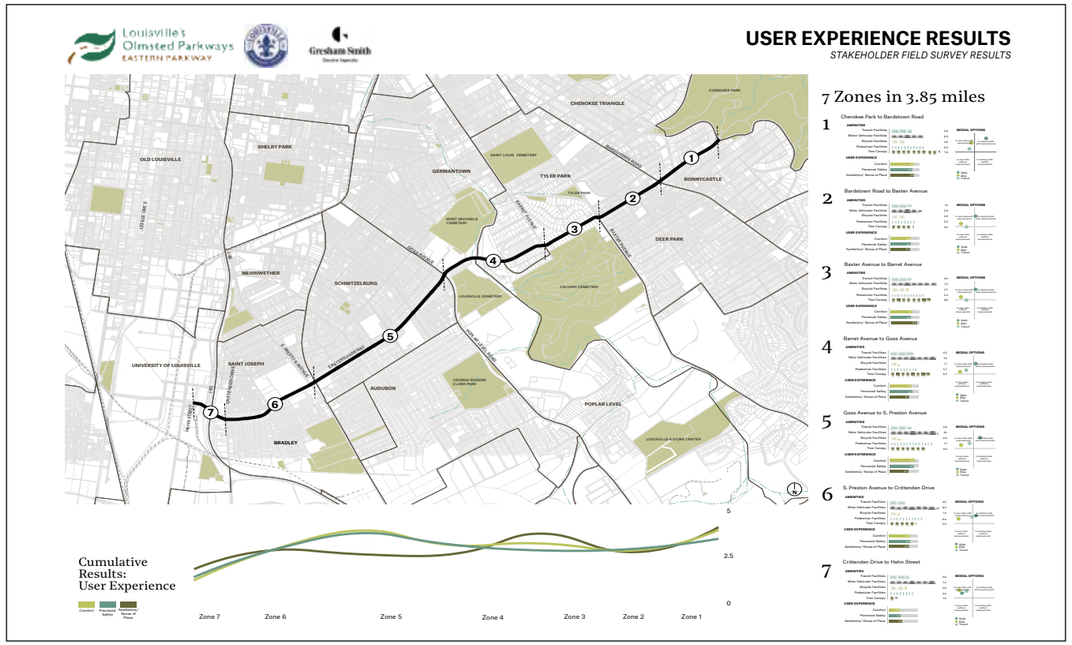


Figure 4.5: *Station 2 – User Experience Results*

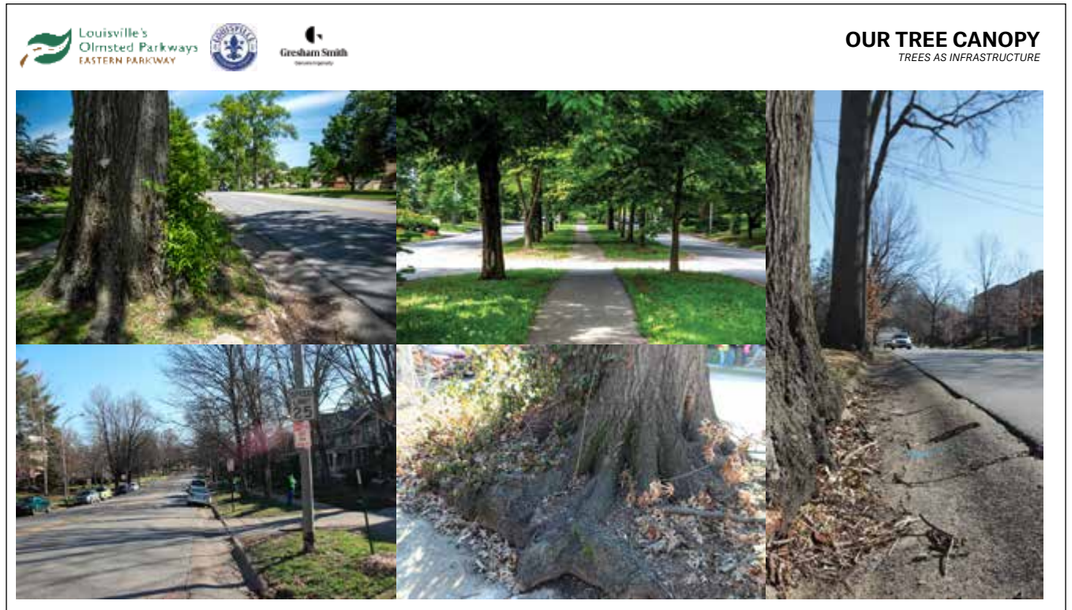


Figure 4.4 *Station 2 – Eastern Parkway Existing Tree Canopy*

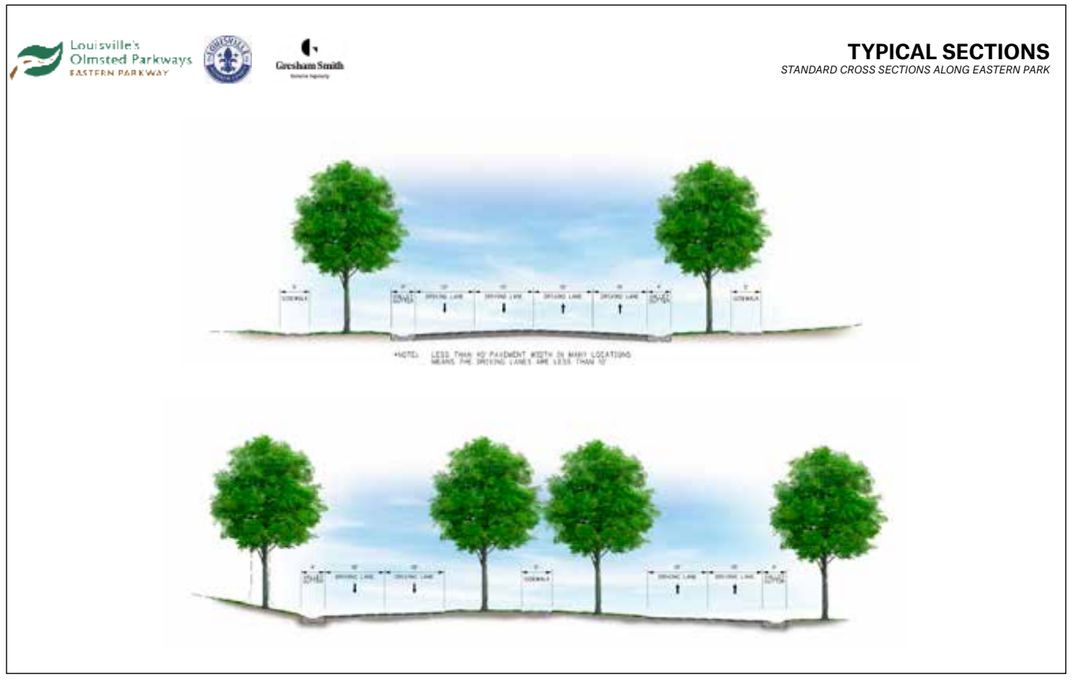


Figure 4.6 *Station 3 – Typical Sections*

Station 3

Station 3 provided information regarding Eastern Parkway's existing typical section and roadway and drainage conditions. The two standard cross sections presented (Figure 4.6) represent the roadway widths that are typically present along Eastern Parkway. These typical sections helped to facilitate functional dialogue with community members with respect to the available width for improvements.

With flooding and an aging stormwater management system a known concern on Eastern Parkway, the project team presented samples of wet and adverse roadway conditions as well as findings from the previous 1999 drainage study (Figure 4.7). Members of the public were provided the opportunity to share areas of known flooding with the project team and collaborate with project team members regarding areas for stormwater improvement.

Station 4

Station 4 focused on traffic issues including speed, collision, and turn history. The project team provided a heat map of injury collisions that have occurred on Eastern Parkway (Figure 4.8), which was used to aid conversations between members of the project team and members of the public regarding safety concerns they have along the corridor.

A second exhibit at Station 4 illustrated existing traffic data collected by the project team (Figure 4.9). This was represented in vehicle counts (the number of cars making specific movements at each of the major intersections), levels of service (a measurement of the amount of traffic experienced), and travel time delay (the amount of time typically waiting at intersections). This information allowed project team members to facilitate informed conversations with members of the public at the meeting, recognizing the need to balance access for all roadway users when considering improvements like signal timing modifications.

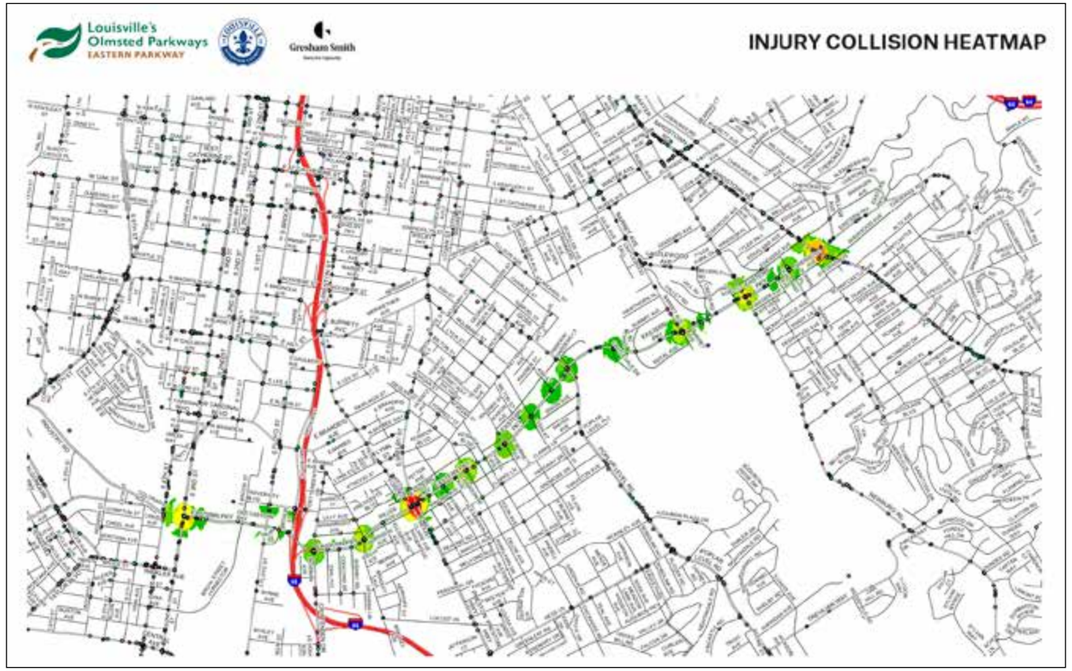


Figure 4.8 *Station 4 – Injury Collision Heat Map*

Figure 4.7 *Station 3 – Drainage*

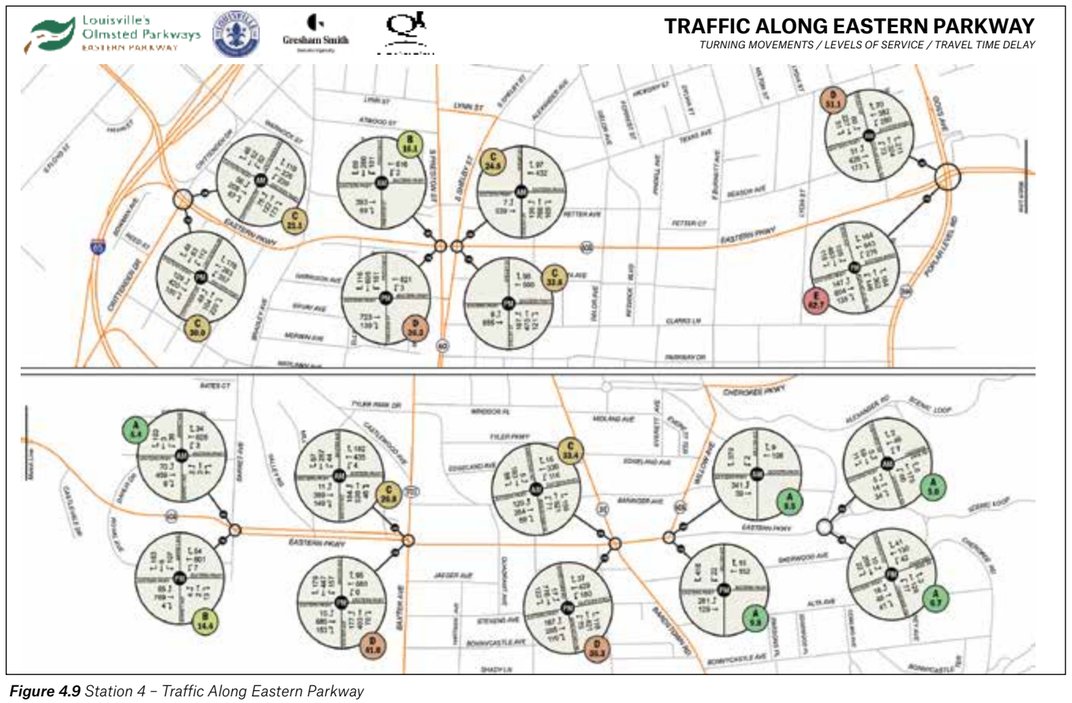


Figure 4.9 *Station 4 – Traffic Along Eastern Parkway*

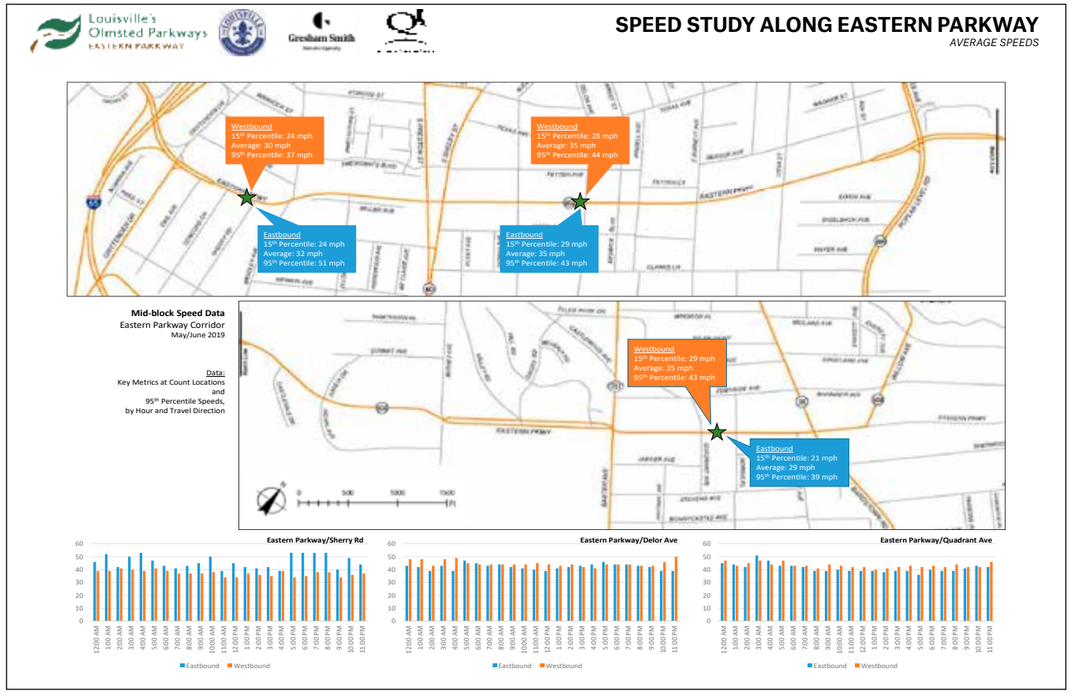


Figure 4.10 *Station 4 – Eastern Parkway Speed Study*

The third exhibit at Station 4 showed the speeds the project team measured along the corridor (Figure 4.10). Understanding that one of the major barriers to walking, biking, or taking transit is the overall safety of a roadway, the project team acknowledges the significance of the current operating speed of motor vehicles on Eastern Parkway. This exhibit illustrated for members of the public areas where speeds were observed to be high, potentially compromising safety for motorists and alternative roadway users.

Station 5

Station 5 presented multiple opportunities for open house attendees to share their feedback in a way that was comfortable and accessible for different people. Project staff were available to answer questions and participate in deeper conversations to better understand the ideas and concerns of the attendees, as well as answer any questions regarding the project at hand.

A laptop computer and touchscreen computer were used to capture citizen responses on the Eastern Parkway Wikimap survey, with a screen projecting people's comments in real time throughout the meeting as they were made (Figure 4.9). As people observed comments being made on the map, conversations began among meeting attendees and project staff, resulting in meaningful dialogue being generated.

In addition to the electronic feedback mechanisms, people were able to participate on the survey by accessing the louisvilleparkways.org website on their mobile devices. The survey was also made available on paper for people to leave their handwritten feedback and comments for the project team.

In summary, the first public meeting held for Eastern Parkway collected important feedback from a variety of citizens and interested people. Attendees included Eastern Parkway residents, business owners, University of Louisville students, and Louisvillians who commute daily on Eastern Parkway by car, bike, foot, and bus, representing the diversity of the surrounding community. Feedback themes heard from the surveys collected included connectivity, legacy, maintenance, multimodalism, and safety. The results of the survey and a summary of feedback heard during the first public meeting were presented at the second public meeting held for Eastern Parkway.

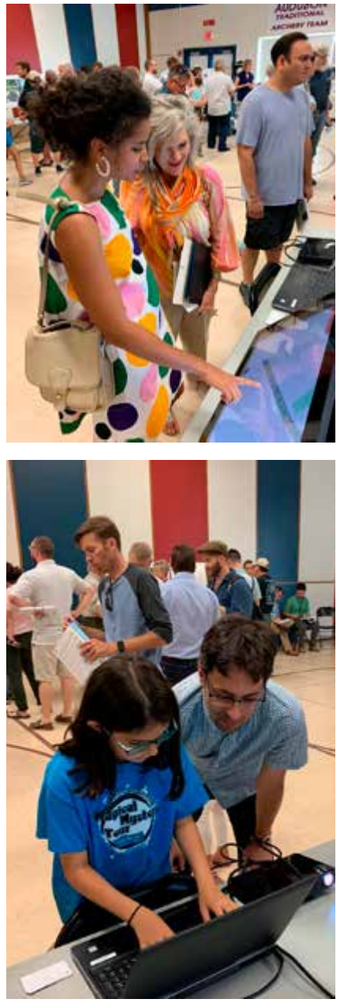


Figure 4.9 *Station 5 – Interactive Engagement*

Stakeholder Meeting #2

On Monday, September 16, 2019, the project team facilitated a second meeting of project stakeholders with vested interest in the Eastern Parkway project and planning process. The meeting began with a brief presentation of project efforts completed to-date and concluded with an open discussion regarding the proposed alternatives for Eastern Parkway.

The presentation began with a summary of feedback heard from the first iteration of public engagement including the surveys and interactive Wikimap, noting that the most common words used by the public to describe the corridor were "beautiful," "busy," and "trees." Surveys confirmed that the public felt "somewhat comfortable" and "somewhat safe" along the parkway, which demonstrates room for improvement in both areas. Furthermore, the surveys showed that the public desired balanced focus on preserving the tree canopy, improving pedestrian connections, improving bicycle connections, improving transit amenities, and improving traffic flow for cars.

The presentation continued with the results of the Road Safety Audit, held on August 21, 2019. This day-long site visit was held to look at specific areas defined through crash history analysis and determine strategies to mitigate apparent safety issues. The results of the Road Safety Audit suggested the introduction of a road diet lane configuration for the corridor to calm traffic, increase safety, and better serve multi-modal transportation, all of which are goals of the project and priorities as communicated by the public. The presentation concluded with a discussion of the preliminary alternatives for Eastern Parkway developed by the project team in response to the data analysis conducted and feedback heard from the community.

General discussion by the stakeholder group emphasized the importance of making pedestrian connections and improving transit accessibility. Stakeholders also wanted to ensure that the project recommended improvements endeavor to remain within the existing right-of-way and avoid existing utilities wherever possible, minimizing impacts to private property and the expense of utility relocations. Each alternative was then discussed by the group and recommendations were provided to the project team for further refinement.

Public Meeting #2

On September 24, 2019, the project team facilitated a second public meeting in the gymnasium at Audubon Traditional Elementary School from 6:00 pm – 8:00 pm. The meeting began with a presentation of project efforts to date and a detailed summary and description of the feedback collected via the online Wikimap survey and heard at the first public meeting. It continued with a description of the results found during the Road Safety Audit data collection conducted by the project team, and it concluded with the presentation of multiple alternative options for rehabilitating Eastern Parkway.

The presentation began by restating the goals of the Eastern Parkway project:

- ***Rehabilitate the existing right-of-way***
- ***Preserve or renew the tree canopy***
- ***Provide separate facilities for different transportation modes***
  - Multi-use Path
  - Sidewalk
  - Bike Lanes
- ***Calm traffic***
- ***Improve drainage conditions***
  - Replace wide valley gutter with traditional curb and gutter
  - Reallocate space to street trees and landscaping

After the presentation, the public was invited to more closely examine the alternatives and engage with the project team, providing their feedback for the proposed ideas. Display boards were installed illustrating existing conditions with their proposed alternatives, as well as boards illustrating the results of the traffic models ran by the project team. Meeting attendees were invited to brainstorm with project team members to continue to refine and enhance the alternatives presented. A second survey was also provided on paper for people to provide their feedback for consideration by the project team and inclusion in the planning process.

A summary of what was heard during the first iteration of public engagement for the project, including both the survey and interactive mapping feedback collection tools, revealed common themes such as the busy nature of Eastern Parkway, the importance of its heritage tree canopy, the importance of its history and legacy as an Olmsted Parkway, the roadway's congestion and a perceived sense of it being dangerous, and Eastern Parkway's ubiquitous nature as something that feels like home for the people of Louisville.

Overall, the 89 survey respondents noted (Figure 4.12) that they generally felt somewhat comfortable (59%) and somewhat safe (63%) while using Eastern Parkway and that they mostly felt that their visual impression of Eastern Parkway was very visually pleasing (58%). Most facilities on Eastern Parkway, however, were noted to either be needing improvement or non-existent.

When asked how the project team should prioritize its efforts, however, the results were equally distributed among preserving or renewing the tree canopy, improving pedestrian connections, improving bicycle connections, improving transit amenities, and improving traffic flow for cars (Figure 4.13). The project team

Figure 4.12 *Survey Ratings*

*How do you rate your **comfort** on Eastern Parkway?*		
Not Comfortable	***Somewhat Comfortable***	Very Comfortable
15%	***59%***	26%

*How do you rate your **safety** on Eastern Parkway?*		
Not Safe	***Somewhat Safe***	Very Safe
19%	***63%***	18%

*How do you rate your **visual impression** of Eastern Parkway?*		
Not Visually Pleasing	Somewhat Visually Pleasing	***Very Visually Pleasing***
3%	39%	***58%***

*How do you rate the **existing amenities** on Eastern Parkway?*			
	Nonexistent	Needs Improvement	Plentiful
Tree Canopy	0%	47%	***53%***
Pedestrian Facilities	9%	***71%***	20%
Bicycle Facilities	***52%***	38%	10%
Transit Facilities	9%	***63%***	28%
Motor Vehicle Facilities	7%	***48%***	45%

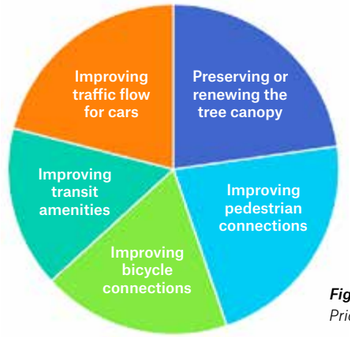


Figure 4.13 *Survey Priority Activities*

interpreted these results to mean that a balanced plan is key, keeping in mind all users and that maintaining the park-like setting of Eastern Parkway is most important.

The presentation then presented the concerns and challenges and big ideas heard from the public in five key project areas:

1. ***Multimodal***
2. ***Traffic***
3. ***Safety***
4. ***Legacy***
5. ***Maintenance/Outreach/Funding***

Multimodal concerns and challenges for the project include finding the space needed for bike lanes, making connections to Beargrass Creek, and improving sidewalk conditions and connectivity. ***Traffic*** concerns and challenges include maintaining the existing travel lanes, speeding, congestion, and residential parking east of Bardstown Road. Issues heard relating to ***safety*** included an emphasis on bicycle and pedestrian safety, speeding, access management and crash reduction. Issues related to the ***legacy*** of Eastern Parkway include preserving the tree canopy, preserving its multimodal character, preventing roadway widening, and accommodating diverse needs through the project. Concerns and challenges for ***maintenance, outreach, and funding*** included communicating the needs of more vulnerable roadway users and securing funding for construction and maintenance.

Respondents provided many ideas for improvements in the rehabilitation of Eastern Parkway. Ideas for ***multimodal*** improvements included adding bike lanes, adding off-street multimodal facilities, connecting sidewalks throughout the corridor, providing enhanced, dedicated transit stops, adding a transit station and

shade in the Kroger parking lot, and adding scooter parking at bus stops. Ideas to support ***traffic*** enhancements included introducing roundabouts, reducing traffic noise, implementing a road diet, maintaining four travel lanes, reducing traffic [congestion], and implementing intersection improvements for crash reduction. Ideas to improve ***safety*** included traffic calming for speed reduction, improving pedestrian crosswalks, implementing safe bicycle transitions and connections, improving lighting, and speed enforcement. Respondents also provided ideas for enhancing the Olmsted ***legacy*** of Eastern Parkway, including replacing concrete islands with green space, improving transitions between zones, restoring missing tree rows, funding a full-time arborist, and replacing damaged or dying trees. Finally, respondents suggested installing fixed trash cans to improve ***maintenance*** along the corridor.

In addition to the survey, a Wikimap was built for Eastern Parkway and utilized to capture geographically-located comments from the public. Overall, 225 comments were received on the interactive mapping tool (Figure 4.14), with suggestions for categories as bikes, parking, trees/landscaping, and drainage. Commenters were able to drop pins and icons for different topic areas on a specific location, and then provide supplementary responses to explain their perspective. Over half of the comments received (53%) related to multimodal themes. Suggestions were also made for bike lane routes, sidewalk connections, and trails/multi-use paths (Figure 4.15)

In general, the comments received on the interactive map regarding ***multimodalism*** included improving sidewalks and connections, adding bike lanes or widening sidewalks into multi-use paths, improving left-turn conditions for bicyclists, adding bike and scooter rental stations, and providing covered transit stops and amenities. Responses regarding ***traffic*** included improving left turn opportunities at intersections and entrances and reducing travel lanes. Comments regarding ***safety*** included improving access management, replacing roll curbs for drainage and access improvements, improving sight distance, eliminating slip lanes, implementing a road diet, reducing the speed limit and/or reducing speeding, replacing faded signs, and relocating hidden street signs. Respondents commenting on preserving the ***legacy*** of Eastern Parkway discussed removing and reallocating excess pavement in the roadway and surrounding parking lots, adding trees, green space, and

Figure 4.14 *Interactive Mapping Responses*

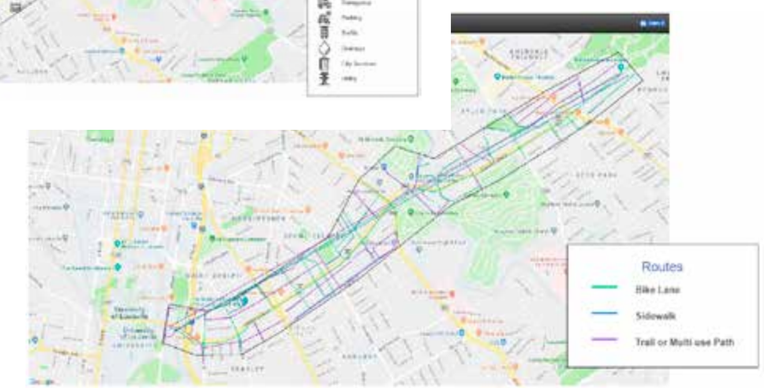


Figure 4.15 *Interactive Mapping Route Suggestions*

community gardens, and allowing low-mow green space and lawns. Comments regarding the ***maintenance*** of Eastern Parkway included providing more trash cans and improving drainage.

After summarizing the public feedback heard and collected to date, the presentation at the second public meeting then summarized the results of data collection efforts for the project, beginning with the Road Safety Audit conducted by the project team. The results of the Road Safety Audit presented safety performance results that would need to be considered during the planning and design processes for Eastern Parkway's rehabilitation. Safety performance was evaluated regarding signalized intersections, horizontal curves through intersections, roadside fixed objects, interaction locations where different modes of transportation mix, right-turn slip lanes, and transit facilities.

Crash data collected during the Road Safety Audit for Eastern Parkway from 2016 to 2018 found that more than 40% of all of the crashes reported on Eastern Parkway, and more than 35% of the crashes that involved a fatality or injury on Eastern Parkway, occurred at one of the corridor's ten signalized intersections. In particular the Baxter Avenue, Shelby Street/Preston Street, and Bradley Avenue intersections performed poorly in crash experience. These results emphasized the importance of planning for safety enhancements in these locations. Additionally, the Road Safety Audit identified horizontal curves in multiple intersections throughout the corridor, which can increase the risk of multiple crash types and reduce road user comfort. These findings became a factor for consideration in the planning process. Further, while the legacy of Eastern Parkway is inextricably intertwined with its treelined-character, roadside fixed objects along the project corridor, which include not only trees but items such as utility poles, retaining walls, and other non-breakaway roadside features common to an urban environment, carry inherent risk that was considered during planning as well. As such, the Road Safety Audit captured the locations of trees along Eastern Parkway to evaluate them for safety.

The Road Safety Audit additionally considered the interaction locations between pedestrians, bikes, scooters, and motor vehicles. Increasing safety where transportation modes mix and converge requires decreasing the number and severity of conflict points, decreasing the speed differential between bicycles, pedestrians, and motorists, and creating intuitive settings for each of these modes to co-exist. Existing conditions were noted where the bicycle/pedestrian facilities move from the exterior of the roadway to the median, resulting in mainline crossings (including several midblock crossings) of Eastern Parkway for vulnerable road users. The Road Safety Audit also identified right-turn slip lanes, where right-turning traffic can turn at an intersection at a higher rate of speed due to the wide approach angle. The limited sight distance, current free-flow of traffic, and reduced visibility of pedestrians in these right-turn slip lanes contribute to far-side rear-end crashes and exacerbate pedestrian conflicts and were thus considered in the planning process. Finally, the Road Safety Audit identified the locations of transit facilities for TARC and school buses, as they can strain necessary flow and increase congestion-related crashes.

The final portion of the presentation given at the second public meeting presented alternatives to Eastern Parkway's existing conditions and typical sections as developed by the project's team of engineers and planners and with respect to the feedback heard from project stakeholders and respondents in the first round of public engagement conduced for the project. Emphasis was placed on the intention of the second public meeting to serve as a forum to demonstrate ideas and concepts, present alternatives to solve the concerns that had been voiced by the public and found in data analysis, re-envision multimodal balance and separation in the unique context of Eastern Parkway, and begin an open discussion and dialogue. It was noted that the alternatives presented were not a push for preconceived fixes, solutions for every problem that exists on Eastern Parkway, a complete design, or the final opportunity for the public to give their input in the planning process.

In the corridor analysis and alternatives evaluation, two themes emerged: developing a road diet and reestablishing the parkland as a linear park for Eastern Parkway. A road diet was contemplated as a proven Federal Highway Administration (FHWA) safety countermeasure. Improvements include an overall crash reduction by 19-47%, reducing rear-end and left turn crashes by moving left-turning traffic moves out of the travel lane, reducing right-angle crashes by making it easier for side street traffic to pull out onto the main line, reducing the number of lanes pedestrians need to cross, providing traffic calming and more consistent travel speeds, and reallocating space for other modes of transportation.

The project team conducted an in-depth and thorough traffic analysis to generate intersection alternatives under a road diet scenario that met safety goals, resulted in minimal impacts to traffic flow and congestion, and maintained continuity of other Olmsted Parkways. Alternatives were presented at the intersections of Eastern Parkway at Barret Avenue, Eastern Parkway at Baxter Avenue, Eastern Parkway at Bardstown Road, and at the termination of Eastern Parkway at Cherokee Park East (at the Daniel Boone monument).

At the conclusion of the presentation, the public was invited to engage with the project team. Display boards with large images illustrating the alternative options were available for people to spend time thoughtfully reviewing, contemplating, and considering at their own pace. Project team members were available to answer questions and document feedback heard from meeting attendees. Display boards illustrating the results of the traffic models were available as well. Finally, a second survey was made available on the project's website for people to give their comments electronically, and a paper survey was available at the meeting as well.

Stakeholder Meeting #3

On Tuesday, January 21, 2020, the project team facilitated a meeting of project stakeholders with vested interest in the Eastern Parkway project and planning process. The meeting consisted of an open discussion among project team members and stakeholders. The conversation included the proposed roundabouts at the Barret Avenue and Bradley Avenue intersections, comparing the proposed alternatives with other roundabouts currently present in Louisville. It was noted that the proposed roundabouts were single lane, rather than multilane such as the roundabout at Brandeis Avenue and S. Floyd Street near the project limits. The discussion also emphasized the importance of planning for safe pedestrian access, particularly in highly congested and popular areas such as at the Dairy Kastle. Additional dialogue noted that sight distance at many intersections continues to be a concern, particularly for left-turning traffic. It was noted, however, that sight distance is also challenging for right-turning traffic particularly from southbound Barret Avenue onto westbound Eastern Parkway. The proposed alternatives would mitigate these issues. Overall, stakeholders were pleased with the planning efforts conducted throughout the project.

Public Meeting #3

On January 28, 2020, the project team facilitated the third and final Eastern Parkway public meeting in the gymnasium at Audubon Traditional Elementary School from 6:00 pm – 8:00 pm. With the room full with standing room only (Figure 4.16), the presentation began with a reiteration of the project's vision and goals, a summary of the public engagement conducted to date, including user surveys and the interactive Wikimap feedback collection tools, a summary of the preliminary alternatives developed for evaluation and consideration, and a review of the project's timeline. As the meeting progressed more people arrived than could fit in the gymnasium, and the meeting was paused to expand the meeting space into the cafeteria to accommodate people standing in the hallway to ensure all attendees could see and hear the presentation.

Figure 4.16 *Public Meeting #3 Attendance*

The project team restated the goals of the Eastern Parkway project and the purpose and need for the project, which include rehabilitating the existing right-of-way, preserving or renewing the tree canopy, providing separate facilities for different transportation modes, calming traffic, improving drainage conditions, and reallocating space to street trees and landscaping. The presentation also explained the purpose of the Eastern Parkway transportation study, as a document that establishes a shared goal and vision for the project collectively as a community, collects information on existing conditions, identifies existing and future performance and conditions, actively engages with the public and stakeholders to hone ideas and document results, and identifies solutions that adhere to the established goals and vision to move forward into future evaluations. The planning study is the first of many phases, of which following are preliminary design, final design, right-of-way acquisition (as applicable), and construction.

After presenting the public engagement feedback heard from the surveys and interactive Wikimap feedback collection tools deployed at the first public meeting held in July, the presentation summarized the findings from the public engagement efforts conducted in conjunction with the second public meeting held in September.

The survey conducted at the second public meeting asked participants to rate how well the proposed alternatives supported specific amenities, including motor vehicles, transit, bicycles, pedestrians, and the tree canopy (Figure 4.17). Motor vehicle facilities (3.79) and pedestrian facilities (3.68) were found to be best supported by the proposed alternatives, while there was room for improvement for transit facilities (2.68) and bicycle facilities (3.21).

Comments provided to improve accommodations for motor vehicles included calming vehicle speeds and addressing traffic backups, and comments for improving pedestrian safety. Almost all were related to access issues and the lack of perceived safety, predominately correlated with the speed of cars. Suggestions for improving bicycle facilities included providing more multi-use paths, protected bike ways, and other dedicated bike facilities and making connections to the existing bike network that crosses Eastern Parkway. Suggestions for improving the tree canopy included the reclamation and/or expansion of Eastern Parkway's green space.

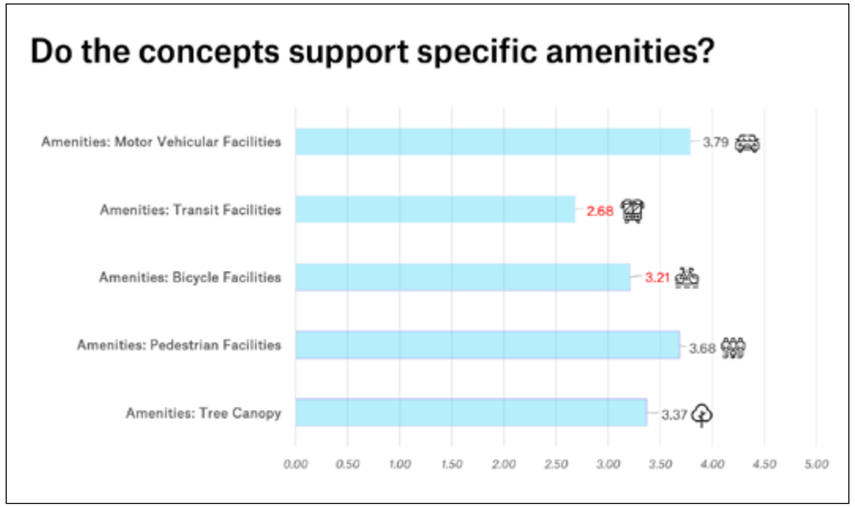


Figure 4.17 *Amenity-support Rankings*

Suggestions for better supporting transit facilities generally included improving amenities at bus stops (with features such as shelters, seating, and trash cans) and providing better connectivity to destinations just off the transit corridor. There were 46 bus stop locations identified in the project's transit inventory (including both sides of Eastern Parkway), with an average stop spacing of 0.135 mile (just over an eighth of a mile). The data collected supports the need for transit amenity improvements as it found that 41 (89.1%) of the 46 stop locations do not have shelters, 34 (73.9%) are a sign only with no amenities, and 29 (63.0%) are not accessible to the curb. Additionally, the three business bus stop locations on Eastern Parkway are at Preston Street/ Shelby Street, Bardstown Road, and Poplar Level Road. The Shelby Street bus stop location on westbound Eastern Parkway, however, is not accessible to the curb and has no amenities. The Bardstown Road bus stop location on eastbound Eastern Parkway does not have a shelter, and none of the Poplar Level Road locations have a shelter. Recommendations for addressing the concerns regarding transit amenities include enhancing stops at busiest locations, adding bus pullouts as needed to accommodate boarding and facilitate traffic flow, making stops accessible, examining stop locations (distance to next stop) and stop performance for consolidation where it makes sense, and improving access to shelter and seating throughout the corridor.

The survey conducted at the second public meeting asked participants to rate how the alternative concepts made them feel (Figure 4.18), with results demonstrating that approximately 70%-80% of respondents perceived the concepts as visually pleasing, safe, and comfortable.

Suggestions to improve the aesthetics of Eastern Parkway included separating travel modes, increasing the amount of greenspace, and enhancing the tree canopy. Suggestions to improve how safe and comfortable Eastern Parkway feels both focused on the interactions people have with cars and the travel speed of cars moving along the corridor.

The presentation then presented crash and collision data collected on Eastern Parkway from 2014 to 2018. Crash counts were provided for different types of collisions, including angle, backing and head on, opposing left turn, rear end and rear-to-rear, sideswipe (opposite and same direction), and single vehicle. Annual average daily traffic counts were also provided to compare with total crash counts and the breakdown of those crashes by injury and fatality. A discussion followed regarding countermeasures that can address crashes, including removing one lane in each direction to accommodate a two-way left-turn lane. This countermeasure was utilized in some of the proposed alternative for certain segments and critical locations along Eastern Parkway.

The survey from the second public meeting asked for people to rate how they felt about each of the proposed alternatives on a scale from 1-5, with 5 being most favorable, and the results showed a generally positive sentiment for all alternatives (Figure 4.19).

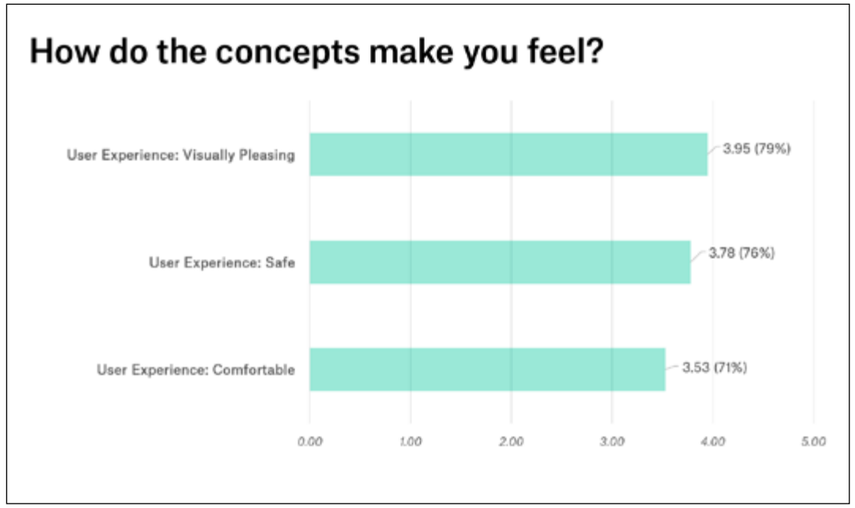


Figure 4.18 *Perception Rankings*

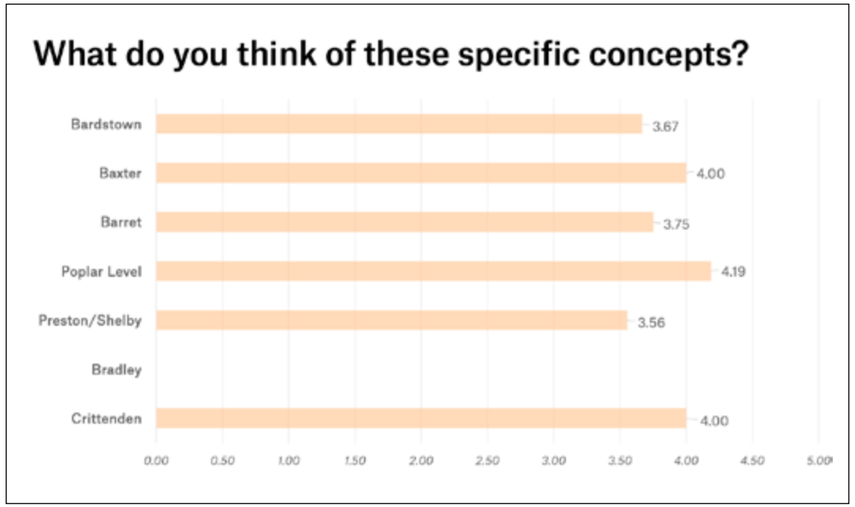


Figure 4.19 *Alternatives Rankings*

The alternative proposed for the intersection of Eastern Parkway and Crittenden Drive, which includes realignment of on/off ramps and intersection legs as well as the introduction of additional greenspace, received an 80% favorable ranking from survey respondents. Comments supported the addition of green space and an approach that focuses on safety. Commenters also requested shorter pedestrian crossings.

While the intersection of Eastern Parkway and Bradley Avenue was not included in the alternatives presented at the second public meeting, the project team responded to requests from the public to include this intersection in the project analysis and evaluation. In particular, feedback received on Bradley Avenue noted the difficulty of making left-turn movements. As such, the project team developed two new alternatives for this intersection, including either introducing aligned lefts or a peanut-shaped roundabout, which were presented for the public to review at the third public meeting.

The alternative proposed for the intersection of Eastern Parkway at Preston Street and Shelby Street, which includes making Preston Street two-way, received a 71% favorable ranking from survey respondents. Comments heard at the second public meeting recommended introducing countermeasures to prevent illegal turning movements and potentially converting Shelby Street into a multimodal-only facility. Commenters also wanted to ensure that alternatives evaluated for this intersection take into consideration the surrounding neighborhoods. Three alternatives were presented to the public at the third public hearing for their review, including a no-build option.

The alternative proposed for the intersection of Eastern Parkway and Poplar Level Road, which includes a road diet with intersection improvements, received an 84% favorable ranking from survey respondents. Comments heard at the second public meeting included support for the proposed alternative as it slowed traffic and an appeal to focus on increasing transit access. Commenters also expressed slight concerns regarding the proposed lane drops.

The two alternatives proposed for the intersection of Eastern Parkway and Barret Avenue, either a modified standard intersection or the introduction of a roundabout, received a 75% favorable ranking from survey respondents. Commenters noted that the intersection was tricky due to the blind curve, and they were divided on the best approach. While some commenters implored the project team to recommend an alternative with a roundabout, others expressed concerns regarding how unfamiliar drivers may struggle navigating a roundabout.

The alternative proposed for the intersection of Eastern Parkway and Baxter Avenue, which realigns intersection legs and removes select turn lanes, received an 80% favorable ranking from survey respondents. Commenters noted that they felt the alternative would make the intersection much safer, and they responded well to the new sidewalks and their placement with respect to the roadway.

The alternative proposed for the intersection of Eastern Parkway and Bardstown Road, which realigns turn lanes, received a 73% favorable ranking from survey respondents. Commenters noted that there was too much traffic on Bardstown Road, and that the proposed alternative appeared to focus more heavily on motor vehicles rather than pedestrians, recommending that the pavement area be reduced and pedestrian access be further improved in future iterations of alternative development.

The final alternative presented at the third public meeting was for enhancements at the tie-in of Eastern Parkway with Cherokee Park at the Daniel Boone Monument, which include modifications to the traffic circle and the introduction of multimodal facilities.

At the conclusion of the presentation, meeting attendees were invited to share their feedback directly with the project team and through either a paper form or online survey. A large map of the Eastern Parkway corridor was also available for people to leave specific comments at different locations via sticky note (Figure 4.20).

With 162 responses, the survey results from the third public meeting demonstrated a general theme of support for the project efforts. People were first asked to provide three words to describe the "Eastern Parkway of the future." Themes included a safer, slower, greener, calmer, accessible and multimodal, and beautiful Eastern Parkway with trees. Word themes voicing hesitation, however, did emphasize the need for convenience and efficiency for the corridor and the importance of Eastern Parkway serving vehicular traffic as well as other modes.

The survey then asked respondents to rank how well the proposed alternatives would address amenities along the corridor, including the tree canopy, pedestrian facilities, light vehicle facilities (scooters/bicycles), transit, and motor vehicles. Respondents were asked to evaluate how well the alternatives addressed each amenity on scale of 1-5, with 1 being "Does not Address," 3 being "Somewhat Addresses," and 5 being "Addresses Completely." Two-thirds of respondents provided a favorable response, with the most common response being a 4 for each of the five amenities.

The next question asked respondents to share how comfortable, safe, and visually pleased each of the proposed alternative concepts would make them feel. Respondents were asked to rate each of these three user experience areas on a scale of "Not," "Somewhat," and "Very." On average, each of the three experience areas was rated as making respondents feel "somewhat" comfortable, safe, or visually pleased in a future state as proposed by the alternative concepts. Responses, however, were generally split evenly across each of the three scale ranks, with approximately the same number of people feeling "very" comfortable, safe, or visually pleased as those who felt "somewhat" or "not."

Finally, respondents were asked to describe how well they liked each of the specific concepts discussed at major intersections along Eastern Parkway: Crittenden Drive, Bradley Avenue, Preston Street/Shelby Street, Poplar Level Road, Barret Avenue, Baxter Avenue, Bardstown Road, and the eastern tie-in with Cherokee Park at the Daniel Boone Monument. Respondents were asked to rank how well they liked the concepts at each intersection on a scale of 1-5, with 1 being "Dislike," 3 being "Neutral," and 5 being "Like." On average, nearly 70% total respondents responded neutral or better, with 50% of the total responding with a favorable ranking of 4 or 5 for each intersection. The most common response for each of the eight intersections was a 5, "Like," except for the intersection at Preston Street/Shelby Street. The most highly ranked intersections were Crittenden Drive, Bradley Avenue, and Barret Avenue, with 50% of the total respondents providing a favorable (4 or 5) ranking. The intersections at Preston Street/Shelby Street, Poplar Level Road, Baxter Avenue, Bardstown Road, and the tie-in to Cherokee Park each received a favorable (4 or 5) ranking by 40% of respondents.

General comments received by survey respondents varied in level of support, from those in full support to those with reservations. Comment themes included the management of vehicular traffic flows and congestion, as well as the provision of safe bicycle and pedestrian facilities. Support was given for preserving green spaces and the tree canopy, while other comments debated how to handle the direction of traffic (one- or two-way) and dedicated turning movements. Other themes included improving safety, sidewalks, and lighting along the corridor.

Figure 4.20 *Feedback Map at Third Public Meeting*

05

CHAPTER 05

Putting It All Together

Comprehensive Recommendations

The development of recommendations for the Eastern Parkway of the future is the culmination of the planning process. It is during this project phase that the project team compiled the body of knowledge from prior planning studies, the data collected while evaluating the existing conditions along Eastern Parkway, and most importantly the feedback heard from the community on every step of the way. Using this information, the project team analyzed four alternative design scenarios, from which a preferred recommendation for the entire Eastern Parkway corridor was selected. The merits of the safety improvements, stormwater improvements, multimodal improvements, and greenspace improvements of this recommendation were analyzed and captured. Specific recommendations were developed to support ten key intersections along the corridor with respect to their unique geometries, volumes, and surrounding contexts. Recommendations were also developed for improving multimodal access for transit users and light vehicles. Recommendations were further developed to enhance the roadside character of Eastern Parkway by addressing access management issues, relocating overhead utilities, and setting standard policies for roadside amenities along the corridor. With flooding and drainage issues pervasive through the corridor, recommendations were developed for managing stormwater along Eastern Parkway. These recommendations include details for curb and gutter construction, along with suggested maintenance-of-traffic plans. Finally, landscaping and planting plans were developed for each zone of the corridor to restore Eastern Parkway's beloved tree canopy and "ribbon of green."

A. Transportation Recommendations

Restoring Eastern Parkway to its original, Olmstedian vision while serving the multimodal transportation needs of a growing, modern population has been the primary goal and guiding north star for the transportation planning process for the parkway. Actions that will promote the success of this goal include reclaiming green space, rehabilitating the tree canopy, and providing safe and functional access for multiple modes of transportation. As such, a general, corridor-wide recommendation was generated for Eastern Parkway that best achieves this goal. Specific recommendations were also developed with respect for the unique contexts along the parkway's intersections, the particular needs of alternative transportation modes, and the importance of Eastern Parkway's roadside character, including its access management, overhead utilities, and roadside amenities.

I. General Corridor Recommendations

1. DEVELOPMENT OF ALTERNATIVE SCENARIOS

Four general roadway configuration scenarios were considered by the project team for the Eastern Parkway corridor to develop recommendations for the parkway's rehabilitation:

Option 1: a no-build scenario;

Option 2: a four-lane configuration with a 10-ft-wide northside shared-use path and 6-ft-wide southside sidewalk;

Option 3: a three-lane configuration consisting of one through lane in each direction and a center two-way left turn lane (TWLTL), light vehicle lanes on each side, a 10-ft-wide northside shared-use path, and a 6-ft-wide southside sidewalk; and

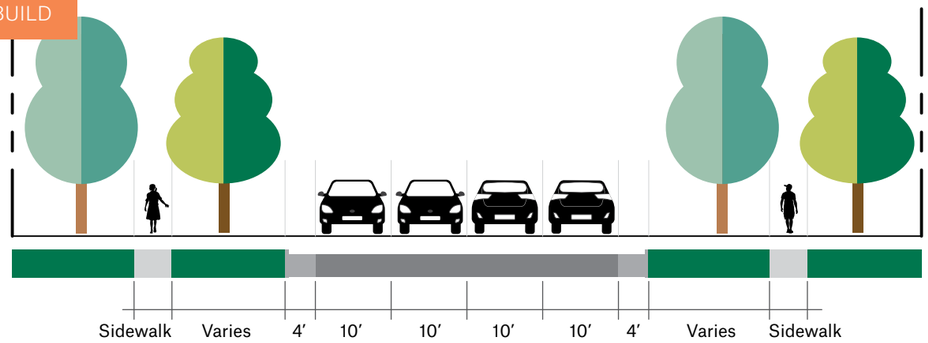
Option 4: a two-lane configuration with light vehicle lanes on each side, with a 10-ft-wide northside shared-use path and a 6-ft-wide southside sidewalk.

In keeping with the project goals, the two primary consideration criteria for evaluating the four scenarios were (1) the degree to which the scenario achieves a rehabilitated Eastern Parkway in alignment with the original Olmstedian aesthetic and function and (2) how well the scenario balances the needs of a modern transportation network, with higher capacity and multimodal users.

Each of these scenarios has its own set of strengths and shortcomings in achieving the two criteria conditions.

All four options are facing east.

OPTION 1
NO BUILD



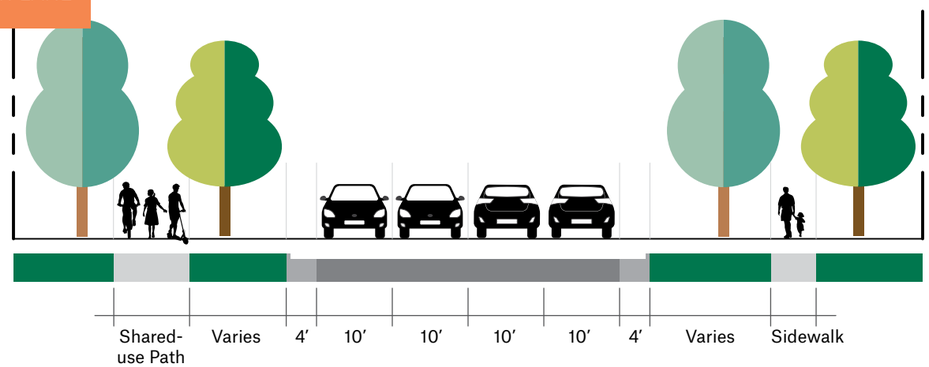
Strengths:

- No cost other than current maintenance activities

Shortcomings:

- Does not provide additional space to recapture green parkway right-of-way
- Does not improve or expand tree canopy
- Does not reduce motor vehicle conflict points inherent in a four-lane configuration
- Does not address access issues for alternate modes of transportation

OPTION 2
FOUR-LANE



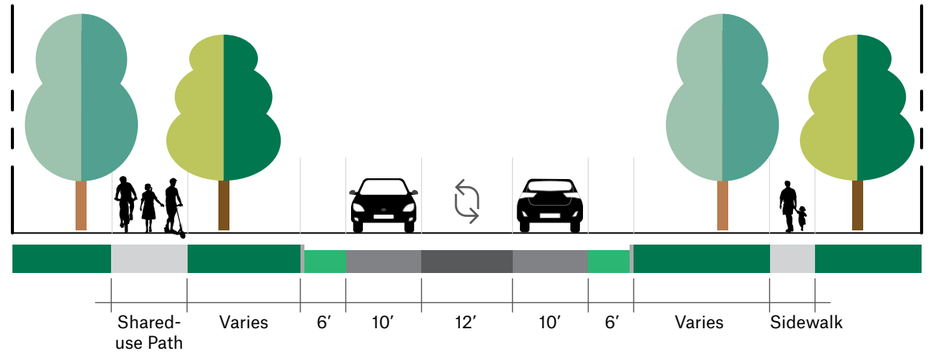
Strengths:

- Moderately improves access for other modes of transportation along Eastern Parkway with shared-use path
- Implementable without major reconstruction of existing pavement or utilities

Shortcomings:

- Does not provide additional space to recapture green parkway right-of-way
- Does not improve or expand tree canopy
- Does not reduce motor vehicle conflict points inherent in a four-lane configuration
- Does not address access across Eastern Parkway for alternate modes of transportation

OPTION 3
THREE-LANE



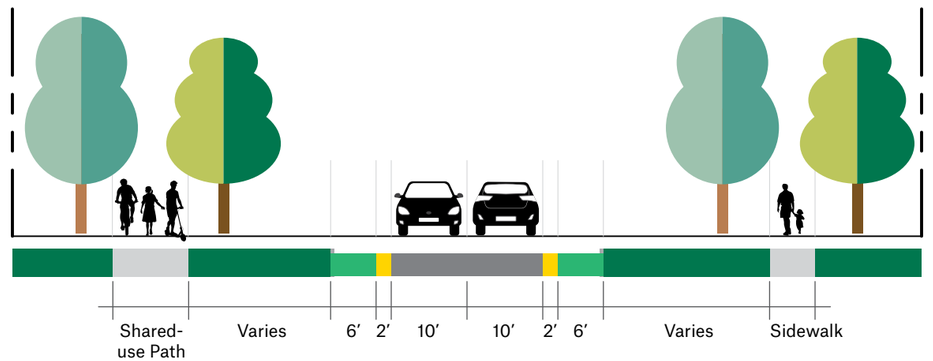
Strengths:

- Improves access for alternate modes of transportation along Eastern Parkway
- Improves access for alternate modes of transportation across Eastern Parkway
- Reduces motor vehicle conflict points, thereby increasing safety
- Reduces motor vehicle speeds, thereby increasing safety for all parkway users
- Provides additional space to recapture green parkway right-of-way
- Provides space to improve and expand tree canopy
- Implementable without major reconstruction of existing pavement or utilities

Shortcomings:

- May adversely impact vehicle queuing at signalized intersections
- Reduces opportunities to pass transit buses and other slow-moving or stopped vehicles

OPTION 4
TWO-LANE



Strengths:

- Provides enhanced opportunity to recapture green parkway right-of-way

Shortcomings:

- Does not adequately address anticipated traffic movements due to the high frequency of left turns to access entrances and private drives and lack of turn lane to accommodate these left turns separate from through traffic
- Requires major reconstruction of existing pavement and utilities
- Removes opportunities to pass transit buses and other slow moving or stopped vehicles

Figure 5.1 *Recommended typical three-lane roadway configuration, facing east.*

2. GENERAL CORRIDOR RECOMMENDATION

Based on this evaluation Option 3, the three-lane roadway reconfiguration, is recommended for Eastern Parkway Zones 2 through 7 (with exceptions for Zones 1 and 3). The 10-ft through lane in each direction and a 10 to 12-ft center two-way left turn lane (Figure 5.1) will provide the greatest holistic improvement to the corridor. This proposed roadway reconfiguration is a straightforward implementation, as it is primarily a change of striping on the corridor. In order to implement the reconfiguration, however, some locations may require physical changes to improve safety and accommodate the volume of vehicular traffic along Eastern Parkway.

A discussion regarding Option 3's safety improvements via a roadway reconfiguration, stormwater improvements, multimodal improvements, and greenspace improvements is included below. The discussion concludes with a description of design exceptions for special conditions in project Zones 1 and 3.

i. Safety Improvements: Roadway Reconfiguration

The Option 3 scenario recommends a three-lane roadway reconfiguration (also known as a road diet), a Federal Highway Administration (FHWA) proven safety countermeasure (Proven 2020). The benefits of transitioning from a four-lane cross-section to a three-lane cross-section are significant and include improvements for crashes (number and type), complete streets, and emergency response time.

Crash Reduction: Roadway reconfigurations reduce crashes by 19-47%, based on national averages. Locally, Louisville Metro has had great success implementing road diets on roadways similar to Eastern Parkway. For example, the Grinstead Drive roadway reconfiguration demonstrated a 59% reduction in total crashes and a 74% reduction in crashes with injuries. There was a 76% reduction in the total number of injuries incurred in crashes during the first two years after construction.

Type of Crash: Roadway reconfigurations also address rear-end, left turn, and right-angle crashes. Rear-end crashes were identified as the largest contributor to crash history in the last three years on Eastern Parkway at 39%, followed closely by angle crashes at 24%. These two crash types alone account for over sixty percent of crashes on the parkway and are appropriately addressed with a roadway reconfiguration.

Complete Streets: Additionally, reducing from four lanes to two through lanes with a center TWLTL better supports complete streets design approach by improving safety and access for pedestrians and other vulnerable modes of transportation crossing the corridor. This is accomplished by slowing traffic speeds thereby decreasing the speed differential between modes, reducing the number of travel lanes to cross, and providing opportunities for refuge islands.

Emergency Response Time: Roadway reconfigurations have the added benefit of improving access for emergency response vehicles which can leverage the center TWLTL, therefore reducing emergency response time (Road 2020).

ii. Pavement Reconstruction and Stormwater Drainage Recommendations

In addition to the overall roadway reconfiguration, Option 3 recommends the replacement of the existing pavement and valley curb and gutter using modified drainage structures and construction methods to mitigate impacts to the existing tree infrastructure. These recommendations address the on-going pavement maintenance and existing drainage issues that occur throughout the corridor, discussed in more detail in the following section.

iii. Multimodal Improvements

Light Vehicles: Safe, functional, and separated modes of transportation, including light vehicles, is an integral part of the original Olmstedian vision. Scooters, electric-powered and assisted bicycles, and pedal-powered bicycles are all considered light vehicles. The typical section in the Option 3 scenario provides for a 6-ft separated light vehicle lane by using available right-of-way reclaimed from the reduction in motor vehicle lanes and the replacement of the valley curb and gutter. In this scenario, light vehicle lanes will connect to existing lanes on Poplar Level Road and the University of Louisville campus. They will also provide new multimodal connections to the trails in Cherokee and Seneca Parks.

Construction of the replacement gutters would directly impact the operation of light vehicles in the dedicated lanes. Two construction options are available for consideration:

1. Modified 2-ft curb and gutter, which has a 2-ft-wide gutter pan, adjacent to 4 ft of asphalt, for a total lane width of 6 ft (Figure 5.2)
2. Modified 6-ftcurb and gutter, with a 6-ft-wide gutter pan encompassing the entire width of the light vehicle lane (Figure 5.3)

Figure 5.2 *Standard Curb and Gutter: The seam between the gutter pan and lane line places light vehicle operators closer to motor vehicle traffic.*

Figure 5.3 *Modified Curb and Gutter: The wide gutter pan provides additional safe operating space for light vehicle operators.*

Of these two construction options, modified 2-ft curb and gutter is the lower cost due to the standardized construction methods using machinery to slip-form the curb and gutter pan, as well as the smaller width of the gutter pan. Modified 2-ft curb and gutter, however, would have a negative impact for light vehicle operators, since the seam between the concrete and asphalt surface is difficult to ride on, and typically riders will split the difference between the seam and the lane line. This provides only 4 ft of rideable space, and it puts the light vehicle operator closer to the motor vehicles driving in the next lane.

The modified 6-ft curb and gutter option provides the full 6 ft of space for operating a light vehicle because the seam between the asphalt and concrete pavements occurs in the striped lane line between the light vehicle lane and the motor vehicle lane. This provides a smoother and safer ride, since the light vehicle can operate further away from motor vehicle traffic. This option provides the additional benefit of making the motor vehicle lane appear narrower due to the contrasting pavement materials, thereby creating a traffic calming effect by reducing vehicle speeds. Modified 6-ft curb and gutter, however, is the more expensive option due to the construction methods required. In this scenario, the concrete pavement of the gutter pan would first be placed and cured, before casting a curb over stirrups placed within the concrete gutter pan. In addition, the 6' width in concrete instead of asphalt increases construction costs versus the 2' width of gutter. Both construction methods are considered modified, because the depth of construction is shallower as compared to standard curb and gutter. This shallower depth provides maximum protection for the existing root infrastructure, while still addressing the existing drainage issues. Combined with other protection and preservation construction methods, the existing tree canopy will be preserved where trees are found to be in good health. If replacement is needed, recommended species for new plantings during the construction process are provided later in this chapter.

Bicycles/Pedestrians: Eastern Parkway does not currently offer continuous access for pedestrians on the south side of the parkway due to gaps in the sidewalk network. To correct these discontinuities, Option 3 recommends providing a continuous 6-ft-wide sidewalk for the entirety of southside Eastern Parkway by rehabilitating existing sidewalk pavement and filling in gaps in the network. Additionally, a 10-ft shared-use path along the north side of the parkway will provide a safe alternative, separated from vehicular traffic, for families to enjoy the parkway by walking, bicycling, or scootering. When continuous sidewalks and multi-use paths are combined with the light vehicle lanes, Eastern Parkway will become a strong, multimodal, east-west connector for the communities and residents who call the parkway home.

Transit: Currently, buses on Eastern Parkway must stop in the lane to pick up and drop off passengers. With the implementation of the roadway reconfiguration, the continuation of buses stopping in the lane may have adverse impacts on the flow of traffic through the corridor. This conflict may be mitigated through the use of bus pull-off bays in high ridership locations to allow through traffic to continue when a bus is stopped.

iv. Greenspace Improvements

Verges throughout the corridor will vary due to existing topography restraints that will control the placement of the shared-use path and sidewalk relative to the curb. Wherever possible, however, the proposed path and sidewalk will utilize existing space already covered with impervious surface to reduce construction impacts on existing tree infrastructure and green space. Verges will be designed to provide as much space for trees as is available within grade constraints. Where feasible, green space should be reclaimed from encroachments into parkway right-of-way, whether public or private, and revegetated during the construction process.

v. Exceptions

Exceptions to the three-lane cross-section include Zones 1 and 3.

Zone 1 is residential, with lower traffic volumes and parking currently on both sides of Eastern Parkway. In order to maintain parking availability for residents, two alternatives were developed:

Alternative 1: a two-lane configuration, with an 11-ft shared travel lane in each direction and 8-ft delineated parking on both sides, allowing for four feet of green space recapture on either side of the new curb and gutter (Figure 5.4).

Alternative 2: a two-lane configuration with an 11-ft eastbound shared travel lane, a 10-ft westbound travel lane, 5-ft westbound light vehicle climbing lane, and 8-ft wide delineated parking on both sides, allowing for two feet of green space recapture on either side of the new curb and gutter (Figure 5.5).

Figure 5.4 *Recommended two-lane alternate without climbing light vehicle lane, facing east for Zone 1.*

Figure 5.5 *Recommended two-lane alternate with climbing light vehicle lane, facing east for Zone 1.*

Figure 5.6 *Recommended typical two-lane configuration for Zone 3 facing east.*

While the first alternate most closely resembles the existing layout of this zone and provides the greatest opportunity to recapture green space, the second alternate provides additional access for light vehicles accessing Eastern Parkway from Cherokee Circle by adding a hill climbing lane in the westbound direction, while still allowing for minor green space recapture along the new curb line. Both alternatives will include a southside 10-ft-wide shared-use path and a northside 6-ft-wide sidewalk. The shared-use path for Zone 1 is located on the south side to avoid the fast movement of right turning motor vehicles from Willow Avenue is largely due to the skew of Willow Avenue as it approaches Eastern Parkway, which creates a larger turn radius for motor vehicles making the right turn.

Zone 3, between Baxter Avenue and Barret Avenue, is recommended to preserve the existing center median, as shown in Figure 5.6. The two through lanes, however, would be reduced to one 10-ft through lane in each direction. Remaining right-of-way would be allocated to multimodal uses and include an adjacent 6-ft light vehicle lane in each direction, an 8 to 10-ft-wide shared-use path adjacent to the curb on the north side, and 6-ft sidewalk adjacent to the curb on the south side. Bicyclists may use the light vehicle lane, or they may travel along the shared-use path. Access ramps available at either end of the zone would connect the shared-use path with the light-vehicle lanes. The required emergency access width of 18 ft on each side of the center median would be maintained with a 1-ft offset between the motor vehicle lane and the median curb and a 1-ft offset between the light vehicle lane and the outside curb.

II. Specific Corridor Recommendations

While the recommended three-lane typical section is generally applicable throughout Eastern Parkway, from Cherokee Park to 3rd Street, special treatment is required at ten intersections throughout the corridor based upon their particular geometry and traffic operations. Additionally, specific recommendations have been provided to address enhanced multimodal facilities for transit and light vehicle users. Finally, specific recommendations to improve Eastern Parkway's roadside character, through its handling of access management, location of overhead utilities, and provision of roadside amenities, are provided to support the holistic restoration of Eastern Parkway to the original Olmstedian vision.

1. INTERSECTION LOCATIONS

Within the overarching roadway reconfiguration recommendation, there are localized recommendations that balance access, safety, and traffic operations to more closely align Eastern Parkway with the original vision of a linear park setting that serves modern, multimodal transportation. Long-term improvement recommendations include modification of the signalized intersections and deviations from the typical three-lane cross-section at specific intersections to allow for appropriate levels of service for motor vehicles. Most intersections along Eastern Parkway would seamlessly transition to a three-lane configuration. With the TWLTL becoming a left turn lane at signalized intersections, however, the intersections detailed below would require additional design considerations to implement the corridor recommendations.

i. Cherokee Circle

Existing Conditions

A traffic circle that serves as the intersection of Eastern Parkway, Cherokee Road, and Cherokee Park Road is the eastern terminus of Eastern Parkway. The traffic circle in its existing state does not operate as a modern roundabout due to the lack of deflection in its geometry to discourage motorists from using the overlarge space. Additionally, because of the size of the traffic circle, motorists are parking along the sides, which reduces sight distance and further erodes the function of the roundabout. As seen in Figure 5.7, however, the traffic circle as it exists today closely matches the original design of Cherokee Circle, and the design cannot be modified to more closely match a modern roundabout without relocating the circle. This is due in large part to the proximity of the two legs of Cherokee Road and the entrance to Cherokee Park to each other.

Recommendation

Therefore, it is recommended that Cherokee Circle receive minor updates around the circle, including a northside 6-ft-wide sidewalk and a southside 10-ft-wide shared-use path. Crosswalks for the shared-use path crossings on the east leg of Cherokee Road and Cherokee Park Road would connect the new shared-use path into Cherokee Park through the existing park shared-use path along Cherokee Park Road. Curb extensions on Eastern Parkway at Cherokee Circle would provide traffic calming and delineate designated parking locations along Zone 1 of Eastern Parkway.

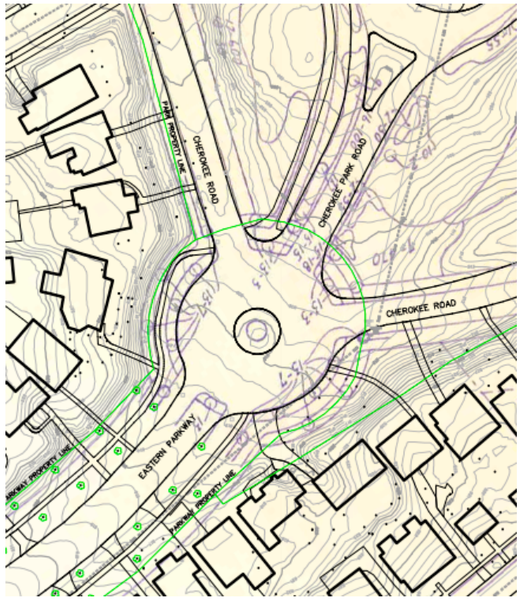


Figure 5.7 *Cherokee Circle – Existing Conditions Overlaid with Original Design*

The recommendation for this intersection remains the same no matter which Zone 1 alternative is selected in future design phases, with only the location of the curb extensions changing between the two options. No right-of-way impacts are anticipated with this design, and utility impacts from construction of the sidewalk and shared-use path are expected to be minor.

Figure 5.8 *Cherokee Circle – Recommendation for each Zone 1 alternate.*

Figure 5.9 *Bardstown Road Recommended Striping – Plan View.*

ii. Bardstown Road

Existing Conditions

Although there are two receiving westbound lanes on the west leg of the intersection of Eastern Parkway and Bardstown Road, only one westbound through lane is allocated on the east leg of the intersection, and westbound traffic is sufficiently served with the single through lane.

Recommendations

Therefore, there is an opportunity to realign the pavement markings to provide neutral offset left turn lanes from Eastern Parkway to Bardstown Road and separate eastbound through and right turning traffic, as shown in Figure 5.9. This is an existing point of significant congestion during the evening rush hour, which negatively impacts traffic accessing Eastern Parkway from Fernwood Avenue and vice versa. The recommended improvement is beneficial even without the roadway reconfiguration, and it could be implemented quickly within the four-lane cross-section to provide immediate relief to congestion at this intersection. No right-of-way impacts are expected with this recommended alternative, and utility impacts from construction of the sidewalk and shared-use path are expected to be minor.

iii. Baxter Avenue

Existing Conditions

The intersection of Eastern Parkway and Baxter Avenue provides a unique challenge, with parking serving the businesses on the northeast corner impacting the traffic operations at this busy intersection. There is a reverse curve at the intersection with sharp radii to accommodate the transition to a median cross-section. This adversely impacts the traffic operations and safety of the intersection, and it creates a highly skewed intersection lacking in sight distance.

Recommendations

By introducing the recommended roadway reconfiguration and modifying the existing median at the intersection, the intersection can be realigned with positive offset left turn bays as shown in Figure 5.10. This would improve sight distance for vehicles waiting to make the left turn. The reconfiguration would also allow for realignment of the striping through the intersection. While the lane shift would still be dramatic due to the transition to the median section, cars would be traveling through the intersection in a straight line with the realignment. The realignment of the intersection shown in Figure 5.10 preserves as much of the green median on the west leg of the intersection as possible. However, further reducing or eliminating the median width between Hill Road and Baxter Avenue would allow for additional realignment of the west leg of the intersection. This option would eliminate entirely the center median walking path and two-stage pedestrian crossing. For all realignment options, 18 feet of emergency access will be provided on both sides of the green median between Barret Avenue and Baxter Avenue.

Additional overhead signage may be required near the beginning of the left turn lanes on Eastern Parkway to manage the left turn lane restriction during the peak hours of traffic. Originally, a concept-level roundabout was considered at this intersection; however, due to the high traffic volume on both Eastern Parkway and Baxter Avenue a roundabout was found to be not feasible at this location.

Additionally, significant upgrades are needed at this intersection to accommodate pedestrians, scooters, bicyclists, as well as improve access to transit. To allow for maximum improvement for all users, the proposed light vehicle lanes would transition to a northside shared-use path for Zone 3. From the additional space available from transitioning the light vehicle lane and reducing the roadway pavement width, a 16-ft-wide path is recommended on the northeast corner. The path would allow circulation along the path, provide access to parking for the businesses, and afford space for an enhanced bus stop. A short segment of shared-use path on the southeast corner would allow for light vehicle travel through the intersection for light vehicles traveling east, with a transition back to a light vehicle lane on the east leg of the parkway to continue traveling east. Additionally, light vehicle users may continue utilizing the shared-use path on the north side, or they may transition to the light vehicle lane continuing west.

Figure 5.10 *Baxter Avenue Recommended Striping – Plan View.*

Figure 5.11 *Barret Avenue Alternative 1: Intersection Realignment.*

Right-of-way impacts are anticipated with this option, particularly for the creation of a southbound right turn lane from Baxter Avenue onto Eastern Parkway, on the northwest corner of the intersection. Additionally, minor right-of-way impacts may occur on the northeast corner as well in order to construct a shared-use path. Accurate right-of-way locations would need to be established through survey early in future design phases to fully detail potential right-of-way impacts and develop avoidance or mitigation strategies.

iv. Barret Avenue

Existing Conditions

Similar to Baxter Avenue, the Barret Avenue intersection is highly skewed with a small radii reverse curve through the intersection, and it experiences a high rate of roadway departure crashes due to this geometry.

Recommendations

In order to alleviate the issues caused by the skewed intersection, two alternatives are available. For either option, both the eastbound and westbound light vehicle lanes would transition to a short segment of shared-use path just before the intersection, then transition back to a light vehicle lane to continue east or west. Light vehicles on the north side of the parkway would continue to have the option to ride on the shared-use path.

1. In Option 1, the intersection could be realigned similar to the recommendation for Baxter Avenue. Offset left turn lanes would require a modification of the center median and changes to the geometry of the road to soften the reverse curve and allow a straighter travel path for vehicles through the intersection as shown in Figure 5.11.

   This alternative is expected to have minor impacts to adjacent right-of-way. Publicly available data from LOJIC[1] indicates that the adjacent property lines on the north side of the parkway extend into the roadway. While it is likely this is not the case, further study of the adjacent right-of-way in future design phases will be required to determine the impacts and create a design that reduces the impacts to adjacent right-of-way. Utility conflicts are anticipated to be minor with this option.
2. A second option at this location would be a roundabout which is feasible at this intersection due to the lower volume of traffic on Barret Avenue. The proposed roundabout has the added benefit of additional traffic calming through the intersection,

1 The Louisville/Jefferson County Information Consortium (LOJIC) represents a multi-agency effort to build and maintain a comprehensive Geographic Information System (GIS) to serve all of Louisville Metro, Jefferson County, Kentucky. Four agencies make up the core members of LOJIC: (1) Louisville / Jefferson County Metro Government, (2) Metropolitan Sewer District (MSD), (3) Property Valuation Administrator (PVA), and (4) Louisville Water Company (LWC). Reference: https://www.lojic.org/

Figure 5.12 *Barret Avenue Alternative 2: Roundabout.*

Figure 5.13 *A rendering of the Barret Avenue roundabout alternative.*

and roundabout intersections were included in the original Olmsted vision for the corridor. This second option would require significant changes to the existing intersection, including the construction of the roundabout itself. Additionally, this second alternative would have significantly greater impacts to the adjacent right-of-way. As such, this option also would require further study with accurate, surveyed right-of-way information in future design phases to determine the location and design of the roundabout to minimize impacts to adjacent properties.

v. Dahlia Drive

Existing Conditions

The current width of Dahlia Drive of 35 ft, combined with one-way traffic and large turning radii, promotes fast turning traffic and high rates of speed on this residential corridor (Figure 5.14). Additionally, concerns were raised during the public engagement process that Dahlia Drive may be used as a cut-through due to its width and the ability to turn quickly and speed through the corridor.

Recommendations

Based on this feedback, the project team recommends that improvements be made to calm speeds on Dahlia Drive as shown in Figure 5.15. The attractiveness of Dahlia Drive as a cut-through opportunity can be reduced by decreasing the entering width to 18 ft, which promotes slower turning speeds while still allowing access for city services and emergency vehicles. Further, this improvement can be applied immediately, as it does not require the recommended roadway reconfiguration to be implemented before construction.

Figure 5.14 *Existing Dahlia Drive*

Figure 5.15 *Dahlia Drive Reconfiguration*

Figure 5.16 *Castlevale Drive – Existing Conditions.*

Figure 5.17 *Proposed Castlevale Drive*

vi. Castlevale Drive

Existing Conditions

This intersection is unique as the entrance to the Medical Arts Building is part of the signalized intersection (Figure 5.16). As it stands today, the entrance to the Medical Arts Building is not aligned with Castlevale Drive. This offset creates an intersection that is larger than necessary. If the intersection geometry were to remain the same, a superfluous pedestrian refuge at the entrance to the Medical Arts Building would result with the implementation of a shared-use path.

Recommendations

As such, the project team recommends that the entrance to the Medical Arts Building be reduced in width and aligned with Castlevale Drive (Figure 5.17). This would make the intersection more compact and provide an improved crossing for the shared-use path.

Intersection not aligned (view from Castlevale Drive, facing north)

vii. Poplar Level Road (Goss Avenue)

Existing Conditions

At Castlevale Drive, the pavement cross-section transitions to a 40-ft pavement width with standard curb and gutter, in preparation for the introduction of a median west of Beargrass Creek on the approach to the intersection of Poplar Level Road (Goss Avenue) and Eastern Parkway. The pavement width expands greatly at the Poplar Level Road (Goss Avenue) intersection to accommodate two 11-ft westbound through travel lanes, a westbound 11-ft left-turn bay, a westbound 12-ft right-turn bay, 5-ft concrete median, and two 10-ft eastbound receiving lanes.

Recommendations

To accommodate the traffic volume on Poplar Level Road (Goss Avenue) and the turning traffic from Eastern Parkway, it is recommended that the proposed three-lane cross-section on Eastern Parkway widen to a four-lane cross-section at this intersection, with dedicated left turn lanes on the approaches to Poplar Level Road (Goss Avenue) (Figure 5.18). In order to accommodate bicycle, scooter, and pedestrian traffic through this busy intersection, the proposed light vehicle lanes would transition to the shared-use path on both sides of the parkway through the intersection, with a transition back to light vehicle lanes on either side of the intersection. Additional green space would be captured on each side of the parkway by removing the channelized right turn lane on the southwest corner of the intersection and the right turn lane on the northeast corner. The proposed four-lane section would transition back to the recommended three-lane section as a merge for eastbound traffic, and a right turn only at Ash Street for westbound traffic.

Significant right-of-way and utility impacts are not anticipated for this alternative. Minor impacts may result from grading and implementation of the sidewalk and shared-use path.

Figure 5.18 *Poplar Level Road/Goss Avenue – Recommendation – Plan View.*

viii. S. Preston Street/S. Shelby Street

Existing Conditions

At the intersection of Clarks Lane, two-way traffic on KY 61 (Preston Highway) split into one-way traffic on KY 61 (S. Shelby Street) northbound and KY 61 (S. Preston Street) southbound. Since the split occurs just over one-eighth of a mile away from Eastern Parkway, these two streets cross Eastern Parkway less than 200 ft away from one another. Two-way traffic operations resume on both S. Preston Street and S. Shelby Street one-quarter of a mile north of the parkway at Lynn Street.

Although the two intersections on Eastern Parkway are signalized separately, due to their proximity to one another, and the signal timing required from their proximity, they operate as a single intersection. Left turns from Eastern Parkway are prohibited at both intersections. While the intent is for traffic to utilize either Lynn Street or Harrison Avenue to connect to either of the one-way segments, traffic is often observed either using adjacent businesses to subvert the restriction, or drivers ignore the left turn prohibition entirely. The latter is observed to be a particularly frequent offense during an existing lag in the signal phasing that provides a red light for oncoming traffic while traffic clearing the short section between the two signals still has a green light. This intersection is often congested on all approaches, due to the signal timing required for the two intersections to operate.

Recommendations

An initial concept-level roundabout was investigated at this location; however, due to the entering traffic volumes and proximity of the one-way pair it was not determined to be feasible at this location.

As such, the project team recommends combining both the S. Preston and S. Shelby intersections into a single intersection, which would serve to streamline traffic operations and maintain the three-lane cross-section proposed throughout the corridor. This can be accomplished by introducing two-way traffic to S. Preston Street. and converting S. Shelby Street to a two-way business frontage road. There are two alternatives for Shelby Street in this scenario. In Alternative 1 (Figure 5.19), the S. Shelby Street two-way business frontage road could allow right-in/right-out access at S. Shelby Street and Eastern Parkway. In Alternative 2 (Figure 5.20), there would be no direct access from S. Shelby Street to Eastern Parkway, and the existing S. Shelby Street would be converted into a pedestrian plaza.

Figure 5.19 *S. Preston Street and S. Shelby Street Alternative 1: S. Shelby Street Right-In/Right-Out Access.*

Figure 5.20 *S. Preston Street and S. Shelby Street Alternative 2: S. Shelby Street Pedestrian Plaza.*

Figure 5.21 *Rendering of the pedestrian plaza alternate at S. Shelby Street.*

This configuration of both Alternative 1 and Alternative 2 would maintain the flow of traffic on the commercial corridor of S. Preston Street, while providing significant traffic calming for residents along S. Shelby Street. It would also allow for streamlined traffic operations due to the reduction of two signalized intersections into one, while providing left turn movements from Eastern Parkway. Access to all businesses on S. Shelby Street would be maintained at Harrison Avenue, Fetter Avenue, and Lynn Street (Figure 5.22). Lynn Street would additionally be converted to two-way traffic to support two-way traffic operations on both S. Shelby Street and S. Preston Street.

Additionally, Alternative 1 and Alternative 2 would allow for improved transit operations, and this new, single intersection would be an ideal candidate for consolidating bus stops and providing pull-off zones to remove buses from traffic due to the high ridership demand at the existing stops (Figure 5.21). The Alternative 1 and 2 scenario does have potentially significant impacts to adjacent right-of-way and utilities. Overhead utilities along the west side of S. Preston Street in particular may be impacted to accommodate the development of the left turn lanes approaching Eastern Parkway. Approximately 60 feet of existing right-of-way is available along the S. Preston Street corridor. Parking on the southwest quadrant of Alternatives 1 and 2 is available in a surface parking lot. Some parking on the southeast side for the businesses between S. Preston Street and S. Shelby Street may need to be shifted to the frontage area on S. Shelby Street to improve safety of pedestrians accessing vehicles and prevent backing out onto S. Preston Street. Access management should be considered at the Eastern Parkway and S. Preston Street intersection, minimizing or eliminating entrances near the intersection to improve safety and reduce pedestrian exposure to traffic conflicts. Impacts to both adjacent right-of-way and utilities along the corridor would need to be reevaluated in future design phases, with avoidance or mitigation strategies developed.

Figure 5.22 *S. Preston Street and S. Shelby Street Alternatives 1 or 2: Two-way conversion for access to all residences and businesses.*

Figure 5.23 *S. Preston Street and S. Shelby Street Alternative 3: Four-Lane Configuration.*

A third alternative for these intersections more closely resembles a no-build scenario. Without consolidating the signals at S. Preston Street and by not converting to two-way operations on S. Shelby Street and S. Preston Street, the proposed three-lane configuration for the corridor would degrade significantly at this location. Therefore, it would require retaining the existing four-lane section, as shown in Figure 5.23. This would not allow for any operations improvements at the existing intersections, and it would still prohibit left turns from Eastern Parkway. Additionally, Alternative 3 would greatly reduce the opportunities to consolidate bus stop locations and enhance the pedestrian experience along this section of the parkway. This alternative would have minimal utility impacts from the construction of sidewalk and shared-use path, but otherwise would have no significant impacts to either utilities or right-of-way along the corridor.

ix. Bradley Avenue

Existing Conditions

Bradley Avenue is another highly skewed intersection on Eastern Parkway. The reverse curve that exists through this intersection is exacerbated by the offset approaches of Bradley Avenue. This results in an intersection that is difficult to navigate due to restricted sight lines to vehicles approaching the intersection. Additionally, a two-way alley is located in the middle of the intersection, but the alley is not part of the signal system. Therefore, cars entering or exiting the alley contribute to driver confusion.

Recommendations

In order to improve the intersection so that it can be easily navigated, two alternates were developed to address sight distance and navigation issues.

Alternative 1: The first alternative would be to realign the east curve of the intersection to develop a tangent, or straight section, through the intersection in order to improve sight distance. The proposed three-lane configuration would also allow for the development of neutral offset left turn lanes on Eastern Parkway.

This configuration addresses the sight distance issue, where motorists waiting to make the left turn cannot see vehicles approaching the intersection intending to travel straight through. This option does not address, however, the issue of motorists queuing in the intersection and driver confusion regarding where to turn into the skewed, offset lanes of Bradley Avenue. The left turns from Eastern Parkway onto Bradley Avenue may need to be addressed through signal timing as a protected left turn only, where motorists may turn with the green arrow only. Additionally, the two-way alley is recommended to be converted into a one-way westbound alley. The conversion to a westbound only direction will still accommodate the existing angle parking, and mitigate conflicts with traffic at the intersection of Bradley Avenue and Eastern Parkway. Existing signage is recommended to be updated to reflect the new one-way conversion, and corner radii to be reduced at both ends to discourage turning wrong-way in the alley.

Alternative 1, as shown in Figure 5.24, does not appear to have significant impacts to right-of-way on adjacent properties; however, further study of this alternative in future design phases would be required to develop the correct geometry to address sight distance issues. Right-of-way impacts may arise from those results. Minor impacts to utilities are expected, primarily for the construction of the sidewalk and shared-use path.

Figure 5.24 *Bradley Avenue Alternative 1 – Intersection Realignment.*

Figure 5.25 *Bradley Avenue Alternative 2 – Roundabout.*

Alternative 2: The second option at this intersection is a peanut-shaped roundabout (Figure 5.25). This pair of conjoined roundabouts is designed to provide the deflection in traffic that reduces speeds in a standard roundabout, while allowing traffic from all directions to approach, navigate, and leave the roundabout with standardized entrances and exits. In this scenario, the alley is converted to one-way traffic, entering from the roundabout only. Therefore, alternative 2 addresses the complication of the alley in the middle of the existing intersection, with updated signage and reduced corner turning radii to discourage wrong-way travel in the alley. While the roundabout option does impact some parking spacing at Dairy Kastle, by restriping the north leg of Bradley Avenue, those parking spaces (and more) can be recaptured as street parking north of the church.

Alternative 2 is anticipated to have a greater impact on adjacent right-of-way than Alternative 1. Further study in future design phases would be required to develop the placement and final design of the roundabout, with accurate right-of-way survey to determine potential impacts and to develop avoidance and mitigation strategies. Additional impacts to utilities may occur due to the removal of the existing signal infrastructure and construction of the roundabout, as well as the sidewalk and shared-use path.

x. Crittenden Drive

Existing Conditions

Crittenden Drive is large due to the four-lane cross section of Eastern Parkway, the dedicated left and right turn lanes on Eastern Parkway, and the dedicated left turn lanes on Crittenden Drive. These lanes accommodate heavy traffic due to the proximity to the University of Louisville and I-65. Additionally, a channelized right turn exists for westbound Eastern Parkway to northbound Crittenden Drive, from southbound Crittenden Drive to westbound Eastern Parkway, and from northbound Crittenden Drive to eastbound Eastern Parkway. Crittenden Drive currently provides one through lane southbound and two through lanes northbound.

Recommendations

Existing right and left turning bays are recommended to remain at the intersection of Crittenden Drive and Eastern Parkway, although these bays may be modified to recapture green space while still providing queueing space for vehicles waiting to make the turn, as shown in Figure 5.26.

Additional right-of-way becomes available by implementing the proposed, narrower three-lane configuration. This right-of-way would be allocated to light vehicle lanes that would continue through the intersection, without having to merge with shared-use path on either side of the intersection. Right turning bays would allow motor vehicles to move on the right side of light vehicle traffic, rather than having right-turning vehicles cross the path of through-moving light vehicles. This provides a safe, seamless connection for light vehicle traffic through the intersection.

Right turn slip lanes on the northwest and northeast corners of the intersection would remain in this scenario in order to preserve the existing pedestrian refuge islands. Because signal timing for pedestrian-serving intersections is controlled by the pedestrian crossing time, the signal timing would require a four-lane configuration on Eastern Parkway if the pedestrian refuges did not exist at these locations. A four-lane configuration would reduce capacity for recapturing green space along the parkway.

Improving the location of the interstate ramp from northbound I-65 to eastbound Eastern Parkway is the most significant change to the Crittenden Drive intersection. This would allow for significant improvements to the function of both the interchange ramp and the intersection of Eastern Parkway and

Figure 5.26 *Crittenden Drive Reconfiguration.*

Figure 5.27 *Tie-in of the reconfiguration with the existing configuration at Hahn Street.*

Crittenden Drive. This option would, however, require further study to determine potential interstate impacts and more detailed design through an Interchange Modification Report (IMR) in conjunction with KYTC and FHWA.

Currently, northbound interstate ramp traffic exits into a right turn bay for southbound Crittenden Drive. At the ramp, if exiting interstate traffic desires to turn left onto Crittenden Drive, vehicles must quickly cross two Eastern Parkway eastbound through lanes in less than 100 ft in order to reach the left turn bay. By relocating the ramp closer to the interstate and implementing the proposed three-lane configuration on Eastern Parkway, ramp traffic can exit into a single through lane at a greater distance from the intersection. This affords drivers more time to safely continue on Eastern Parkway or make a left or right turn onto Crittenden Drive. The ramp relocation also improves sight distance for exiting traffic by creating a more perpendicular access point for traffic and by reducing the need to look far over the shoulder when merging into traffic. This improves safety for motor vehicles, pedestrians, and light vehicles by increasing visibility through the crossing.

A new sidewalk is recommended to address the existing gap on the southwest corner of the intersection. This would greatly improve the pedestrian connection that was already occurring via a “goat path” created by pedestrians walking through the grass verge to access the other side of Crittenden Drive. Additionally, the existing sidewalk at the interstate ramp from northbound I-65 would be upgraded to a 6-ft-wide sidewalk, connecting to the existing sidewalk at the west side interstate ramp to southbound I-65. Finally, the 10-ft-wide shared use path would continue through the Crittenden Drive intersection, connecting to the existing path in front of the Clubhouse Apartment complex and completing the shared-use path connection from 3rd Street all the way to Cherokee Park.

No significant right-of-way impacts are anticipated for this alternative, only minimal impacts from grading for the placement of sidewalk and shared-use path. The construction of a new interstate ramp would occur within existing interstate right-of-way. Impacts to utilities from construction of the sidewalk and shared-use path are expected to be minor; however, impacts to utilities associated with relocation of the interstate ramp would be evaluated in the future IMR process.

Example shelter from an approved TARC vendor, which can be customized by color and finish.

2. MULTIMODAL ACCESS

The recommended Eastern Parkway three-lane typical section provides for robust, Americans with Disabilities Act (ADA)-compliant, contiguous sidewalks and shared-use paths from Cherokee Park to 3rd Street. In order to achieve the holistic, Olmstedian vision of a full-service, multimodal corridor that meets the needs of modern users, additional consideration will need to be given for transit access improvements and recommendations to improve safety for light vehicle operators.

i. Transit

At the time of this report writing, the Transit Authority of River City (TARC) was in the process of conducting a Comprehensive Operational Analysis (COA) for the entire Louisville Metro network. Ultimately, the recommendations that result from the COA will influence route locations, timing, and stop locations. Within the framework of a potentially changing transit network on Eastern Parkway, there are overarching recommendations that may be made for transit along the corridor.

Consolidating bus stops is one method to improve transit service by reducing lost time at stops and reallocating funding to enhance transit stop amenities. Stop locations are selected through a coordinated effort by Louisville Metro and TARC. A holistic review of the stops along Eastern Parkway suggests that transit stops are located too close to each other for optimum transit service. Currently, four stops are less than 500 ft apart, and consolidating these stops with their next nearest stop would still result in less than one-eighth of a mile between stops, which is still relatively close. Another four stops are less than one-eighth of a mile apart, and consolidation of three of these stops with their next nearest stop would result in one-quarter mile or less spacing between stops. Additional evaluation is needed for the remaining stops for location and ridership that are located less than one-quarter mile apart, along with recommendations for consolidation with underperforming stops and spacing requirements.

All stops along Eastern Parkway should be accessible in order to be a strong transit network along the corridor. Currently, only 37% of the transit stops are accessible, which means most stops are merely a sign in a grass verge. Some inaccessible stops do not even have sidewalk nearby to access the stop from the rest of the block, and none of them have an ADA-compliant concrete pad allowing access to transit at the curb. These conditions preclude the viability of transit as an

option for those without the mobility to access the curb without accessible stops. Additionally, accessibility has a significant impact on the experience of transit service, regardless of individual ability, as waiting for the bus or accessing the bus in inclement conditions at a poorly accessible stop is unsatisfactory for users. All stops should provide an accessible concrete pad to the curb from the adjacent existing or proposed sidewalk or shared-use path to improve user experience.

Similarly, transit shelters provide an enhanced bus stop experience along with benches and trash cans. These amenities, however, are lacking throughout the corridor. The shelters that do exist are often an older model in poor condition, which detract from the parkway character. Shelter locations are often selected based on ridership data, where shelters are placed at stops with the highest ridership and funded through an outdoor advertising company. Additional bus stop amenities funding policies should be evaluated in partnership with Louisville Metro Parks, Louisville Metro Public Works, and TARC to identify opportunities to support enhanced transit stop experience, without reliance on outdoor advertising. Transit shelter design is limited based on designs available from approved TARC vendors; however, shelters should be chosen for minimal impact to the roadside character: providing clear sightlines, made of light materials that fade to the background, and minimizing or eliminating advertising in the parkway right-of-way. An example of a new shelter, which can be customized by color and finish, is shown in the inset photo on the previous page.

Finally, high ridership locations with frequent bus service should be evaluated for the implementation of bus pull-offs to streamline traffic flow. Bus pull-offs are beneficial for motor vehicle traffic in a busy corridor with frequent service, as they allow for the free flow of traffic while the bus serves the stop; however, the bus must then find an opportunity to merge back into traffic once they have served the stop. Additionally, the bus pull-off shares space with the light vehicle lane, which can temporarily block access to light vehicle lanes for users while the bus completes its stop. As such, this treatment should be reserved for high-volume ridership locations to minimize the impacts to bus service while balancing the needs of both motor vehicle and light vehicle traffic, particularly during peak hours in the morning and evening.

ii. Light Vehicles

A combination of shared-use path and light vehicle lanes are proposed throughout the entirety of Eastern Parkway. To realize the vision of Eastern Parkway as a complete east-west multimodal connector, multimodal connections would need to extend through the surrounding infrastructure and neighborhoods. The existing light vehicle lanes on Poplar Level Road would need to connect to Eastern Parkway to develop a strong, interconnected light vehicle network. The existing lanes on Poplar Level Road begin and end just south of the parkway. While outside the boundary of the Eastern Parkway study, additional technical study in future phases should evaluate the feasibility of connecting the existing bike lanes to the shared-use path on either side of Poplar Level Road. This would safely connect the proposed shared-use path on the south side of Eastern Parkway and ultimately to the proposed light vehicle lanes on the parkway. Additionally, the neighborhoods adjacent to the parkway should be connected to the new infrastructure on Eastern Parkway by implementing shared lane markings to identify quiet neighborhood streets that connect to the parkway and by adding traffic calming measures to provide a safe, interconnected network for residents along the parkway.

Electric rental scooters along Eastern Parkway provide a micromobility alternative transportation mode along the corridor. They can quickly become a nuisance or even dangerous, however, when they are operated without care for residents, block sidewalks and shared-use path when parked, and are operated in an unsafe manner both on pathways and in the roadway. Incentivization of parking in specified locations, as well as no parking zones that prevent ending a scooter ride in designated, geofenced locations, can help prevent parked scooters from blocking multimodal thoroughfares. No-parking and no-riding zones should be leveraged in the Eastern Parkway corridor to further prevent illegal sidewalk riding and parking on the south side of the corridor. Additionally, current Louisville Metro policy requires scooter operation in light vehicle lanes and on shared-use paths when available while yielding to bicyclists in the light vehicle lanes and to pedestrians on shared-use paths. Louisville Metro should consider expanding its light vehicle policies to limit operational speeds on the shared-use path where they may be in conflict with pedestrians. Finally, training in schools and awareness campaigns, similar to those implemented for bicycle safety and awareness, should be considered to promote the safe operation of the electric rental scooters, as well as increase motorist awareness.

3. ROADSIDE CHARACTER

The Olmsted Parkways are unique in their design in that consideration was given to the parkways' surroundings to create a sense of rest and respite in contrast to other roadways whose focus is on the roadway alone. Frederick Law Olmsted did not simply design the parkway alignment and materials, he also provided design direction for adjacent land to create a cohesive, cocooned, and canopied park-like effect. The following discussion provides recommendations for access management, overhead utilities, and roadside amenities in order to support the comprehensive rehabilitation of Eastern Parkway.

i. Access Management

Access management is an important consideration during a planning study, as small improvements can drastically improve both motor vehicle and multimodal safety. By reducing the width of access points and the number of access points along a corridor, pedestrian and light vehicle safety increases due to the reduced exposure to conflict points with motor vehicles. Additionally, decreasing radii on entrances reduces the speed of motor vehicles entering and exiting a property, which improves pedestrian outcomes. The project team recommends clearly defining entrances and exits for motor vehicles, as well as reducing turn radii, to create a predictable pathway for entering and exiting traffic and support multimodal safety.

To support this recommendation, two examples are provided. First, the entrance at 1155 Eastern Parkway is too large at nearly 50 ft wide. By reducing the width to 24-36-ft-wide (typical for commercial entrances), full access to the property can be maintained while reducing exposure to conflicts for vulnerable roadway users. A recommended redesign is included in Figure 5.28.

1155 Eastern Parkway

Figure 5.28 *Access management redesign at 1155 Eastern Parkway.*

A second example is the undefined access to parking located at 1601 Eastern Parkway. Without clear ingress and egress, driver behavior at this location is not predictable when entering and exiting the property. Access to parking can still be maintained, while providing additional definition to the ingress and egress on parkway right-of-way using hardscape, such as curbs and landscaping.

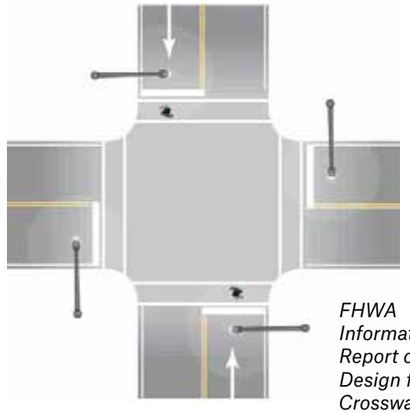
ii. Overhead Utilities

Overhead utilities are typically located outside of the Eastern Parkway right-of-way, usually in alleys behind the first row of houses. The exception is Zone 2, which does have overhead utilities located in the parkway right-of-way. These utilities severely impact the character of the parkway by contributing to the decline of the tree canopy. In order to rehabilitate the tree canopy, it is recommended that overhead utilities be relocated in this zone. Relocation of the overhead utilities can be accomplished through two methods: underground relocation or relocation to the rear of the houses in existing alleys. Either type of relocation would require significant changes to the wiring of the adjacent houses. Relocation of the overhead utilities to the adjacent alleys could also require utility easements for the placement of new utilities in areas where the existing alleys do not connect. The relocation of the overhead utilities, however, is imperative to bring this zone of the parkway in alignment with the rest of the corridor and with the original Olmsted parkway intent.

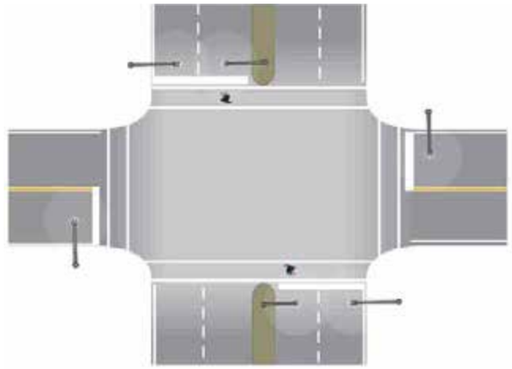
Example of Overhead Utility Line Impact on Tree Canopy.

iii. Roadside Amenities

Roadside amenities such as roadway lighting, pedestrian lighting, and cohesive signage greatly influence the character of Eastern Parkway, and they define the user experience for visitors and residents alike. It is recommended that all intersections, whether signalized or not, be lit to current FHWA standards to provide safe pedestrian and shared-use path crossings.



FHWA Informational Report on Lighting Design for Midblock Crosswalks Page 16



FHWA Informational Report on Lighting Design for Midblock Crosswalks Page 17

In addition, all modern roundabouts are required to have the intersection lit for safe motor vehicle operation at night, and all pedestrian and shared-use crossings must also be lit for safe crossings according to these standards. Care should be taken that roadway lighting is placed such that it is not blocked by the overhead tree canopy, particularly in seasons where the canopy is leafy. Likewise, it is imperative that the lighting also be placed such that it does not negatively impact the tree canopy either. An example of proper lighting placement currently existing on Eastern Parkway is illustrated in Figure 5.29.

Pedestrian lighting that illuminates amenities off the roadway, such as sidewalks and shared-use paths, is largely absent from the corridor today. With no dedicated lighting provided, pedestrians rely on ambient light filtering in from nearby roadway lighting or adjacent homeowners and businesses. Pedestrian lighting provides an attractive park experience even at night, and it improves perceived safety for pedestrians and other multimodal users. It is recommended that pedestrian lighting be implemented along the corridor at a scale that is appropriate to illuminate sidewalks and shared-use paths (see example in Figure 5.29). The design of the lighting should fade to the background and should not negatively impact the character of the parkway.

Corridor overlays are an additional tool to develop standards for roadside amenities. These may include stipulations for features such as the following: signage design and placement, lighting design and placement, building design and setbacks, location of parking, retaining walls and landscaping, and other impacts to the roadside character. In order to encourage and preserve an Olmstedian aesthetic along Eastern Parkway, the project team recommends the development of an overarching, cohesive policy that provides standards for the character of future developments adjacent to the parkway. A common set of design standards would prevent the construction of offending elements, such as large, road-facing open parking lots, that adversely impact the character of Eastern Parkway. This would create a more consistent approach to future property changes throughout the parkway.

Example of Pedestrian Lighting on Eastern Parkway near Bardstown Road.

Figure 5.29 *Correct Lighting Placement Behind the Crosswalk Across Eastern Parkway at Poplar Level Road.*

B. Pavement Reconstruction and Stormwater Drainage Recommendations

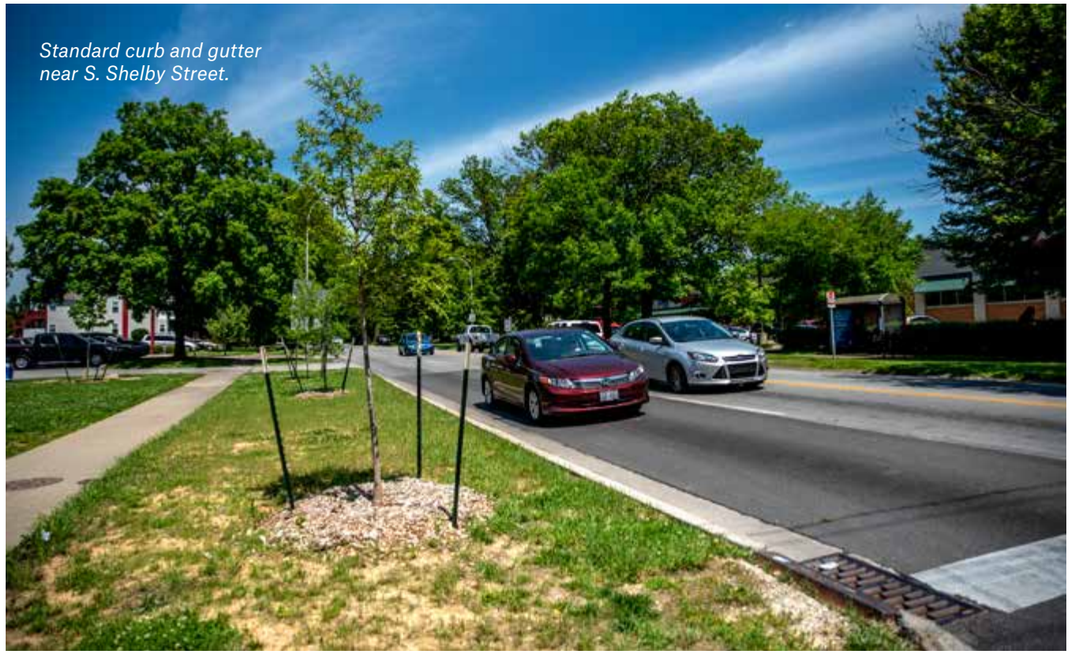
Recognizing the loss of mature trees and the further degradation of the gutter pan and pavement, now is the time to make constructed improvements and enhance both the beauty and the function of Eastern Parkway. Building on the previous study and anecdotal knowledge of the existing pavement structure, the project team has developed thoughtful recommendations to address deteriorating pavement, stormwater drainage, and related issues along the corridor.

Eastern Parkway was originally constructed as a macadam pavement, which is an aggregate treated with a small amount of asphalt. This original construction provides the subgrade to the current thin asphalt overlay. Due to the on-going pavement maintenance required based upon testimony from KYTC staff who have had to replace base failures during resurfacing operations on Eastern Parkway, full-depth reconstruction of the Parkway is recommended to address both pavement condition and poor drainage conditions along the Parkway.

To eliminate water ponding behind the curb, the most appropriate replacement for the valley gutter along the parkway is a modified curb and gutter, with the top of curb placed at the same elevation as the existing valley curb. This allows water outside the curb to drain over the curb, into the gutter. A 4-inch curb height is recommended to raise the elevation of the gutter to minimize tree impacts. A thinner gutter pan depth will also help protect the adjacent tree infrastructure.

Finally, by constructing a new storm sewer trunk line down the center of the Parkway and utilizing transverse pipes to connect curb boxes, the deepest excavation would occur as far from the trees as possible. The curb boxes would be located between trees. Subgrade drainage will be designed to drain to the center trunk line to limit root damage from construction near the edges of the roadway.

Existing valley curb along the majority of Eastern Parkway.



Standard curb and gutter near S. Shelby Street.

Additional maintenance benefits would be realized by constructing a new storm sewer system. In the existing system, many of the catch basins are trapped because they are connected directly to the combined sewer system. Each of these connections must be documented by the Louisville/Jefferson County Metropolitan Sewer District (MSD) and periodically require debris removal. The new center trunk line storm sewer system would string multiple un-trapped catch basins together, before connecting to the existing combined sewer with a single trapped structure. This would decrease the volume of annual maintenance conducted by MSD, a time and cost savings.

In order to most appropriately address localized flooding, a supplemental study of both corridor flooding issues and the existing combined sewer and stormwater drainage systems is recommended. Localized flooding along the Parkway typically occurs where broken segments of valley gutter are not adequately conveying water to the intended catch basins; however, some areas are associated with known flood-prone combined sewer locations. It is important to determine the causes of the flooding so that solutions can be developed so as to prevent overwhelming the existing system.

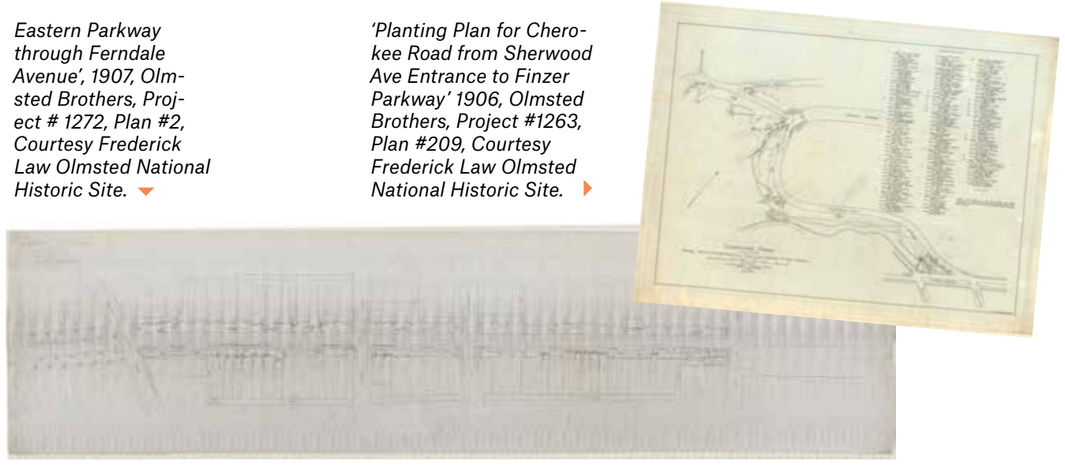
Finally, constructability must always be considered when evaluating reconstruction on this scale. Due to the current width of Eastern Parkway, two-way traffic operations could be maintained while the center stormwater drainage trunk line is constructed. Then, traffic would be shifted to adjacent lanes on one side of the center trunk line to construct curb and gutter and drainage structures. Final surfacing and striping of the entire corridor width would finalize the project.

C. Living Landscape Recommendations

Eastern Parkway was the last of the Olmsted Parkways to be developed and was designed in conjunction with final plans for Cherokee Park, including the park entrance at Eastern Parkway ('Planting Plan for Cherokee Road from Sherwood Ave Entrance to Finzer Parkway' 1906 – Project #1263, Plan #209). In 1902, John Charles Olmsted visited Louisville and outlined the parkway intent to include a 120-ft parkway with a 40-ft center drive, 40-ft median on either side of the center drive, and two rows of trees backed by a massing of shrubs.

he Olmsted Brothers firm consulted on the parkway alignments and prepared only a few detailed plans which can be found in the Olmsted Archives (Frederick Law Olmsted National Historic Site – Project #1272). Correspondence between the Olmsted Brothers and the Board of Park Commissioners (Library of Congress, Olmsted Associates Records, Series B "Correspondence Files" and 'Olmsted Documentary Resource – Louisville's Park Legacy' compiled by Arleyn Levee and Charles Beveridge, 1992), as well as the recorded minutes from the Board of Park Commissioners meetings (Louisville's Olmsted Park Legacy: Selective Chronology for Cherokee, Iroquois, and Shawnee Parks and the Parkways, compiled by Arleyn A. Levee, 1992), give insight to design consultation conducted during construction. These historic documents provide the cornerstone for the design recommendations proposed for this current Eastern Parkway Study.

As described in Chapter 1, separation of uses and control of scenic character and experience are the framework that Olmsted envisioned for "Park-Ways". The proposed recommendations for adjustments on how cars travel the parkway, how to effectively provide sustainable drainage solutions, and how to provide multimodal access via shared-use paths and bike lanes, link directly with the "Olmstedian" design intent of use separation. In addition, proposed planting plans for the corridor address the preservation and re-establishment of the deciduous tree canopy cover that is evident in the historic Olmsted Brothers plans and correspondence. The canopy cover encompasses the corridor's scenic character ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2). These proposals provide an improved and enhanced visual scenic experience as users travel down and enjoy the parkway. Planting descriptions for each zone, as well as recommended plant species lists, are discussed to ensure that the scenic character of Eastern Parkway remains intact.



Eastern Parkway through Ferndale Avenue', 1907, Olmsted Brothers, Project # 1272, Plan #2, Courtesy Frederick Law Olmsted National Historic Site.

'Planting Plan for Cherokee Road from Sherwood Ave Entrance to Finzer Parkway' 1906, Olmsted Brothers, Project #1263, Plan #209, Courtesy Frederick Law Olmsted National Historic Site.

Planting Plan Descriptions

ZONE 1

Typical Block Plan

The corridor between the entrance to Cherokee Park and Bardstown Road can be considered the most representative of the original corridor design today largely due to the fact that existing road alignment is relatively unchanged. Design Alternative 1, with no light vehicle lane, (Figure 5.30) and design Alternative 2, with a 5-ft light vehicle lane, (Figure 5.31) differ in planting area only slightly. Therefore, the proposed typical block plans are the same with respect to planting. The 1907 historic planting study developed by the Olmsted Brothers shows a double row of canopy trees which still exists today despite the ravaging tornado of 1974. (The 1907 Baxter Avenue is currently Bardstown Road.) In this plan, east of Baxter Avenue/Bardstown Road, symbols for existing trees can be measured approximately 40-50 ft apart. They are placed in the staggered double row on each side of the parkway with approximately 25-30 ft between the outer and inner rows. The typical block proposed planting plan for Zone 1 addresses the reestablishment or continuation of the deciduous canopy cover through this zone with the double row of trees as seen in the historic plan.

Figure 5.30 *Typical Block Plan, Alternative 1 (no light vehicle lane).*

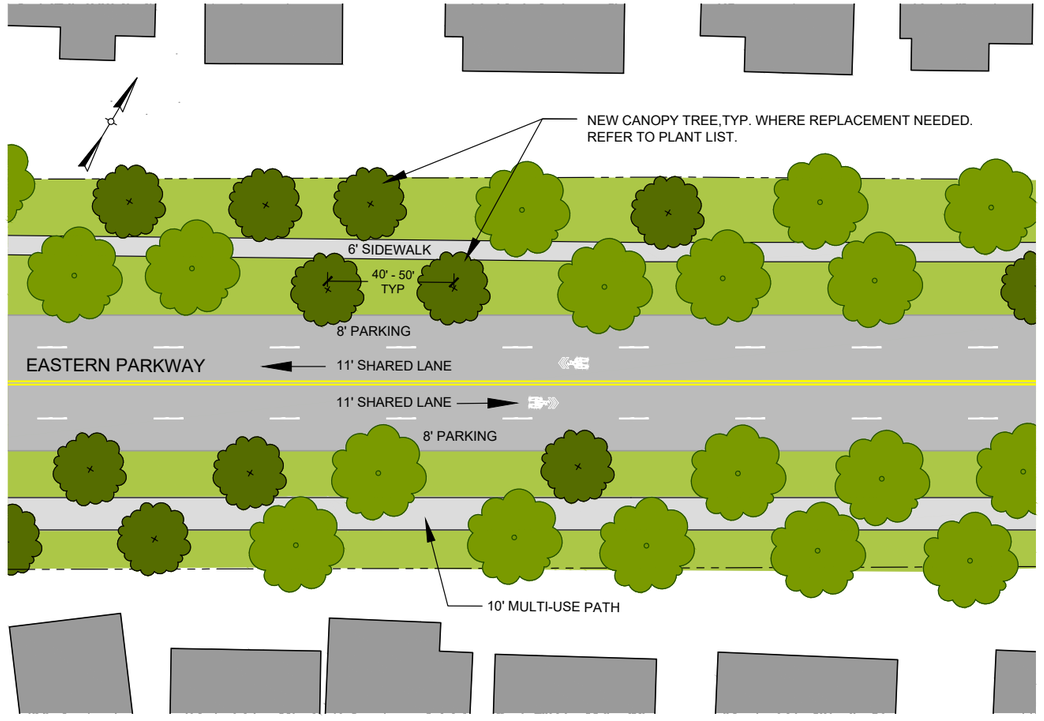


Figure 5.31 *Zone 1 - Typical Block Plan, Alternative 2 (5-ft light vehicle lane).*

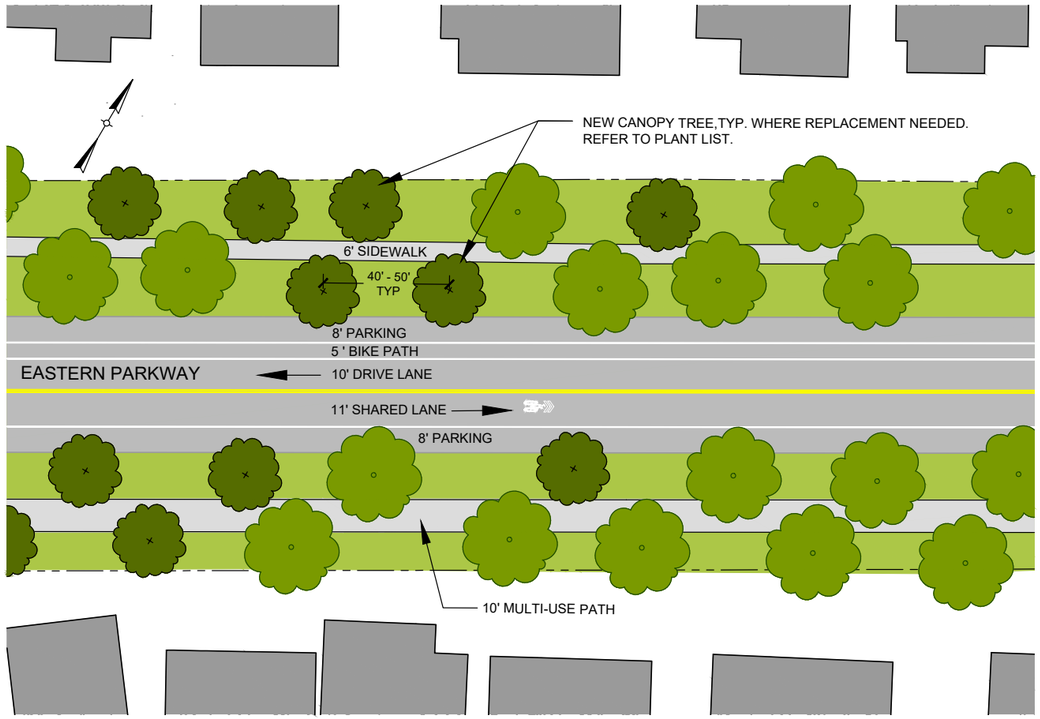


Figure 5.32 *Zone 1 - Planting Plan for Recommended Roundabout.*

The proposed planting plan for the recommended roundabout at the entrance to Cherokee Park (Figure 5.32) references the 1906 Olmsted Brothers plan ('Planting Plan for Cherokee Road from Sherwood Ave Entrance to Finzer Parkway' 1906 - Project #1263, Plan #209). As seen in this plan, a double row of trees surrounds the circle with shrub massings to enhance the park road entrance.

Recommended Canopy Tree Species List

As confirmed by written correspondence and historic photographs, the inner row of trees within this zone was pin oak (Quercus palustris) with the outer row sycamore (Platanus occidentalis). Best practices are now to integrate biodiverse species within a streetscape to prevent catastrophic loss due to disease or insects (Dutch elm disease/Emerald ash borer). Species of canopy trees should be chosen with both soils and topography in mind for each zone. According to the United States Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) data, soils within Zone 1 are mostly Urban Land or fill soils from the construction of Bardstown Road. Some higher quality soils are also present, namely Crider and rocky Caneyville Silt Loam. The highest elevation within this zone (540.8 elevation) falls mid-block and splits drainage toward Cherokee Park to the east and Bardstown Road to the west. Table 5.1 summarizes a recommended standard canopy tree species list for Zone 1 with respect to these existing conditions.

Shrub species at the entrance to Cherokee Park (Table 5.2) can be massed to enhance the entrance, as shown in the 1906 Olmsted Brothers plan referenced above. Native species have ecosystem values that correspond to the nature of the park.

Table 5.1

Zone 1 Recommended Standard Canopy Tree Species List

Magnolia acuminata	Cucumbertree magnolia
Platanus occidentalis	American planetree
Quercus alba	White oak
Quercus macrocarpa	Bur oak
Quercus muehlenbergii	Chinkapin oak
Quercus prinus	Chestnut oak
Quercus rubra	Red oak
Tilia americana	American linden
Ulmus americana (hybrid Valley Forge, etc.)	American elm clone

Table 5.2

Zone 1 Recommended Shrub Species List (Cherokee Park Entrance)

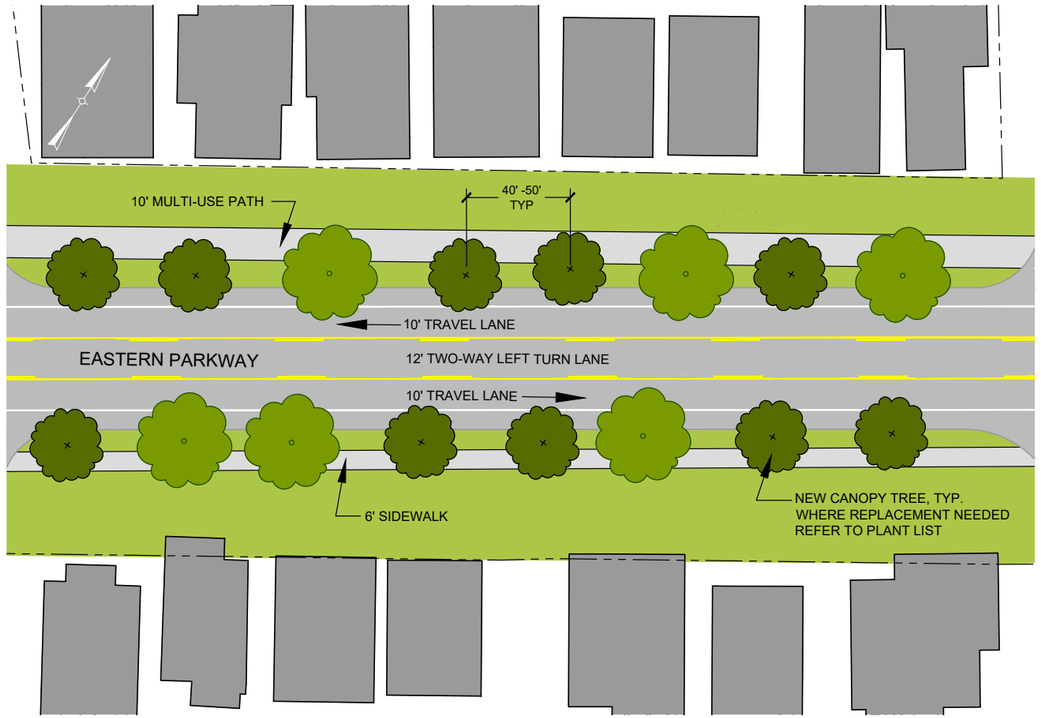
Cephalanthus occidentalis	Common buttonbush
Hydrangea arborescens	Wild hydrangea
Symphoricarpos orbiculatus	Coralberry
Viburnum dentatum	Arrowwood viburnum
Viburnum x juddii	Judd viburnum

ZONE 2

Typical Block Plan

The tree canopy within corridor between Bardstown Road and Baxter Avenue has been largely affected by overhead utilities causing uneven limbing of trees and a disturbance to the scenic character. By implementing the proposed relocation of the overhead utilities, tree canopy can again flourish in a more natural manner. Likely due to the close proximity of buildings to their property line and the grade changes in some areas, the Olmsted Brothers designed a single row of trees spaced between 40-50 ft along the road; as shown in the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2) (Note: The Baxter Avenue named in this plan is current Bardstown Road. The named Castleman Avenue is current Baxter Avenue). The plan also shows dense plantings along the parkway, although early images do not show record of them having been installed. The typical block proposed planting plan for Zone 2 addresses the reestablishment or continuation of the deciduous canopy cover through this zone with the single row of trees along the parkway as seen in the historic plan.

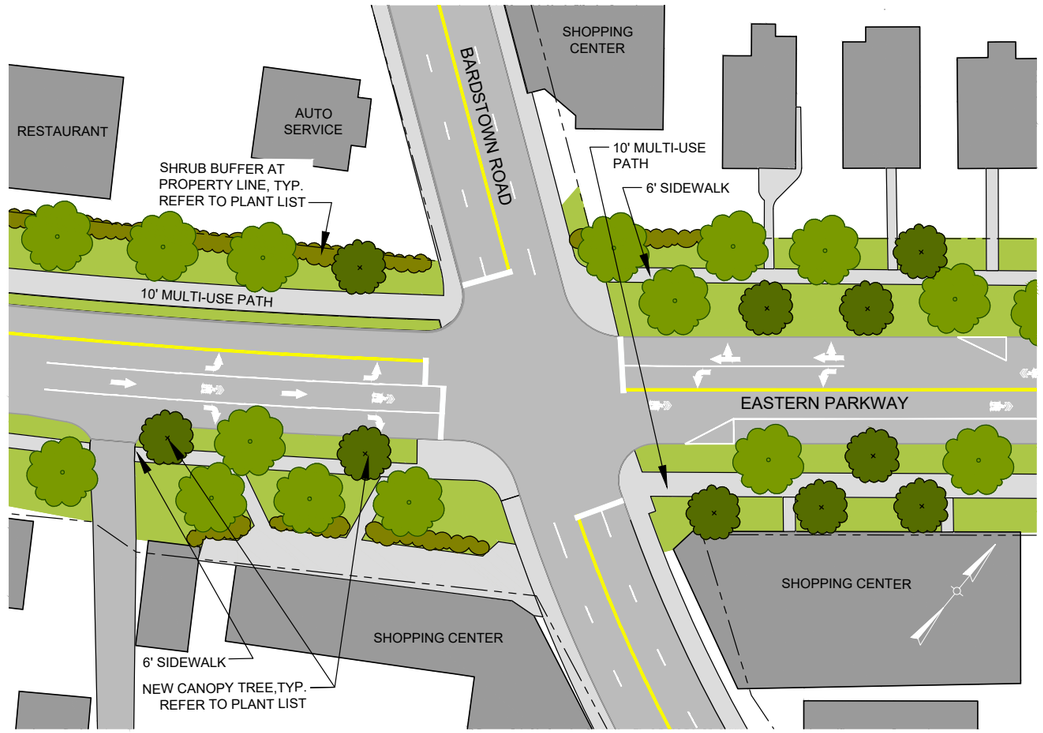
Figure 5.33 *Zone 2 - Typical Block Plan.*



Planting Plan: Intersection of Eastern Parkway and Bardstown Road

The proposed planting plan for the intersection of Eastern Parkway and Bardstown Road references the 1906 Olmsted Brothers plan ('Planting Plan for Cherokee Road from Sherwood Ave Entrance to Finzer Parkway' 1906 - Project #1263, Plan #209). As seen in this plan, canopy trees are located near the intersection to provide scenic character. The plan also shows dense plantings along the parkway although early images do not show record of them being installed. The proposed plan recommends the continuation of the tree canopy up to the intersection, with the introduction of shrubs to act as a buffer between businesses along the parkway property line.

Figure 5.34 *Zone 2 - Proposed Planting Plan for Intersection of Eastern Parkway and Bardstown Road.*



Recommended Canopy Tree Species List

Confirmed by historic photographs, the row of trees within this zone consisted of pin oak (Quercus palustris). Best practices are now to integrate biodiverse species within a streetscape to prevent catastrophic loss due to disease or insects (Dutch elm disease/Emerald ash borer). Species of new canopy trees should be chosen with both soils and topography in mind. According to the United States Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) data, soils within this zone are mostly Urban Land/Crider soils. Within this zone, there is a 20-ft elevation change from Bardstown Road down to just east of Quadrant Avenue. From Quadrant Avenue, the parkway raises back up 20 ft just east of Baxter Avenue. Proposed canopy tree species for the block of parkway between Norris Place and Quadrant Avenue should follow the below recommended list for wet soils (Table 5.3). The rest of the parkway in Zone 2 is recommended to follow the standard list in Table 5.4.

Shrub species at the intersection of Bardstown Road (Table 5.5) can be designed to buffer along existing businesses at the parkway property line. Shrub species can be between 2-5 ft in height.

Table 5.3

Zone 2 Recommended Wet Soils Canopy Tree Species List

Acer rubrum	Red maple
Acer rubrum	Red maple
Liquidambar styraciflua	American sweetgum (choose fruitless)
Nyssa sylvatica	Black gum
Platanus occidentalis	American sycamore
Quercus lyrata	Overcup oak
Quercus macrocarpa	Bur oak
Quercus phellos	Willow oak

Table 5.4

Zone 2 Recommended Standard Canopy Tree Species List

Magnolia acuminata	Cucumbertree magnolia
Aesculus flava	Yellow Buckeye
Quercus alba	White oak
Quercus bicolor	Swamp white oak
Quercus muehlenbergii	Chinkapin oak
Quercus rubra	Red oak
Quercus shumardii	Shumard oak
Tilia americana	American linden
Ulmus americana (clone Valley Forge, etc.)	American elm clone

Table 5.5

Zone 2 Recommended Shrub Species List

Hydrangea arborescens 'Annabelle'	Annabelle hydrangea
Hydrangea quercifolia 'Pee Wee'	Pee Wee dwarf oakleaf hydrangea
Symphoricarpos orbiculatus	Coralberry
Viburnum carlesii 'Compactum'	Compact Koreanspice viburnum
Viburnum x 'Conoy'	Conoy viburnum

ZONE 3

Typical Block Plan

Known as the Castlewood section, the parkway between Baxter Avenue and Barret Avenue is unique from the rest of the corridor due to the insertion of an approximate 32-ft middle greenway with staggered rows of trees. Both the greenway median and the single row of trees on either side of the parkway are shown in the Olmsted Brothers study for the intersection ('Study for Junction at Castlewood Ave' 1907 – Project #1272, Plan #4). Although the Gheen Circle from the historic plan was not introduced at Baxter Avenue, the intent is shown for the spacing of the trees in the middle green space, staggered 40-50 ft between trees and 20 ft between the rows, and on the sides of the parkway at the same 40-50 ft spacing. The typical block proposed planting plan for Zone 3 addresses the reestablishment or continuation of the deciduous canopy cover through this zone with the double row of trees in the middle greenway and the single row of trees along each side of the parkway as seen in the historic plan study.

Figure 5.35 *Zone 3 -Typical Block Plan.*

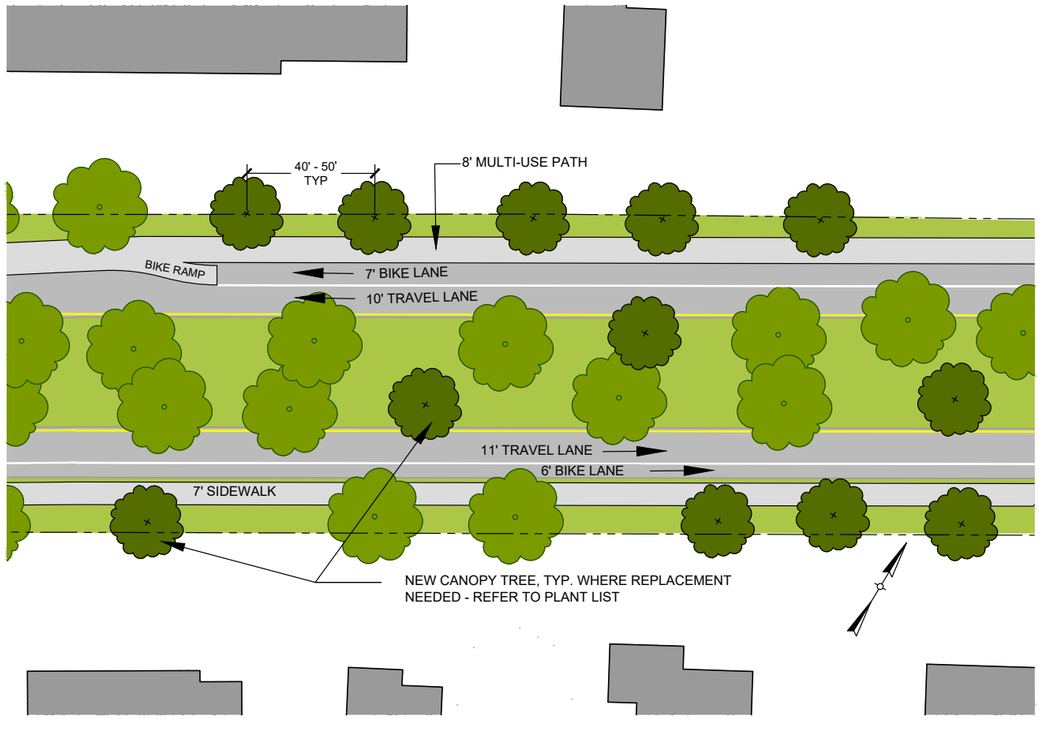


Figure 5.36 *Zone 3 – Proposed Planting Plan for Intersection of Eastern Parkway and Baxter Avenue.*

Planting Plan: Intersection of Eastern Parkway and Baxter Avenue

The proposed planting plan (Figure 5.36) for the intersection of Eastern Parkway and Baxter Avenue references the 1907 Olmsted Brothers study plan ('Study for Junction at Castlewood Ave' 1907 – Project #1272, Plan #4). A double row of staggered canopy trees is located in the middle greenway in the Castlewood section, with a single row along the parkway both east and west of the intersection. Canopy trees are introduced at the frontage of the businesses on the northeast corner. Trees are also added to the parkway further up to the intersection. This is to retain as much continuous canopy at the intersections as possible.

Recommended Canopy Tree Species List

It is more difficult to decipher tree species through historic photographs of Zone 3, and none of the Olmsted Brothers correspondence describes a specific species. The habit of the tree species on either side of the parkway do look similar, however, to that of the well-used pin oak (Quercus palustris). The species in the middle greenway is unknown. Regardless, best practices are now to integrate more biodiverse species within a streetscape to prevent catastrophic loss due to disease or insects (Dutch elm disease/Emerald ash borer). Species of new canopy trees should be chosen with both soils and topography in mind. According to the United States Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) data, soils within this zone are mostly Urban Land/Crider soils. Within this zone, there is a 10-ft downward elevation change between Baxter Avenue to Barret Avenue. The recommended list for tree canopy species in Zone 3 should follow the standard list in Table 5.6.

Table 5.6

Zone 3 Recommended Standard Canopy Tree Species List

Cladrastis kentukea	Yellowwood
Magnolia acuminata	Cucumbertree magnolia
Platanus occidentalis	American planetree
Quercus alba	White oak
Quercus bicolor	Swamp white oak
Quercus macrocarpa	Bur oak
Quercus rubra	Red oak
Tilia americana	American linden
Ulmus americana (hybrid Valley Forge, etc.)	American elm hybrid

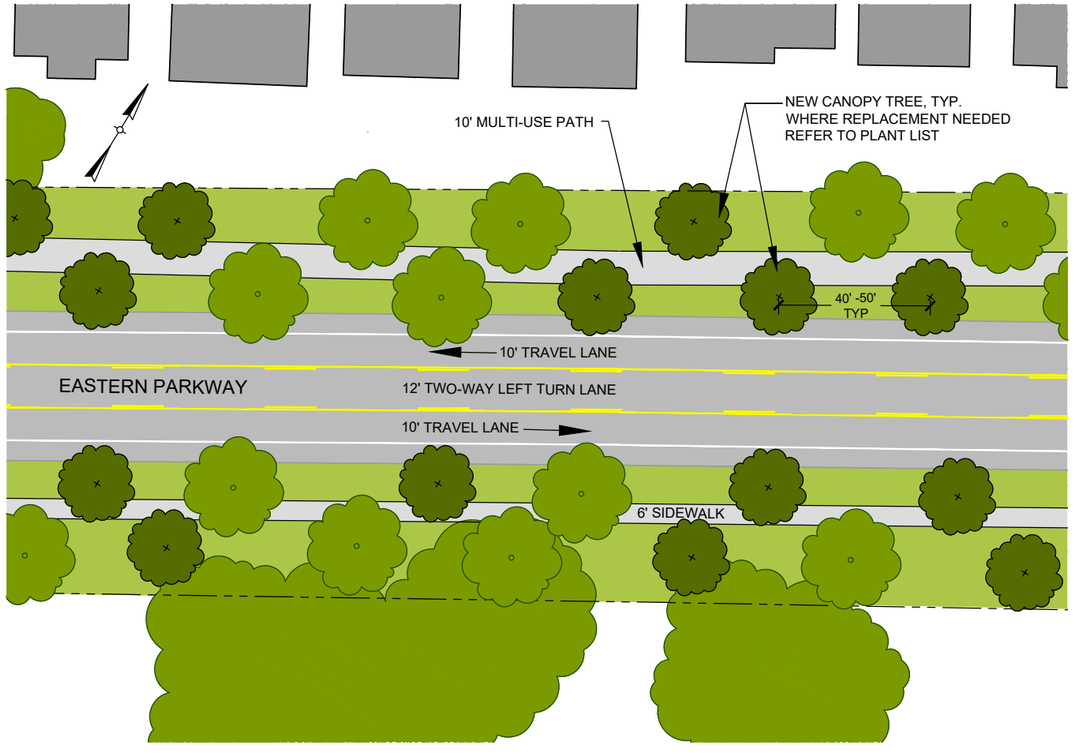
ZONE 4

Typical Block Plan

Eastern Parkway between Barret Avenue and Poplar Level Road (Goss Avenue) merges back to the double row of trees on each side of the parkway, similar to Zone 1. No historic plans can be referenced for this particular zone, but the design intent from east of Bardstown Road can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2).

In this plan, east of Baxter/Bardstown, symbols for existing trees can be measured approximately 40-50 ft apart. They are placed in the staggered double row on each side of the parkway, with approximately 25-30 ft between the outer and inner rows. The typical block proposed planting plan for Zone 4 addresses the reestablishment or continuation of the deciduous canopy cover through this zone with the double row of trees as seen in the historic plan.

Figure 5.37 *Zone 4 - Typical Block Plan.*



Planting Plan: Intersection of Eastern Parkway and Barret Avenue – Alternative 1 (Realigned Intersection)

The proposed planting plan for the proposed realigned intersection of Eastern Parkway and Barret Avenue (Alternative 1) references the 1907 Olmsted Brothers study plan ('Study for Junction at Castlewood Ave' 1907 – Project #1272, Plan #4). A double row of staggered canopy trees is located in the middle greenway in the Castlewood section with a single row along the parkway east of the intersection. West from the intersection references the 1907 Olmsted Brothers plan ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2) with the double row of trees on each side of the parkway. Canopy trees are added to the parkway nearer the intersection. This is to retain as much continuous canopy at the intersections as possible.

Figure 5.38 *Zone 4 - Proposed Planting Plan for Intersection of Eastern Parkway and Barret Avenue (Alternative 1)*

Planting Plan: Intersection of Eastern Parkway and Barret Avenue – Alternative 2 (Roundabout)

The proposed planting plan (Figure 5.39) for the roundabout intersection of Eastern Parkway and Barret Avenue (Alternative 2) references the 1907 Olmsted Brothers study plan ('Study for Junction at Castlewood Ave' 1907 – Project #1272, Plan #4). A double row of staggered canopy trees is located in the middle greenway in the Castlewood section, with a single row along the parkway east of the roundabout. West from the intersection references the 1907 Olmsted Brothers plan ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2) with the double row of trees on each side of the parkway.

Canopy trees are added to the parkway nearer the intersection. This is to retain as much continuous canopy at the intersections as possible. To diffuse headlights from shining into adjoining residences due to the adjusted road alignment, a shrub buffer is proposed next to corner properties. Low shrubs to a maximum height of 2-3 ft are proposed within the roundabout island. Reference shrub buffer list on Table 5.9

Figure 5.39 *Zone 4 - Proposed Planting Plan for Intersection of Eastern Parkway and Barret Avenue (Alternative 2)*

Recommended Canopy Tree Species List

There are many historic photographs within this zone, and within the correspondence between John Charles Olmsted and the Board of Park Commissioners, it is noted that 'Olmsted Brothers advises use of sweet gum as substitutes for sycamore in planting of outer rows' in the zone of 'Castlewood to Shelby Street'. The inner row was to be pin oak (Quercus palustris) and outer row sweet gum (Liquidambar styraciflua). Best practices are now to integrate more biodiverse species within a streetscape to prevent catastrophic loss due to disease or insects (Dutch elm disease/Emerald ash borer). Species of new canopy trees should be chosen with both soils and topography in mind. According to the United States Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) data, soils within this zone are mostly Urban Land/Crider soils. Within this zone, lies the crossing of the South Fork of Beargrass Creek. There is a 70-ft elevation decrease toward the creek from Barret Avenue and 25-ft difference from Poplar Level to the creek dropping east. Historic photographs show flooding near the creek. The recommended list for tree canopy species in Zone 4 should follow the wet soils list in Table 5.7.

Shrub species within the roundabout island at Barret Avenue in recommended design Alternative 2 can be designed to maintain sight distances for vehicular travel. Shrub species should be less than 3 ft in height. Reference shrubs for roundabout on Table 5.8

Table 5.7

Zone 4 Recommended Wet Soils Canopy Tree Species List

Acer rubrum	Red maple
Liquidambar styraciflua	American sweetgum (choose fruitless)
Nyssa sylvatica	Black gum
Platanus occidentalis	American sycamore
Quercus lyrata	Overcup oak
Quercus macrocarpa	Bur oak
Quercus michauxii	Swamp chestnut oak
Quercus phellos	Willow oak

Table 5.8

Zone 4 Recommended Shrub Species List Roundabout (Alternative 2)

Viburnum dentatum 'Little Joe'	Little Joe viburnum
Viburnum x juddii	Judd Viburnum
Viburnum x 'Conoy'	Conoy viburnum

Table 5.9

Zone 4 Recommended Shrub Species List Property Line (Alternative 2)

Clethra alnifolia	Summersweet
Hydrangea arborescens 'Annabelle'	Annabelle hydrangea
Hydrangea quercifolia	Oakleaf hydrangea
Itea virginica	Virginia sweetspire
Symphoricarpos orbiculatus	Coralberry
Viburnum x 'Conoy'	Conoy viburnum
Viburnum juddii	Judd viburnum
Viburnum x juddii	Judd viburnum

ZONE 5

Typical Block Plan

Eastern Parkway between Poplar Level Road (Goss Avenue) and the S. Preston/S. Shelby intersections is similar to Zone 1 with the double row of trees on each side of the parkway. No historic plans can be referenced for this particular zone, but the design intent from east of Bardstown Road can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2).

In this plan, east of Baxter Avenue/Bardstown Road, symbols for existing trees can be measured approximately 40-50 ft apart. They are placed in the staggered double row on each side of the parkway with approximately 25-30 ft between the outer and inner rows. The typical block proposed planting plan for Zone 5 addresses the reestablishment or continuation of the deciduous canopy cover through this zone with the double row of trees as seen in the historic plan.

Figure 5.40 *Zone 5 - Typical Block Plan.*

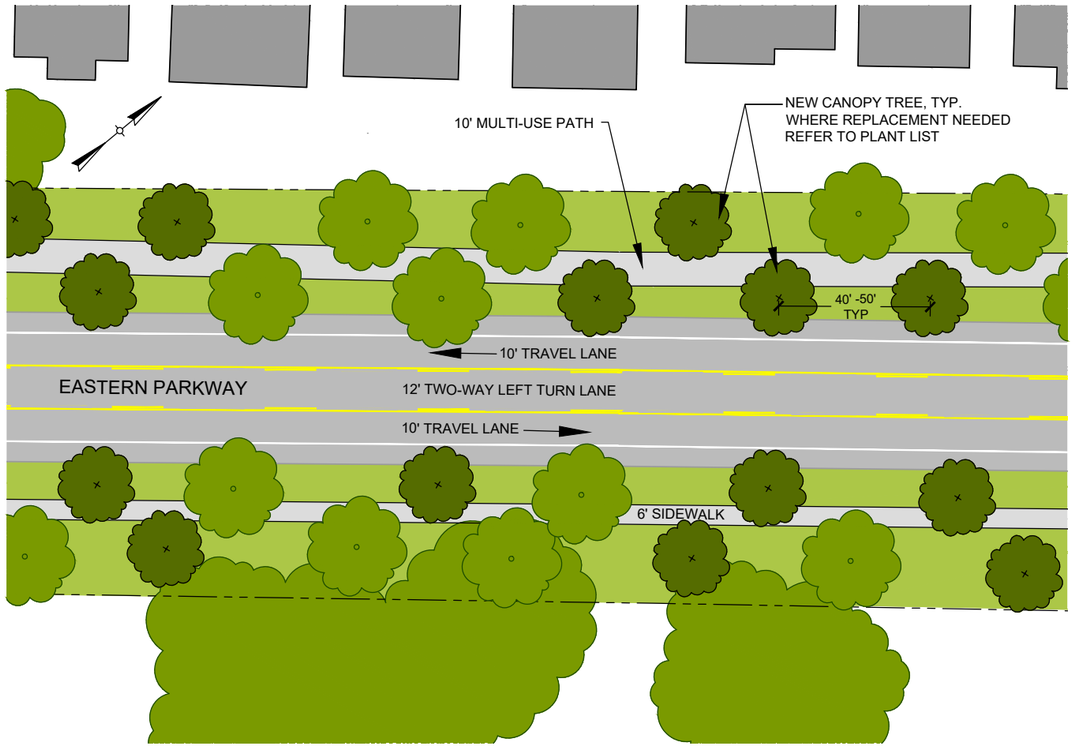
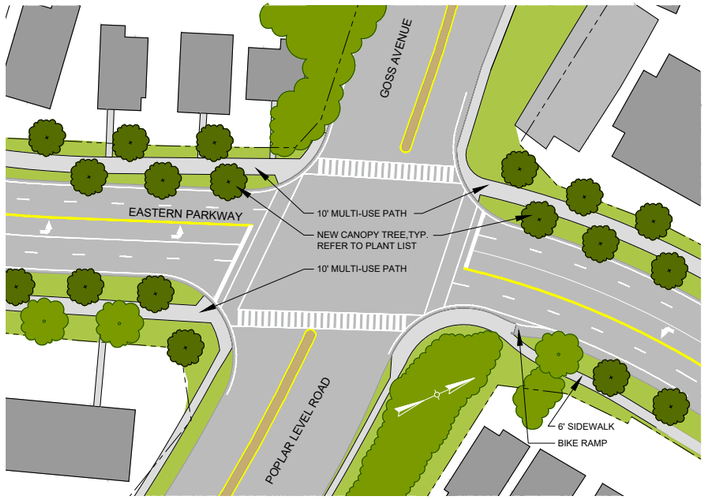


Figure 5.41 *Zone 5 – Proposed Planting Plan for Intersection of Eastern Parkway and Poplar Level Road (Goss Avenue)*



Planting Plan: Intersection of Eastern Parkway and Poplar Level Road (Goss Avenue)

The intersection of Eastern Parkway and Poplar Level Road presents a greater landscaping challenge due to the large width of the intersection. With so much pavement, a complete canopy will never seem fluid and uninterrupted. Regardless, the proposed plan (Figure 5.41) adds a double row of canopy trees as close to the intersection as possible. The double row of trees can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2).

Recommended Canopy Tree Species List

Historic photographs within this zone, as well as the correspondence between John Charles Olmsted and the Board of Park Commissioners, inform the tree species that were likely planted in the double row of trees. It is noted that 'Olmsted Brothers advises [the] use of sweet gum as substitutes for sycamore in planting of outer rows' in the zone of 'Castlewood to Shelby Street'. The inner row was to be pin oak (Quercus palustris) and outer row sweet gum (Liquidambar styraciflua). Best practices are now to integrate biodiverse species within a streetscape to prevent catastrophic loss due to disease or insects (Dutch elm disease/Emerald ash borer). Species of new canopy trees should be chosen with both soils and topography in mind. According to the United States Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) data, soils within this zone are mostly Urban Land soils. Topography within this zone varies little, with a small rise from Poplar Level Road to mid-block between Ash Street and Lydia Street. It then descends gradually toward the intersection at S. Preston Street and S. Shelby Street. The recommended list for tree canopy species in Zone 5 should follow the standard list in Table 5.10.

Table 5.10

Zone 5 Recommended Standard Canopy Tree Species List

Magnolia acuminata	Cucumbertree magnolia
Platanus occidentalis	American sycamore
Quercus alba	White oak
Quercus bicolor	Swamp white oak
Quercus macrocarpa	Bur oak
Quercus rubra	Red oak
Quercus muehlenbergii	Chinkapin oak
Tilia americana	American linden
Ulmus americana (clone Valley Forge, etc.)	American elm clone
Aesculus flava	Yellow Buckeye
Cladrastis kentukea	Yellowwood
Carya cordiformis	Bitternut hickory

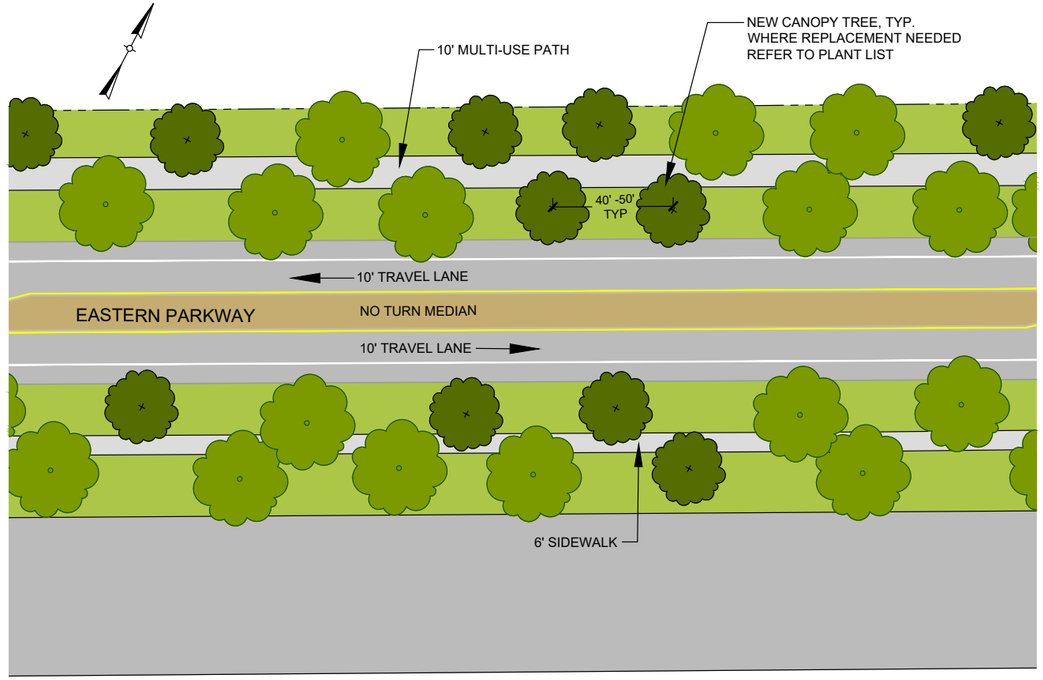
ZONE 6

Typical Block Plan

Eastern Parkway between S. Preston Street/S. Shelby Street and Crittenden Drive is similar to Zone 1, with the double row of trees on each side of the parkway. No historic plans can be referenced for this particular zone, but the design intent can be referenced from east of Bardstown Road from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2).

In this plan, east of Baxter Avenue/Bardstown Road, symbols for existing trees can be measured approximately 40-50 ft apart. They are placed in the staggered double row on each side of the parkway with approximately 25-30 ft between the outer and inner rows. The typical block proposed planting plan for Zone 6 addresses the re-establishment or continuation of the deciduous canopy cover through this zone, with the double row of trees as seen in the historic plan.

Figure 5.42 *Zone 6 -Typical Block Plan.*



Planting Plan: Intersection of Eastern Parkway and S. Preston/S. Shelby Streets Planting Plan – Alternative 1 (Right-in/Right-Out)

The intersection of the parkway at S. Preston Street and S. Shelby Street is a unique opportunity to re-establish the parkway character. The proposed planting plan for the first design alternative (Preston Street two-way; Shelby St, right-in/right-out) adds a double row of canopy trees as close to the intersections as possible.

The double row of trees can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2). A shrub buffer can be introduced at the parkway property line adjacent to commercial activity to provide additional separation.

Figure 5.43 *Proposed Planting Plan for Intersection of Eastern Parkway and S. Preston/S. Shelby Streets – Alternative 1*

Planting Plan: Intersection of Eastern Parkway and S. Preston/S. Shelby Streets Planting Plan – Alternative 2 (Pedestrian Plaza)

The second design alternative for this intersection recommends Preston Street as a two-way facility and Shelby Street as a pedestrian plaza. The proposed planting plan for this alternative re-establishes a double row of canopy trees through the intersection at Shelby and as close to Preston Street as possible, with additional trees in the green spaces introduced by the partial closure of Shelby Street. The double row of trees can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2). A shrub buffer can be introduced at the parkway property line adjacent to commercial activity to provide additional separation.

Figure 5.44 *Proposed Planting Plan for Intersection of Eastern Parkway and S. Preston/S. Shelby Streets – Alternative 2.*

Planting Plan: Intersection of Eastern Parkway and S. Preston/S. Shelby Streets Planting Plan – Alternative 3 (Four-Lane)

A third design alternative was also developed for the intersection of the parkway at S. Preston Street and S. Shelby Street, retaining the existing four-lane typical section (similar to a no-build scenario). The proposed planting plan for this alternative adds a double row of canopy trees as close to the intersections as possible, without a substantial change in the pavement areas.

The double row of trees can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2). A shrub buffer can be introduced at the parkway property line adjacent to commercial activity to provide additional separation.

Figure 5.45 *Proposed Planting Plan for Intersection of Eastern Parkway and S. Preston/S. Shelby Streets – Alternative 3.*

Planting Plan: Intersection of Eastern Parkway and Bradley Avenue - Alternative 1 (Re-aligned Intersection)

The intersection of the parkway at Bradley Avenue is different due to the geometry of the road alignments. Two design alternatives were presented for this intersection, the first being a realignment of the intersection legs. The proposed planting plan for design Alternative 1 maintains a double row of canopy trees as close to the intersection as possible. The double row of trees can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2).

Figure 5.46 *Proposed Planting Plan for the Intersection of Eastern Parkway and Bradley Avenue – Alternative 1 (Re-aligned Intersection).*

Planting Plan: Intersection of Eastern Parkway and Bradley Avenue - Alternative 2 (Peanut-about)

Design Alternative 2 for the intersection of the parkway at Bradley Avenue introduces a peanut-shaped roundabout is illustrated in Figure 5.47. The proposed planting plan for Alternative 2 maintains a double row of canopy trees as close to the intersection as possible. The double row of trees can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2). The inner part of the island of the roundabout alignment can be planted with low shrubs to avoid interruption of sight distances.

Figure 5.47 *Proposed Planting Plan for the Intersection of Eastern Parkway and Bradley Avenue – Alternative 2 (Peanut-shaped Roundabout).*

Recommended Canopy Tree Species List

Historic photographs within this zone, as well as the correspondence between John Charles Olmsted and the Board of Park Commissioners, inform the tree species that were likely planted in the double row of trees. It is noted that 'Olmsted Brothers advises use of sweet gum as substitutes for sycamore in planting of outer rows' in the zone of 'Castlewood to Shelby Street'. The inner row was to be pin oak (Quercus palustris) and outer row sweet gum (Liquidambar styraciflua). Best practices are now to integrate biodiverse species within a streetscape to prevent catastrophic loss due to disease or insects (Dutch elm disease/Emerald ash borer). Species of new canopy trees should be chosen with both soils and topography in mind. According to the United States Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) data, soils within this zone are mostly Urban Land soils. Topography within this zone rises slightly about 10 ft from east to west toward Crittenden. The recommended list for tree canopy species in Zone 6 should follow the standard list in Table 5.11.

Table 5.11

Zone 6 Recommended Standard Canopy Tree Species List

Acer rubrum	Red maple
Betula nigra	River birch
Carya illinoinensis	Pecan
Carya laciniosa	Shellbark hickory
Nyssa sylvatica	Blackgum
Platanus occidentalis	American sycamore
Quercus bicolor	Swamp white oak
Quercus lyrata	Overcup oak
Quercus michauxii	Swamp chestnut oak
Quercus palustris	Pin oak

Shrub species at the intersection of S. Preston Street and S. Shelby Street (Table 5.12), for all proposed plans, can be designed to buffer along existing commercial businesses at the parkway property line. Shrub species should be between 2-5 ft in height.

Shrub species at the intersection at Bradley Avenue in Alternative 2, the peanut-shaped roundabout, can be designed maintain sight distances for vehicular travel (Table 5.13). Shrub species can be less than 3 ft in height.

Table 5.12

Zone 6 Recommended Shrub Species List
S. Preston/Shelby Streets

Hydrangea arborescens 'Annabelle'	Annabelle hydrangea
Hydrangea quercifolia 'Pee Wee'	Pee Wee dwarf oakleaf hydrangea
Symphoricarpos orbiculatus	Coralberry
Viburnum carlesii 'Compactum'	Compact Koreanspice viburnum
Viburnum x 'Conoy'	Conoy viburnum

Table 5.13

Zone 6 Recommended Shrub Species List
Bradley Avenue Alternative 2
(Peanut-shaped Roundabout)

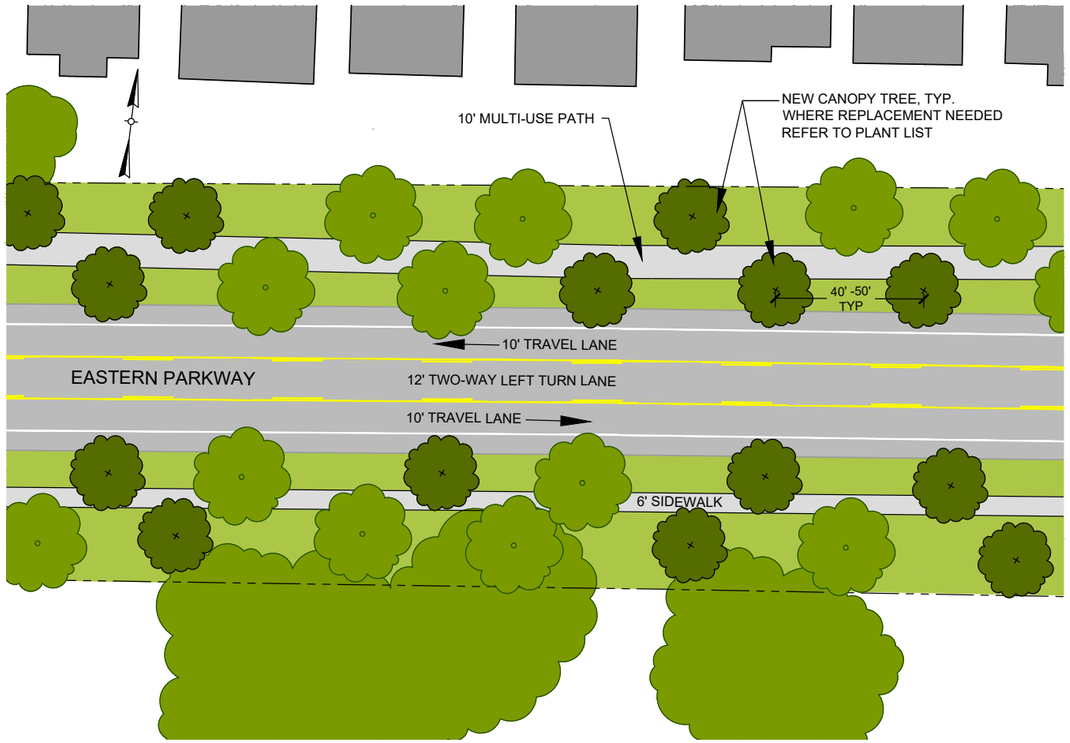
Forsythia viridissima 'Bronxensis'	Bronxensis Green stem forsythia
Rhus aromatica 'Gro Low'	Gro Low sumac

ZONE 7

Typical Block Plan

Eastern Parkway between Crittenden Drive and Hahn Street is interrupted by Interstate 65. As such, the landscape character of the parkway is significantly degraded by existing infrastructure. Opportunities exist to enhance the parkway through the addition of canopy trees where available space merits. The typical block proposed planting plan for Zone 7 addresses the re-establishment or continuation of the deciduous canopy cover, as illustrated in Figure 5.48

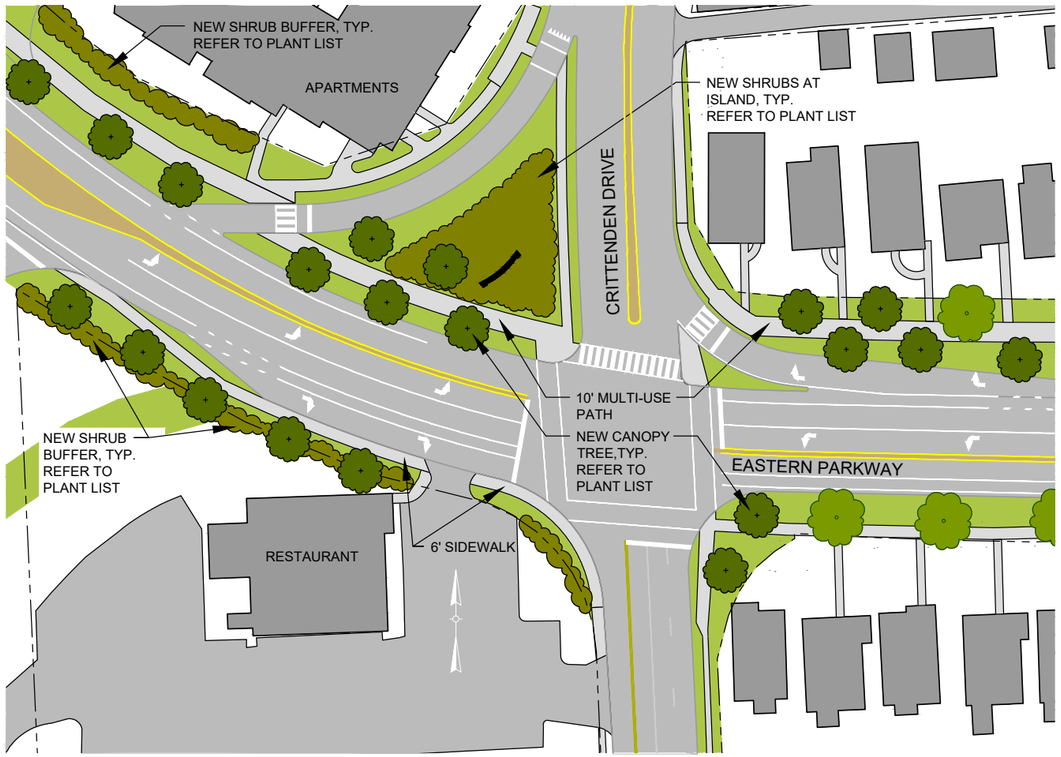
Figure 5.48 *Zone 7 -Typical Block Plan.*



Planting Plan: Intersection of Eastern Parkway and Crittenden Drive

The intersection of Eastern Parkway at Crittenden Drive serves as the western gateway to the parkway. The historic double row of trees east of Crittenden Drive can be maintained as close to the intersection as possible, as shown in the proposed planting plan in Figure 5.49. Through this intersection, though, there is only corridor width for a single row on the south side of the parkway. The double row of trees can be referenced from the 1907 historic planting study developed by the Olmsted Brothers ('Eastern Parkway through Ferndale Avenue' 1907 – Project #1272, Plan #2). West of Crittenden Drive, canopy trees can be added where feasible. At the triangular island within the intersection, shrubs can be used to enhance the corridor. A shrub buffer can also be placed along the parkway property line to buffer from businesses and buildings.

Figure 5.49 *Zone 7 - Proposed Planting Plan.*



Recommended Canopy Tree Species List

Species of new canopy trees should be chosen with both soils and topography in mind. According to the United States Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) data, soils within this zone are mostly Urban Land soils. Topography within this zone is fairly flat between Crittenden Drive and Interstate 65. West of the interstate, elevation begins to drop toward the University of Louisville campus. The recommended list for tree canopy species for Zone 7 should follow the standard list in Table 5.14.

Shrub species at the island in the intersection at Crittenden Drive can be designed to maintain sight distances for vehicular travel (Table 5.13). Shrub species should be less than 3 ft in height.

Shrub species at the intersection at Crittenden Drive (Table 5.14) can be designed to buffer along existing businesses and buildings at the parkway property line. Shrub species can be between 2-5 ft in height.

Table 5.14

Zone 7 Recommended Standard Canopy Tree Species List

Carya cordiformis	Bitternut hickory
Celtis occidentalis	Common hackberry
Magnolia acuminata	Cucumbertree magnolia
Quercus alba	White oak
Quercus bicolor	Swamp white oak
Quercus macrocarpa	Bur oak
Quercus prinus	Chestnut oak
Quercus rubra	Red oak
Tilia americana	American linden
Ulmus americana (clone Valley Forge, etc.)	American elm clone

Table 5.15

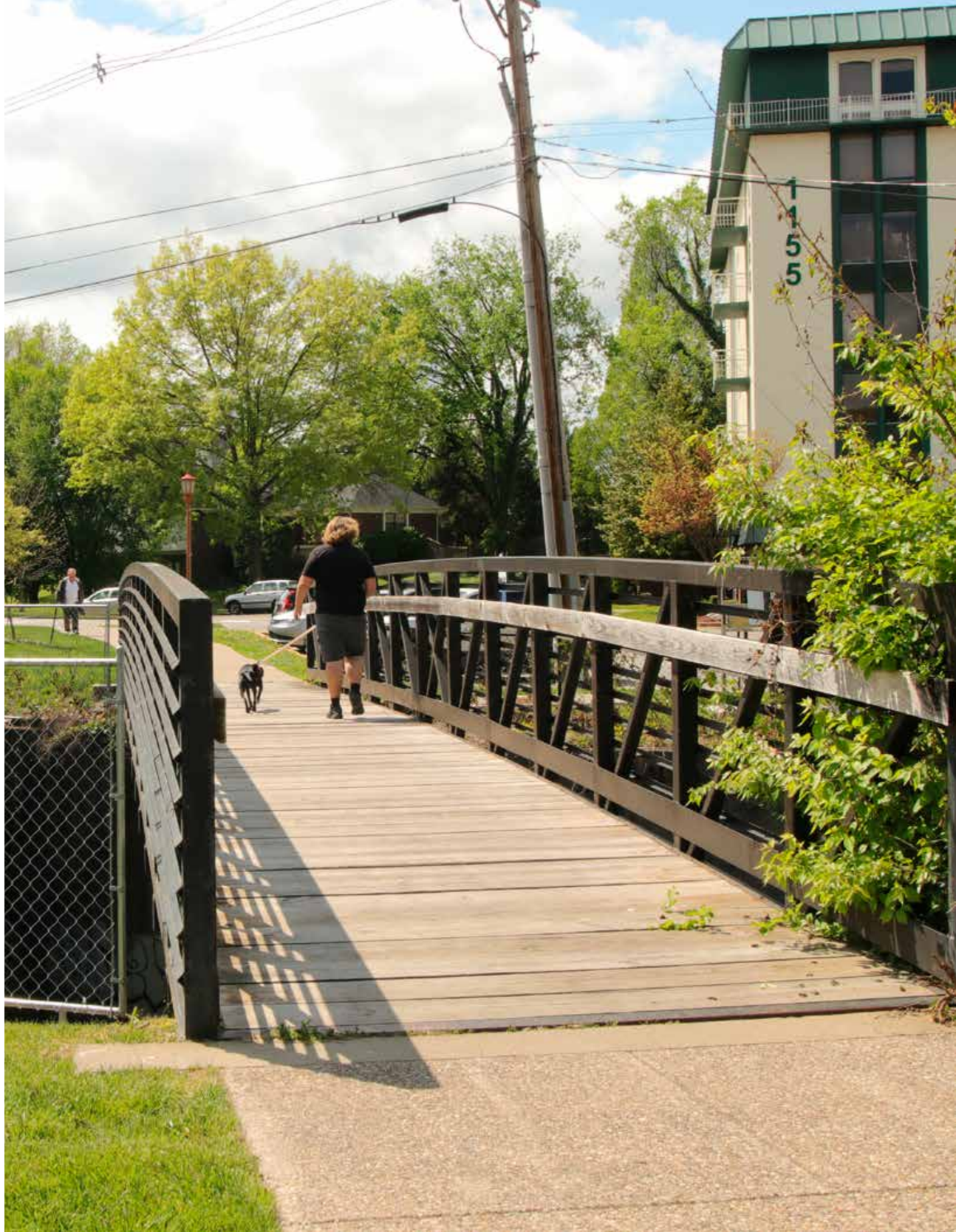
Zone 7 Recommended Shrub Species List
Island

Forsythia viridissima 'Bronxensis'	Bronxensis Green stem forsythia
Rhus aromatica 'Gro Low'	Gro Low sumac

Table 5.16

Zone 7 Recommended Shrub Species List
Intersection

Hydrangea arborescens 'Annabelle'	Annabelle hydrangea
Hydrangea quercifolia 'Pee Wee'	Pee Wee dwarf oakleaf hydrangea
Symphoricarpos orbiculatus	Coralberry
Viburnum carlesii 'Compactum'	Compact Koreanspice viburnum
Viburnum x 'Conoy'	Conoy viburnum



06

CHAPTER 06

Planning Report Summary

This is Just the Beginning

Eastern Parkway is a celebrated icon of Louisville's design heritage, environmental character, and quality of life. For over a century, the people of Louisville have enjoyed Eastern Parkway's shade on foot, by bike, and in buses and cars. A bastion of the Olmstedian aesthetic, Eastern Parkway is an heirloom of 19th century design principles that are still functional for and cherished by Louisville's residents and visitors today.

As time has progressed since its construction, however, the original character of Eastern Parkway fell into a shadow of its own, cast by changing land uses adjacent to the parkway, evolving transportation needs and technologies, and an expanding population. The parkway's once bright ribbon of green was interrupted as trees were removed from its ubiquitous double row canopy, and its landscaped, verdant edges were replaced by increasing amounts of impervious pavement and parked vehicles.

In the mid 1990s, the people of Louisville set out on a mission to restore the city's Olmstedian parkways, in the same way its earliest residents sought out Frederick Law Olmsted to preserve Louisville's environmental treasures as an interconnected system of parks and parkways in the late 1800s. The Louisville/Jefferson County Metro Government commissioned a series of planning studies to establish a solid foundation for the future of the city's Olmsted parks and parkways. The *Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management prepared in 1994; the Parks and Open Space Master Plan* prepared in 1995; *Louisville Olmsted Parkways Design Standards* prepared in 2002; the *Olmsted Parkway Shared-Use Pathway System Master Plan* prepared in 2009; and the *Move Louisville 2035 Transportation Plan* prepared in 2016 have served as important foundational documents in the planning process for the entire Olmsted system. Each of the Olmsted parks and parkways, however, features its own unique context and heritage. As such, a study was initiated to analyze Eastern Parkway in detail, in preparation for future design phases. This report will serve as the cornerstone for the future of Eastern Parkway and how it serves the residents of Louisville for generations to come.

This report will serve as the cornerstone for the future of Eastern Parkway and how it serves the residents of Louisville for generations to come.

Visioning & Planning Study Objectives

The *Olmsted Shared-Use Pathway System Master Plan* in 2009 conducted preliminary planning assessments for the interconnected Olmsted parkway system as a whole. Following recommendations from the 1995 Parks and Open Space Master Plan, the 2009 Master Plan set forth multiple objectives, including the acquisition and development of new park land, the construction of a 100-mile paved loop trail around the perimeter of Jefferson County (the Louisville Loop), and the revival of an integrated and interconnected open space system by rehabilitating the Olmsted parkways and linking them together.

The plan provided an analysis of each of the Olmsted parkways, including Eastern Parkway for which it provided a series of recommendations. After a review of Eastern Parkway by zone, the 2009 Master Plan enumerated a series of actions to support implementation of the plan's recommendations.

This planning study is first among those recommendations and serves as a comprehensive resource for future implementation phases of Eastern Parkway rehabilitation projects. This report holistically reviews the body of planning work conducted to develop a thorough understanding of Eastern Parkway's context, to assess existing conditions of Eastern Parkway in a modern context, to collect extensive feedback as provided by the community, and to provide informed recommended design alternatives for each of Eastern Parkway's zones, consistent with its Olmstedian aesthetic and supporting the safe and efficient movement of people using all transportation modes.

Planning Process

The project team has undertaken a methodical process to develop a summary of prior planning efforts for the Olmsted parkway system, a holistic assessment of Eastern Parkway's existing conditions, and recommended design alternatives for each of Eastern Parkway's seven zones.

The first step of the process was to review studies conducted over the past twenty-five years. The project team collectively analyzed each body of work in this well-rounded library of planning literature. The plans reviewed as a part of this analysis include the following:

1. Master Plan for Louisville's Olmsted Parks and Parkways: A Guide to Renewal and Management (1994)
2. Parks and Open Space Master Plan (1995)
3. Feasibility Study to Re-Curb Eastern Parkway (1999)
4. Louisville Olmsted Parkways Design Standards (2005)
5. Olmsted Shared-Use Path Master Plan (2009)
6. Louisville Urban Tree Canopy Assessment (2015)
7. Move Louisville 2035 Transportation Plan (2016)

Common themes heard across these prior planning efforts emphasized the importance of interconnectivity between Louisville's Olmsted parkways and multimodal networks, the prioritization of safety for all modes of transportation, and a preservation of the Olmsted parkway aesthetic by restoring its tree canopy and enhancing its overall design.

The second step of the planning process included a study of Eastern Parkway's surrounding context and existing conditions. The project team conducted a review of the history of Eastern Parkway, its potential archaeological locations, and its notable cultural historic resources, including its historic places and historic districts as recognized by the National Register of Historic Places (NRHP). Additionally, the project team evaluated Eastern Parkway's environmental and ecological characteristics, including an assessment of its soil composition as well as its terrestrial and aquatic resources. Further, the project arborist executed a thorough inventory and analysis of all 1,200 trees along the parkway to discuss their current condition and health. Finally, the project team reviewed the surrounding land uses of the parkway, including its zoning and form districts, to better understand the transportation trips generated by Eastern Parkway residences and businesses and how Eastern Parkway serves the residents of and visitors to Louisville.

Existing conditions of Eastern Parkway were analyzed in a methodical fashion. General features, including typical section width, utility treatment, curb and gutter, and sidewalk and transit conditions, were captured during an on-site Road Safety Audit. A detailed review of additional features of the parkway was conducted and summarized, including its 10 signalized intersections, numerous curb cuts and pervasive private encroachments on the public right-of-way, lighting, bridges, and current multimodal facilities (including its 46 transit stops). In addition, the project team conducted a series of traffic analysis studies. Collision data along the corridor was collected and analyzed, along with traffic and turning movement counts and measured speed. An operational analysis was performed to investigate five measures of performance for proposed design alternatives: (1) corridor travel times, (2) intersection delay, (3) intersection level of service, (4) intersection volume-to-capacity ratio, and (5) approach queues. Drainage, stormwater, and flooding issues along the corridor and its surrounding limits were also studied by the project team.

Developing recommendations for future design alternatives for Eastern Parkway was the third step in the process. Recognizing that the ultimate project goal is to restore the parkway to its original Olmstedian vision, while meeting the multimodal transportation needs of a modern population, the project team evaluated four design alternatives as a part of its analysis: (1) a no-build scenario; (2) a four-lane configuration with a 10-ft-wide north side shared-use path and 6-ft-wide south side sidewalk; (3) a three-lane configuration consisting of one through lane in each direction and a center two-way left turn lane (TWLTL), light vehicle lanes on each side, a 10-ft-wide north side shared-use path, and a 6-ft-wide south side sidewalk; and (4) a two-lane configuration with light vehicle lanes on each side, with a 10-ft-wide north side shared-use path and a 6-ft-wide south side sidewalk. Positive and negative outcomes for each of the alternatives were discussed, as well as future conditions for each of Eastern Parkway's seven zones. Short-term recommendations were provided, as well as conceptual drainage & curb improvement recommendations and conceptual landscaping concepts.

Concurrent to and in tandem with the study of Eastern Parkway's existing conditions and the development of recommended alternatives, the project team conducted regular engagement activities with the broader community. A broad and diverse array of feedback was collected from the people who have a personal knowledge of Eastern Parkway from their regular experience and interaction with the parkway, and thus a vested interest in participating in the conversation about its future. The planning process integrated opportunities for public feedback every step of the way. Three stakeholder and steering committees were facilitated, along with three public meetings. Further, a project website established for Louisville's parkways has served as a central location for people to provide comments on the project and find project information. Multiple surveys were conducted using a variety of means, including paper and online forms. A Wikimap was also deployed to collect geographically-located feedback on a variety of project themes. This Wikimap was available at public meetings and on the project website for participant interaction. Communication through a variety of channels, including traditional media, Facebook, and Twitter, was regularly published to keep the public informed throughout the process. Common themes heard from the community included ensuring the safe and efficient movement of cars, bikes, buses, and people (by improving and expanding multimodal facilities while also supporting design alternatives that protected the integrity of the flow of vehicular traffic) and preserving Eastern Parkway's tree canopy and green spaces. Detailed feedback heard from the public regarding design alternatives influenced their revisions between phases to incorporate the voice of the community.

Existing Conditions & Data Analysis

Surrounding Context

Historic Context: Eastern Parkway has a storied history, the roots of which extend as deep as the settlement of the Ohio River Valley by British settlers. In the mid-1800s, the Salmagundi Club, a prestigious all-male, 24-member social and literary club devoted to conversation and the exchange of ideas, supported the development of a parks system. This led to the hiring of Frederick Law Olmsted's firm to design the Olmsted parks and parkways we enjoy today. Eastern Parkway was constructed between 1900 - 1913.

Archaeological Context. While only a small portion of the project area has been subjected to previous archaeological survey, no previously identified archaeological sites are located within the project area. Archaeological deposits are expected throughout the project area, however. In areas of little to no disturbance (or depending on the type of disturbance), a Phase I archaeological survey is recommended within areas planned for ground disturbance.

Cultural Historic Resources Context: A total of 134 individual cultural historic resources in the immediate area of Eastern Parkway have been previously documented according to the Kentucky Heritage Council (KHC). While there are no National Historic Landmarks in the project area, Eastern Parkway itself is considered a large NRHP historic district as part of the Olmsted Park System of Louisville listing. Eastern Parkway also forms part of the boundary of two National Register of Historic Places (NRHP)-listed historic districts: the Cherokee Triangle Area Residential Historic District and the Highlands Historic District. Eastern Parkway also crosses part of the southern portion of the University of Louisville Belknap Campus Historic District. The Schuster Building is listed on the NHRP, and one other building (the Kosair Charities Center) and six residences have been recommended. The Grotto and Garden of Our Lady of Lourdes on the grounds of the former St. Joseph's Infirmary is the only state and local landmark. One preservation district (the Cherokee Triangle Preservation District) and one overlay district (the Bardstown Road/Baxter Avenue Corridor Overlay District) are located within the project area. No cemeteries have been identified within the Eastern Parkway study area, but three large cemeteries lie nearby, all between Baxter Avenue and Poplar Level Road.

Environmental and Ecological Context:

- **Soils** - Overall, the general United States Department of Agriculture (USDA)-National Resources Conservation Service (NRCS) soil map units that formed within the project area are Urban land complexes. Five soil-forming factors: (1) parent material (geology); (2) time; (3) relief (landform); (4) climate; and (5) organisms were evaluated as a part of the study.
- **Terrestrial and Aquatic Resources** - The U.S. Fish and Wildlife Service's Information for Planning and Conservation (USFWS IPaC) notes that there are no critical habitats within the project boundary. The Office of Kentucky Nature Preserves (OKNP) response did not note any federally listed T/E species within the project boundary.

Tree Canopy: 1,199 trees were inventoried and assessed as a part of this study, and the arboreal evaluation included a verification and/or update of each tree's species, size, and location. The two most commonly found species of trees on Eastern Parkway were found to be *Acer saccharum* (Sugar maple) and *Quercus palustris* (Pin oak). Most trees measured 10" DBH or smaller (45%) or 10.5"-20.0" (44%). Most trees (87%) were found to be in fair or better condition. All trees were additionally evaluated for an abnormal root system, auto damage, curb damage, extensive decay, girdling roots, potentially hazardous condition, history of limb failure, poor placement, poor species selection, tip dieback and a weak crotch.

Zoning, Form Districts, and Land Use: The parkway is primarily zoned as residential, with three notable areas of Commercial-Industrial and frequent concentrations of Office zoning. Most of the parkway is under a Neighborhood or Traditional Neighborhood Form District jurisdiction, with two segments under the Traditional Marketplace Corridor Form District. The Bardstown Road/Baxter Avenue Corridor Overlay District is the only overlay district to cross the parkway.

Roadway Characteristics

General Features by Zone: Generally, the typical pavement width for Eastern Parkway is 40 ft, resulting in two 10-ft-wide vehicular travel lanes in each direction. Within each unique character zone, the parkway varies from this typical 40-ft section with respect to pavement width and roadside character. The zones also reflect many attributes of the intended parkway character as developed by Olmsted, including its tree canopy and ribbon of green parkway medians, as well as deviations from the original parkway design. A detailed assessment of each zone is included in this study in Chapter 3.

Signalized Intersections: There are ten signalized intersections along the Eastern Parkway study area: Bardstown Road, Norris Place, Baxter Avenue, Barret Avenue, Castlevale Drive, Poplar Level Road (Goss Avenue), Burnett Avenue, S. Shelby Street and S. Preston Street, Bradley Avenue and Crittenden Drive. This study provides a detailed description of the existing condition for each intersection.

Curb Cuts: Residential driveways are common throughout the corridor, even in areas where parking access is intended to be in the alleys to either side of Eastern Parkway. Often, gutters adjacent to driveways have been filled in, causing drainage issues. Commercial entrances are also common, many of which do not feature defined access.

Private Encroachments on Public Right-of-Way: There are a wide range of encroachments along the parkway, including residential and commercial paved or gravel parking, signage, undesirable or invasive vegetation, and retaining walls. Private, residential parking is one of the most common encroachments. Retaining walls and commercial signage are other common encroachments issues along the parkway.

Lighting: Lighting along Eastern Parkway is predominately roadway lighting, with large overhead cobra-style lights. Lighting is generally insufficient or poorly situated, particularly for pedestrians.

Bridges: Three bridges are located along Eastern Parkway: the Beargrass Creek Bridge, the I-65 interchange, and the Brook and Floyd Streets overpass. An evaluation of each structure is included in this report.

Multimodal Facilities: The study evaluated existing pedestrian, transit, and bicycle/light vehicle facilities. Sidewalks were generally noted along the parkway, with disconnected and missing portions noted. 46 transit stops were identified along Eastern Parkway, served by four transit routes (Line 2, Line 18, Line 27, and Line 29). As of 2019, there is a combined weekday average ridership of 9,205, and stops are generally spaced a quarter of a mile apart or less. Most transit stops along Eastern Parkway consist only of a sign in a grass verge, and 29 of the 46 stops (63%) are not considered ADA accessible. On-street, 6-ft painted bicycle lanes currently exist on Eastern Parkway in certain segments, other segments feature an 8-ft-wide multi-use path.

Collision Data: Collision data was collected from the Kentucky Collision Analysis Database, providing reportable crashes between 2014 and 2018. It was determined that all three segments of Eastern Parkway experience a significantly higher overall crash rate than is expected when compared to the statewide averages. The most common crash types on Eastern Parkway are Rear End (37%), Angle (23%), and Sideswipe (20%), which are the typical crashes seen in a four-lane, signal controlled corridor.

Counts: Turning movement counts and traffic counts were obtained as a part of this study. The peak hour turning movement volumes were used to develop forecast volumes.

Speed: Mid-block speed data was collected at three locations along the parkway. The average speed on Eastern Parkway was found to be near the 35-mph posted speed limit. The 95th percentile speed, however, exceeds the posted speed limit in all three locations. Eastern Parkway near Sherry Road showed the most significant deviation from the posted speed limit, with a speed of 51 mph.

Forecast Volumes: The project team met with Louisville Metro Public Works and KYTC to establish the 2040 design year horizon. The team also met with the Metropolitan Planning Organization (MPO) Kentuckiana Regional Planning and Development Agency (KIPDA) to establish growth rates used to develop the forecast traffic volumes for Eastern Parkway.

Figure 6.1 – Recommended typical three-lane roadway configuration, facing east.

Operational Analysis: All intersections were determined to operate comparably well with either a four-lane or three-lane configuration, except for Poplar Level Road (Goss Avenue). Due to the high traffic volume on Poplar Level Road (Goss Avenue), the intersection requires a four-lane configuration on Eastern Parkway to manage the level of approaching traffic from Poplar Level Road to the north and Goss Avenue to the south. Additionally, reducing Eastern Parkway to a three-lane cross section at S. Shelby Street and S. Preston Street would require consolidating the signalized intersection into a single intersection; otherwise, the parkway will require a four-lane cross section at this intersection to accommodate traffic volumes on all approaches.

Roadway Safety Analysis: A team of representatives from Louisville Metro Public Works, the Kentucky Transportation Cabinet, and the consultant team performed a Road Safety Audit (RSA). In the study period between 2016 and 2018, 598 crashes were reported, and the most frequent crash type was rear-end crashes (consistent with the corridor-type). Nearly 13% of crashes were injury or fatal crashes. More than 40% of all crashes and more than 35% of injury or fatality crashes occurred at a signalized intersection. The highest crash location was the intersection with Baxter Avenue (18%).

Drainage, Stormwater, and Flooding: South Fork Beargrass Creek is in a known FEMA Regulatory Floodway. Three generally known flood-prone areas were identified: (1) the area between Bradley Avenue and S. Preston Street, (2) Castlevale Drive near the South Fork Beargrass Creek Regulatory Floodplain, and (3) the intersection of Eastern Parkway and 3rd Street. A history of Eastern Parkway's drainage system is provided in this study. The useful life of the valley gutter system along Eastern Parkway has expired and the existing valley gutter system is insufficient to support the drainage needs of the corridor. Curb and gutter is a reasonable solution, though it presents its own design and constructability challenges, which are discussed in the body of the report.

Recommendations

Based on an analysis of Eastern Parkway's existing conditions and surrounding context, a review of prior planning efforts, and consideration of feedback communicated by the public, a general recommendation was developed for the Eastern Parkway corridor. A three-lane roadway reconfiguration is recommended, with two 10-ft through lanes (one in each direction) a 10 to 12-ft center two-way left turn lane, a variable width planted verge, 10-ft shared-use path on the north side of the parkway, and a 5-6 ft sidewalk on the south side of the parkway.

The recommended roadway reconfiguration provides safety improvements, stormwater improvements, multimodal improvements, and greenspace improvements. Safety improvements include an anticipated reduction in crashes, support for complete streets, and a reduction in emergency response time. Stormwater improvements are achieved by replacing the existing valley curb and gutter. Multimodal improvements are included by providing on-facility light vehicle lanes and separated shared-use paths and sidewalks. Greenspace is expanded through the corridor by landscaping expanded verges and rehabilitating the tree canopy. It was noted that Zones 1 and 3 were exceptions to this general corridor recommendation, given the roundabout at Cherokee Park in Zone 1 and the central median in Zone 3.

Specific recommendations were given to address special conditions at ten intersections (based on their respective geometry, context, and traffic operations). Recommendations for enhanced multimodal facilities were provided, including for transit and light vehicles. Transit recommendations included the provision of accessible transit stops and the consolidation of transit stops. Additional recommendations were also provided for access management along the corridor (decreasing entrance width and radii), overhead utilities (relocate overhead utilities in Zone 2 either underground or to alleys), and roadside amenities (add pedestrian lighting and develop corridor overlay to preserve Olmstedian aesthetic).

Stormwater improvements were also proposed. The project team recommends the removal of the existing valley gutter along the parkway. The recommended replacement is curb and gutter, with two alternatives presented (standard or modified curb and gutter) to address the light vehicle lane. Recommendations for construction methods and maintenance-of-traffic were provided.

Finally, recognizing that a restoration of Eastern Parkway would not be complete without breathing life back into its ubiquitous 'ribbon of green,' recommendations for parkway landscaping were presented. A typical block plan is provided for each of the seven zones, including planting plans for specific locations and recommended tree and shrub species.

Next Steps

Project Phasing and Estimates for Implementation of Recommendations

This study has undertaken a holistic evaluation and analysis of Eastern Parkway in order to identify and develop the recommendations that best meet the project's vision: to restore Eastern Parkway to its original Olmstedian design aesthetic.

This plan has provided recommendations for future improvements for the following project areas:

ZONE 1 – Cherokee Park to Bardstown Road

ZONE 2 – Bardstown Road to Baxter Avenue

ZONE 3 – Baxter Avenue to Barret Avenue

ZONE 4 – Barret Avenue to Poplar Level Road (Goss Avenue)

ZONE 5 – Poplar Level Road to S. Preston/S. Shelby Streets

ZONE 6 – S. Preston/S. Shelby Streets to Crittenden Drive

ZONE 7 – Crittenden Drive to 3rd Street

For the purposes of planning discussion throughout this report, the zones have been bounded and demarcated by intersection. For the purposes of estimation, however, intersections have been wholly included within a particular estimation segment. For clarification, estimation segments have been lettered rather than numbered, though they do generally follow the segmentation of the numbered planning zones 1-7.

This section includes a series of estimates that have been generated as a part of this planning process to support the implementation of recommended improvements. First, construction estimates have been developed for the improvements recommended for each of the estimation segments. Second, estimates for a phased approach for implementation have been provided, including estimates for design, right-of-way, utilities and construction.

Estimation Segment A: Eastern Parkway from the Cherokee Road traffic roundabout to Willow Avenue, and US 60A (Eastern Parkway) from Willow Avenue to Bardstown Road [US 60A (Eastern Parkway) approximate MP 6.8]. This estimation segment generally corresponds with planning Zone 1: Cherokee Park to Bardstown Road.

Estimation Segment B: US 60A (Eastern Parkway) from US 31E (Bardstown Road) [US 60A (Eastern Parkway) approximate MP 6.8] to near KY 1703 (Baxter Avenue) [US 60 (Eastern Parkway) approximate MP 6.5]. This segment includes an estimate for the intersection of US 60 (Eastern Parkway) and US 31E (Bardstown Road). This estimation segment generally corresponds with planning Zone 2: Bardstown Road to KY 1703 (Baxter Avenue).

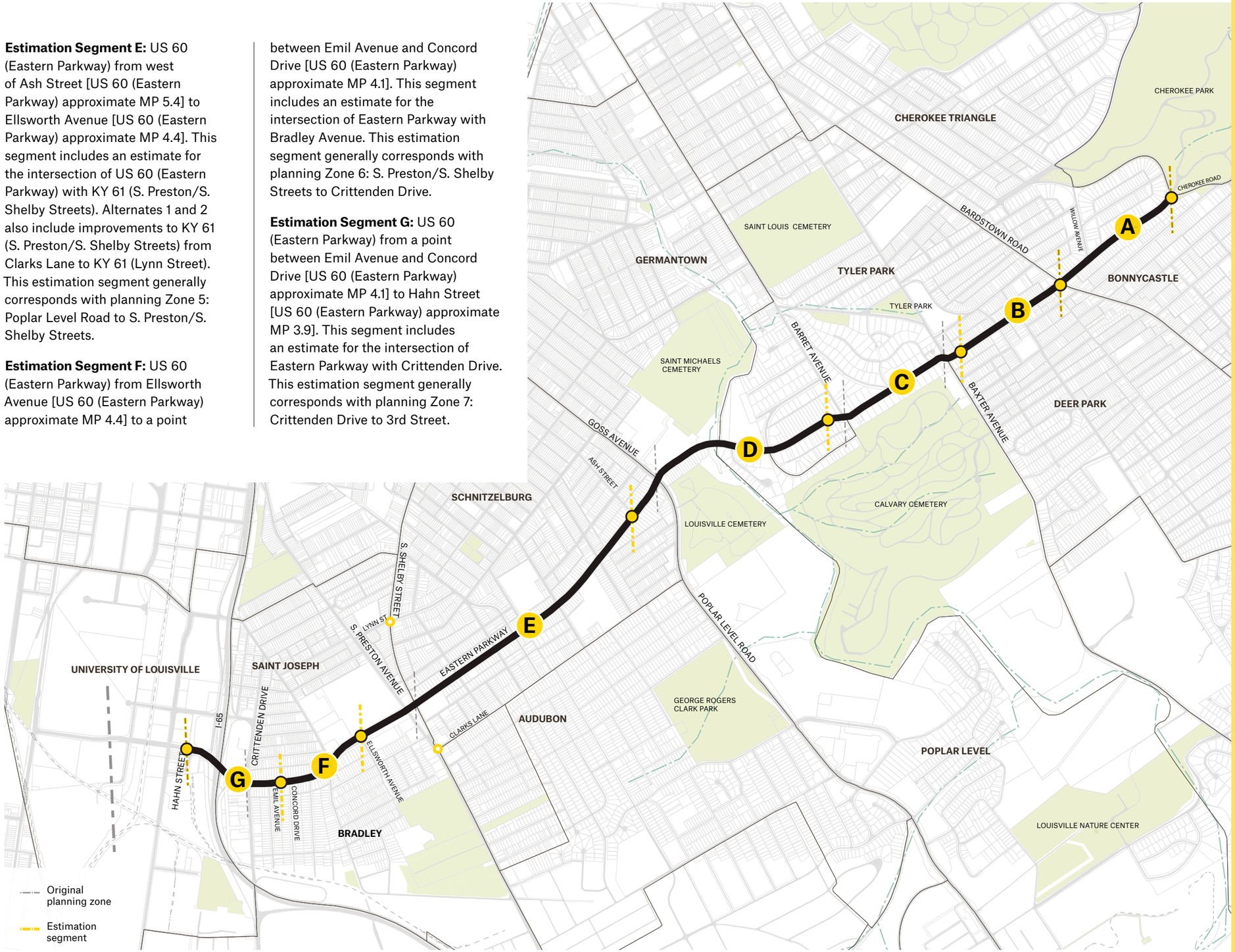
Estimation Segment C: US 60 (Eastern Parkway) from near KY 1703 (Baxter Avenue) [US 60 (Eastern Parkway) approximate MP 6.5] to near Barret Avenue [US 60 (Eastern Parkway) approximate MP 6.0]. This segment includes an estimate for the intersections of Eastern Parkway with Baxter Avenue and Eastern Parkway with Barret Avenue. This estimation segment generally corresponds with planning Zone 3: Baxter Avenue to Barret Avenue.

Estimation Segment D: US 60 (Eastern Parkway) from west of Barret Avenue [US 60 (Eastern Parkway) approximate MP 6.0] to west of Ash Street [US 60 (Eastern Parkway) approximate MP 5.4]. This segment includes an estimate for the intersection of Eastern Parkway with KY 864 (Poplar Level Road/Goss Avenue). This estimation segment generally corresponds with planning Zone 4: Barret Avenue to Poplar Level Road (Goss Avenue).

Estimation Segment E: US 60 (Eastern Parkway) from west of Ash Street [US 60 (Eastern Parkway) approximate MP 5.4] to Ellsworth Avenue [US 60 (Eastern Parkway) approximate MP 4.4]. This segment includes an estimate for the intersection of US 60 (Eastern Parkway) with KY 61 (S. Preston/S. Shelby Streets). Alternates 1 and 2 also include improvements to KY 61 (S. Preston/S. Shelby Streets) from Clarks Lane to KY 61 (Lynn Street). This estimation segment generally corresponds with planning Zone 5: Poplar Level Road to S. Preston/S. Shelby Streets.

Estimation Segment F: US 60 (Eastern Parkway) from Ellsworth Avenue [US 60 (Eastern Parkway) approximate MP 4.4] to a point between Emil Avenue and Concord Drive [US 60 (Eastern Parkway) approximate MP 4.1]. This segment includes an estimate for the intersection of Eastern Parkway with Bradley Avenue. This estimation segment generally corresponds with planning Zone 6: S. Preston/S. Shelby Streets to Crittenden Drive.

Estimation Segment G: US 60 (Eastern Parkway) from a point between Emil Avenue and Concord Drive [US 60 (Eastern Parkway) approximate MP 4.1] to Hahn Street [US 60 (Eastern Parkway) approximate MP 3.9]. This segment includes an estimate for the intersection of Eastern Parkway with Crittenden Drive. This estimation segment generally corresponds with planning Zone 7: Crittenden Drive to 3rd Street.



CONSTRUCTION ESTIMATES BY ESTIMATION SEGMENT

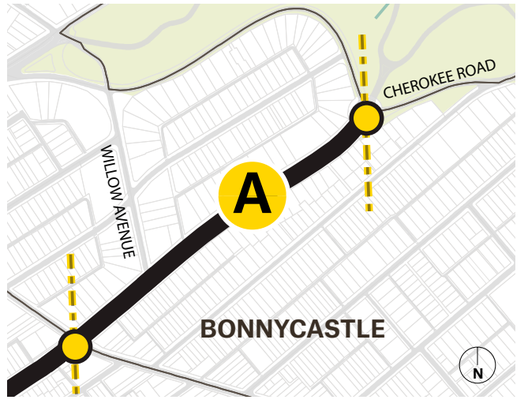
Roadway improvement construction estimates have been generated which include roadway construction, mobilization/ demobilization, drainage, driveways, earthwork, signalization, signing and striping. Additionally, construction estimates have been provided for multimodal improvements (shared-use path and sidewalk), lighting (pedestrian) and landscaping.

The Louisville Metro LOJIC database served as the source for cost estimates and quantities used in developing the estimates for the proposed recommendations in this plan. Costs are based on construction costs for the year 2020. Please note that prior to the design for each segment and recommendation, more detailed and updated estimates will need to be developed based upon physical survey information collected for each segment. All estimates include a 30% contingency. A list of assumptions made to derive these estimates is included in appendix H.

The following sections describe the estimated costs for recommendations in each Eastern Parkway estimation segment. The project team generally recommends the replacement of the existing valley gutter with curb and gutter. Modified curb and gutter with a 2-ft-wide gutter pan is the recommended approach for estimation segment A. Two alternatives exist for the curb and gutter in estimation Segments B-G: (1) a modified curb and gutter with a 2-ft-wide gutter pan, which would create a seam between the gutter pan and the light vehicle lane line, and (2) a modified curb and gutter with a 6-ft-wide gutter pan to avoid the seam and provide additional rideable width for light vehicles. As such, an estimate has been provided for the Segment A recommendation and any respective alternative reflective of the two modified curb and gutter options for estimation Segments B through G.

Estimation Segment A

Eastern Parkway from the Cherokee Road roundabout to Willow Avenue, and US 60 (Eastern Parkway) from Willow Avenue to Bardstown Road [US 60 (Eastern Parkway) approximate MP 6.8]. This estimation segment generally corresponds with planning Zone 1: Cherokee Park to Bardstown Road.



Two alternative recommendations were prepared for this segment given its unique context, proximity to Cherokee Park and existing roundabout. Additionally, it is recommended that the Cherokee roundabout receive minor updates around the roundabout, including a northside 6-ft-wide sidewalk and a southside 10-ft-wide shared-use path.

Alternate 1 recommends the aforementioned improvements to the Cherokee roundabout and a two-lane configuration, with an 11-ft shared travel lane in each direction and 8-ft delineated parking on both sides, allowing for four feet of green space recapture on either side of the new curb and gutter. Estimates for Segment A improvements are included in Table 6.3.

Table 6.3 *Estimation Segment A – Alternate 1 – Construction Cost Estimate*

Alternate 1 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	1,867,000
Stormwater Drainage Improvements	$	486,000
Multimodal Improvements	$	518,000
Pedestrian Lighting	$	180,000
Landscaping	$	130,000
Total	**$**	**3,181,000**

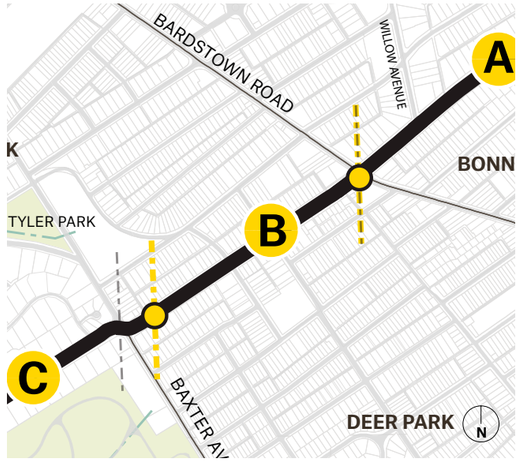
Alternate 2 recommends the aforementioned improvements to the Cherokee roundabout and a two-lane configuration with an 11-ft eastbound shared travel lane, a 10-ft westbound travel lane, 5-ft westbound light vehicle climbing lane, and 8-ft wide delineated parking on both sides, allowing for 2 ft of green space recapture on either side of the new curb and gutter. Estimates are included in Table 6.4.

Table 6.4 *Estimation Segment A – Alternate 2 – Construction Cost Estimate*

Alternate 2 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	1,930,000
Stormwater Drainage Improvements	$	486,000
Multimodal Improvements	$	518,000
Pedestrian Lighting	$	180,000
Landscaping	$	145,000
Total	**$**	**3,259,000**

Estimation Segment B

US 60 (Eastern Parkway) from US 31E (Bardstown Road) [US 60 (Eastern Parkway) approximate MP 6.8] to near KY 1703 (Baxter Avenue) [US 60 (Eastern Parkway) approximate MP 6.5]. This segment includes an estimate for the intersection of US 60 (Eastern Parkway) and US 31E (Bardstown Road). This estimation segment generally corresponds with planning Zone 2: Bardstown Road to Baxter Avenue.



The recommendation for this segment follows the general corridor recommendation for Eastern Parkway: a three-lane configuration consisting of one through lane in each direction and a center two-way left turn lane (TWLTL), light vehicle lanes on each side, a 10-ft-wide northside shared-use path, and a 6-ft-wide southside sidewalk.

An additional recommendation is included for the intersection of Eastern Parkway with Bardstown Road: realign the pavement markings to provide neutral offset left turn lanes from Eastern Parkway to Bardstown Road and separate eastbound through and right turning traffic. Estimates for Segment B improvements, including the intersection with Bardstown Road, are included in Table 6.5 and Table 6.6.

Table 6.5 *Estimation Segment B – Alternate 1 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	1,817,000
Stormwater Drainage Improvements	$	418,000
Multimodal Improvements	$	409,000
Pedestrian Lighting	$	155,000
Landscaping	$	74,000
Total	**$**	**2,873,000**

Table 6.6 *Estimation Segment B – Alternate 1 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	1,866,000
Stormwater Drainage Improvements	$	418,000
Multimodal Improvements	$	409,000
Pedestrian Lighting	$	155,000
Landscaping	$	74,000
Total	**$**	**2,922,000**

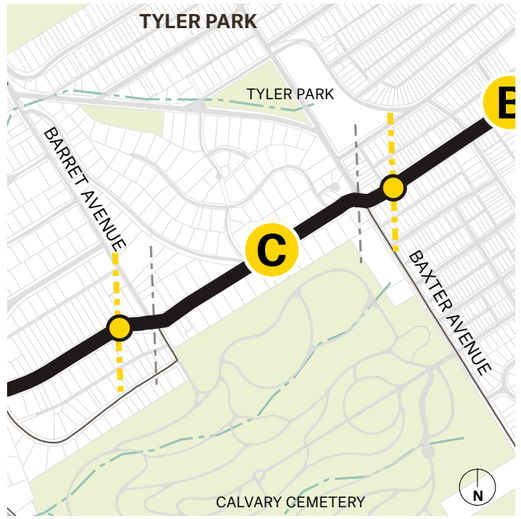
Additional recommendations were provided specific to the existing overhead utilities present in this segment. Because the presence of overhead utilities detracts from the character of the parkway and contributes to the degradation of Eastern Parkway's iconic tree canopy, it is recommended that utilities be relocated. Two alternative options for relocating overhead utilities include relocating utilities to the alleyways or undergrounding the utilities. Cost estimates for each alternative are provided in Table 6.7. Please note that the cost of utility relocation may decrease if implementation coincides with the construction of roadway improvements.

Table 6.7 *Estimation Segment B – Utility Relocation – Construction Cost Estimate*

Utility Relocation - Relocation to Alley Overhead	$	800,000
Utility Relocation - Relocation to Underground	$	1,500,000

Estimation Segment C

US 60 (Eastern Parkway) from near KY 1703 (Baxter Avenue) [US 60 (Eastern Parkway) approximate MP 6.5] to near Barret Avenue [US 60 (Eastern Parkway) approximate MP 6.0]. This segment includes an estimate for the intersections of Eastern Parkway with Baxter Avenue and Eastern Parkway with Barret Avenue. This estimation segment generally corresponds with planning Zone 3: Baxter Avenue to Barret Avenue.



The recommendation for this segment reflects its unique character with a central median: two 10-ft through lanes (one on either side of the median), 6-ft light vehicle lane on the outside of the through lanes, a central planted median, 10-ft shared-use path on the north side of the parkway, and a 6-ft sidewalk on the south side of the parkway.

Additional recommendations are included for the intersection of Eastern Parkway with Baxter Avenue and Barret Avenue. For Baxter Avenue, it is recommended that the intersection be realigned with positive offset left turn bays. There are two alternatives presented for the intersection with Barret Avenue: intersection realignment or a roundabout.

Alternate 1 for the intersection of Eastern Parkway and Barret Avenue recommends a realignment of the intersection with offset left turn lanes. Estimates for Segment C/Alternate 1 improvements, including the realigned intersection with Baxter Avenue and a realigned intersection with Barret Avenue are included in Table 6.8 and Table 6.9.

Table 6.8 *Estimation Segment C – Alternate 1 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	2,611,000
Stormwater Drainage Improvements	$	584,000
Multimodal Improvements	$	518,000
Pedestrian Lighting	$	213,000
Landscaping	$	87,000
Total	**$**	**4,013,000**

Table 6.9 *Estimation Segment C – Alternate 1 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	2,794,000
Stormwater Drainage Improvements	$	584,000
Multimodal Improvements	$	545,000
Pedestrian Lighting	$	213,000
Landscaping	$	87,000
Total	**$**	**4,223,000**

Alternate 2 for the intersection of Eastern Parkway and Barret Avenue recommends a roundabout. Estimates for Segment C/Alternate 2 improvements, including the realigned intersection with Baxter Avenue and a roundabout intersection with Barret Avenue, are included in Table 6.10 and Table 6.11.

Table 6.10 *Zone 3 – Estimation Segment C – Alternate 2 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

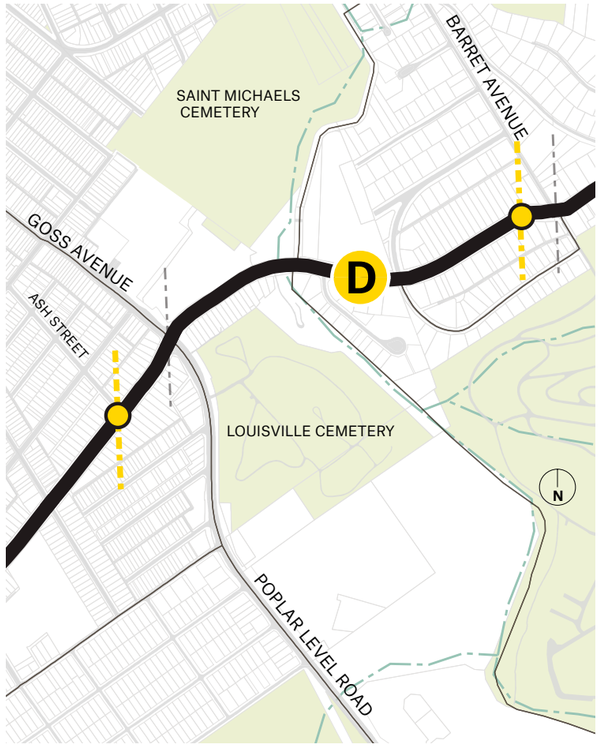
Alternate 2 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	2,789,000
Stormwater Drainage Improvements	$	584,000
Multimodal Improvements	$	545,000
Pedestrian Lighting	$	213,000
Landscaping	$	100,000
Total	**$**	**4,231,000**

Table 6.11 *Estimation Segment C – Alternate 2 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 2 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	2,972,000
Stormwater Drainage Improvements	$	584,000
Multimodal Improvements	$	545,000
Pedestrian Lighting	$	213,000
Landscaping	$	100,000
Total	**$**	**4,414,000**

Estimation Segment D

US 60 (Eastern Parkway) from west of Barret Avenue [US 60 (Eastern Parkway) approximate MP 6.0] to west of Ash Street [US 60 (Eastern Parkway) approximate MP 5.4]. This segment includes an estimate for the intersection of Eastern Parkway with KY 864 (Poplar Level Road/Goss Avenue). This estimation segment generally corresponds with planning Zone 4: Barret Avenue to Poplar Level Road (Goss Avenue).



The recommendation for this segment follows the general corridor recommendation for Eastern Parkway: a three-lane configuration consisting of one through lane in each direction and a center two-way left turn lane (TWLTL), light vehicle lanes on each side, a 10-ft-wide northside shared-use path, and a 6-ft-wide southside sidewalk.

An additional recommendation is included for the intersection of Eastern Parkway with Poplar Level Road (Goss Avenue). It is recommended that the proposed three-lane cross-section on Eastern Parkway widen to a four-lane cross-section at this intersection, with dedicated left turn lanes on the approaches to Poplar Level Road (Goss Avenue). Estimates for Segment D improvements, including the intersection with Poplar Level Road (Goss Avenue), are included in Table 6.12 and Table 6.13.

Table 6.12 *Estimation Segment D – Alternate 1 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

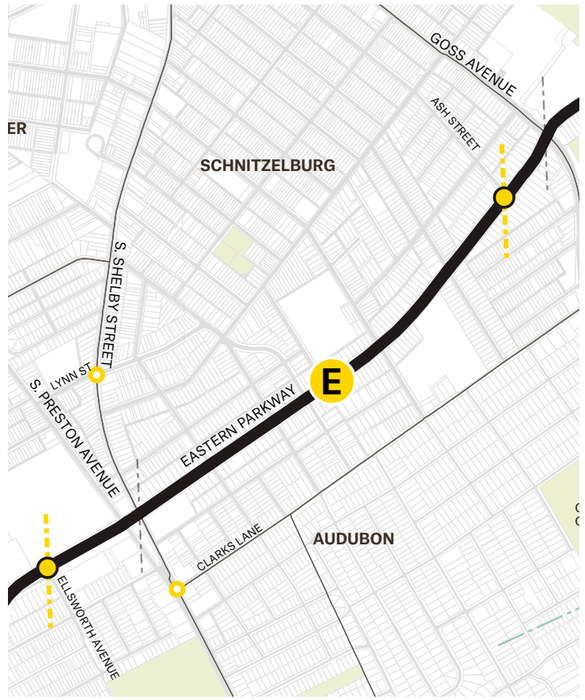
Alternate 1 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	3,257,000
Stormwater Drainage Improvements	$	908,000
Multimodal Improvements	$	734,000
Pedestrian Lighting	$	279,000
Landscaping	$	148,000
Total	**$**	**5,326,000**

Table 6.13 *Estimation Segment D – Alternate 1 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	3,439,000
Stormwater Drainage Improvements	$	908,000
Multimodal Improvements	$	734,000
Pedestrian Lighting	$	279,000
Landscaping	$	148,000
Total	**$**	**5,508,000**

Estimation Segment E

US 60 (Eastern Parkway) from west of Ash Street [US 60 (Eastern Parkway) approximate MP 5.4] to Ellsworth Avenue [US 60 (Eastern Parkway) approximate MP 4.4]. This segment includes an estimate for the intersection of US 60 (Eastern Parkway) with KY 61 (S. Preston/S. Shelby Streets). Alternates 1 and 2 also include improvements to KY 61 (S. Preston/S. Shelby Streets) from Clarks Lane to KY 61 (Lynn Street). This estimation segment generally corresponds with planning Zone 5: Poplar Level Road to S. Preston/S. Shelby Streets.



The recommendation for this segment follows the general corridor recommendation for Eastern Parkway: a three-lane configuration consisting of one through lane in each direction and a center two-way left turn lane (TWLTL), light vehicle lanes on each side, a 10-ft-wide northside shared-use path, and a 6-ft-wide southside sidewalk. Three alternative recommendations are included for the intersection of Eastern Parkway with S. Preston/S. Shelby Streets.

Alternate 1 introduces two-way traffic to S. Preston Street. and converts S. Shelby Street to a two-way business frontage road. The S. Shelby Street two-way business frontage road would provide right-in/right-out access maintained at S. Shelby Street and Eastern Parkway. Estimates for Segment E/Alternate 1 improvements, including the intersection with S. Preston/S. Shelby Streets, are included in Table 6.14 and Table 6.15.

Table 6.14 *Estimation Segment E – Alternate 1 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	4,651,000
Stormwater Drainage Improvements	$	1,230,000
Multimodal Improvements	$	978,000
Pedestrian Lighting	$	459,000
Landscaping	$	288,000
Total	**$**	**7,606,000**

Table 6.15 *Estimation Segment E – Alternate 1 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	4,953,000
Stormwater Drainage Improvements	$	1,230,000
Multimodal Improvements	$	978,000
Pedestrian Lighting	$	459,000
Landscaping	$	288,000
Total	**$**	**7,908,000**

Alternate 2 for the intersection of Eastern Parkway with S. Preston/S. Shelby Streets introduces two-way traffic to S. Preston Street. and converts S. Shelby Street into a pedestrian plaza. Estimates for Segment E/Alternate 2 improvements, including the intersection with S. Preston/S. Shelby Streets, are included in Table 6.16 and Table 6.17.

Table 6.16 *Estimation Segment E – Alternate 2 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

Alternate 2 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	4,625,000
Stormwater Drainage Improvements	$	1,230,000
Multimodal Improvements	$	980,000
Pedestrian Lighting	$	459,000
Landscaping	$	303,000
Total	**$**	**7,597,000**

Table 6.17 *Estimation Segment E – Alternate 2 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 2 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	4,928,000
Stormwater Drainage Improvements	$	1,230,000
Multimodal Improvements	$	980,000
Pedestrian Lighting	$	459,000
Landscaping	$	303,000
Total	**$**	**7,900,000**

Alternate 3 for the intersection of Eastern Parkway with S. Preston/S. Shelby Streets resembles a no-build scenario and retains the existing four-lane section and the one-way operation of S. Preston and S. Shelby Streets. Estimates for Segment E/Alternate 3 improvements, including the intersection with S. Preston/S. Shelby Streets, are included in Table 6.18 and Table 6.19.

Table 6.18 *Estimation Segment E – Alternate 3 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

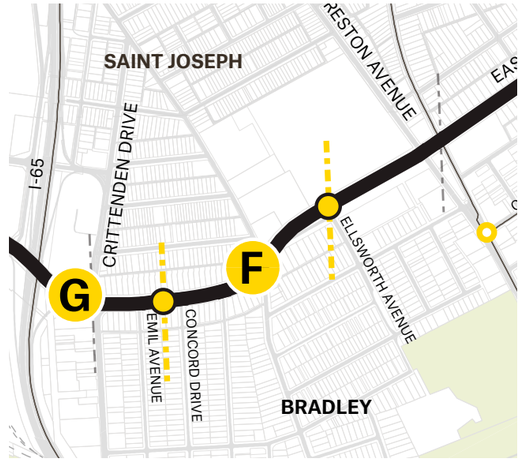
Alternate 3 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	3,585,000
Stormwater Drainage Improvements	$	1,230,000
Multimodal Improvements	$	977,000
Pedestrian Lighting	$	459,000
Landscaping	$	288,000
Total	**$**	**6,539,000**

Table 6.19 *Estimation Segment E – Alternate 3 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 3 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	4,113,000
Stormwater Drainage Improvements	$	1,230,000
Multimodal Improvements	$	977,000
Pedestrian Lighting	$	459,000
Landscaping	$	288,000
Total	**$**	**7,067,000**

Estimation Segment F

US 60 (Eastern Parkway) from Ellsworth Avenue [US 60 (Eastern Parkway) approximate MP 4.4] to a point between Emil Avenue and Concord Drive [US 60 (Eastern Parkway) approximate MP 4.1]. This segment includes an estimate for the intersection of Eastern Parkway with Bradley Avenue. This estimation segment generally corresponds with planning Zone 6: S. Preston/S. Shelby Streets to Crittenden Drive.



The recommendation for this segment follows the general corridor recommendation for Eastern Parkway: a three-lane configuration consisting of one through lane in each direction and a center two-way left turn lane (TWLTL), light vehicle lanes on each side, a 10-ft-wide northside shared-use path, and a 6-ft-wide southside sidewalk. Two alternative recommendations are included for the intersection of Eastern Parkway with Bradley Avenue.

Alternate 1 recommends a realignment the east curve of the intersection to develop a tangent through the intersection and add neutral offset left turn lanes. Estimates for Segment F/Alternate 1 improvements, including the intersection with Bradley Avenue, are included in Table 6.20 and Table 6.21.

Table 6.20 *Estimation Segment F – Alternate 1 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	1,757,000
Stormwater Drainage Improvements	$	335,000
Multimodal Improvements	$	356,000
Pedestrian Lighting	$	139,000
Landscaping	$	114,000
Total	**$**	**2,701,000**

Table 6.21 *Estimation Segment F – Alternate 1 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	1,794,000
Stormwater Drainage Improvements	$	335,000
Multimodal Improvements	$	356,000
Pedestrian Lighting	$	139,000
Landscaping	$	114,000
Total	**$**	**2,738,000**

Alternate 2 for Bradley Avenue recommends a peanut-shaped roundabout. Estimates for Segment F/Alternate 2 improvements, including the intersection with Bradley Avenue, are included in Table 6.22 and Table 6.23.

Table 6.22 *Estimation Segment F – Alternate 2 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

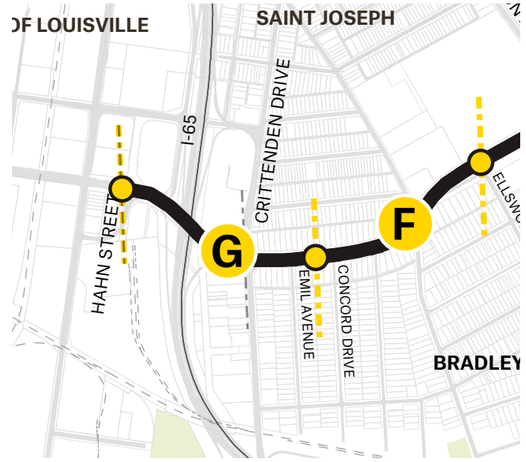
Alternate 2 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	1,682,000
Stormwater Drainage Improvements	$	335,000
Multimodal Improvements	$	360,000
Pedestrian Lighting	$	139,000
Landscaping	$	136,000
Total	**$**	**2,652,000**

Table 6.23 *Estimation Segment F – Alternate 2 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 2 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	1,723,000
Stormwater Drainage Improvements	$	335,000
Multimodal Improvements	$	360,000
Pedestrian Lighting	$	139,000
Landscaping	$	136,000
Total	**$**	**2,693,000**

Estimation Segment G

US 60 (Eastern Parkway) from a point between Emil Avenue and Concord Drive [US 60 (Eastern Parkway) approximate MP 4.1] to Hahn Street [US 60 (Eastern Parkway) approximate MP 3.9]. This segment includes an estimate for the intersection of Eastern Parkway with Crittenden Drive. This estimation segment generally corresponds with planning Zone 7: Crittenden Drive to 3rd Street.



The recommendation for this segment follows the general corridor recommendation for Eastern Parkway: a three-lane configuration consisting of one through lane in each direction and a center two-way left turn lane (TWLTL), light vehicle lanes on each side, a 10-ft-wide northside shared-use path, and a 6-ft-wide southside sidewalk.

An additional recommendation is included for the intersection of Eastern Parkway with Crittenden Drive. It is recommended that the right and left turn bays remain (though modified to capture green space), the light vehicle lane situate between the through travel lane and the right turn lane, and the northbound interstate ramp be realigned.

Estimates for Segment G improvements, including the intersection with Crittenden Drive, are included in Tables 6.24 and 6.25. A separate estimate for the recommended interstate ramp relocation is included in Table 6.26.

Table 6.24 *Estimation Segment G – Alternate 1 – Modified 2-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 2-ft Curb and Gutter		
Roadway Improvements	$	2,038,000
Stormwater Drainage Improvements	$	363,000
Multimodal Improvements	$	360,000
Pedestrian Lighting	$	139,000
Landscaping	$	97,000
Total	**$**	**2,997,000**

Table 6.25 *Estimation Segment G – Alternate 1 – Modified 6-ft Curb and Gutter – Construction Cost Estimate*

Alternate 1 with Modified 6-ft Curb and Gutter		
Roadway Improvements	$	2,098,000
Stormwater Drainage Improvements	$	363,000
Multimodal Improvements	$	360,000
Pedestrian Lighting	$	139,000
Landscaping	$	97,000
Total	**$**	**3,057,000**

Table 6.26 *Estimation Segment G – Interstate Ramp Relocation – Construction Cost Estimate*

Interstate Ramp Relocation		
I-65 Northbound to Eastern Parkway Eastbound Ramp Relocation*	$	600,000

*Note: Ramp relocation will require future study as an IMR in coordination with KYTC and FHWA.

ESTIMATES FOR PHASED IMPLEMENTATION

A complete reconstruction of Eastern Parkway is recommended as a long-term goal to address multimodal safety, pavement maintenance, and drainage issues throughout the corridor. A phased approach, however, will allow for implementation of immediate improvements through smaller site projects. It can also provide a guiding plan to address corridor-wide multimodal and vehicle safety concerns while making progress towards the long-term goals.

PHASE 1

Recommendations for Phase 1 include the low-cost implementation of the roadway reconfiguration by updating signage and restriping the corridor between Bardstown Road and Hahn Street. The implementation of the roadway reconfiguration without the pavement and drainage improvements would not immediately provide full-width light vehicle lanes. It would, however, provide immediate benefits to the safety of all users by calming traffic and implementing a two-way left turn lane to improve left turning movements for motor vehicles. Further, motor vehicles would have additional separation from the existing valley gutters, as well as the adjacent trees.

The intersection of Poplar Level Road (Goss Avenue) and Eastern Parkway would remain in its current four-lane configuration, as would the combined intersections of S. Shelby Street and S. Preston Street with Eastern Parkway. The existing two lanes between Baxter Avenue and Barret Avenue would be modified with striping to allow a single through lane on either side of the median with left turn only bays at the intersections. This roadway reconfiguration treatment would provide flexibility in the future for selection of any intersection alternate.

Table 6.27 *Phase 1 Estimates - Roadway Reconfiguration Only - Signing and Striping Only*

PHASE 1*	Project Description	Design	Right of Way	Utilities	Construction	Total
Segment **B**	Reconfiguration of US 60 (Eastern Parkway) to improve vehicular and multimodal safety between approximate MP 6.8 near US 31E (Bardstown Road) and approximate MP 6.5 near KY 1703 (Baxter Avenue).	$ 7,000	$.	$.	$ 46,000	$ 53,000
Segment **C**	Reconfiguration of US 60 (Eastern Parkway) to improve vehicular and multimodal safety between approximate MP 6.5 near KY 1703 (Baxter Avenue) and approximate MP 6.0 near Barret Avenue.	$ 10,000	$.	$.	$ 63,000	$ 73,000
Segment **D**	Reconfiguration of US 60 (Eastern Parkway) to improve vehicular and multimodal safety between approximate MP 6.0 near Barret Avenue and approximate MP 5.4 near Ash Street.	$ 15,000	$.	$.	$ 94,000	$ 109,000
Segment **E**	Reconfiguration of US 60 (Eastern Parkway) to improve vehicular and multimodal safety between approximate MP 5.4 near Ash Street and approximate MP 4.4 near Ellsworth Avenue.	$ 27,000	$.	$.	$ 177,000	$ 204,000
Segment **F**	Reconfiguration of US 60 (Eastern Parkway) to improve vehicular and multimodal safety between approximate MP 4.4 near Ellsworth Avenue and approximate MP 4.1 near Concord Drive.	$ 6,000	$.	$.	$ 35,000	$ 41,000
Segment **G**	Reconfiguration of US 60 (Eastern Parkway) to improve vehicular and multimodal safety between approximate MP 4.1 near Concord Drive and approximate MP 3.9 near Hahn Street.	$ 9,000	$.	$.	$ 54,000	$ 63,000
Total	**Reconfiguration of US 60 (Eastern Parkway) to improve vehicular and multimodal safety between approximate MP 6.8 near US 31E (Bardstown Road) and approximate MP 3.9 near Hahn Street.**	**$ 74,000**	**$.**	**$.**	**$ 469,000**	**$ 543,000**

*Note: No applicable Phase 1 improvements recommended for estimation Segment A.

TACTICAL OPPORTUNITIES

To provide further flexibility and short-term implementation opportunities, small-scale, tactical projects have been identified. These projects can be implemented either before, during, or after Phase I improvements have been completed, and they can be implemented as standalone projects. By nature, these tactical recommendations present Louisville Metro Government with additional options for short-term improvement to Eastern Parkway that could provide immediate, positive impact and may not require state funding.

Restripe intersection of Bardstown Road and Eastern Parkway

Restripe US 60 (Eastern Parkway) at US 31E (Bardstown Road) to include a single eastbound and westbound through lane, dedicated eastbound and westbound left turn lane, and dedicated eastbound right turn lane. This can be done within the existing four lane section on the west leg of US 60 (Eastern Parkway).

Delineate bus stop area on northeast corner of US 60 (Eastern Parkway) and KY 1703 (Baxter Avenue) intersection

Delineate the transit stop waiting area within US 60 (Eastern Parkway) right-of-way with planters, seating, and other amenities to create a favorable bus stop experience. Work with adjacent property owners to enhance vehicular circulation through the parking areas.

Remove Hill Road median crossing on US 60 (Eastern Parkway)

Near the intersection of KY 1703 (Baxter Avenue) and US 60 (Eastern Parkway), this median access for Hill Road is proposed to be eliminated in the future with the construction of the left turn bay. This closure could be tested ahead of time and make Hill Road at US 60 (Eastern Parkway) right-in/ right-out only.

Modification of Dahlia Drive intersection with US 60 (Eastern Parkway)

The width of Dahlia Drive at US 60 (Eastern Parkway) is too wide for one-way operations, contributing to high turning speeds and higher operational speed on Dahlia Drive. Dahlia Drive can be narrowed to 18 feet wide at this intersection with paint and post. This would slower turning speeds and maintain emergency access width.

Modification of entrance at 1155 Eastern Parkway

This entrance from US 60 (Eastern Parkway) is too wide and can be narrowed with paint and post to shorten the pedestrian crossing and reduce turning speeds. These enhancements would improve pedestrian safety.

Removal or reduction of right turn lanes on US 60 (Eastern Parkway) at KY 864 (Poplar Level Road/ Goss Avenue)

The eastbound and westbound right turn lanes from US 60 (Eastern Parkway) onto KY 864 (Poplar Level Road/Goss Avenue) can be greatly reduced or eliminated entirely. Utilize paint and post applications to reduce the eastbound right turn lane and remove the westbound right turn lane, and potentially allocate bus pull-off locations within this space. This also serves to reduce pedestrian crossing distance on US 60 (Eastern Parkway) with the removal of the right turn only lane. Complete removal of the eastbound right turn lane would require hardscape modification to remove the right turn slip lane.

Alley conversion to one-way operations at the intersection of US 60 (Eastern Parkway) and Bradley Avenue

Convert the alley at the Bradley Avenue and US 60 (Eastern Parkway) intersection to one-way westbound only. Use paint and post to reduce corner radii on either end to encourage one-way driving.

PHASE 2

Phase 2 will construct the long-term improvements that will complete the rehabilitation of the Eastern Parkway corridor. This includes the design of the pavement reconstruction, drainage improvements, utility relocation, and the roadside multimodal improvements together in order to coordinate roadside slopes and path and sidewalk elevations. Utility relocation is also recommended, as the existing utility poles are both a detriment to the tree canopy and an obstacle for multimodal improvements. Additional safety improvements will be designed and constructed in this phase, providing separated facilities for bicyclists and pedestrians of all ages and abilities as well as transit stop enhancements.

Table 6.28 *Phase 2 Estimates**

	Project Description					
Segment **A**	Reconstruct roadway pavement and improve drainage conditions to improve safety, maintenance operations, and restore historic integrity per the recommendations in the Louisville's Olmsted Parkways – Eastern Parkway Transportation Plan on US 60 (Eastern Parkway) between Cherokee Park roundabout and US 31E (Bardstown Road).					
Alternate	**Alternate Description**	**Design**	**Right of Way**	**Utilities**	**Construction**	**Total**
1	No Climbing Lane	$ 478,000	$.	$.	$ 3,181,000	**$ 3,659,000**
2	Climbing Lane	$ 489,000	$.	$.	$ 3,259,000	**$ 3,748,000**

	Project Description					
Segment **B**	Reconstruct roadway pavement and improve drainage conditions to improve safety, maintenance operations, and restore historic integrity per the recommendations in the Louisville's Olmsted Parkways – Eastern Parkway Transportation Plan on US 60 (Eastern Parkway) between approximate MP 6.8 near US 31E (Bardstown Road) and approximate MP 6.5 near KY 1703 (Baxter Avenue).					
Alternate	**Alternate Description**	**Design**	**Right of Way**	**Utilities**	**Construction**	**Total**
Utility-1	Alley Utility Relocation (Overhead)	$ 436,000	$ 386,000	$ 800,000	$ 2,905,000	**$ 4,527,000**
Utility-2	Underground Utility Relocation	$ 436,000	$.	$1,500,000	$ 2,905,000	**$ 4,841,000**

	Project Description					
Segment **C**	Reconstruct roadway pavement and improve drainage conditions to improve safety, maintenance operations, and restore historic integrity per the recommendations in the Louisville's Olmsted Parkways – Eastern Parkway Transportation Plan on US 60 (Eastern Parkway) between approximate MP 6.5 near KY 1703 (Baxter Avenue) and approximate MP 6.0 near Barret Avenue.					
Alternate	**Alternate Description**	**Design**	**Right of Way**	**Utilities**	**Construction**	**Total**
1	Realignment at Barret	$ 627,000	$ 456,000	$.	$ 4,176,000	**$ 5,259,000**
2	Roundabout at Barret	$ 660,000	$ 529,000	$.	$ 4,394,000	**$ 5,583,000**

	Project Description					
Segment **D**	Reconstruct roadway pavement and improve drainage conditions to improve safety, maintenance operations, and restore historic integrity per the recommendations in the Louisville's Olmsted Parkways – Eastern Parkway Transportation Plan on US 60 (Eastern Parkway) between approximate MP 6.0 near Barret Avenue and approximate MP 5.4 near Ash Street.					
Alternate	**Alternate Description**	**Design**	**Right of Way**	**Utilities**	**Construction**	**Total**
		$ 824,000	$ 189,000	$.	$ 5,487,000	**$ 6,500,000**

	Project Description					
Segment **E**	Reconstruct roadway pavement and improve drainage conditions to improve safety, maintenance operations, and restore historic integrity per the recommendations in the Louisville's Olmsted Parkways – Eastern Parkway Transportation Plan on US 60 (Eastern Parkway) between approximate MP 5.4 near Ash Street and approximate MP 4.4 near Ellsworth Avenue.					
Alternate	**Alternate Description**	**Design**	**Right of Way**	**Utilities**	**Construction**	**Total**
1	Right-In/Right-Out Consolidation of Shelby/Preston	$ 1,183,000	$ 194,000	$.	$ 7,881,000	**$ 9,258,000**
2	Pedestrian Plaza Consolidation of Shelby/Preston	$ 1,182,000	$ 194,000	$.	$ 7,874,000	**$ 9,250,000**
3	4-Lane Section - No Consolidation	$ 1,057,000	$.	$.	$ 7,045,000	**$ 8,102,000**

	Project Description					
Segment **F**	Reconstruct roadway pavement and improve drainage conditions to improve safety, maintenance operations, and restore historic integrity per the recommendations in the Louisville's Olmsted Parkways – Eastern Parkway Transportation Plan on US 60 (Eastern Parkway) between approximate MP 4.4 near Ellsworth Avenue and approximate MP 4.1 near Concord Drive.					
Alternate	**Alternate Description**	**Design**	**Right of Way**	**Utilities**	**Construction**	**Total**
1	Realignment at Bradley	$ 410,000	$.	$.	$ 2,730,000	**$ 3,140,000**
2	Peanut at Bradley	$ 403,000	$ 96,000	$.	$ 2,685,000	**$ 3,184,000**

	Project Description					
Segment **G**	Reconstruct roadway pavement and improve drainage conditions to improve safety, maintenance operations, and restore historic integrity per the recommendations in the Louisville's Olmsted Parkways – Eastern Parkway Transportation Plan on US 60 (Eastern Parkway) between approximate MP 4.1 near Concord Drive and approximate MP 3.9 near Hahn Street.					
Alternate	**Alternate Description**	**Design**	**Right of Way**	**Utilities**	**Construction**	**Total**
		$ 456,000	$ 112,000	$.	$ 3,037,000	**$ 3,605,000**

*Note: Phased implementation assumes a modified curb and gutter with 6-ft-wide gutter pan for estimation Segments B-G. Estimation Segment A has been estimated with a modified curb and gutter with a 2-ft-wide gutter pan.

Conclusion

When Louisville's ancestor residents in the late 1800s set aside lands for parks and parkways throughout the gentle slopes of a nascent Louisville, tucked in the banks of the Ohio River, they could not have imagined the prescience of their vision. True trailblazers, their spark of inspiration invited the creative genius of Frederick Law Olmsted to develop one of his greatest and most treasured triumphs: a series of flagship parks—Cherokee, Iroquois, and Shawnee—interconnected by verdantly canopied greenways. Today, Louisville's Olmsted park and parkway system is one of only four of its kind in the nation.

Since its construction in the early 1900s, Eastern Parkway has evolved over the last century. Its time-honored tree canopy matured and separated spaces for active recreation provided access for Louisville residents and visitors to enjoy the respite of the parkway's verdant green and cooling shade. Modifications made to the parkway to meet the needs of modern transportation and a growing population, however, began to alter Eastern Parkway's heritage character. Civic leaders and community advocates together began to call for its restoration to its original vision. Planning efforts for Eastern Parkway's renewal began in the early 1990s, and culminated with this study.

By thoughtfully reviewing the rich body of prior planning work, carefully analyzing the parkway's existing conditions, and and committing to genuine dialogue with members of the community, this planning report has developed a series of well-informed recommendations for the sustainable restoration and rehabilitation of Eastern Parkway to its original Olmstedian design intent. The revitalized Eastern Parkway will support the safe and efficient movement of all transportation modes, restore and enhance the parkway's ubiquitous tree canopy, and develop a legacy to last for generations to come.

Appendices

Appendix A

Eastern Parkway Ecological Summary - Terrestrial and Aquatic Assessment and No Effect Finding

REDWING ECOLOGICAL SERVICES, INC. 1139 South Fourth Street • Louisville, KY 40203 • Phone 502.625.3009 • Fax 502.625.3077

EXECUTIVE SUMMARY – VIA EMAIL

DATE: September 25, 2019

TO: Katie Rowe – Gresham Smith
katie.rowe@greshamsmith.com

FROM: Richard Clausen and Benjamin Deetsch
Redwing Ecological Services, Inc.

SUBJECT: **Terrestrial and Aquatic Resources Assessment**
Eastern Parkway Transportation Study
Jefferson County, Kentucky
KYTC Item No.: 5-3213
Redwing Project No.: 18-142

Redwing Ecological Services, Inc. (Redwing) is pleased to provide this summary of the aquatic and terrestrial resources assessment performed in support of the Eastern Parkway Transportation Study (KYTC Item No. 5-3213) in Jefferson County, Kentucky (Figure 1). The project corridor extends along 3.35 miles of Eastern Parkway (US ALT 60) from the intersection of Eastern Parkway and Third Street (US 60 ALT/KY HWY 1020) to the entrance of Cherokee Park, with anticipated improvements from the Hahn Street intersection to the entrance of Cherokee Park. The purpose of the proposed project is to improve safety for all transportation methods, improve connectivity, and increase opportunities for multimodal transportation along Eastern Parkway, while improving stormwater drainage, landscaping, and respecting the history of the original Olmsted design. Anticipated project activities include the reconfiguration of existing travel lanes to provide a center turn lane and on-street bicycle lanes.

The project is located in a highly-developed, urban area with residential and commercial developments, including a university. The project corridor contains maintained lawns, except for the eastern terminus that enters Cherokee Park. The purpose of the assessment is to identify major ecological resources within the project boundary for use in the project planning process and in completion of Categorical Exclusion (CE) documentation. The assessment is summarized below in terms of study methodology, results, and potential impacts.

METHODOLOGY

Occurrence records maintained by the U.S. Fish and Wildlife Service – Kentucky Field Office (USFWS KFO) and the Office of Kentucky Nature Preserves (OKNP) were reviewed as part of this assessment. The USFWS's Information for Planning and Conservation (IPaC) website was used to obtain a list of federally threatened/endangered (T/E) species that may occur within the project boundary. In-house research involved review of USGS topographic quadrangle maps, aerial photography, the Jefferson County soil survey, digital elevation model (DEM) maps, and FEMA floodplain maps. USGS geologic quadrangle maps, karst potential maps, and available mine maps were reviewed to identify caves, mine portals, sinkholes, and other underground features within the project boundary.

During the field assessment, the presence of streams and open water bodies was evaluated on the basis of ordinary high-water mark (OHWM), defined bed and bank features, and flow regimes. Potential wetland areas were investigated following the Routine On-Site Determination Method as defined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountain and Piedmont Region – Version 2.0* (April 2012). The locations and extent of jurisdictional features and T/E species habitat presented in this summary have not been formally delineated or verified by the appropriate resource agency, which holds final authority over determination.

RESULTS

Following in-house review of resource materials, Redwing conducted a pedestrian assessment of the project boundary on August 14, 2019 to identify the approximate location and extent of waters/wetlands and habitat types. The results of the assessment are presented below in terms of federally listed species and waters of the U.S.

Federally listed Species: The status of federally listed species identified by the USFWS KFO and OKNP as occurring or having the potential to occur in the vicinity of the project and the presence/absence of suitable habitat for each species in the project boundary are summarized in the following table. Correspondence from the resource agencies is provided in the Appendix.

Scientific Name	Common Name	Federal Status	Habitat Present
Mammals			
Myotis grisescens	gray bat	Endangered	No
Myotis septentrionalis	northern long-eared bat	Threatened	Summer Roosting
Myotis sodalis	Indiana bat	Endangered	Summer Roosting
Mussels			
Cumberlandia monodonta	spectaclecase	Endangered	No
Cyprogenia stegaria	fanshell	Endangered	No
Epioblasma torulosa rangiana	northern riffleshell	Endangered	No
Obovaria retusa	ring pink	Endangered	No
Plethobasus cooperianus	orangefoot pimpleback	Endangered	No
Epioblasma obliquata obliquata	purple cat's paw	Endangered	No
Pleurobema clava	clubshell	Endangered	No
Pleurobema plenum	rough pigtoe	Endangered	No
Plethobasus cyphyus	sheepnose	Endangered	No
Quadrula cylindrica cylindrica	rabbitsfoot	Threatened	No
Plants			
Trifolium stoloniferum	running buffalo clover	Endangered	No

The USFWS IPaC response notes that there are no critical habitats within the project boundary. The OKNP response did not note any federally listed T/E species within the project boundary.

A review of mine maps, topographic quadrangle maps, and geologic maps did not identify any underground or surface mines within the project boundary, and the project boundary is classified as having non-karst, medium, and high karst potential. No caves, sinkholes, or other underground features were observed within project boundary during the assessment. One cave was identified south of the project boundary on the west side of South Fork Beargrass Creek. This feature is outside the project boundary and will not be impacted by project activities.

Suitable summer roosting habitat was identified for the Indiana bat and northern long-eared bat along the majority of the project boundary. The right-of-way and front yards of the residences along Eastern

Parkway contain individual mature trees that represent suitable summer roosting habitat for the Indiana and northern long-eared bat. This habitat totals approximately 225 individual trees (Figure 2). These trees are considered roosting habitat only and do not represent foraging or commuting habitat for either species based on a lack of prey resources or connection to quality habitat blocks. The project is located in potential habitat for the Indiana and northern long-eared bats per the USFWS (Figure 3). One perennial stream (South Fork Beargrass Creek) is found within the project boundary. This stream has been completely channelized, lined with concrete, and receives sewage overflow during heavy rain events due to its connection to the Louisville/Jefferson County Metropolitan Sewer District's Combined Sewer Overflow system. Due to the degraded stream quality, the absence of substrate, and the lack of structure conducive to aquatic insect production, South Fork Beargrass Creek does not represent gray bat foraging habitat.

Potential habitat for the federally listed mussel species includes streams and small rivers with moderate to fast-flowing current and substrate consisting of sand, gravel, cobble, and boulders. South Fork Beargrass Creek is entirely channelized with concrete, which does not provide suitable substrate for mussels. In addition, South Fork Beargrass Creek is not anticipated to be impacted by the project. Furthermore, no live mussels or relic shells were observed during the assessment of the perennial stream. Due to the degraded stream quality and lack of suitable substrate, federally listed mussel species are considered likely absent from the project corridor.

Suitable habitat for running buffalo clover includes rich, mesic forests with partial to filtered sunlight that have periodic occurrences of moderate disturbance. The maintained lawns found throughout the project boundary are regularly maintained and lack areas of periodic disturbance within wooded areas. These lawns consist largely of tall fescue (*Schedonorus arundinaceus*) and Kentucky bluegrass (*Poa pratensis*), along with other non-native plants. This species is likely absent from the project corridor.

Waters of the U.S.: One perennial stream, South Fork Beargrass Creek, was identified within the project boundary (Figure 2). South Fork Beargrass Creek flows through the project boundary for approximately 150 linear feet (0.155 acre) and is entirely channelized and lined with concrete. South Fork Beargrass Creek is located within the 100-year FEMA floodplain. No other waters/wetlands were found within the project boundary during the assessment, and the National Wetlands Inventory mapping shows no features within the project corridor.

POTENTIAL IMPACTS

Federally listed Species: The project is located within potential habitat for both the Indiana and northern long-eared bats (Figure 3). Based on the results of the assessment, the project will require consultation with the USFWS to address potential impacts to federally listed species. It appears that impacts to the Indiana and northern long-eared bat from this project may be addressed following guidance provided in the *Revised Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky* (2016) and a contribution to the Imperiled Bat Conservation Fund (IBCF). The 4(d) Rule may be used to address impacts to the northern long-eared bat since the project is not located within 0.25 mile of known hibernacula or 150 feet of a known maternity roost tree. Adverse effects to other federally listed T/E species are not anticipated as a result of the project. Therefore, with the exception of the Indiana and northern long-eared bats, federally listed T/E species can be addressed using a No Effects Finding Form.

Waters of the U.S.: Impacts to 500 feet or less of intermittent or perennial stream or 0.5 acre or less of Waters of the U.S. for each single and complete project are permittable under Nationwide Permit (NWP) 14 for linear transportation projects under Section 404 of the Clean Water Act. Impacts to greater than 500 feet of intermittent or perennial stream or 0.5 acre of waters of the U.S. can be authorized under a Letter of Permission (LOP). An Individual Water Quality Certification under Section 401 of the Clean Water Act is required if impacts to each intermittent or perennial stream are greater than 300 feet, the overall project impacts greater than 500 feet of intermittent and perennial stream

within each Hydrologic Unit Code (HUC) 14, or the project results in impacts greater than 0.5 acre of wetland. No impacts to waters/wetlands of the U.S. are anticipated as a result of the project. Therefore, no permit is required from the U.S. Army Corps of Engineers or Water Quality Certification from the Kentucky Division of Water.

We appreciate the opportunity to assist with this important project. Please contact Richard Clausen or Benjamin Deetsch at (502) 625-3009 with questions regarding this report.

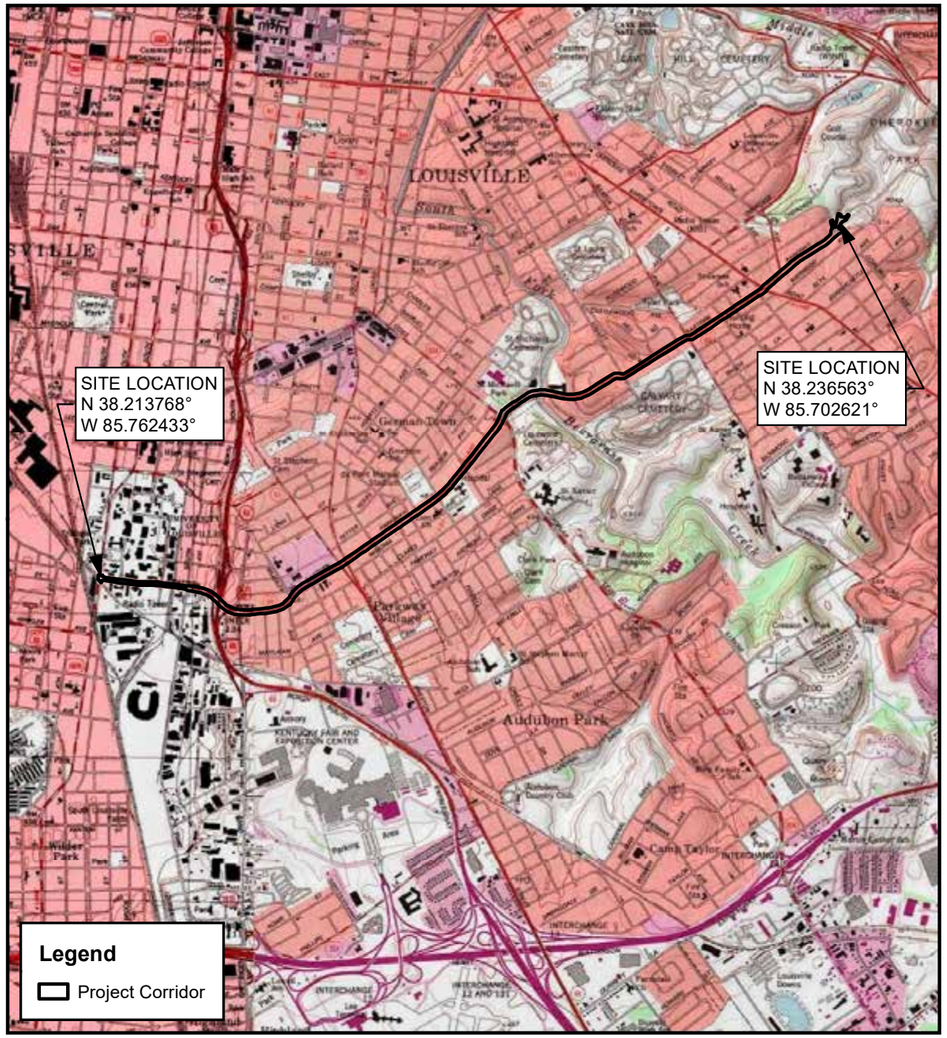
Attachments: Figures
Photographs
Appendix – Resource Agency Correspondence

P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Report\Ecological Summary\Executive Summary-Eastern Parkway Project.docx

Executive Summary – Terrestrial and Aquatic Assessment *September 25, 2019*
Eastern Parkway Transportation Study — KYTC Item No.: 5-3213 *Redwing Project No.: 18-142*

FIGURES

Source: USA Topo Maps, (2013) National Geographic Society, USGS 7.5-minute Topographic Map - Louisville East and Louisville West, Kentucky Quadrangles.



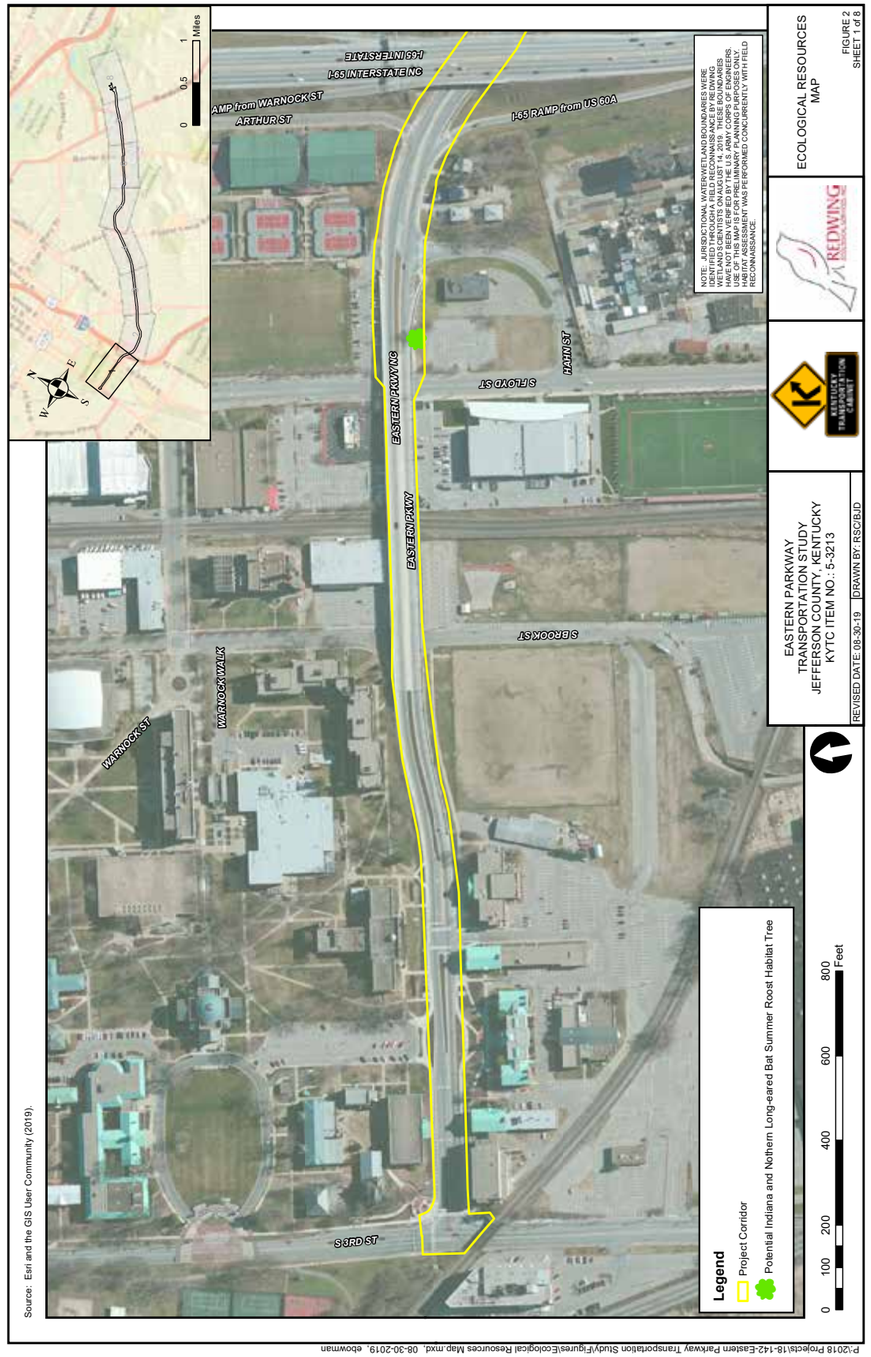
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213

REVISED DATE: 08-23-19 | DRAWN BY: BJD

SITE LOCATION MAP

FIGURE 1

P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Site Location Map.mxd, 08-30-2019, ebowman



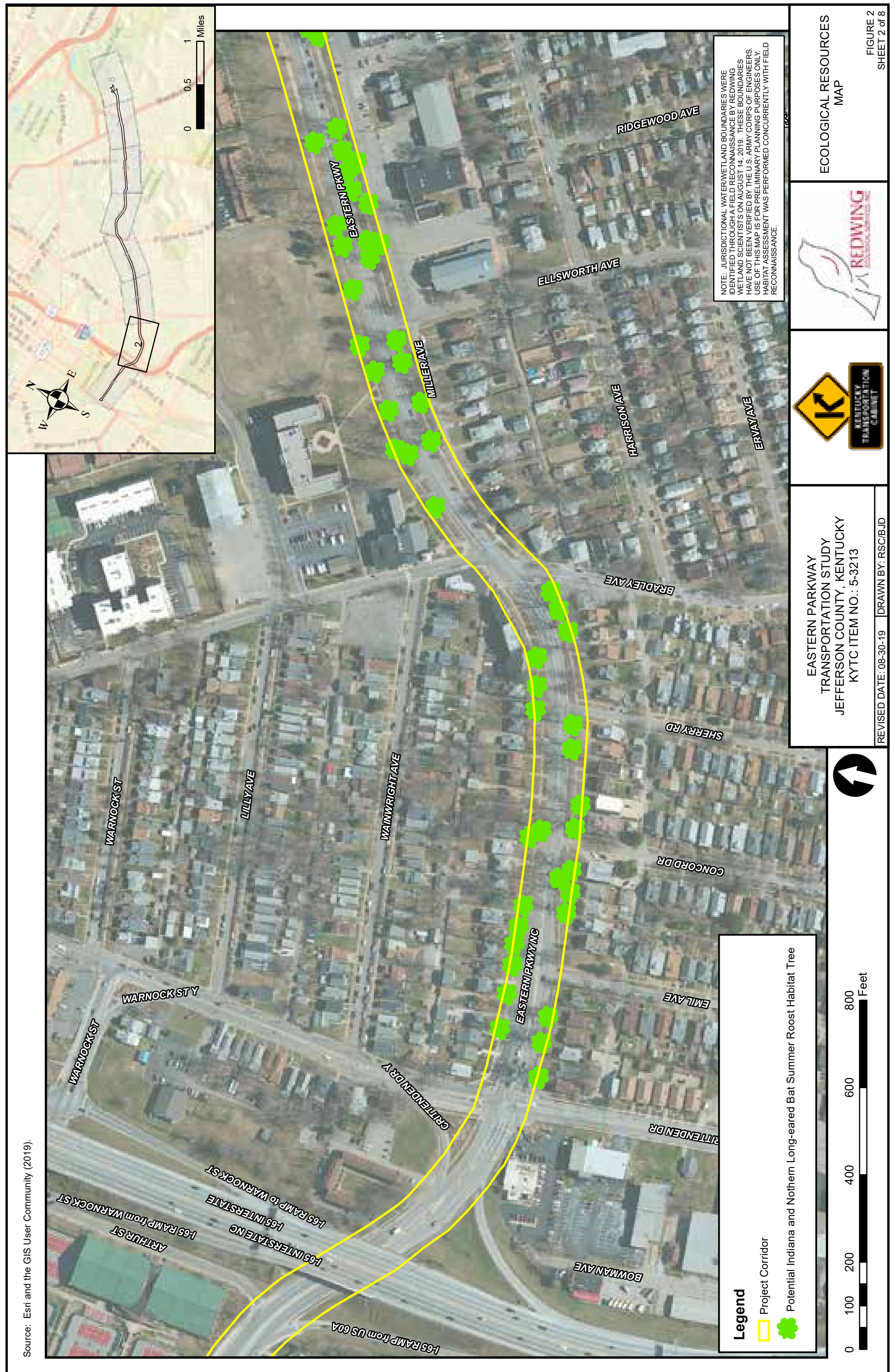
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213

REVISED DATE: 08-30-19 | DRAWN BY: RSC/BJD

ECOLOGICAL RESOURCES MAP

FIGURE 2
SHEET 1 of 8

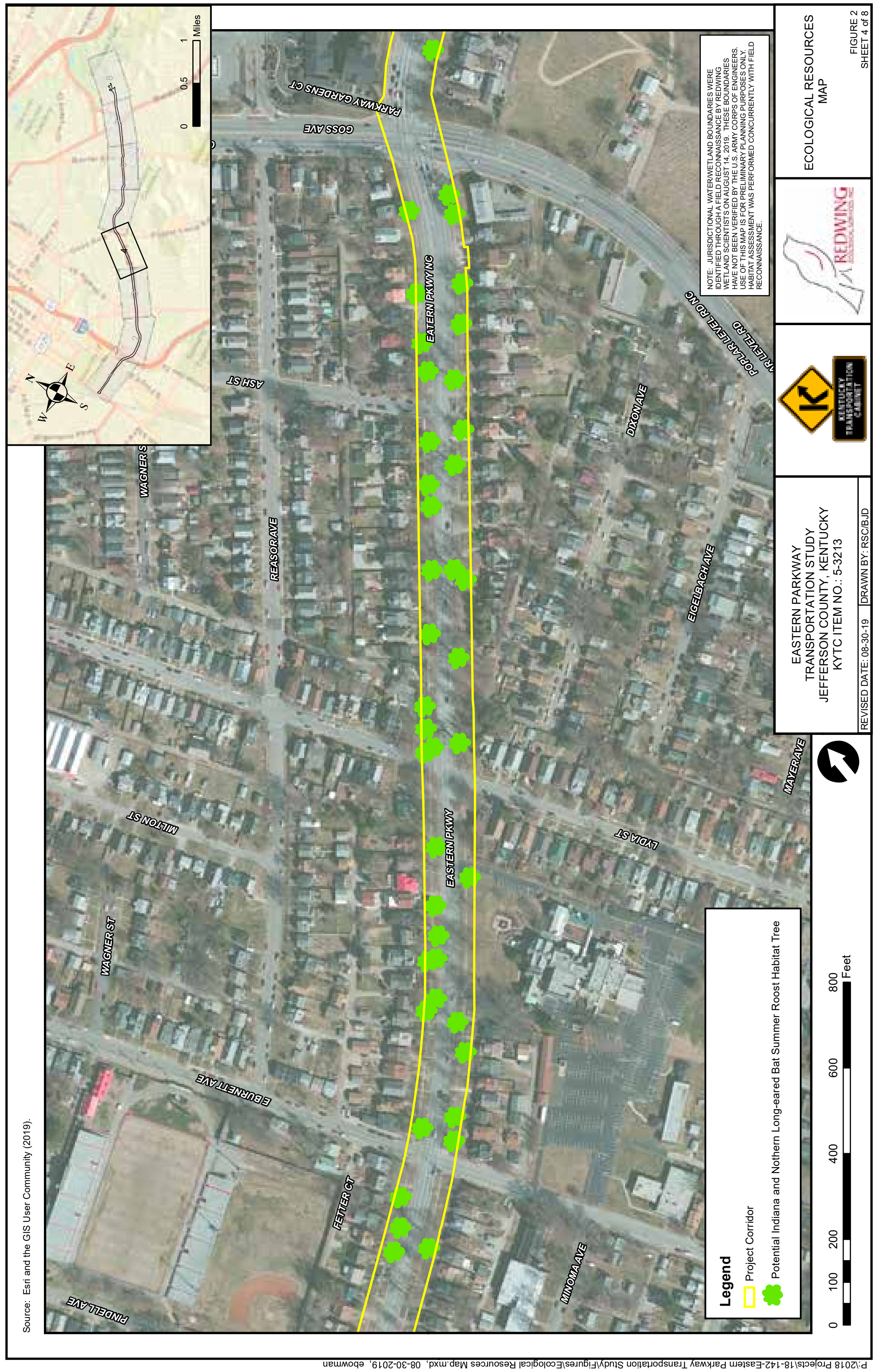
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 08-30-2019, ebowman

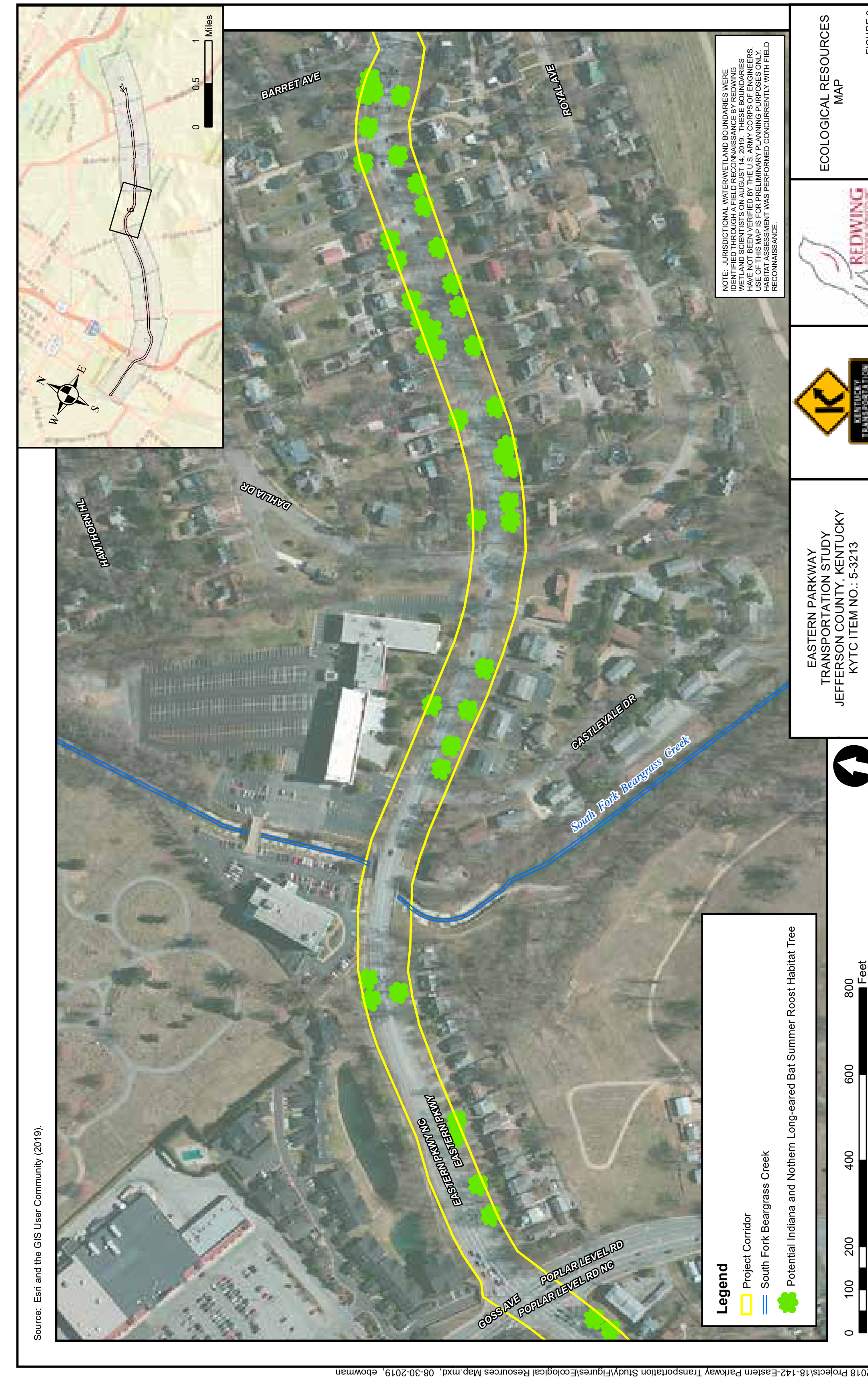

ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 2 of 8
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213
REVISED DATE: 08-30-19
DRAWN BY: RSC/BJD
NOTE: JURISDICTIONAL WATER/WETLAND BOUNDARIES WERE IDENTIFIED THROUGH A FIELD RECONNAISSANCE BY REDWING WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. HABITAT ASSESSMENT WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
REDWING
KENTUCKY TRANSPORTATION CABINET
Legend
Project Corridor
Potential Indiana and Nothern Long-eared Bat Summer Roost Habitat Tree
0 100 200 400 600 800 Feet
0 0.5 1 Miles
N E S W
EASTERN PKWY
MILLER AVE
RIDGEWOOD AVE
ELLSWORTH AVE
HARRISON AVE
ERVAY AVE
BRADLEY AVE
SHERRY RD
CONCORD DR
EMIL AVE
CRITTENDEN DR
BOWMAN AVE
WARNOCK ST
LILLY AVE
WAINWRIGHT AVE
WARNOCK ST Y
EASTERN PKWY NC
CRITTENDEN DR Y
I-65 RAMP to WARNOCK ST
I-65 INTERSTATE
I-65 INTERSTATE NC
I-65 RAMP from WARNOCK ST
ARTHUR ST
I-65 RAMP from US 60A
Source: Esri and the GIS User Community (2019).

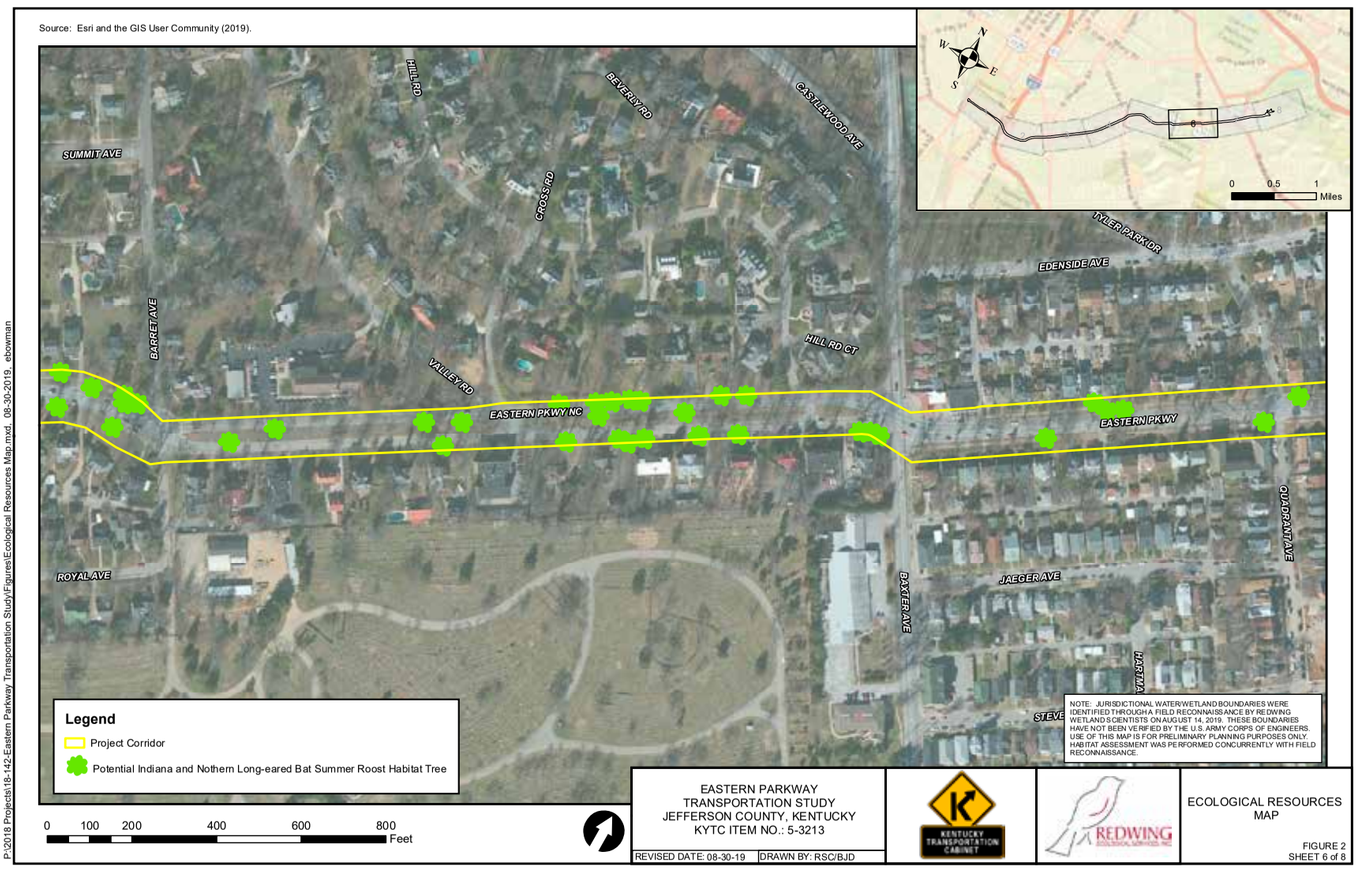
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 08-30-2019, ebowman


ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 3 of 8
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213
REVISED DATE: 08-30-19
DRAWN BY: RSC/BJD
NOTE: JURISDICTIONAL WATER/WETLAND BOUNDARIES WERE IDENTIFIED THROUGH A FIELD RECONNAISSANCE BY REDWING WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. HABITAT ASSESSMENT WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
REDWING
KENTUCKY TRANSPORTATION CABINET
Legend
Project Corridor
Potential Indiana and Nothern Long-eared Bat Summer Roost Habitat Tree
0 100 200 400 600 800 Feet
0 0.5 1 Miles
N E S W
EASTERN PKWY
FETTER CT
PINDELL AVE
KESWICK BLVD
DELOR AVE
LANSDOWNE AVE
FETTER AVE
ALEXANDER AVE
MINOMA AVE
DORMA AVE
TEXAS AVE
FLEET AVE
S SHELBY ST
S PRESTON ST
FREDERICK STAMM CT
RAYMOND KENT CT
MILLER AVE
HARRISON AVE
Source: Esri and the GIS User Community (2019).

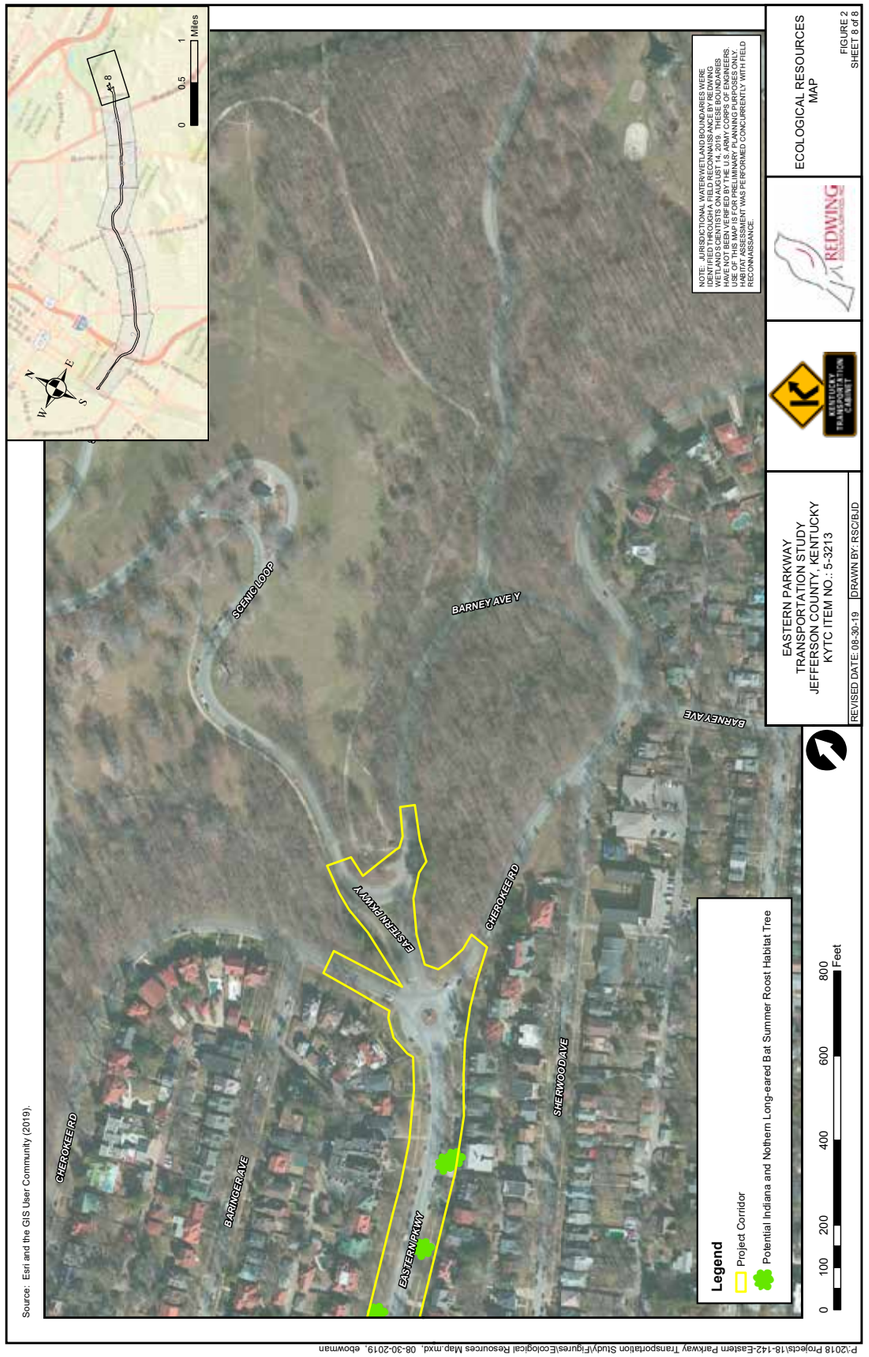
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 08-30-2019, ebowman


ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 4 of 8
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213
REVISED DATE: 08-30-19
DRAWN BY: RSC/BJD
Legend
Project Corridor
Potential Indiana and Northern Long-eared Bat Summer Roost Habitat Tree
0 100 200 400 600 800 Feet
Source: Esri and the GIS User Community (2019).
GOSS AVE
PARKWAY GARDENS CT
EASTERN PKWY
EASTERN PKWY NC
ASH ST
REASOR AVE
DIXON AVE
EIGELBACH AVE
LYDIA ST
MILTON ST
WAGNER ST
EBURNETT AVE
FELTER CT
MINOMA AVE
PINDELL AVE
MAYER AVE

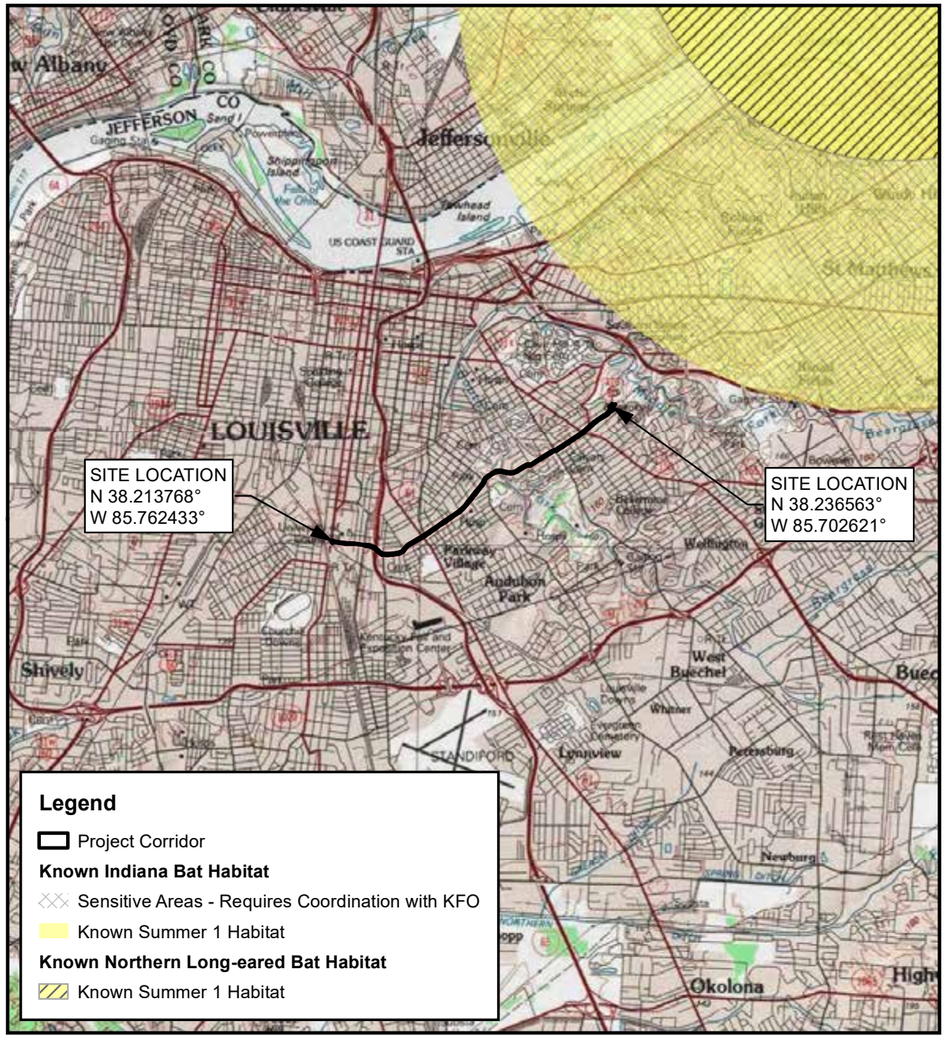

ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 5 of 8
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213
REVISED DATE: 08-30-19
DRAWN BY: RSC/BJD
Legend
Project Corridor
South Fork Beargrass Creek
Potential Indiana and Northern Long-eared Bat Summer Roost Habitat Tree
0 100 200 400 600 800 Feet
Source: Esri and the GIS User Community (2019).
BARRET AVE
ROYAL AVE
DAHLIA DR
CASTLEVALE DR
South Fork Beargrass Creek
EASTERN PKWY
POPLAR LEVEL RD
POPLAR LEVEL RD NC
GOSS AVE


Source: Esri and the GIS User Community (2019).
HILL RD
BEVERLY RD
CASTLEWOOD AVE
SUMMIT AVE
CROSS RD
TYLER PARK DR
EDENSIDE AVE
BARRET AVE
HILL RD CT
VALLEY RD
EASTERN PKWY NC
EASTERN PKWY
QUADRANT AVE
ROYAL AVE
BAXTER AVE
JAEGER AVE
HARVEY
STEVE
Legend
Project Corridor
Potential Indiana and Nothern Long-eared Bat Summer Roost Habitat Tree
0 100 200 400 600 800
Feet
NOTE: JURISDICTIONAL WATER/WETLAND BOUNDARIES WERE IDENTIFIED THROUGH A FIELD RECONNAISSANCE BY REDWING WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. HABITAT ASSESSMENT WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
0 0,5 1
Miles
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213
REVISED DATE: 08-30-19
DRAWN BY: RSC/BJD
KENTUCKY TRANSPORTATION CABINET
REDWING ECOLOGICAL SERVICES, INC.
ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 6 of 8
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 08-30-2019, ebowman


Source: Esri and the GIS User Community (2019).
EDGELAND AVE
EDGELAND AVE
EDENSIDE AVE
BARINGER AVE
BARDSTOWN RD
WILLOW AVE
EASTERN PKWY
QUADRANT AVE
SHERWOOD AVE
JAEGER AVE
SHERWOOD AVE
MORRIS PL
FERNWOOD AVE
STEVENS AVE
BULLOCK ALY
Legend
Project Corridor
Potential Indiana and Nothern Long-eared Bat Summer Roost Habitat Tree
0 100 200 400 600 800
Feet
NOTE: JURISDICTIONAL WATER/WETLAND BOUNDARIES WERE IDENTIFIED THROUGH A FIELD RECONNAISSANCE BY REDWING WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. HABITAT ASSESSMENT WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
0 0,5 1
Miles
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213
REVISED DATE: 08-30-19
DRAWN BY: RSC/BJD
KENTUCKY TRANSPORTATION CABINET
REDWING ECOLOGICAL SERVICES, INC.
ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 7 of 8
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 08-30-2019, ebowman



Source: USA Topo Maps, (2013) National Geographic Society, USGS 7.5-minute Topographic Map - Louisville East and Louisville West, Kentucky Quadrangles; USFWS Kentucky Field Office - Indiana and Northern Long-eared Bat Habitat (2018).



P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Known Bat Habitat Map.mxd, 08-30-2019, ebowman

EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213

KENTUCKY TRANSPORTATION CABINET

REDWING ECOLOGICAL SERVICES, INC.

KNOWN INDIANA AND NORTHERN LONG-EARED BAT HABITAT MAP

REVISED DATE: 08-23-19 | DRAWN BY: BJD

FIGURE 3

PHOTOGRAPHS

Photograph 1: View of Eastern Parkway (US ALT 60) and surrounding habitat near the beginning of the project at the western terminus facing east. August 14, 2019.

Photograph 2: View of Eastern Parkway under Interstate 65 overpass facing east. August 14, 2019.

Photograph 3: View of Eastern Parkway between Preston Highway (US 61) and Ellsworth Avenue facing west. August 14, 2019.

Photograph 4: View of Eastern Parkway between Preston Highway and Alexander Avenue facing west. August 14, 2019.

Photograph 5: View of Eastern Parkway between Poplar Level Road (KY HWY 864) and Ash Street facing west. August 14, 2019.

Photograph 6. Upstream view of South Fork Beargrass Creek from Eastern Parkway. The stream including the low-flow channel is made of concrete. August 14, 2019.

Photograph 7: Downstream view of South Fork Beargrass Creek facing north. August 14, 2019.

Photograph 8. View facing east of the walking path located in the medium of Eastern Parkway. The walking path is only found in a portion of the project between Barret Avenue and Newburg Road (KY HWY 1703). August 14, 2019.

Photograph 9: View facing east of Eastern Parkway between Willow Avenue and Cherokee Parkway. This portion of the project is the only section that is two lanes for driving and parking is permitted. August 14, 2019.

Photograph 10. View facing east of the eastern terminus of the project at the entrance to Cherokee Park. August 14, 2019.

APPENDIX

RESOURCE AGENCY CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
Phone: (502) 695-0468 Fax: (502) 695-1024
http://www.fws.gov/frankfort/

In Reply Refer To:
Consultation Code: 04EK1000-2019-SLI-1099
Event Code: 04EK1000-2019-E-03083
Project Name: Eastern Parkway Transportation Study

June 06, 2019

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

Your concern for the protection of endangered and threatened species is greatly appreciated. The purpose of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA) is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. The species list attached to this letter fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the ESA to provide information as to whether any proposed or listed species may be present in the area of a proposed action. This is not a concurrence letter; additional consultation with the Service may be required.

The Information in Your Species List:

The enclosed species list identifies federal trust species and critical habitat that may occur within the boundary that you entered into IPaC. For your species list to most accurately represent the species that may potentially be affected by the proposed project, the boundary that you input into IPaC should represent the entire “action area” of the proposed project by considering all the potential “effects of the action,” including potential direct, indirect, and cumulative effects, to federally-listed species or their critical habitat as defined in 50 CFR 402.02. This includes effects of any “interrelated actions” that are part of a larger action and depend on the larger action for their justification and “interdependent actions” that have no independent utility apart from the action under consideration (e.g.; utilities, access roads, etc.) and future actions that are reasonably certain to occur as a result of the proposed project (e.g.; development in response to a new road). If your project is likely to have significant indirect effects that extend well beyond the project footprint (e.g., long-term impacts to water quality), we highly recommend that you

coordinate with the Service early to appropriately define your action area and ensure that you are evaluating all the species that could potentially be affected.

We must advise you that our database is a compilation of collection records made available by various individuals and resource agencies available to the Service and may not be all-inclusive. This information is seldom based on comprehensive surveys of all potential habitats and, thus, does not necessarily provide conclusive evidence that species are present or absent at a specific locality. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list.

Please note that "critical habitat" refers to specific areas identified as essential for the conservation of a species that have been designated by regulation. Critical habitat usually does not include all the habitat that the species is known to occupy or all the habitat that may be important to the species. Thus, even if your project area does not include critical habitat, the species on the list may still be present.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and associated information. To re-access your project in IPaC, go to the IPaC web site (https://ecos.fws.gov/ipac/), select "Need an updated species list?", and enter the consultation code on this letter.

ESA Obligations for Federal Projects:

Under sections 7(a)(1) and 7(a)(2) of the ESA and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

If a Federal project (a project authorized, funded, or carried out by a federal agency) may affect federally-listed species or critical habitat, the Federal agency is required to consult with the Service under section 7 of the ESA, pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). Recommended contents of a Biological Assessment are described at 50 CFR 402.12. For projects other than major construction activities, the Service suggests that a biological evaluation

similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat.

ESA Obligations for Non-federal Projects:

Proposed projects that do not have a federal nexus (non-federal projects) are not subject to the obligation to consult under section 7 of the ESA. However, section 9 of the ESA prohibits certain activities that directly or indirectly affect federally-listed species. These prohibitions apply to all individuals subject to the jurisdiction of the United States. Non-federal project proponents can request technical assistance from the Service regarding recommendations on how to avoid and/or minimize impacts to listed species. The project proponent can choose to implement avoidance, minimization, and mitigation measures in a proposed project design to avoid ESA violations.

Additional Species-specific Information:

In addition to the species list, IPaC also provides general species-specific technical assistance that may be helpful when designing a project and evaluating potential impacts to species. To access this information from the IPaC site (https://ecos.fws.gov/ipac/), click on the text "My Projects" on the left of the black bar at the top of the screen (you will need to be logged into your account to do this). Click on the project name in the list of projects; then, click on the "Project Home" button that appears. Next, click on the "See Resources" button under the "Resources" heading. A list of species will appear on the screen. Directly above this list, on the right side, is a link that will take you to pdfs of the "Species Guidelines" available for species in your list. Alternatively, these documents and a link to the "ECOS species profile" can be accessed by clicking on an individual species in the online resource list.

Next Steps:

Requests for additional technical assistance or consultation from the Kentucky Field Office should be submitted following guidance on the following page http://www.fws.gov/frankfort/PreDevelopment.html and the document retrieved by clicking the "outline" link at that page. When submitting correspondence about your project to our office, please include the Consultation Tracking Number in the header of this letter. (There is no need to provide us with a copy of the IPaC-generated letter and species list.)

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
(502) 695-0468

Project Summary

Consultation Code: 04EK1000-2019-SLI-1099

Event Code: 04EK1000-2019-E-03083

Project Name: Eastern Parkway Transportation Study

Project Type: TRANSPORTATION

Project Description: Road improvements

Project Location:
Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/38.22407862724184N85.73009553808168W

Counties: Jefferson, KY

Endangered Species Act Species

There is a total of 14 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 12 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Bat *Myotis grisescens*	Endangered
Indiana Bat *Myotis sodalis*	Endangered
Northern Long-eared Bat *Myotis septentrionalis*	Threatened

Gray Bat *Myotis grisescens*
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6329
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/21/office/42431.pdf

Indiana Bat *Myotis sodalis*
There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:
- All activities in this location should consider possible effects to this species. The project area includes "potential" habitat.

Species profile: https://ecos.fws.gov/ecp/species/5949
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/1/office/42431.pdf

Northern Long-eared Bat *Myotis septentrionalis*
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The specified area includes areas in which incidental take would not be prohibited under the 4(d) rule. For reporting purposes, please use the "streamlined consultation form," linked to in the "general project design guidelines" for the species.

Species profile: https://ecos.fws.gov/ecp/species/9045
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/10043/office/42431.pdf

Clams

NAME	STATUS

Clubshell *Pleurobema clava* — Endangered

Population: Wherever found; Except where listed as Experimental Populations
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/3789
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/352/office/42431.pdf

Fanshell *Cyprogenia stegaria* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, Ohio, Rolling Fork Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/4822
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/368/office/42431.pdf

Northern Riffleshell *Epioblasma torulosa rangiana* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/527
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/374/office/42431.pdf

Orangefoot Pimpleback (pearlymussel) *Plethobasus cooperianus* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significanlty impact, directly or indirectly, the following rivers: Green, Ohio, Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/1132
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/340/office/42431.pdf

Purple Cat's Paw (=purple Cat's Paw Pearlymussel) *Epioblasma obliquata obliquata* — Endangered

Population: Wherever found; Except where listed as Experimental Populations
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/5602
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/323/office/42431.pdf

NAME	STATUS

Rabbitsfoot *Quadrula cylindrica cylindrica* — Threatened

There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Ohio, Rolling Fork Salt, South Fork Kentucky, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/5165
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/3645/office/42431.pdf

Ring Pink (mussel) *Obovaria retusa* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Ohio, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/4128
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/341/office/42431.pdf

Rough Pigtoe *Pleurobema plenum* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/6894
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/338/office/42431.pdf

Sheepnose Mussel *Plethobasus cyphyus* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Kentucky, Licking, Ohio, Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/6903
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/7816/office/42431.pdf

Spectaclecase (mussel) *Cumberlandia monodonta* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Little South Fork of the Cumberland, Ohio, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/7867
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/4490/office/42431.pdf

Flowering Plants

NAME	STATUS
Running Buffalo Clover *Trifolium stoloniferum*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2529
Species survey guidelines:
https://ecos.fws.gov/ipac/guideline/survey/population/1041/office/42431.pdf
Habitat assessment guidelines:
https://ecos.fws.gov/ipac/guideline/assessment/population/1041/office/42431.pdf

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

MATTHEW G. BEVIN
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
OFFICE OF KENTUCKY NATURE PRESERVES
300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601
(502) 573-2886

CHARLES G. SNAVELY
SECRETARY

ZEB WEESE
EXECUTIVE DIRECDTOR

June 6, 2019

Benjamin Deetsch
Redwing Ecological Services, Inc.
1339 S. Fourth St.
Louisville, KY 40203

Project:	Eastern Parkway Transportation Study; 18-142
Project ID:	19-0131
Project Type:	Other
Site Acreage:	1.88
Site Lat/Lon:	38.220940 / -85.732531
County:	Jefferson
USGS Quad:	LOUISVILLE EAST; LOUISVILLE WEST
Watershed HUC12:	Beargrass Creek; Mill Creek Cutoff; South Fork Beargrass Creek

Dear Benjamin Deetsch,

This letter is in response to your data request for the project referenced above. We have reviewed our Natural Heritage Program Database to determine if any of the endangered, threatened, or special concern plants and animals or exemplary natural communities monitored by the Office of Kentucky Nature Preserves occur within your general project area. Your project does pose a concern at this time, therefore please see the attached reports for more detailed information.

I would like to take this opportunity to remind you of the terms of the data request license, which you agreed upon in order to submit your request. The license agreement states "Data and data products received from the Office of Kentucky Nature Preserves, including any portion thereof, may not be reproduced in any form or by any means without the express written authorization of the Office of Kentucky Nature Preserves." The exact location of plants, animals, and natural communities, if released by the Office of Kentucky Nature Preserves, may not be released in any document or correspondence. These products are provided on a temporary basis for the express project (described above) of the requester, and may not be redistributed, resold or copied without the written permission of the Biological Assessment Branch (300 Sower Blvd - 4th Floor, Frankfort, KY, 40601. Phone: 502-782-7828).

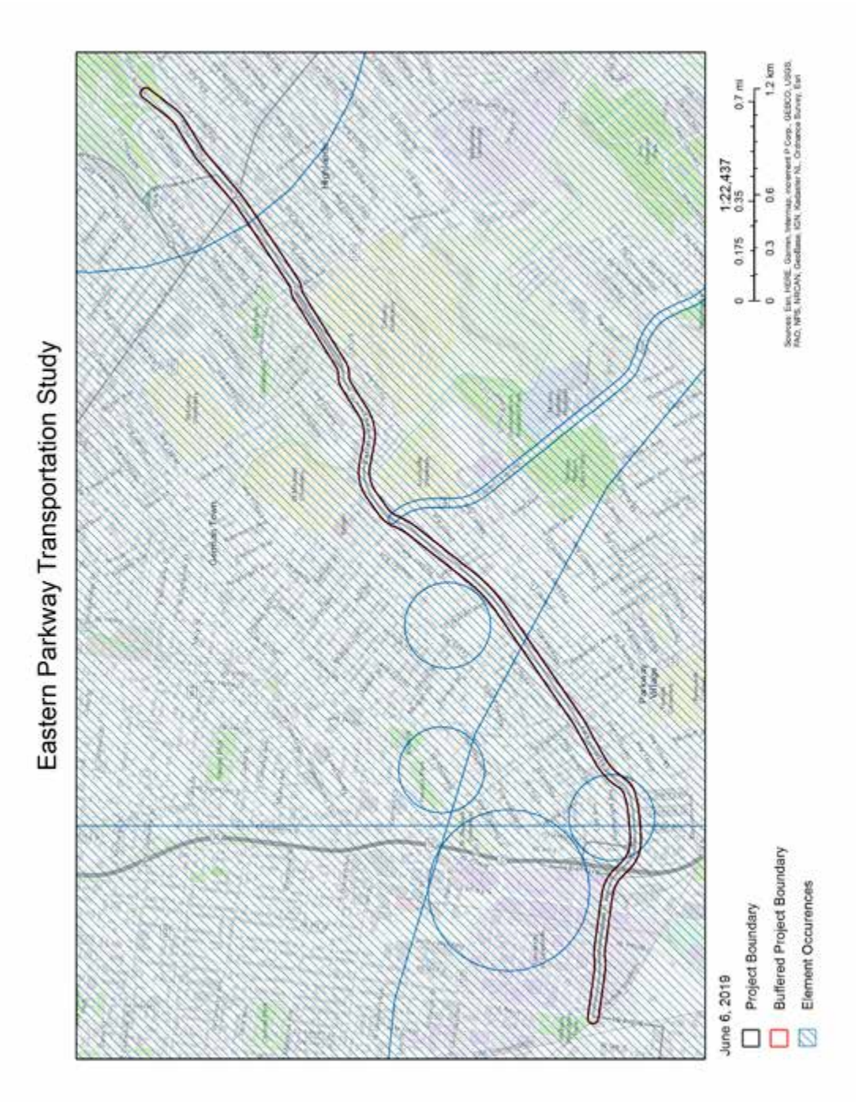
Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed and new plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage

Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. We would greatly appreciate receiving any pertinent information obtained as a result of on-site surveys.

If you have any questions, or if I can be of further assistance, please do not hesitate to contact me.

Sincerely,

Nour Salam
Geoprocessing Specialist



KENTUCKY TRANSPORTATION CABINET	**Kentucky Transportation Cabinet Federal Highway Administration No Effect Finding**		U.S. Department of Transportation Federal Highway Administration
KYTC Item No:	**5-3213**	**Route(s):**	**Eastern Pkwy (US 60 ALT)**
County(ies):	**Jefferson**		

Project Description: (Type of improvement, areas to be impacted, crossroad improvements, easements, etc.)

The project involves improvements to approximately 3.35 miles of Eastern Parkway (US 60 ALT) to improve safety, improve connectivity, and increase opportunities for multimodal transportation. Anticipated project activities include reconfiguration of the travel lanes to provide a center turn lane and bicycle lanes. The project will not require work in any streams.

IPaC LISTED SPP FOR PROJECT SITE:

Gray Bat	*Myotis grisescens*
Indiana Bat	*Myotis sodalis*
Northern Long-eared Bat	*Myotis septentrionalis*
Sheepnose	*Plethobasus cyphyus*
Clubshell	*Pleurobema clava*
Fanshell	*Cyprogenia stegaria*
Spectaclecase	*Cumberlandia monodonta*
Northern Riffleshell	*Epioblasma torulosa rangiana*
Orangefoot Pimpleback	*Plethobasus cooperianus*
Purple Cat's Paw	*Epioblasma obliquata obliquata*
Rabbitsfoot	*Quadrula cylindrica cylindrica*
Ring Pink	*Obovaria retusa*
Rough Pigtoe	*Pleurobema plenum*
Running Buffalo Clover	*Trifolium stoloniferum*

IB and NLEB will be addressed via IBCF CMOA, as appropriate.

Methodologies: (Methods of assessment, who, what, when, resources, etc.)

Site visit performed by Redwing Ecological Services, Inc. on August 14, 2019. Review of available GIS data to identify potential habitat for federally listed species following guidance in the KYTC Habitat Assessment Manual (2017).

Results: (Compare habitat used by listed species with available habitat)

Gray Bat: Gray bats utilize caves year-round for roosting and can utilize bridges for roosting as well. Commuting/foraging habitat consist of riparian areas over open water. South Fork Beargrass Creek is the only stream within the project boundary and does not provide foraging habitat due to degraded water quality and the absence of suitable substrate or pooled water for aquatic organisms. Furthermore, the project spans South Fork Beargrass Creek utilizing an existing bridge that will not be impacted by the project. Habitat for the gray bat is not present in the corridor.

Mussels: South Fork Beargrass Creek is completely channelized and has been entirely lined with concrete, including the bed and banks; therefore, habitat for listed mussel species is not present.

Running Buffalo Clover: This species prefers rich, mesic forests with partial to filtered sunlight that have periodic occurrences of moderate disturbance. The maintained lawns found throughout the project corridor are regularly maintained and lack areas of periodic disturbance within wooded areas. Habitat for this species is not found within the project corridor.

Determinations:

Gray Bat: No Effect

Mussels: No Effect

Running Buffalo Clover: No Effect

The project has been assessed in accordance with the provisions of Section 7 of the Endangered Species Act. As a designated representative of the FHWA, the KYTC has determined that the project will have No Effect on any listed species or their critical habitat other than the Indiana Bat and Northern Long-eared Bat and further Section 7(a)(2) consultation with the Service is not required with the exception of the Indiana Bat and Northern Long-eared Bat.

Ellen Mullins
KYTC Signature

09/25/2019
Date

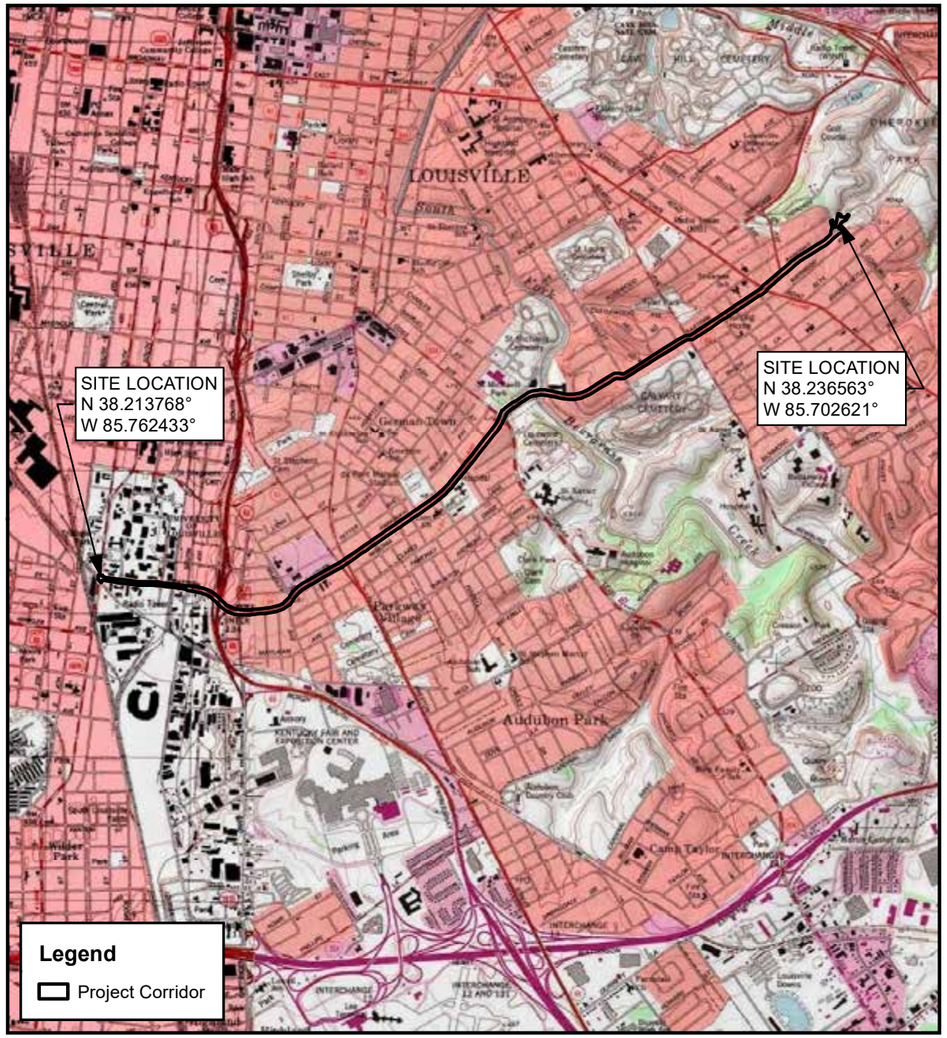
Ellen Mullins
Print Name

Prepared By: Redwing Ecological Services, Inc. 09/11/19
Firm Name Date

ATTACHED: Figure
Resource Agency Correspondence (IPaC)
Photographs

FIGURE

Source: USA Topo Maps, (2013) National Geographic Society, USGS 7.5-minute Topographic Map - Louisville East and Louisville West, Kentucky Quadrangles.



P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Site Location Map.mxd, 08-30-2019, ebowman

EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213

REVISED DATE: 08-23-19 | DRAWN BY: BJD

KENTUCKY TRANSPORTATION CABINET

REDWING ECOLOGICAL SERVICES, INC.

SITE LOCATION MAP

FIGURE 1

RESOURCE AGENCY CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
Phone: (502) 695-0468 Fax: (502) 695-1024
http://www.fws.gov/frankfort/

In Reply Refer To:
Consultation Code: 04EK1000-2019-SLI-1099
Event Code: 04EK1000-2019-E-03083
Project Name: Eastern Parkway Transportation Study

June 06, 2019

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

Your concern for the protection of endangered and threatened species is greatly appreciated. The purpose of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA) is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. The species list attached to this letter fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the ESA to provide information as to whether any proposed or listed species may be present in the area of a proposed action. This is not a concurrence letter; additional consultation with the Service may be required.

The Information in Your Species List:

The enclosed species list identifies federal trust species and critical habitat that may occur within the boundary that you entered into IPaC. For your species list to most accurately represent the species that may potentially be affected by the proposed project, the boundary that you input into IPaC should represent the entire “action area” of the proposed project by considering all the potential “effects of the action,” including potential direct, indirect, and cumulative effects, to federally-listed species or their critical habitat as defined in 50 CFR 402.02. This includes effects of any “interrelated actions” that are part of a larger action and depend on the larger action for their justification and “interdependent actions” that have no independent utility apart from the action under consideration (e.g.; utilities, access roads, etc.) and future actions that are reasonably certain to occur as a result of the proposed project (e.g.; development in response to a new road). If your project is likely to have significant indirect effects that extend well beyond the project footprint (e.g., long-term impacts to water quality), we highly recommend that you

coordinate with the Service early to appropriately define your action area and ensure that you are evaluating all the species that could potentially be affected.

We must advise you that our database is a compilation of collection records made available by various individuals and resource agencies available to the Service and may not be all-inclusive. This information is seldom based on comprehensive surveys of all potential habitats and, thus, does not necessarily provide conclusive evidence that species are present or absent at a specific locality. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list.

Please note that "critical habitat" refers to specific areas identified as essential for the conservation of a species that have been designated by regulation. Critical habitat usually does not include all the habitat that the species is known to occupy or all the habitat that may be important to the species. Thus, even if your project area does not include critical habitat, the species on the list may still be present.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and associated information. To re-access your project in IPaC, go to the IPaC web site (https://ecos.fws.gov/ipac/), select "Need an updated species list?", and enter the consultation code on this letter.

ESA Obligations for Federal Projects:

Under sections 7(a)(1) and 7(a)(2) of the ESA and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

If a Federal project (a project authorized, funded, or carried out by a federal agency) may affect federally-listed species or critical habitat, the Federal agency is required to consult with the Service under section 7 of the ESA, pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). Recommended contents of a Biological Assessment are described at 50 CFR 402.12. For projects other than major construction activities, the Service suggests that a biological evaluation

similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat.

ESA Obligations for Non-federal Projects:

Proposed projects that do not have a federal nexus (non-federal projects) are not subject to the obligation to consult under section 7 of the ESA. However, section 9 of the ESA prohibits certain activities that directly or indirectly affect federally-listed species. These prohibitions apply to all individuals subject to the jurisdiction of the United States. Non-federal project proponents can request technical assistance from the Service regarding recommendations on how to avoid and/or minimize impacts to listed species. The project proponent can choose to implement avoidance, minimization, and mitigation measures in a proposed project design to avoid ESA violations.

Additional Species-specific Information:

In addition to the species list, IPaC also provides general species-specific technical assistance that may be helpful when designing a project and evaluating potential impacts to species. To access this information from the IPaC site (https://ecos.fws.gov/ipac/), click on the text "My Projects" on the left of the black bar at the top of the screen (you will need to be logged into your account to do this). Click on the project name in the list of projects; then, click on the "Project Home" button that appears. Next, click on the "See Resources" button under the "Resources" heading. A list of species will appear on the screen. Directly above this list, on the right side, is a link that will take you to pdfs of the "Species Guidelines" available for species in your list. Alternatively, these documents and a link to the "ECOS species profile" can be accessed by clicking on an individual species in the online resource list.

Next Steps:

Requests for additional technical assistance or consultation from the Kentucky Field Office should be submitted following guidance on the following page http://www.fws.gov/frankfort/PreDevelopment.html and the document retrieved by clicking the "outline" link at that page. When submitting correspondence about your project to our office, please include the Consultation Tracking Number in the header of this letter. (There is no need to provide us with a copy of the IPaC-generated letter and species list.)

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
(502) 695-0468

Project Summary

Consultation Code: 04EK1000-2019-SLI-1099

Event Code: 04EK1000-2019-E-03083

Project Name: Eastern Parkway Transportation Study

Project Type: TRANSPORTATION

Project Description: Road improvements

Project Location:
Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/38.22407862724184N85.73009553808168W

Counties: Jefferson, KY

Endangered Species Act Species

There is a total of 14 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 12 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Bat *Myotis grisescens*	Endangered
Indiana Bat *Myotis sodalis*	Endangered
Northern Long-eared Bat *Myotis septentrionalis*	Threatened

Gray Bat *Myotis grisescens*
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6329
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/21/office/42431.pdf

Indiana Bat *Myotis sodalis*
There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:
- All activities in this location should consider possible effects to this species. The project area includes "potential" habitat.

Species profile: https://ecos.fws.gov/ecp/species/5949
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/1/office/42431.pdf

Northern Long-eared Bat *Myotis septentrionalis*
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The specified area includes areas in which incidental take would not be prohibited under the 4(d) rule. For reporting purposes, please use the "streamlined consultation form," linked to in the "general project design guidelines" for the species.

Species profile: https://ecos.fws.gov/ecp/species/9045
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/10043/office/42431.pdf

Clams

NAME	STATUS
Clubshell *Pleurobema clava*	Endangered

Population: Wherever found; Except where listed as Experimental Populations
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/3789
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/352/office/42431.pdf

Fanshell *Cyprogenia stegaria* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, Ohio, Rolling Fork Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/4822
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/368/office/42431.pdf

Northern Riffleshell *Epioblasma torulosa rangiana* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/527
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/374/office/42431.pdf

Orangefoot Pimpleback (pearlymussel) *Plethobasus cooperianus* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significanlty impact, directly or indirectly, the following rivers: Green, Ohio, Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/1132
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/340/office/42431.pdf

Purple Cat's Paw (=purple Cat's Paw Pearlymussel) *Epioblasma obliquata obliquata* — Endangered

Population: Wherever found; Except where listed as Experimental Populations
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/5602
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/323/office/42431.pdf

NAME	STATUS
Rabbitsfoot *Quadrula cylindrica cylindrica*	Threatened

There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Ohio, Rolling Fork Salt, South Fork Kentucky, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/5165
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/3645/office/42431.pdf

Ring Pink (mussel) *Obovaria retusa* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Ohio, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/4128
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/341/office/42431.pdf

Rough Pigtoe *Pleurobema plenum* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/6894
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/338/office/42431.pdf

Sheepnose Mussel *Plethobasus cyphyus* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Kentucky, Licking, Ohio, Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/6903
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/7816/office/42431.pdf

Spectaclecase (mussel) *Cumberlandia monodonta* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Little South Fork of the Cumberland, Ohio, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/7867
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/4490/office/42431.pdf

Flowering Plants

NAME	STATUS
Running Buffalo Clover *Trifolium stoloniferum*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2529
Species survey guidelines:
https://ecos.fws.gov/ipac/guideline/survey/population/1041/office/42431.pdf
Habitat assessment guidelines:
https://ecos.fws.gov/ipac/guideline/assessment/population/1041/office/42431.pdf

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

PHOTOGRAPHS

Photograph 1: View of Eastern Parkway (US ALT 60) and surrounding habitat near the beginning of the project at the western terminus facing east. August 14, 2019.

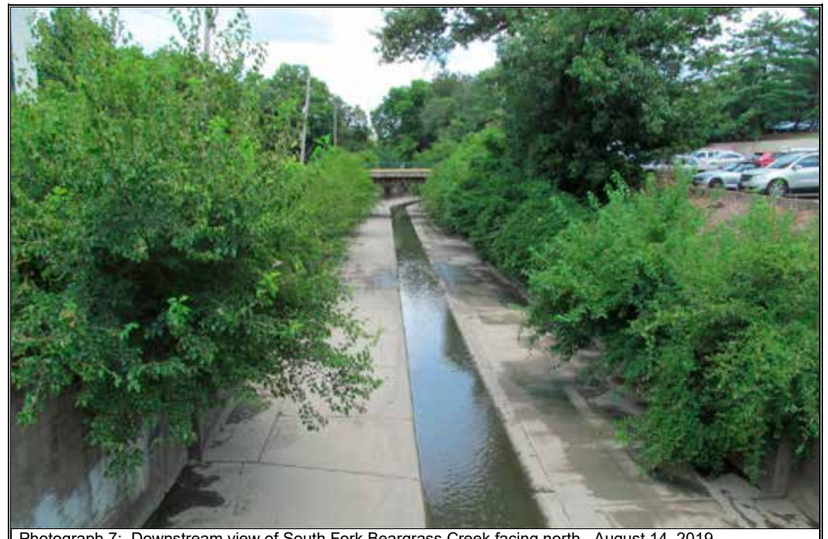
Photograph 2: View of Eastern Parkway under Interstate 65 overpass facing east. August 14, 2019.

Photograph 3: View of Eastern Parkway between Preston Highway (US 61) and Ellsworth Avenue facing west. August 14, 2019.

Photograph 4: View of Eastern Parkway between Preston Highway and Alexander Avenue facing west. August 14, 2019.

Photograph 5: View of Eastern Parkway between Poplar Level Road (KY HWY 864) and Ash Street facing west. August 14, 2019.

Photograph 6. Upstream view of South Fork Beargrass Creek from Eastern Parkway. The stream including the low-flow channel is made of concrete. August 14, 2019.



Photograph 7: Downstream view of South Fork Beargrass Creek facing north. August 14, 2019.

Photograph 8. View facing east of the walking path located in the medium of Eastern Parkway. The walking path is only found in a portion of the project between Barret Avenue and Newburg Road (KY HWY 1703). August 14, 2019.

Photograph 9: View facing east of Eastern Parkway between Willow Avenue and Cherokee Parkway. This portion of the project is the only section that is two lanes for driving and parking is permitted. August 14, 2019.

Photograph 10. View facing east of the eastern terminus of the project at the entrance to Cherokee Park. August 14, 2019.

Appendix B

Eastern Parkway Environmental Overview

REDWING ECOLOGICAL SERVICES, INC. 1139 South Fourth Street • Louisville, KY 40203 • Phone 502.625.3009 • Fax 502.625.3077

April 10, 2020

Mr. David Stills, P.E.
Gresham, Smith and Partners
111 W Main Street, Suite 201
Louisville, Kentucky 40202

Subject: **Environmental Overview**
Eastern Parkway Transportation Study
Jefferson County, Kentucky
KYTC Item No.: 5-3213.00
Redwing Project No.: 18-142

Dear Mr. Stills:

Redwing Ecological Services, Inc. (Redwing) is pleased to submit this Environmental Overview in support of the Eastern Parkway Transportation Study in Jefferson County, Kentucky. This overview is intended to identify significant environmental features in the vicinity of the proposed project and to assist Louisville Metro Public Works in evaluating the environmental effects of the proposed improvements. The overview summarizes potential impacts to air quality, highway noise, terrestrial and aquatic ecology, socioeconomics, cultural resources, Section 4(f) and 6(f) resources, and hazardous materials as a result of the project.

We appreciate the opportunity to work with you on this important project. If you have any questions regarding this report or the overall project, please do not hesitate to call Richard Clausen at (502) 625-3009.

Sincerely,

Seth R. Bishop (Apr 10, 2020)

Seth R. Bishop
Senior Ecologist

Richard S. Clausen by sjb

Richard S. Clausen
Principal
Senior Ecologist

P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Report\Environmental Overview\Environmental Overview_Eastern Parkway.docx

DRAFT

ENVIRONMENTAL OVERVIEW

EASTERN PARKWAY TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY

KYTC Item No. 5-3213.00

Prepared for:

LOUISVILLE METRO PUBLIC WORKS

April 2020

ENVIRONMENTAL OVERVIEW

EASTERN PARKWAY TRANSPORTATION STUDY

JEFFERSON COUNTY, KENTUCKY

KYTC Item No. 5-3213.00

Prepared for:

LOUISVILLE METRO PUBLIC WORKS

Submitted to:

GRESHAM SMITH

Prepared by:

REDWING ECOLOGICAL SERVICES, INC.

Seth R. Bishop (Apr 10, 2020)

Seth R. Bishop
Senior Ecologist

Richard S. Clausen by sjb

Richard S. Clausen
Principal
Senior Ecologist

April 10, 2020

EXECUTIVE SUMMARY

The Eastern Parkway Transportation Study was requested by Louisville Metro Public Works to identify and evaluate alternative designs for the rehabilitation and preservation of Eastern Parkway from Third Street to Cherokee Park. Anticipated improvements will occur along 3.35 miles of Eastern Parkway from the Hahn Street intersection to the entrance of Cherokee Park. The purpose of the project is to improve safety for all transportation methods, improve connectivity, and increase opportunities for multimodal transportation along Eastern Parkway, while improving stormwater drainage, landscaping, and respecting the history of the original Olmsted design.

An environmental overview was conducted for the proposed project to identify significant environmental features in the project vicinity and assist Louisville Metro Parks in evaluating the potential environmental, social, and economic effects of the proposed improvements. Prior to the overview, a project corridor was developed along Eastern Parkway based on areas where potential impacts from the project may occur. This report presents potential environmental, social, and economic impacts associated with the construction of the Preferred Alternative for the project.

The Preferred Alternative would reduce Eastern Parkway from four 10-foot wide driving lanes to two 10-foot wide driving lanes with a 10 to 12-foot wide center two-way left turn lane. Six-foot wide light vehicle lanes would be added immediately adjacent to the driving lanes. This alterative would also include the installation of a 10-foot wide shared-use path along the north side of Eastern Parkway and a six-foot wide sidewalk along the south side throughout the project corridor. Intersection improvements will also be included at major intersections to address the need for improved safety. Improvements to stormwater drainage and landscaping would also occur along the project corridor.

The Preferred Alternative includes two exceptions to the three-lane cross section, including Eastern Parkway east of Bardstown Road and the divided section between Barret and Baxter Avenues. Two alternatives are being considered for the portion of Eastern Parkway east of Bardstown Road. One alternative includes a two-lane configuration with one 11-foot wide shared travel lane in each direction and eight-foot delineated parking on both sides. The second alternative includes a two-lane configuration with an 11-foot wide eastbound shared travel lane, a 10-foot wide westbound travel lane, a five-foot wide westbound light vehicle lane, and eight-foot wide delineated parking on both sides. For both alternatives, the 10-foot wide shared-use path would be located on the south side of the road and the six-foot wide sidewalk would be constructed on the north side. Both configurations would allow green space to be recaptured on each side of the new curb and gutter.

Eastern Parkway between Barret and Baxter Avenues would be reduced to one 10-foot wide lane in each direction, with an adjacent six-foot wide light vehicle lane in each direction. A 10-foot wide shared-use path would be located adjacent to the curb on the north side, and a six-foot wide sidewalk will be located adjacent to the curb on the south side.

The Preferred Alternative may result in impacts to environmental features within the project corridor. Ecological impacts are limited to the removal of suitable summer roost trees for the Indiana and northern long-eared bats and potential impacts to the 100-year floodplain along South Fork Beargrass Creek. These impacts will likely require coordination with federal and state agencies.

Several historic properties were identified within and adjacent to the project corridor, including three National Register of Historic Places (NRHP)-listed historic districts, two NRHP-listed resources, and seven NRHP-eligible resources. The project corridor also has a high potential for archaeological resources based on previous investigations in the vicinity. Based on these findings, cultural historic and Phase 1 archaeological surveys are recommended prior to construction of the project. Both 4(f) and 6(f) resources are also present in the project corridor and could be impacted by the Preferred Alternative; therefore, further coordination regarding these resources will be required. Seven potential hazardous material sites were identified along the project corridor; however, the sites are considered to be adjacent to the project and are not expected to be disturbed during project construction. No socioeconomic impacts are expected from the Preferred Alternative, and the project is anticipated to be beneficial to the community and local economy.

Louisville Metro Parks has coordinated with the public through multiple advisory team meetings and three advertised public meetings. Comments and concerns from the meetings were used to help develop the Preferred Alternative for the proposed project.

TABLE OF CONTENTS

LIST OF FIGURES

Figure

1.0 INTRODUCTION

Eastern Parkway is located in the City of Louisville in Jefferson County, Kentucky and extends from the intersection with Third Street to Cherokee Park. Louisville Metro Public Works is conducting the Eastern Parkway Transportation Study to identify and evaluate alternative designs for the rehabilitation and preservation of a 3.35-mile corridor along Eastern Parkway from the Hahn Street intersection [Milepoint (MP) 3.848] to the entrance of Cherokee Park (MP 7.139) (Figure 1). The project is part of the overall Olmsted Parkway Shared-Use Pathway System Master Plan (2009), which was developed with the goal of improving multimodal mobility and safety while preserving the historic heritage of the Olmsted Parkway System.

Eastern Parkway is currently a four-lane undivided roadway classified as an urban collector, with average daily traffic (ADT) of around 17,000 vehicles and speed limits of 25 miles per hour (mph) and 35 mph. A four-lane divided section separated by a center median is present between Barret and Baxter Avenues (MP 6.105 to MP 6.441). A continuous sidewalk is present on the north side of Eastern Parkway along the entire project corridor, with the exception of the section between Barret Avenue and Baxter Avenue that has a path through the center median. The south side of Eastern Parkway lacks a continuous sidewalk from Poplar Level Road/Goss Avenue to Baxter Avenue.

This report presents an overview of the potential social, economic, and environmental impacts of the proposed project. The report is based on an assessment of the project corridor that included in-house research, agency coordination, and field surveys, as well as studies performed by Corn Island Archaeology, LLC (CIA) and Linebach Funkhouser, Inc. (LFI). The assessment was intended to identify significant environmental features in the project vicinity to assist Louisville Metro Parks in evaluating the environmental effects from the project.

2.0 PROJECT PURPOSE AND NEED

The purpose of the proposed project is to improve safety for all transportation methods, improve connectivity, and increase opportunities for multimodal transportation along Eastern Parkway. Development of the Olmsted Parkway Master Plan included identification of additional goals to guide project recommendations and improvements throughout the Parkway system, including Eastern Parkway. The goals were identified through an open process during the planning phase, which solicited review from a 50-member community advisory group. These goals include: ensuring that improvements are respectful of the historic Olmsted design; improving stormwater drainage; and improving landscaping.

The needs identified for the proposed project include improved safety, connectivity, and multimodal transportation, reduced congestion, and improved drainage and landscaping along this portion of Eastern Parkway, while maintaining the historic character of the corridor. Each of these interrelated project needs is discussed further below.

2.1 Safety

Data regarding vehicle collisions for the portion of Eastern Parkway in the project corridor from 2014 to 2018 was extracted from the Kentucky State Police database and analyzed by Gresham Smith. The project corridor was analyzed in three distinct segments based on varying amounts of ADT. The first corridor segment includes 0.607 mile between Hahn Street and Preston Street. This segment is a four-lane undivided roadway with an ADT of 16,752. The second segment consists of 0.973 mile between Preston Street and Lydia Street. This segment is also a four-lane undivided roadway with an ADT of 15,494. The final segment is 1.308 miles long, beginning at Lydia Street and ending at the Cherokee Park traffic circle. This segment is a four-lane undivided roadway, with exception of the divided segment between Barret and Baxter Avenues. ADT for this segment is 17,066. Data analysis for this segment ends at Bardstown Road due to the shift from four lanes to two lanes east of the Bardstown Road intersection. The crash histories for each segment of the corridor were utilized to develop crash rates. The crash rates for each segment are shown in the following table, as well as statewide crash rates for similar Urban Four-Lane Undivided Parkways reported in the *Analysis of Crash Data in Kentucky (2014-2018)* developed by the Kentucky Transportation Center.

Corridor Segment	Average Total Crashes	Average Total Crashes with Injury	Corridor Crash Rate	Corridor Injury Crash Rate	2013-2017 Statewide Crash Rate	2013-2017 Statewide Injury Crash Rate
Hahn St. to Preston St.	56	8	1,503	216	578	91
Preston St. to Lydia St.	67	13	1,210	233	578	91
Lydia St. to Bardstown Rd.	82	8	978	96	544	87

Note: Crash rates are based on the number of crashes per hundred million vehicles miles.

As shown in the table, crash rates within the project corridor are nearly double the statewide average, documenting that Eastern Parkway is less safe than similar four-lane undivided urban facilities. The higher crash rates are likely attributed to high speeds, imbalanced lane usage, weaving maneuvers, access management issues, and recurring congestion.

The crash data was also grouped by collision type to examine trends that occur within the project corridor. A total of 1,344 collisions occurred within the project corridor between 2014 and 2018. The most common collision type was rear-end collision (37%), followed by angle (23%), sideswipe – same direction (18%), and single vehicle collisions (9%). The types of crashes along the project corridor are summarized in the following table.

Manner of Collision	Number of Crashes	Percentage of Crashes
Angle	310	23%
Backing	42	3%
Head On	22	2%
Opposing Left Turn	77	6%
Rear End	492	37%
Sideswipe – Opposite Direction	28	2%
Sideswipe – Same Direction	246	18%
Single Vehicle	127	9%
Total	**1,344**	**100%**

The collision data documents safety concerns within the project corridor and the need for the project to address these concerns. On four-lane undivided highways, vehicles frequently brake and accelerate due to vehicles stopped in the interior lane waiting to turn left, resulting in a higher frequency of rear-end collisions. These conditions also lead to increased angle and sideswipe collisions as drivers weave in and out of traffic to avoid left-turning vehicles. The presence of numerous driveways and other ingress/egress points throughout the corridor also results in slowed or stopped traffic in the right travel lane that leads to collisions.

The majority of crashes (73%) in the project corridor occurred at intersections, where increased stopping and turning movements create a higher potential for collisions. The following table shows the number of crashes at the busiest intersections along the project corridor, as well as crashes that resulted in injury.

Intersection	Number of Crashes	Injury Crashes
Crittenden Dr.	79	8
Bradley Ave.	76	12
Preston St. and Shelby St.	180	28
Burnett Ave.	55	8
Poplar Level Rd./Goss Ave.	78	10
Castlevale Dr.	54	6
Barret Ave.	83	15
Baxter Ave.	107	9*
Norris Pl.	54	5
Bardstown Rd.	221	18
Total	**987**	**119**

* includes one fatality

The intersection crash data shows that the highest number of collisions occurred at the Bardstown Road intersection, followed by the Preston Street/Shelby Street and Baxter Avenue intersections. Injury crashes were highest at the Preston Street/Shelby Street, Bardstown Road, and Barret Avenue intersections. The high number of crashes and injuries at these intersections, as well as the higher occurrence of crashes at intersections compared to the rest of the parkway, indicate the need to improve safety at intersections along the project corridor.

The existing configurations at several of these intersections also appear to contribute to the higher crash rate. The intersection of Crittenden Drive and Eastern Parkway is located approximately 133 feet east of the I-65 northbound exit ramp, and exiting vehicles proposing to turn left onto Crittenden Drive are required to cross two through lanes within this short distance to reach the left turn lane. This configuration results in significant weaving from the right turn lane to the left turn lane of Eastern Parkway and creates unsafe conditions for vehicles, pedestrians, and bicyclists. These conditions also result in increased congestion and reduced traffic flow at the intersection.

The intersection with Bradley Drive is located in a turn of Eastern Parkway, resulting in an offset and skewed intersection. This configuration causes limited sight distance for left turning traffic, contributing to crashes and an unsafe pedestrian area.

The intersections of Eastern Parkway with Preston Street and Shelby Street are located in close proximity to each other and are both signalized intersections. Their proximity requires split phasing of the approaches and a long all-red clearance interval for traffic on Eastern Parkway, which results in significant capacity issues along the parkway. In addition, left turns onto Preston and Shelby Streets from Eastern Parkway are currently prohibited.

Traffic volumes at the intersection of Poplar Level Road and Goss Avenue are significantly higher than other intersections in the project corridor, resulting in safety issues for all users. High numbers of turning vehicles at Poplar Level Road also create congestion and reduce traffic flow. The eastbound channelized right turn lane from Eastern Parkway to Poplar Level Road has limited sight lines, which has been confirmed to be a safety issue by the crash data.

Crash analysis at the intersection of Eastern Parkway and Barret Avenue shows a high rate of single vehicle crashes. Eastern Parkway transitions between a four-lane divided roadway and a four-lane undivided roadway at the intersection that requires lane shifts, and the curvature of the parkway results in decreased sight lines. The current configuration also creates hazardous conditions for bicyclists and pedestrians crossing Eastern Parkway or accessing the central median east of the intersection.

Traffic volumes along Baxter Avenue are higher than other intersecting roads along this portion of the project corridor, and the limited right-of-way constrains capacity at the intersection. Currently, left turns from Eastern Parkway are prohibited during the morning and afternoon peak periods. Additionally, the central median west of the intersection complicates the geometry of Eastern Parkway similar to that experienced at Barret Avenue.

Southbound queuing on Bardstown Road during the afternoon peak causes delays for eastbound vehicles turning right from Eastern Parkway. This condition results in queuing on Eastern Parkway, as the existing right lane shares both through and right turning traffic.

The safety of bicyclists and pedestrians is also an issue of concern at intersections in the project corridor. Four-lane undivided roadways without refuge islands increase the number of traffic lanes to be crossed and, therefore, the number of potential conflict points between bicyclists, pedestrians, and vehicles. Eastern Parkway generally lacks a central refuge area except for the bifurcated section, and access to the central island in this section is disjunct. The lack of separate bicyclist facilities decreases the overall safety of the parkway.

Vehicle speeds were also collected and analyzed at one location within each corridor segment. The results of the speed analysis for the westbound and eastbound lanes within each segment are shown in the following table.

Cross Street Detector Location	Posted Speed	Average Speed	50th Percentile Speed	85th Percentile Speed	95th Percentile Speed
Westbound					
Sherry Rd.	35	30	28	34	37
Delor Ave.	35	35	34	40	44
Quadrant Ave.	35	35	33	39	43
Eastbound					
Sherry Rd.	35	32	30	38	51
Delor Ave.	35	35	33	39	43
Quadrant Ave.	35	29	29	36	39

Note: Speed measured in miles per hour.

The speed analysis shows that greater than 15% of vehicles are traveling above the posted limit. The Sherry Road detector was located in the Hahn Street to Preston Street project segment (16,752 ADT). The Delor Avenue detector was located in the Preston Street to Lydia Street project segment (15,494 ADT), which exhibited the highest injury crash rate. The Quadrant Avenue detector was located in the Lydia Street to Bardstown Road project segment (17,066 ADT).

Speed has a direct impact on the safety and comfort of all users, and the current minimal separation between vehicles and pedestrians, bicyclists, and other users further exacerbates the impacts of speeding. According to the FHWA, a pedestrian hit at 40 mph has an 85% chance of fatality, while a pedestrian hit at 20 mph has only a 5% chance of fatality. This data shows the need to reduce vehicle speeds and encourage drivers to follow the posted speed limits to increase safety for pedestrians/bicyclists. Reduced speeds will also increase safety for vehicular users by reducing the potential for collisions and allowing better ingress and egress to the parkway from side streets, entrances, and residential driveways.

2.2 Connectivity

Eastern Parkway was designed as part of the Olmsted Parkways system to provide a park-like corridor to link the various Olmsted Parks and surrounding neighborhoods via a variety of transportation methods (e.g., vehicular, bicycle, and pedestrian). Subsequent to the design and construction of the parkway, the surrounding area has undergone significant residential and commercial development, leading to encroachments such as curb cuts, driveways, and signage. Pedestrian facilities are present within the project corridor; however, they are not continuous. Sidewalks along the parkway are varied and inconsistent, and crosswalks and signals are inadequate in several areas. The median between Baxter and Barret Avenues, which serves as the primary route for pedestrians and bicyclists along this portion of the parkway, is difficult to access from other sidewalks along the corridor. Bicycle lanes are also absent from the parkway. The discontinuous sidewalks and lack of bicyclist facilities impedes forms of transportation other than motor vehicles, which limits the usefulness of the parkway as a multimodal connection to resources.

2.3 Multimodal Transportation

The existing project corridor provides limited opportunities for modes of transportation other than motor vehicles, although the Traffic Authority of River City (TARC) services 49 bus stops throughout the project corridor. Improved connectivity along the parkway through the creation of continuous pedestrian and bicyclist facilities would increase the effectiveness of bus service and allow for connections to other resources. Improved pedestrian facilities could be used to enhance the accessibility and safety of existing TARC stops.

Major impediments to efficient and comfortable bicyclist and pedestrian movements exist along Eastern Parkway due to narrow lanes, high-speed traffic, and free flow entry and exit ramps/lanes at the I-65 interchange and some major street intersections. As previously discussed, no bicycle lanes exist along the parkway, forcing bicyclists to share lanes with vehicular traffic, presenting safety issues for even the most experienced cyclists. Cyclists who are less comfortable navigating the parkway (i.e., recreational users and children) are forced to share the narrow, discontinuous sidewalks with pedestrian traffic. The parkway can also be an obstacle for pedestrians due to high-speed traffic and multiple travel lanes to cross with no refuge. Collision data, presented under the safety section, illustrates the need to ensure bicyclist and pedestrian facilities are provided separately from vehicular traffic.

2.4 Character

The historic character of the original parkway design has deteriorated along much of Eastern Parkway. As previously discussed, various encroachments are present throughout the parkway, and removal or replacement of trees has occurred in many areas. Installation of free flow ramps at the I-65 interchange and expansion of the Poplar Level Road and Crittenden Drive intersections to five lanes with free-flowing right turn lanes resulted in removal of the trees along the parkway in these areas. These changes have affected the parkway setting and changed the character of the area.

2.5 Drainage

Drainage along Eastern Parkway, with the exception of the portion from Crittenden Drive to Third Street, is provided by concrete gutters with elevations below road level that drain to catch basins. The gutters are four-feet wide and up to one foot deep, which creates the appearance of a wider travel lane. The depth of the gutters creates a safety concern for vehicles in this portion of the project corridor. The gutters have been impacted by the first row of trees, which have damaged the gutters through root and trunk growth. Driveway extensions of varying types have been installed to facilitate access from adjacent properties to the Parkway. These extensions block or impede drainage, collect trash and debris, and greatly reduce the effectiveness of the drainage system.

2.6 Landscape

Generally, Eastern Parkway has a 120-foot wide cross section with a central 40-foot wide roadway and 40-foot wide greenspace on each side of the roadway. The greenspace was intended by Olmsted to include two rows of planted trees, with pin oak (*Quercus palustris*) and other oaks being the dominant species. Due to storms, construction, development, landowner encroachment, utility maintenance, and a variety of

other reasons, portions of the tree canopy have been removed, which affects the character of the parkway. Additionally, the health of numerous trees within the project corridor is declining.

3.0 PROJECT DESCRIPTION

Alternatives developed for the proposed project include three build alternatives and a no-build alternative. A summary of each alternative is provided below.

3.1 No-Build Alternative

The No-Build Alternative provides a baseline of comparison for the other alternatives. This alternative would include routine maintenance of the current roadway and facilities. While this alternative will reduce costs in the short term, it will not address vehicular/pedestrian/bicyclist safety, improve connectivity, increase multimodal transportation, or improve drainage or landscaping. This alternative will also not restore the historic character of Eastern Parkway in areas where substantial changes have altered the original design. The No Build Alternative does not result in social, economic, or environmental impacts and does not require substantial investment of taxpayer money; however, this alternative does not address the purpose and need of the project.

3.2 Build Alternatives

The three Build Alternatives for the proposed project include a two-lane alternative, a three-lane alternative, and a four-lane alternative. The typical section for each alternative is included in Appendix A. All three alternatives would include the installation of a 10-foot wide shared-use path along the north side of Eastern Parkway and a six-foot wide sidewalk along the south side throughout the project corridor. The alternatives would also involve similar improvements to stormwater drainage and landscaping in the project corridor. The primary difference between the three alternatives is the reconfiguration of the existing driving lanes, which is discussed further below.

The three Build Alternatives for the proposed project include:

- Two-lane Alternative – This alternative would reduce the roadway from four 10-foot wide driving lanes to two 10-foot wide driving lanes. Six-foot wide light vehicle lanes for bicycles, scooters, and other transportation modes would be added in each direction and would be separated from the driving lanes by two feet.
- Three-lane Alternative – This alternative would reduce the roadway from four 10-foot wide driving lanes to two 10-foot wide driving lanes with a 10 to 12-foot wide center two-way left turn lane (TWLTL). Six-foot wide light vehicle lanes would be added immediately adjacent to the driving lanes.
- Four-lane Alternative – This alternative would maintain the four 10-foot wide driving lanes of the current roadway, but increase the distance to the curb from four to six feet in width.

3.3 Preferred Alternative (Three-lane Alternative)

The three-lane alternative provides the greatest improvement to the project corridor and most adequately addresses the purpose and need of the proposed project; therefore, the three-lane alternative is recommended as the Preferred Alternative. The safety benefits of moving from a four-lane configuration to a three-lane configuration are significant, and the Federal Highway Administration (FHWA) recognizes this as a proven safety countermeasure. Roadway reconfigurations (also known as road diets) nationally produce a 19% to 47% reduction in crashes, and Louisville Metro has had great success implementing road diets on roadways similar to Eastern Parkway. For example, the Grinstead Drive roadway reconfiguration experienced a 59% reduction in crashes and a 74% reduction in injury crashes, with a 76% reduction in total number of injuries during the first two years following completion. Roadway reconfigurations address rear-end, left turn, and right-angle crashes. Rear-end crashes were identified as the largest contributor to crash history (2014-2018) on Eastern Parkway at 37%, followed closely by angle crashes at 23%. These two crash types alone account for over 60% of crashes on the parkway and are appropriately addressed with a roadway reconfiguration.

The reduction from four driving lanes to two driving lanes with a center two-way left turn lane (TWLTL) promotes multimodal transportation by improving safety and access for pedestrians and other vulnerable modes of transportation using the corridor. This is accomplished through traffic calming, reducing the number of travel lanes to cross, providing opportunities for refuge islands, and providing light vehicle lanes. Roadway reconfigurations also have the added benefit of improving access for emergency response vehicles through the use of the center TWLTL and, therefore, reduce response time (FHWA 2020). Generally, implementation of a roadway reconfiguration involves a change of striping; however, implementation of the road diet may require physical changes to improve safety and accommodate the volume of traffic at several points along Eastern Parkway.

In addition to the overall roadway reconfiguration, the existing valley curbs and gutters will be replaced throughout the project corridor to address existing drainage issues. The space gained from reducing motor vehicle lanes and replacing the curbs and gutters will be used to create six-foot wide light vehicle lanes to accommodate bicyclists and scooter users who are comfortable operating near motor vehicle traffic. Safe, functional, and separated modes of transportation are an integral part of the Olmsted parkway character. The reconfiguration will continue the improvements made along Eastern Parkway through the University of Louisville campus in the western portion of the project corridor will connect to existing light vehicle lanes on Eastern Parkway and Poplar Level Road, and will provide direct access to the trails in Cherokee Park.

The current discontinuous network of sidewalks on the south side of Eastern Parkway limit access for pedestrians. The Preferred Alternative includes rehabilitation of the existing sidewalk pavement and connecting the network on the south side of Eastern Parkway to provide a continuous six-foot wide sidewalk for the entirety of the parkway. Additionally, the 10-foot wide shared-use path along the north side of the roadway will provide a safe alternative for walking, bicycling, or scootering, for people who are uncomfortable using those modes of transportation near motor vehicle traffic. When the continuous sidewalks and shared-use path are combined with the light vehicle lanes, Eastern Parkway will become a strong multimodal facility, connecting the communities and residents along the corridor.

Verges throughout the project corridor will vary due to existing topographic restraints that will control the placement of the shared-use path and sidewalk relative to the roadway curb. Wherever possible, the proposed path and sidewalk will utilize existing space already covered with impervious surface to reduce construction impacts on existing tree infrastructure and green space. The pathways will be designed to provide as much space for trees as possible within grade constraints. Where feasible, green space will be reclaimed from encroachments into parkway right-of-way, whether public or private, and these areas will be revegetated during the construction process.

Exceptions to the three-lane cross section include Eastern Parkway east of Bardstown Road and the divided section between Barret and Baxter Avenues. The portion of Eastern Parkway east of Bardstown Road currently consists of two driving lanes with parking on both sides of the roadway. In order to maintain parking availability for residents lacking other parking options, two alternatives were developed. The first alternative includes a two-lane configuration with one 11-foot wide shared travel lane in each direction and eight-foot delineated parking on both sides. This configuration allows four feet of green space to be recaptured on each side of the new curb and gutter. The second alternative includes a two-lane configuration with an 11-foot wide eastbound shared travel lane, a 10-foot wide westbound travel lane, a five-foot wide westbound light vehicle lane, and eight-foot wide delineated parking on both sides. This configuration allows two feet of green space to be recaptured on each side of the new curb and gutter. While the first alternative is more similar to the existing layout of this section and provides the greatest opportunity to recapture green space, the second alternative provides additional access for light vehicles and still allows for minor recapturing of green space. For both alternatives, the 10-foot wide shared-use path will be located on the south side of the road to avoid heavy traffic and safety concerns associated with Willow Avenue. The six-foot wide sidewalk will be constructed on the north side of the road through this section. A preferred alternative for this section will be selected during a subsequent phase of the project.

The section between Barret and Baxter Avenues will remain a divided roadway with a central median. However, the two existing driving lanes will be reduced to one 10-foot wide lane in each direction, with an adjacent six-foot wide light vehicle lane in each direction. A 10-foot wide shared-use path will be located adjacent to the curb on the north side, and a six-foot wide sidewalk will be located adjacent to the curb on the south side. Bicyclists may use the light vehicle lane or travel along the shared-use path, as access ramps to and from the path from the light vehicle lanes will be available at either end of this section. The required emergency access width of 18 feet will be maintained on each side of the center median by maintaining a one-foot offset between the driving lane and the median curb, as well as a one-foot offset between the light vehicle lane and the outside curb.

Intersection improvements will also be included under this alternative to address the need for improved safety in the identified areas. The Eastern Parkway intersections with the following roads were reviewed under this study: Crittenden Drive, Bradley Avenue, Preston/Shelby Streets, Poplar Level/Goss Avenue, Barret Avenue, Baxter Avenue, and Bardstown Road. Alternatives have been designed for these intersections; however, preferred alternatives have not been selected. The selection of preferred intersection alternatives will be completed during a subsequent phase of the project.

4.0 ENVIRONMENTAL SETTING

The general environmental setting of the project corridor is presented below in terms of climate, physiography, topography, geology, and watershed.

4.1 Climate

The *Soil Survey of Jefferson County, Kentucky* describes the climate of Jefferson County as temperate, with an average winter temperature of 34.8° F and average summer temperature of 75.9° F. The average annual total precipitation is 44.41 inches, with 26.2 inches (59%) occurring from April through October. The growing season for most crops is approximately 202 days five years out of 10 and falls within this period (Blanford et al. 2005).

4.2 Physiography

The proposed project is located in Jefferson County, which is located in the north-central portion of Kentucky. The majority of Jefferson County is located within the Outer Bluegrass physiographic region, with the southwestern portion located in the Knobs region. Jefferson County is bordered by Oldham County to the northeast, Shelby County to the east, Spencer County to the southeast, Bullitt County to the south, and the Ohio River to the west and northwest.

Outer Bluegrass Physiographic Region

The rolling to hilly Outer Bluegrass physiographic region contains sinkholes, springs, entrenched rivers, and intermittent and perennial streams (Woods et al. 2002). This region is underlain by Ordovician, Silurian, and Devonian limestone and is divided based on differences between the erodibility of the underlying limestones. These easily eroded limestones and shales cause this area to have deep valleys with small amounts of flat land (KGS 2020a). Natural soil fertility is high, and pastureland and cropland are widespread. Woodland is primarily limited to dissected areas. Upland streams have moderate to high gradients with cobble, boulder, or bedrock substrates. Concentrations of suspended sediment and nutrients in these streams can be high (Woods et al. 2002).

Knobs Physiographic Region

The Knobs physiographic region consists of broad floodplains, terraces, foothills, erosional remnants, and escarpments. The term “knobs” refers to the hundreds of isolated, steep, conical-shaped hills located throughout the region. These formations are comprised of erosionally-resistant limestone or sandstone caps with shale side slopes that are less resistant to erosion than the overlying caps (KGS 2018b). The soil composition of the knobs supports mixed deciduous forests, and the majority of the knobs remain forested. Pastureland and cropland are typically present in the adjacent valleys. Perennial upland streams are present throughout the region (Woods et al. 2002).

4.3 Topography

The topography of Jefferson County varies between rolling to hilly land in the extreme eastern portion of the county, tableland of low relief in the central and northern portions, and knobs in the southwestern corner. The land generally slopes to the southwest, from elevations of 790 feet above mean sea level (msl) in the

east to 500 feet above msl in the southwest and 430 feet above msl along the Ohio River floodplain. Floyds Fork and Harrods Creek have formed valleys from 150 to 200 feet below the tableland in the east-central part of the county. The highest elevation of 902 feet above msl is located in the southwestern portion of the county. The lowest elevation in Jefferson County, 383 feet above msl, is the normal pool elevation of the Ohio River at the mouth of the Salt River (McGrain and Currens 1978).

The project corridor is flat to rolling and ranges in elevation from approximately 450 to 540 feet above msl. The project can be found on the Louisville West and Louisville East USGS 7.5-minute topographic quadrangle maps (Figure 1).

4.4 Geology

The project corridor is primarily underlain by loess in the western portion and Sellersburg and Jeffersonville limestones in the eastern portion. Small areas of glacial outwash, lacustrine deposits, alluvium, and Louisville limestone are also present in the project corridor. The eastern portion of the project corridor has medium to high karst potential, and two sinkholes are mapped along Eastern Parkway near Poplar Level Road. No other significant geologic features are mapped in the project corridor (KGS 2020).

The majority of the project corridor is located within the Urban Land-Udorthents and Urban Land-Alfic Udarents, and Urban Land-Alfic Udarents-Crider soil complexes. These soils range from 0 to 50 percent slopes and are all non-hydric soils (NRCS 2020).

4.5 Watershed

The project corridor is located within the Silver-Little Kentucky (HUC 05140101) 8-digit watershed; the Beargrass Creek-Ohio River (HUC 0514010109) 10-digit watershed; and the Ohio River (HUC 05140101260010), South Fork Beargrass Creek (HUC 05140101250020), and Middle Fork Beargrass Creek (HUC 05140101250010) 14-digit watersheds. The majority of the project corridor drains to South Fork and Middle Fork Beargrass Creek, which flow northwest to Beargrass Creek and eventually into the Ohio River (KDOW 2020).

5.0 SUMMARY IMPACT ANALYSIS

Impacts to environmental resources as a result of the Preferred Alternative are discussed in more detail below. The No Build Alternative will not result in impacts to environmental resources; however, this alternative does not meet the purpose and need for the project.

5.1 Air Quality Overview

The project is included in Administrative Modification 2016.012 of Kentucky's Statewide Transportation Improvement Program for FY 2017-2020. The proposed project (KIPDA ID# 2142) is also listed in the FY 2018 – FY 2021 Transportation Improvement Program for the Louisville/Jefferson County, KY-IN Metropolitan Planning Area published by the Kentuckiana Regional Planning and Development Agency

(KIPDA) in July 2017. Transportation control measures are not required for Jefferson County, pursuant to the Transportation Conformity Rule Amendments of August 2004.

The proposed project is not located in an air quality non-attainment or maintenance area for ozone (O_3), or particulate matter (PM). The Louisville Area was redesignated by the Environmental Protection Agency to attainment for PM 2.5 on April 7, 2017. As a result, the 1997 standard was revoked, and the Louisville area is free from transportation conformity (including hot-spot analysis) for both ozone and PM. In addition, the Preferred Alternative does not increase vehicle capacity or add a lane in either direction of travel; therefore, there is no potential for meaningful Mobile Source Air Toxin (MSAT) effects from the project. Based on these factors, the Preferred Alternative is not expected to negatively impact ambient air quality in the project corridor. No air quality analysis was conducted for this overview.

5.2 Highway Noise Overview

Noise impacts are not anticipated from the Preferred Alternative. This alternative does not involve a new roadway, new alignment, or the addition of travel lanes and does not significantly alter existing traffic patterns. The distances between the parkway and adjacent residences and businesses will not be halved, and the project will not substantially reduce the shielding effect of landforms or noise barriers. As a result, the use of noise impact and abatement measures are not applicable. No noise analysis was conducted for this overview.

5.3 Terrestrial and Aquatic Ecology Overview

Redwing Ecological Services, Inc. completed an assessment of ecological resources within the project corridor on August 14, 2019. A detailed discussion of the assessment results is provided in the *Terrestrial and Aquatic Resources Assessment* dated September 25, 2019. A brief summary of the assessment results is included below.

5.3.1 Natural Habitats

The project is located in a highly developed urban area with abundant residential and commercial developments. The majority of the project corridor contains maintained lawns and landscaping associated with these developments. The lawns consist largely of tall fescue (*Schedonorus arundinaceus*) and Kentucky bluegrass (*Poa pratensis*), along with other non-native turf species.

Trees are also located throughout the project corridor within the maintained lawns and roadway right-of-way. Many of the larger trees were planted during construction of the parkway. Greenhaven Tree Care performed an assessment of the trees within the project corridor to determine their location, species, size, and condition. A total of 1,199 trees were identified in the project corridor, which range from small saplings with diameters-at-breast height (dbh) of a few inches to large mature trees with dbhs over 50 inches. The majority of large trees consist of native oak species including, in order of highest number to fewest number, pin oak, northern red oak (*Quercus rubra*), chinkapin oak (*Quercus muehlenbergii*), swamp white oak (*Quercus bicolor*), scarlet oak (*Quercus coccinea*), and bur oak (*Quercus macrocarpa*). Other large native trees include sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), green ash (*Fraxinus* pennsylvanica), sweetgum (*Liquidambar styraciflua*), black gum (*Nyssa sylvatica*), and sycamore (*Platanus*

occidentalis). Smaller native trees in the project corridor include flowering dogwood (*Cornus florida*), American yellowwood (*Cladrastis kentukea*), buckeye (*Aesculus* spp.), and Kentucky coffeetree (*Gymnocladus dioicus*). Numerous ornamental and non-native tree species have also been planted in the project corridor. Of the 1,199 trees assessed, 763 (64%) are rated in "Good" or "Good-Fair" condition. One tree is rated as "Good-Poor" due to the tree being in good condition but the species selection being poor for the location. Of the remaining trees, 339 (28%) are rated "Fair" or "Fair-Poor" and 95 (8%) are rated "Poor", with one tree noted as dead. Observed characteristics that affected the condition ratings included abnormal root system, auto damage, curb damage, extensive decay, girdling roots, hazardous, history of limb failure, poor placement, poor species selection, tip dieback, and weak crotch.

5.3.2 Jurisdictional Waters/Wetlands

Jurisdictional waters/wetlands within the project corridor are limited to one perennial stream, South Fork Beargrass Creek, in the central portion of the corridor (Figure 2). The stream flows through the project corridor for approximately 150 linear feet (0.155 acre) and is entirely channelized and lined with concrete. The Preferred Alternative will not result in impacts to the stream; therefore, the project will not require a Section 404 permit from the U.S. Army Corps of Engineers or Section 401 Water Quality Certification from the Kentucky Division of Water.

5.3.3 State Champion Trees

According to the list of Kentucky's Champion Trees on the Kentucky Department of Forestry website, no state champion trees are located within the project corridor (KDOF 2020).

5.3.4 Outstanding State Resource Waters and Wild Rivers

No Outstanding State Resource Waters, Wild Rivers, or other Special Use Waters are located within the project corridor (KDOW 2020). As a result, the Preferred Alternative will not result in impacts to Special Use Waters. Best management practices (BMPs) will be employed to protect aquatic resources from pollutants originating from runoff and sedimentation during project construction.

5.3.5 Federally-Listed Species

The USFWS's Information for Planning and Consultation (IPaC) website was used to obtain an official list of species and critical habitat that may occur within the vicinity of the project (USFWS 2020). As summarized in the following table, the review identified 14 federally-listed species that are known to occur or have the potential to occur in the project corridor. No designated critical habitat was identified within the vicinity of the project during the review. The IPaC official species lists for the project is provided in Appendix B.

Scientific Name	Common Name	Federal Status	Habitat Present
Mammals			
Myotis grisescens	gray bat	Endangered	No
Myotis septentrionalis	northern long-eared bat	Threatened	Summer Roosting
Myotis sodalis	Indiana bat	Endangered	Summer Roosting
Mussels			
Cumberlandia monodonta	spectaclecase	Endangered	No
Cyprogenia stegaria	fanshell	Endangered	No
Epioblasma torulosa rangiana	northern riffleshell	Endangered	No
Obovaria retusa	ring pink	Endangered	No
Plethobasus cooperianus	orangefoot pimpleback	Endangered	No
Epioblasma obliquata obliquata	purple cat's paw	Endangered	No
Pleurobema clava	clubshell	Endangered	No
Pleurobema plenum	rough pigtoe	Endangered	No
Plethobasus cyphyus	sheepnose	Endangered	No
Quadrula cylindrica cylindrica	rabbitsfoot	Threatened	No
Plant			
Trifolium stoloniferum	running buffalo clover	Endangered	No

An electronic data request was also submitted to the Office of Kentucky Nature Preserves (OKNP) requesting information regarding documented occurrences in the Natural Heritage Program Database for listed species or exemplary natural communities in the vicinity of the proposed project. On June 6, 2019, the OKNP provided a report of state and federally-listed species that are known to occur within the project vicinity. The report did not identify any federally-listed species within the project corridor. One record for the federally-endangered American burying beetle (*Nicrophorus americanus*) was included; however, the occurrence is located more than five miles southeast of the corridor. The OKNP report is included in Appendix B.

According to maps of known habitat for the Indiana and northern long-eared bats in the state of Kentucky maintained by the USFWS Kentucky Field Office, the proposed project is located within "Potential" habitat for both species (USFWS KFO 2019a, USFWS KFO 2019b). During the assessment, 225 trees in the project corridor were identified as suitable summer roosting habitat for the Indiana and northern long-eared bats (Figure 2). Removal of suitable Indiana and northern long-eared bat summer roosting habitat may be required for the Preferred Alternative, which will require consultation with the USFWS to address potential impacts to these species. Impacts can likely be addressed through the process identified in the 2015 Interim Programmatic Agreement for Forest Dwelling Bats between the FHWA, KYTC, and USFWS KFO (USFWS KFO 2015). This agreement will result in a contribution to the Imperiled Bat Conservation Fund for use in protection of these species. The final 4(d) Rule can be used to address impacts to the northern long-eared bat since the project is not located within 0.25 mile of a known hibernaculum or 150 feet of a known maternity roost tree.

No suitable habitat is present in the project corridor for the listed mussel species or running buffalo clover. South Fork Beargrass Creek is entirely channelized and lined with concrete and does not provide suitable substrate for mussels. Running buffalo clover prefers rich, mesic forests with partial to filtered sunlight that have periodic occurrences of moderate disturbance. The maintained lawns found throughout the project

corridor are regularly mowed and dominated by invasive species that typically outcompete running buffalo clover. In addition, the corridor lacks forested areas with partial to filtered sunlight. Based on the lack of suitable habitat for the listed mussel species and running buffalo clover in the project corridor, no adverse effects to these species are anticipated from the Preferred Alternative. These species can be addressed through a No Effect Finding per the agreement between the Kentucky Transportation Cabinet, FHWA, and USFWS.

5.3.6 Designated Parks and Preserves

Eastern Parkway and Cherokee Park are both part of the Olmsted Park System and are considered Section 4(f) resources. Land and Water Conservation Funds (LWCF) have been utilized for improvements to Cherokee Park; therefore, these portions of the park are considered a 6(f) resource. See Sections 5.6 and 5.7 for additional information on Section 4(f) and 6(f) resources within the project corridor.

5.3.7 Floodplain

The FEMA floodplain map shows that the project corridor intersects the 100-year floodplain along South Fork Beargrass Creek (Figure 2). Minimal impacts may occur within the 100-year floodplain during construction; therefore, a permit from the Kentucky Division of Water (KDOW)-Floodplain Management Section, local floodplain construction permit, No Rise Certification, and FEMA Map Revision may be required during final design.

5.4 Socioeconomic Overview

Socioeconomic impacts as a result of the project are discussed in the following sections.

5.4.1 Land Use

The project corridor is located within a highly developed urban area, and land use is unlikely to change significantly from the Preferred Alternative. Current land uses throughout the majority of the project corridor include single-family residential properties, with multi-family housing, commercial properties, and public facilities interspersed throughout the corridor. The portion of the corridor west of Crittenden Drive is located on the University of Louisville campus and contains large buildings, multi-unit housing, and greenspaces associated with the university. Cherokee Park is located at the eastern extent of the project corridor. The Preferred Alternative will result in improvements to the parkway and bicycle/pedestrian paths in the project corridor but is not anticipated to result in changes in land use.

The Preferred Alternative is also consistent with several goals and objectives of the Traditional Neighborhood Form District described in the Cornerstone 2020 Comprehensive Plan published by the Louisville and Jefferson County Planning Commission. These goals and objectives include: development of a connected network of streets, walks, and trails within the neighborhood, ensuring that redevelopment maintains or improves the existing street pattern established in the neighborhood; strengthening the identity of the neighborhood and creating a pleasant and safe environment through streetscape elements such as street trees, landscaping, signage, and other features; and encouraging a variety of open spaces (e.g., playgrounds, parks, squares, or greenways) for public gathering places or recreation.

5.4.2 Project Displacements

The Preferred Alternative will not result in the displacement or taking of existing residences or businesses within the project corridor. Acquisition of additional right-of-way and permanent or temporary easements are also not anticipated under the Preferred Alternative. The need for additional right-of-way and easements will be determined in future phases of the project.

5.4.3 Economic Effects

Based on the lack of business and residential relocations and maintenance of existing land uses, the Preferred Alternative will not result in negative economic impacts. It is anticipated that the project will result in beneficial impacts to businesses through increased pedestrian/bicyclist safety and mobility and better connectivity between residential and commercial areas.

5.4.4 Farmland Effects

The project is located within a highly developed urban area, and no prime farmland or agricultural preservation easements are present within the project corridor.

5.4.5 Social Effects

Social effects from the Preferred Alternative are discussed below in terms of neighborhood and community cohesion, mobility and travel, and community resources.

Neighborhood and Community Cohesion

The primary character of the project corridor is residential, with limited commercial development at intersections with major roadways. The project corridor includes portions of the Bradley, Saint Joseph, Schnitzelburg, Germantown, Tyler Park, Deer Park, Cherokee Triangle, and Bonnycastle neighborhoods. Two educational facilities, Kenwood Montessori School and Highlands Educational Center, are located along the project corridor. Three churches, Eastern Parkway Baptist Church, Our Mother of Sorrows, and the Church of Jesus Christ of Latter-day Saints, are also located adjacent to the project corridor. In addition, several medical facilities, restaurants, and retail businesses are located along the corridor. Based on the extent of residential development and the presence of community resources, there is a high level of community cohesion within the project corridor.

The Preferred Alternative will likely have a positive influence on community cohesion by further increasing accessibility and improving safety for all users. The shared-use path, continuous sidewalk, and addition of light travel lanes will increase walking and bicycling connections between residences, community resources, and businesses and improve access to bus service for transit-dependent individuals. The lane reduction will help calm vehicular traffic, and the center TWLTL is expected to improve pedestrian and bicyclist safety by reducing the number of conflict points along the parkway and providing refuge points for crossing.

The improved accessibility to Eastern Parkway and its features from the Preferred Alternative will result in increased community cohesion through the creation of opportunities for social groups to meet and interact outside of traditional or conventional locations. The Preferred Alternative is also anticipated to increase the

opportunity for participation in recreational activities by increasing access to Cherokee Park and similar facilities.

Mobility and Travel

Eastern Parkway was originally developed as part of the system of parkways used to link the three major Olmsted Parks in Louisville. The intent of the parkways was for scenic pleasure driving and not for commercial use; however, development along Eastern Parkway and adjacent areas has resulted in the parkway being used as a major commercial and travel route within this portion of Louisville. The parkway is primarily used as a connection between residential neighborhoods and commercial and industrial developments in the Old Louisville Area to the west and the I-64 corridor to the east. The existing roadway was not designed for current traffic levels, which has resulted in congestion, reduced traffic flow, increased travel times, and a higher incident of crashes than similar roadways in the state. Traffic slows or stops behind vehicles attempting to make left turns onto the many residential streets intersecting Eastern Parkway, leading to increased queuing and higher rates of rear-end, side swipe, and angle collisions, especially during the morning and afternoon peaks. The lack of designated turn lanes at several of the busiest intersections further contributes to congestion and queuing along the parkway. Non-vehicular mobility is also limited within the project corridor from the lack of designated bicycle lanes and a continuous sidewalk on the south side of the parkway.

Under the Preferred Alternative, mobility and travel will be temporarily disrupted during the construction phase of the project. Vehicular access to residences and community facilities will be maintained throughout construction, and access to existing pedestrian and bicyclist facilities will be preserved as much as possible. After construction, the project is anticipated to improve vehicular mobility and travel along the roadway by reducing congestion through installation of the TWLTL. The TWLTL will also add potential areas of refuge when crossing the roadway, which will increase safety for the elderly, handicapped, and less mobile pedestrians using the parkway. Additionally, the shared-use path, light vehicle lanes, and continuous sidewalk will increase bicyclist and pedestrian mobility and safety.

Community Resources

As previously discussed, several educational facilities, churches, medical facilities, and other community resources are located along the project corridor. Access to and from these facilities will be maintained during construction of the Preferred Alternative and are expected to improve after project completion.

5.4.6 Environmental Justice

Environmental justice and other traditionally underserved populations are not anticipated to be adversely impacted by the Preferred Alternative. This alternative does not involve residential or commercial relocations. Following the protocol documented in the *New Guidance Developed for Environmental Justice Analysis* by the KYTC Division of Environmental Analysis in 2014, no direct impacts to environmental justice and other traditionally underserved populations are anticipated by the Preferred Alternative due to the absence of relocations. Indirect and cumulative effects, if realized, are expected to benefit the communities along and adjacent to the project corridor. These beneficial impacts include improved mobility, increased access to community resources, improved safety features, and increased neighborhood connectivity. The benefits and burdens of the Preferred Alternative will be experienced equally by both environmental justice and non-environmental justice populations in the area.

5.5 Cultural Resources Overview

CIA conducted an archaeological and cultural historic overview for the proposed project in 2019. The overview included researching previously documented archaeological resources within the project corridor, assessing the potential for undiscovered resources to be present, and preparing a brief overview of the findings. A detailed discussion of the overview is presented in the *Archaeological and Cultural Historic Overview for the Eastern Parkway Planning Study* published by CIA on August 22, 2019. A brief summary of the overview is included below.

5.5.1 Historic Resources

The study area for historic buildings and structures consisted of properties fronting Eastern Parkway within the project corridor. The entire length of Eastern Parkway is listed on the National Register of Historic Places (NRHP) as part of the Olmsted Park System of Louisville. In addition, three NRHP-listed historic districts are present along the project corridor, including the University of Louisville Belknap Campus Historic District at the western extent of the project and the Cherokee Triangle Area Residential District and Highlands Historic District at the eastern end. One resource, the Schuster Building, is listed on the NRHP, and another resource, the Kosair Crippled Children's Hospital (now the Sam Swope Kosair Charities Center), has previously been recommended for listing but is not currently on the NRHP. Both of these resources are located in the eastern portion of the project. Six residences within the Cherokee Triangle Area Residential District are also eligible for listing individually. The historic districts and NRHP-listed and eligible resources are shown on Figure 3. The NRHP-listed and eligible resources are included in the following table.

Site Number	Historic Name	Address	NRHP Recommendation
JFEH-1647	Schuster Building	1500-1512 Bardstown Rd	Listed individually
JFCZ-10	Kosair Crippled Children's Hospital	982 Eastern Pkwy	Eligible individually
JFET-344	F. E. Short Residence	1484 Cherokee Rd	Eligible individually and as contributing to historic district
JFET-348	Ambassador Apartments	2111 Eastern Pkwy	Eligible individually and as contributing to historic district
JFET-352	William Ruedeman Residence	2101 Eastern Pkwy	Eligible individually and as contributing to historic district
JFET-353	Schlegel Residence	2067 Eastern Pkwy	Eligible individually and as contributing to historic district
JFET-358	Heimerdinger House	2057 Eastern Pkwy	Eligible individually and as contributing to historic district
JFET-359	H N Newmark Residence	2055 Eastern Pkwy	Eligible individually and as contributing to historic district

Buildings that may be potentially eligible for listing on the NRHP are also present in the western portion of the proposed project. These buildings have construction dates between 1970 and 1975 and are approaching the 50-year age criterion for historic properties. Property Valuation Administration research was not completed on these structures for the overview but may be required to address potential impacts to these buildings, which include apartment buildings, office buildings, and some retail establishments.

Based on the results of the historic resources overview, CIA recommends that a Section 106 cultural historic survey be performed for the Preferred Alternative during future phases of the project. The recommended

Area of Potential Effect (APE) includes those properties directly fronting Eastern Parkway, as well as the adjacent properties of the Grotto and Garden of Our Lady of Lourdes at the Old St. Joseph's Infirmary Site and the Medical Arts office building located at 1169 Eastern Parkway, which were identified as potentially eligible cultural-historic resources.

5.5.2 Archaeological Resources Overview

The study area for the archaeology overview consisted of a two-kilometer (1.2-mile) buffer of Eastern Parkway. A review of archaeological records maintained by the Office of State Archaeology showed that 21 previous archaeological investigations have been conducted within the two-kilometer study area. CIA is also aware of three additional investigations in the study area that were not included in the OSA records, increasing the total to 24 investigations. Of these 24 previous investigations, only one has been conducted within the project corridor, and no archaeological sites were identified during the investigation. The investigations outside of the project corridor resulted in numerous archaeological finds, and one site within the two-kilometer study area is considered eligible for listing on the NRHP. Based on the results of these investigations, archaeological deposits are expected within the project corridor. CIA recommends that a Phase I archaeological survey be performed during future phases of the project in areas planned for ground disturbance. No cemeteries were identified within the study area; however, St. Michael's Cemetery, Calvary Cemetery, and Louisville Cemetery are located nearby.

5.6 Section 4(f) Overview

Section 4(f) of the Department of Transportation Act applies to U.S. Department of Transportation actions (federally funded projects) and is tasked with "[p]reserv[ing] publicly owned public parklands, waterfowl and wildlife refuges, and significant historic sites." The entire length of Eastern Parkway is considered a 4(f) resource, as well as Cherokee Park (Figure 3). Therefore, 4(f) properties may be affected by the Preferred Alternative, and further coordination under Section 4(f) will be required during future phases of the project.

5.7 Section 6(f) Overview

The Land and Water Conservation Fund Act (LWCFA) - Section 6(f) is tasked to "[p]reserve, develop, and assure the quality and quantity of outdoor recreation resources for present and future generations". Based on review of the National Park Service-LWCF database, LWCFA funds have been used for Cherokee Park (Figure 3). Based on the current design, potential impacts to Cherokee Park may not be necessary. If impacts extend into the park, 6(f) properties may be affected by the Preferred Alternative, and further coordination under Section 6(f) will be required in future phases of the project.

5.8 Hazardous Materials Overview

A hazardous materials assessment was conducted by LFI to identify properties that may have the potential to pose a threat to human health and the environment and determine the potential for the occurrence of hazardous materials at properties that might be acquired prior to construction. Properties with potential for hazardous materials were assessed for past or current environmental conditions indicative of releases and/or threatened releases of hazardous substances, petroleum products or other contaminates, and related environmental concerns.

The assessment included a review of federal, state, and local records of environmentally sensitive incidents and activities within 50 feet of Eastern Parkway. Federal and state databases were accessed through EDR, a commercial database retrieval company. State agencies were contacted directly for information concerning environmental activities or conditions representing a significant impact to the property. Following the database review, a pedestrian/driving survey of the project corridor was performed by LFI on April 26, 2019.

The database review identified four historical areas that included seven sites within approximately 50 feet of Eastern Parkway. These sites are summarized in the following table and shown on Figure 3.

Site	Site Name	Site Address	Database
1	Bates Service Station	575 Eastern Pkwy.	EDR Hist Auto
2	Chevron #48547	796 Eastern Pkwy (formerly 2301 S. Preston St.)	EDR Hist Auto; KY SB193; KY UST; KY Financial Assurance
3	Puritan Dry Cleaner	2255 S. Preston St. (formerly 2287 S. Preston St.)	EDR Hist Cleaner
4	Cor Standard Oil Co. Service Station	2255 S. Preston St. (formerly 2289 S. Preston St.)	EDR Hist Auto
5	Dahlem Center	810 - 822 Eastern Pkwy.	EDR Hist Cleaner
6	McQuillens D X Service Station	1601 Eastern Pkwy.	EDR Hist Auto
7	Precision Tune	1449 Bardstown Rd.	KY UST; EDR Hist Auto; SHWS

Although sites were identified during the assessment, the sites are considered to be adjacent to the project and do not appear to present a significant environmental concern to construction. Extensive excavation is not anticipated to be conducted adjacent to any of the identified sites; however, if excavations extend more than a few feet below the existing ground surface or property acquisition is anticipated from one of the identified sites, a Phase II environmental site assessment may be necessary to confirm or deny potential contamination.

Several historical sites were identified that had underground petroleum-containing equipment. During construction, unknown soil or groundwater contamination could be encountered. If encountered, contaminated soil and groundwater should be properly handled in accordance with local, state, and federal laws. A detailed discussion of the assessment is presented in the *Categorical Exclusion Level I – UST/HAZMAT* published by LFI on May 21, 2019.

Based on the results of the assessment, hazardous materials are unlikely to be present in the project corridor. Excavation associated with the Preferred Alternative is expected to be limited to the removal of existing pavement for resurfacing, and impacts to the subgrade below the roadway are not anticipated. If impacts to the existing subgrade are required, the excavated area(s) should be examined for stained soils, chemical odors, and other obvious signs of contamination.

6.0 COMMENTS AND COORDINATION

Louisville Metro Public Works has coordinated with the public throughout development of the proposed project to present alternatives and solicit comments. Public outreach included three advisory team

meetings and three public meetings held at a local elementary school. Prior to each public meeting, advertisements were published in a local newspaper, with additional advertisements through other local and on-line media. Comments were received during the meetings and considered during the alternative selection process for the project. A brief description of each meeting is included below.

6.1 Advisory Team Meeting

Three meetings were held with an Advisory Team composed of stakeholders within the project corridor. The stakeholders included members of local government, utilities, business owners, bicycle groups, TARC, and others. The meetings were performed in advance of the public meetings and were held on June 20 and September 16, 2019 and on January 21, 2020. The comments received during the Advisory Team meetings were consistent with those formalized in the public meetings.

6.2 Public Meeting Advertisements

Prior to the first public meeting, an advertisement was published in the Louisville Courier-Journal (LCJ) newspaper on June 29, 2019 notifying the public about the proposed project and upcoming meeting. A news release about the meeting was also issued by Louisville Metro Public Works on June 27, 2019, and news stories about the project and meeting appeared on the websites of local television station WLKY on July 1, 2019 and local radio station WFPL on July 8, 2019.

A newspaper advertisement for the second public meeting was published in the LCJ from September 11 to 15, 2019. The advertisement was also posted on the newspaper's website from September 11 to 21, 2019. Advertisements for the third public meeting were published in the LCJ newspaper on January 11 and 24, 2020. Documentation for the advertisement of each public meeting is provided in Appendix C.

6.3 Public Meetings

The first public meeting was held on July 11, 2019 in the gymnasium at Audubon Traditional Elementary School from 5:00 pm to 7:00 pm. The meeting was facilitated by the project team and was structured informally and in-the-round, with four informational stations situated clockwise around the event space. The informational stations focused on one of the following topics: (1) Corridor History and Olmsted Vision; (2) Tree Canopy and Results of Stakeholder Site Visit; (3) Existing Typical Section, Roadway Conditions, and Drainage; and (4) Traffic Data Collection, including speed, collision, and turn history. Each informational station included visual and graphic exhibits and was staffed by multiple members of the project team to answer questions. A fifth station was included that offered opportunity for attendees to submit their feedback either on paper, via an online survey, or interactively with an online WikiMap. Overall, the meeting was very well attended with well over a hundred attendees, and the meeting was fully attended through the duration of the scheduled event time. Feedback themes identified from the collected surveys included connectivity, legacy, maintenance, multimodalism, and safety. The results of the survey and a summary of feedback heard during the first public meeting were presented at the second public meeting.

On September 24, 2019, the project team facilitated a second public meeting in the gymnasium at Audubon Traditional Elementary School from 6:00 pm to 8:00 pm. The meeting began with a presentation of project efforts to date and a detailed summary and description of the feedback collected at the first public meeting.

The meeting continued with a description of the results found during the Road Safety Audit data collection conducted by the project team and concluded with the presentation of multiple alternative options for rehabilitating Eastern Parkway. After the presentation, the public was invited to examine the alternatives and engage with the project team, providing their feedback, criticisms, suggestions, and support for the proposed ideas. Display boards were installed illustrating current existing conditions with their proposed alternatives, as well as boards illustrating the results of the traffic models run by the project team. Meeting attendees were invited to brainstorm with project team members to continue to refine and enhance the alternatives presented. A second survey was also provided on paper for people to provide their feedback for consideration by the project team and inclusion in the planning process.

A summary of comments received during the first iteration of public engagement for the project, including both the survey and interactive mapping feedback collection tools, revealed common themes such as the busy nature of Eastern Parkway, the importance of its heritage tree canopy, the importance of its history and legacy as an Olmsted Parkway, the vehicle congestion and a perceived sense of the road being dangerous, and the sense of home and place that Eastern Parkway provides for the people of Louisville.

The third and final public meeting was held on January 28, 2020 in the gymnasium at Audubon Traditional Elementary School from 6:00 pm to 8:00 pm. With standing room only, the presentation began with a reiteration of the project's vision and goals, a summary of the public engagement conducted to date, including user surveys and the interactive WikiMap feedback collection tools, a summary of the preliminary alternatives developed for evaluation and consideration, and a review of the project's timeline. As the meeting progressed, more people arrived than could fit in the gymnasium, and the meeting was paused to expand into the cafeteria to ensure all attendees could see and hear the presentation. At the end of the presentation, questions from attendees were received and the floor was opened for discussion.

General comments received by survey respondents varied in level of support, from those in full support to those with reservations. Comment themes included the management of vehicular traffic flows and congestion, as well as the provision of safe bicyclist and pedestrian facilities. Support was given for preserving green spaces and the tree canopy, while other comments debated how to handle the direction of traffic (one or two-way) and dedicated turning movements. Other themes included improving safety, sidewalks, and lighting along the corridor.

7.0 SUMMARY

This environmental overview was conducted for the Eastern Parkway Transportation Study to identify significant environmental features in the vicinity of the proposed project and assist Louisville Metro Public Works in evaluating the potential environmental effects of the proposed improvements. Prior to the overview, a project corridor was developed along Eastern Parkway based on areas where potential impacts from the project may occur. Potential impacts were determined based on the Preferred Alternative for the project.

The Preferred Alternative may result in impacts to environmental features within the project corridor. Ecological impacts are limited to the removal of suitable summer roost trees for the Indiana and northern long-eared bats and potential impacts to the 100-year floodplain along South Fork Beargrass Creek. These impacts will likely require coordination with federal and state agencies.

Several historic properties were identified within and adjacent to the project corridor, including three NRHP-listed historic districts, two NRHP-listed resources, and seven NRHP-eligible resources. The project corridor also has a high potential for archaeological resources based on previous investigations in the vicinity. Based on these findings, cultural historic and Phase 1 archaeological surveys are recommended prior to construction of the project. Both 4(f) and 6(f) resources are also present in the project corridor and could be impacted by the Preferred Alternative; therefore, further coordination regarding these resources will be required. Seven potential hazardous material sites were identified along the project corridor; however, the sites are considered to be adjacent to the project and are not expected to be disturbed during project construction. No socioeconomic impacts are expected from the Preferred Alternative, and the project is anticipated to be beneficial to the community and local economy.

Louisville Metro Public Works has coordinated with the public through advertisements and three public meetings. Comments and concerns from the meetings were used to help develop the Preferred Alternative for the proposed project.

8.0 REFERENCES

Blanford, S.J., P.S. Aldridge, and R.A. Eigel. 2005. Soil Survey of Jefferson County, Kentucky. United States Department of Agriculture, Natural Resources Conservation Service in cooperation with Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky Agricultural Experiment Station. 851 pp.

Kentucky Division of Forestry (KDOF). 2020. Kentucky's Champion Trees. Accessed March 2020. https://eec.ky.gov/Natural-Resources/Forestry/ky-champion-trees/Pages/default.aspx

Kentucky Division of Water (KDOW). 2020. Kentucky Watershed Viewer. Accessed January 2020. http://eppcgis.ky.gov/watershed/.

Kentucky Geological Survey (KGS). 2018a. The Bluegrass Region. Accessed March 2020. http://www.uky.edu/KGS/geoky/regionbluegrass.htm.

Kentucky Geological Survey (KGS). 2018b. The Knobs Region. Accessed March 2020. https://www.uky.edu/KGS/geoky/regionknobs.htm.

Kentucky Geological Survey (KGS). 2020. Kentucky Geologic Map Information Service. Karst Potential Map. Accessed March 2020. http://kgs.uky.edu/kgsmap/kgsgeoserver/viewer.asp.

McGrain, P. and J.C. Currens. 1978. Topography of Kentucky. Series X, Special Publication 25. Kentucky Geological Survey. University of Kentucky, Lexington, KY.

Natural Resources Conservation Service (NRCS). 2020. Web Soil Survey. Accessed March 2020. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

United States Department of Agriculture, Natural Resources Conservation Service (NRCS). Web Soil Survey. 2020. Accessed February 24, 2020. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.

United States Department of Transportation, Federal Highway Administration (FHWA). https://www.safety.fhwa.dot.gov/road_diets/resources/fhwasa16074/. Accessed March 2020.

United States Fish and Wildlife Service (USFWS). 2020. Information for Planning and Conservation. Endangered, Threatened, Proposed, and Candidate Species listed under the Endangered Species Act. Accessed March 19, 2020. https://ecos.fws.gov/ipac.

United States Fish and Wildlife Service Kentucky Ecological Services Field Office (USFWS KFO). 2015. Programmatic Consultation on the Interim ESA Process Addressing Potential Adverse Effects on the Northern Long-eared Bat in association with On-going and Future KYTC Projects throughout Kentucky. Kentucky Ecological Services Field Office. Frankfort, KY. 3 pp.

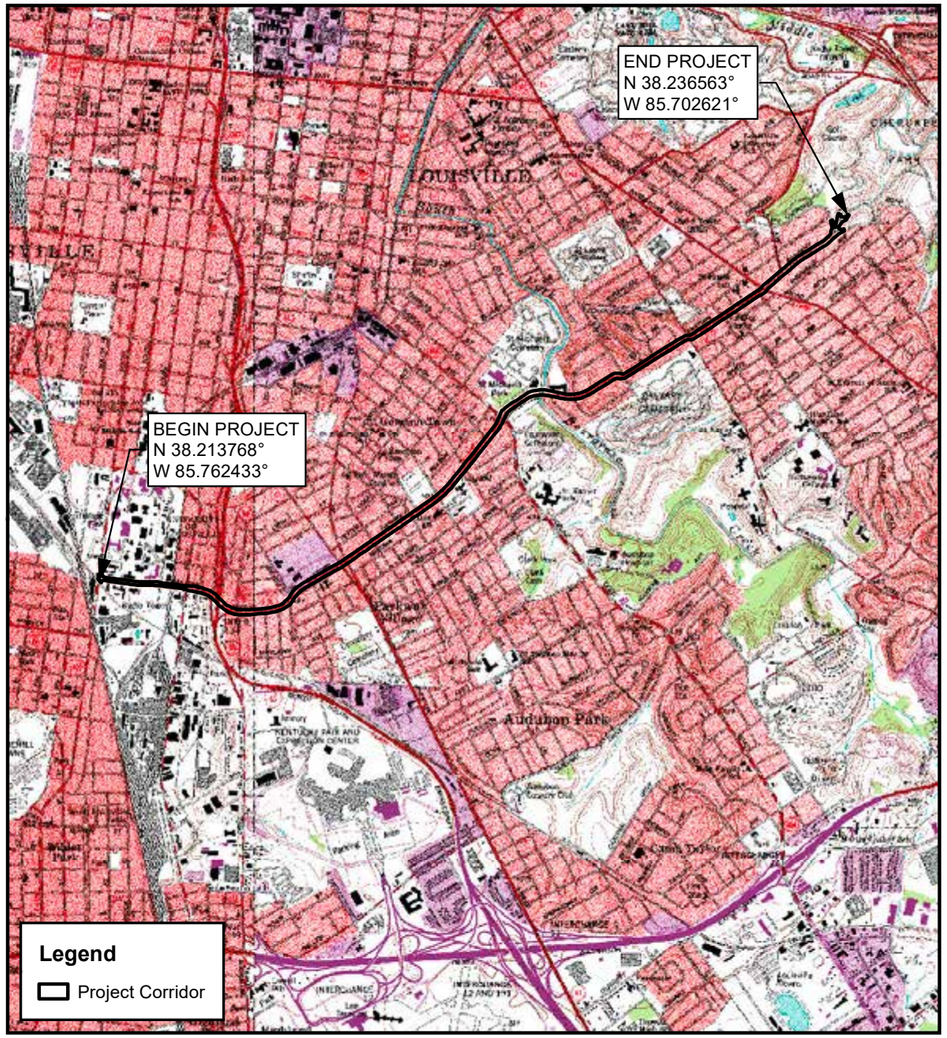
United States Fish and Wildlife Service Kentucky Ecological Services Field Office (USFWS KFO). 2019a. Known Indiana bat habitat in Kentucky and within 20 miles (August 2019). Map. Kentucky Ecological Services Field Office. Frankfort, KY.

United States Fish and Wildlife Service Kentucky Ecological Services Field Office (USFWS KFO). 2019b. Known northern long-eared bat habitat in Kentucky and within 20 miles (August 2019). Map. Kentucky Ecological Services Field Office. Frankfort, KY.

Woods, A.J., J.M. Omernik, W.H. Martin, G.J. Pond, W.M. Andrews, S.M. Call, J.A. Comstock, and D.D. Taylor. 2002. Ecoregions of Kentucky (color poster with map, descriptive text, summary tables, and photographs): Reston, VA. U.S. Geological Survey (map scale 1:1,000,000).

FIGURES

Source: USGS 7.5-minute Topographic Map - Louisville East and Louisville West, Kentucky Quadrangles.



P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Site Location Map.mxd, 03-16-2020, ebowman

EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00

REVISED DATE: 03-16-20 | DRAWN BY: BJD/EDB

KENTUCKY TRANSPORTATION CABINET

REDWING ECOLOGICAL SERVICES, INC.

SITE LOCATION MAP

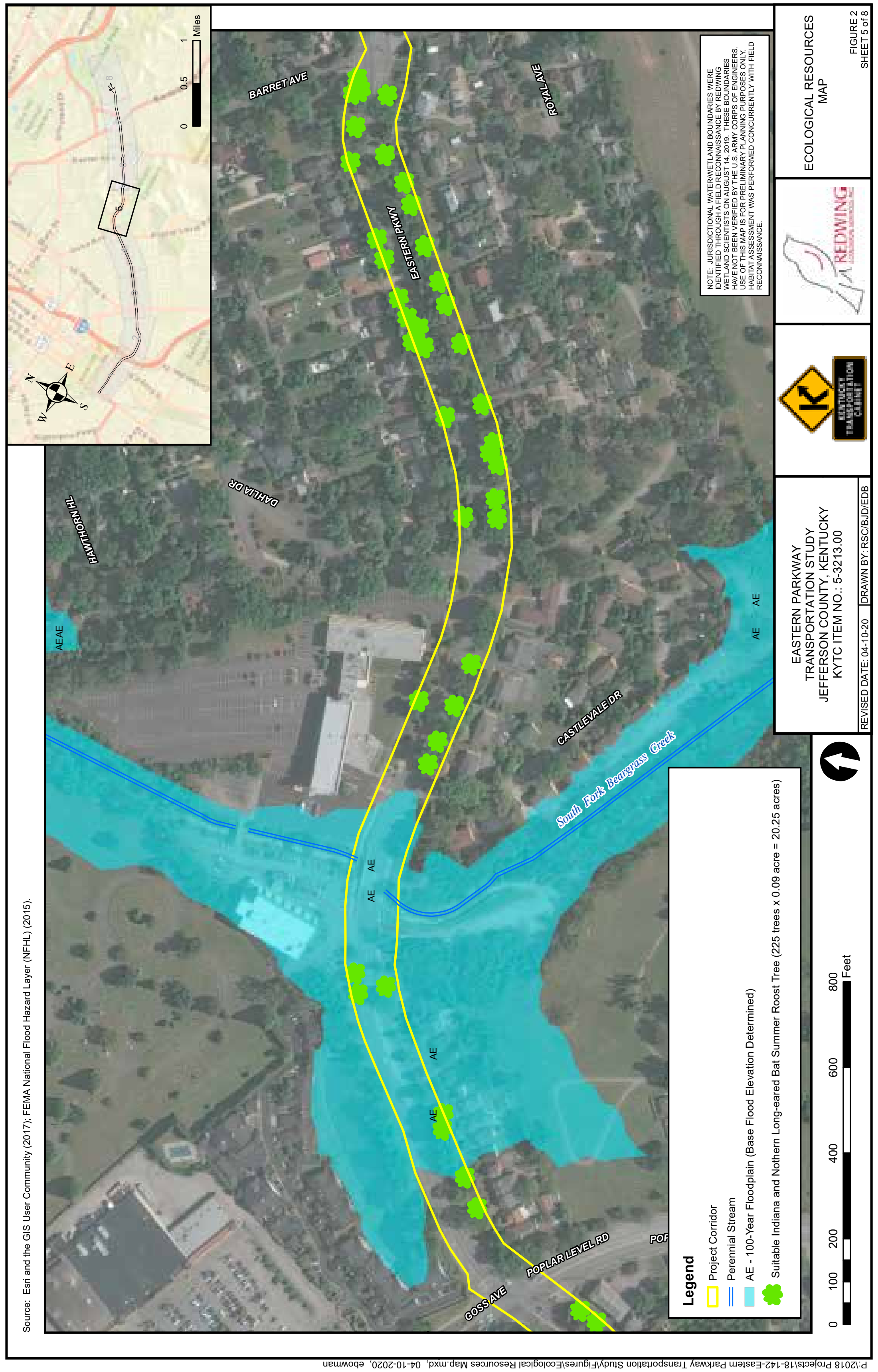
FIGURE 1

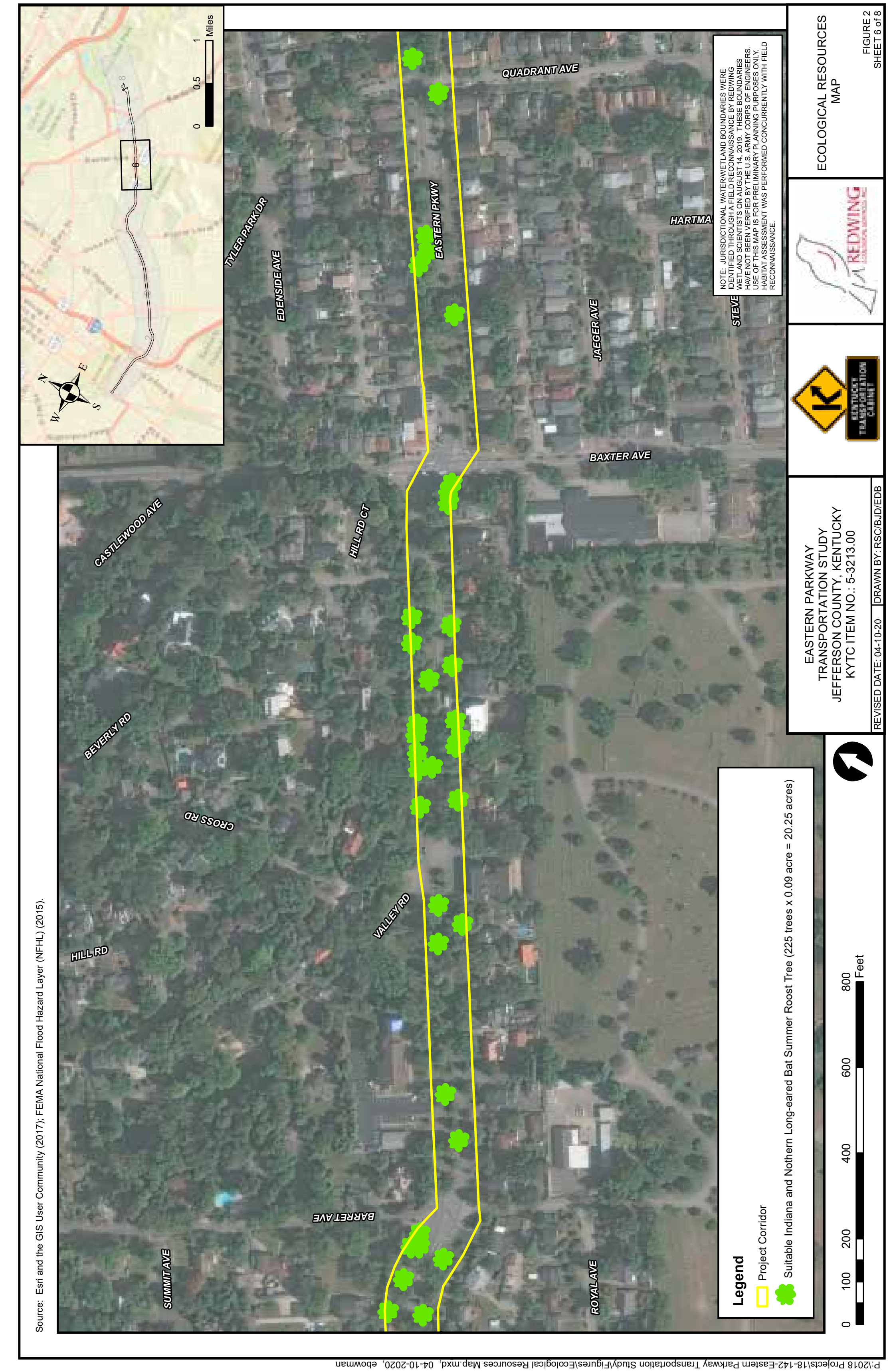
I-65 INTERSTATE
I-65 INTERSTATE NC
I-65 RAMP from WARNOCK ST
ARTHUR ST
I-65 RAMP from US 60A
S FLOYD ST
HAHN ST
OLD EASTERN PKWY
EASTERN PKWY
S BROOK ST
WARNOCK WALK
WARNOCK ST
S 3RD ST
NOTE: JURISDICTIONAL WATERWAYS AND TOWNSHIPS WERE NOT FIELD THROUGHA FIELD RECONNAISSANCE BY RS WYNE WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. HABITAT ASSESSMENT WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
Legend
Project Corridor
Suitable Indiana and Nothern Long-eared Bat Summer Roost Tree (225 trees x 0.09 acre = 20.25 acres)
0 100 200 400 600 800 Feet
0 0.5 1 Miles
N W E S
Source: Esri and the GIS User Community (2017); FEMA National Flood Hazard Layer (NFHL) (2015).
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 04-10-2020, ebowman
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 04-10-20
DRAWN BY: RSC/BJD/EDB
KENTUCKY TRANSPORTATION CABINET
REDWING ECOLOGICAL SERVICES, INC.
ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 1 of 8

EASTERN PKWY
RIDGEWOOD AVE
ELLSWORTH AVE
MILLER AVE
HARRISON AVE
ERVAY AVE
BRADLEY AVE
SHERRY RD
WARNOCK ST
ILLY AVE
WANWRIGHT AVE
WARNOCK ST Y
EMIL AVE
CHILEANDEN DR
I-65 RAMP from WARNOCK ST
I-65 INTERSTATE NC
I-65 RAMP from WARNOCK ST
ARTHUR ST
BOWMAN AVE
I-65 RAMP from US 60A
NOTE: JURISDICTIONAL WATERWAYS AND TOWNSHIPS WERE NOT FIELD THROUGHA FIELD RECONNAISSANCE BY RS WYNE WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. HABITAT ASSESSMENT WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
Legend
Project Corridor
Suitable Indiana and Nothern Long-eared Bat Summer Roost Tree (225 trees x 0.09 acre = 20.25 acres)
0 100 200 400 600 800 Feet
0 0.5 1 Miles
N W E S
Source: Esri and the GIS User Community (2017); FEMA National Flood Hazard Layer (NFHL) (2015).
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 04-10-2020, ebowman
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 04-10-20
DRAWN BY: RSC/BJD/EDB
KENTUCKY TRANSPORTATION CABINET
REDWING ECOLOGICAL SERVICES, INC.
ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 2 of 8

NOTE: JURISDICTIONAL WATERS WETLAND DELINEATED IN NOVEMBER 2019. WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. A FIELD VISIT SHOULD BE MADE BEFORE ANY DECISIONS ARE MADE. THIS MAP WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 04-10-20
DRAWN BY: RSC/BJD/EDB
KENTUCKY TRANSPORTATION CABINET
REDWING ECOLOGICAL SERVICES, INC.
ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 3 of 8
Source: Esri and the GIS User Community (2017), FEMA National Flood Hazard Layer (NFHL) (2015).
Legend
Project Corridor
Suitable Indiana and Nothern Long-eared Bat Summer Roost Tree (225 trees x 0.09 acre = 20.25 acres)
0 100 200 400 600 800 Feet
0 0.5 1 Miles
EASTERN PKWY
FETTER AVE
FETTER CT
PINDELL AV
KESWICK BLVD
DELOR AVE
LANSDOWNE AVE
ALEXANDER AVE
TEXAS AVE
MINONA AVE
DORMA AVE
FLEET AVE
S SHELBY ST
S PRESTON ST
FREDERICKSTAMM CT
RAYMOND KENT CT
MILLER AVE
HARRISON AVE
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 04-10-2020, ebowman

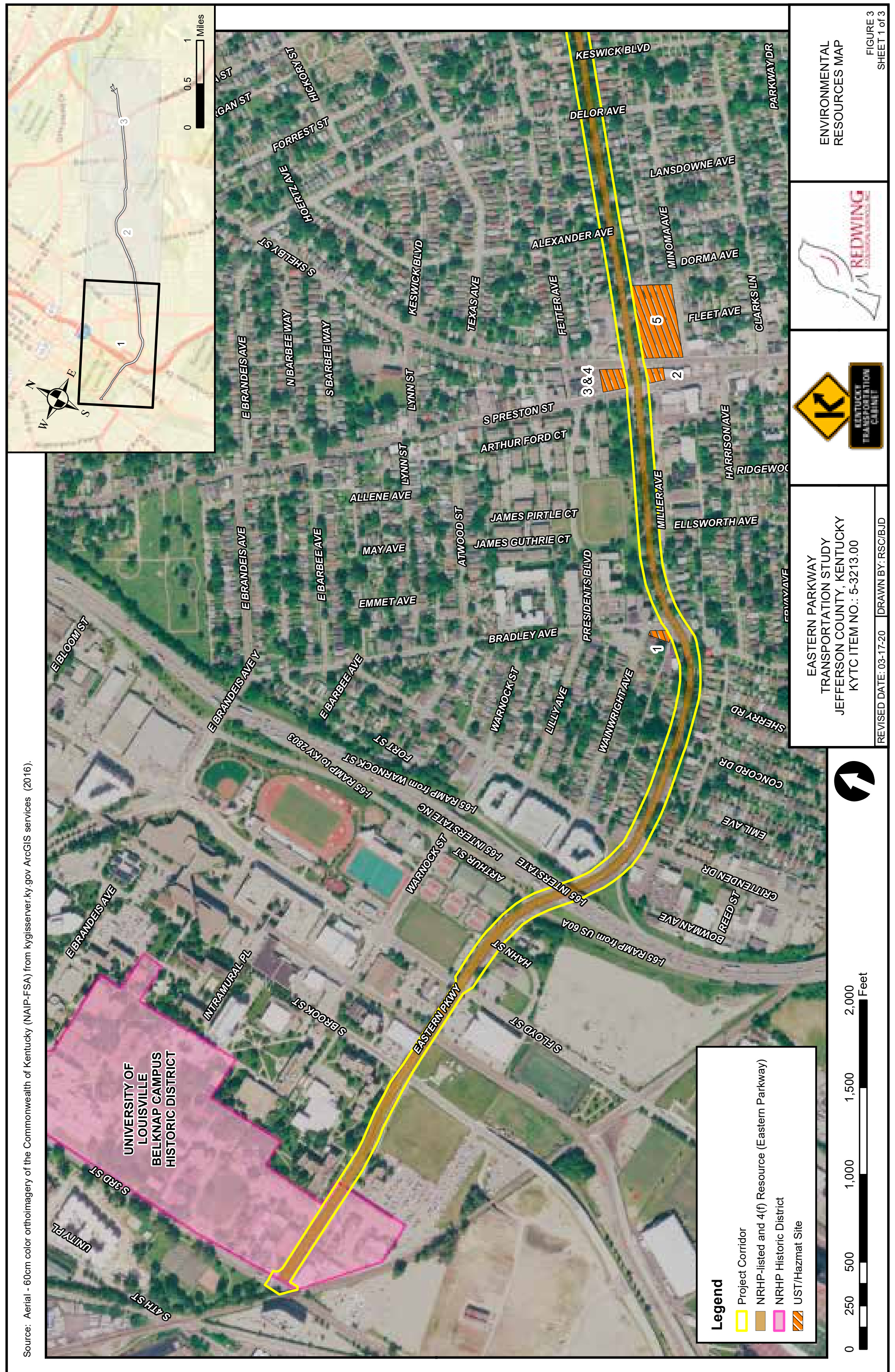
NOTE: JURISDICTIONAL WATERS WETLAND DELINEATED IN NOVEMBER 2019. WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. A FIELD VISIT SHOULD BE MADE BEFORE ANY DECISIONS ARE MADE. THIS MAP WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 04-10-20
DRAWN BY: RSC/BJD/EDB
KENTUCKY TRANSPORTATION CABINET
REDWING ECOLOGICAL SERVICES, INC.
ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 4 of 8
Source: Esri and the GIS User Community (2017), FEMA National Flood Hazard Layer (NFHL) (2015).
Legend
Project Corridor
AE - 100-Year Floodplain (Base Flood Elevation Determined)
Suitable Indiana and Nothern Long-eared Bat Summer Roost Tree (225 trees x 0.09 acre = 20.25 acres)
0 100 200 400 600 800 Feet
0 0.5 1 Miles
AEAE
AE AE
PARKWAY GARDENS CT
COSS AVE
ASH ST
ROCHELLE LEAD
REAS AVE
EASTERN PKWY
WAGNER ST
MILTON ST
E BURNETT AVE
FETTER CT
PINDELL AVE
MINONA AVE
LYDIA ST
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 04-10-2020, ebowman

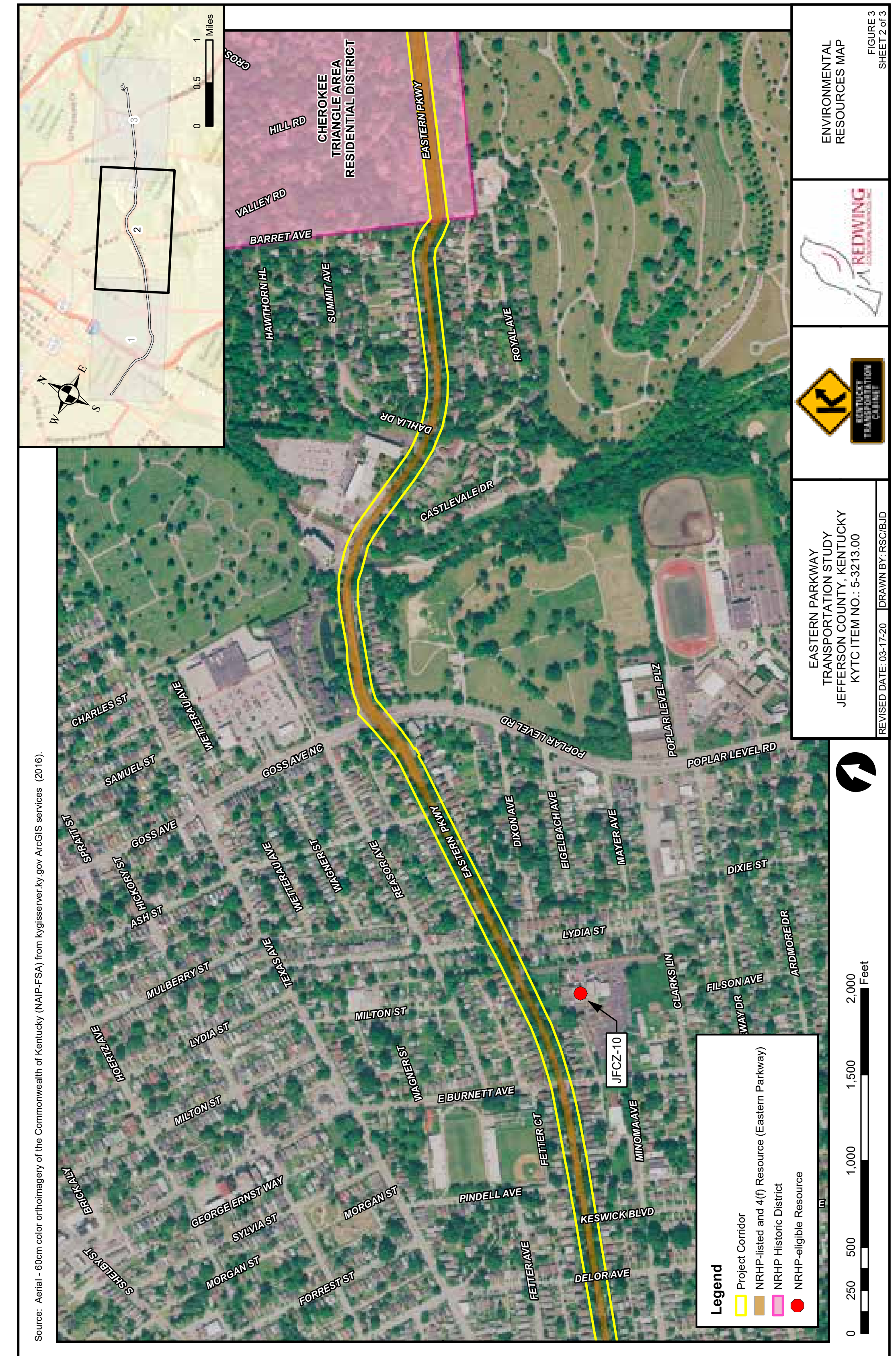

ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 5 of 8
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 04-10-20
DRAWN BY: RSC/BJD/EDB
REDWING
Legend
Project Corridor
Perennial Stream
AE - 100-Year Floodplain (Base Flood Elevation Determined)
Suitable Indiana and Northern Long-eared Bat Summer Roost Tree (225 trees x 0.09 acre = 20.25 acres)
0 100 200 400 600 800 Feet
Source: Esri and the GIS User Community (2017); FEMA National Flood Hazard Layer (NFHL) (2015).
EASTERN PKWY
BARRET AVE
ROYAL AVE
DAHLIA DR
HAWTHORN TL
CASTLEVALE DR
South Fork Beargrass Creek
POPLAR LEVEL RD
GOSS AVE
AE

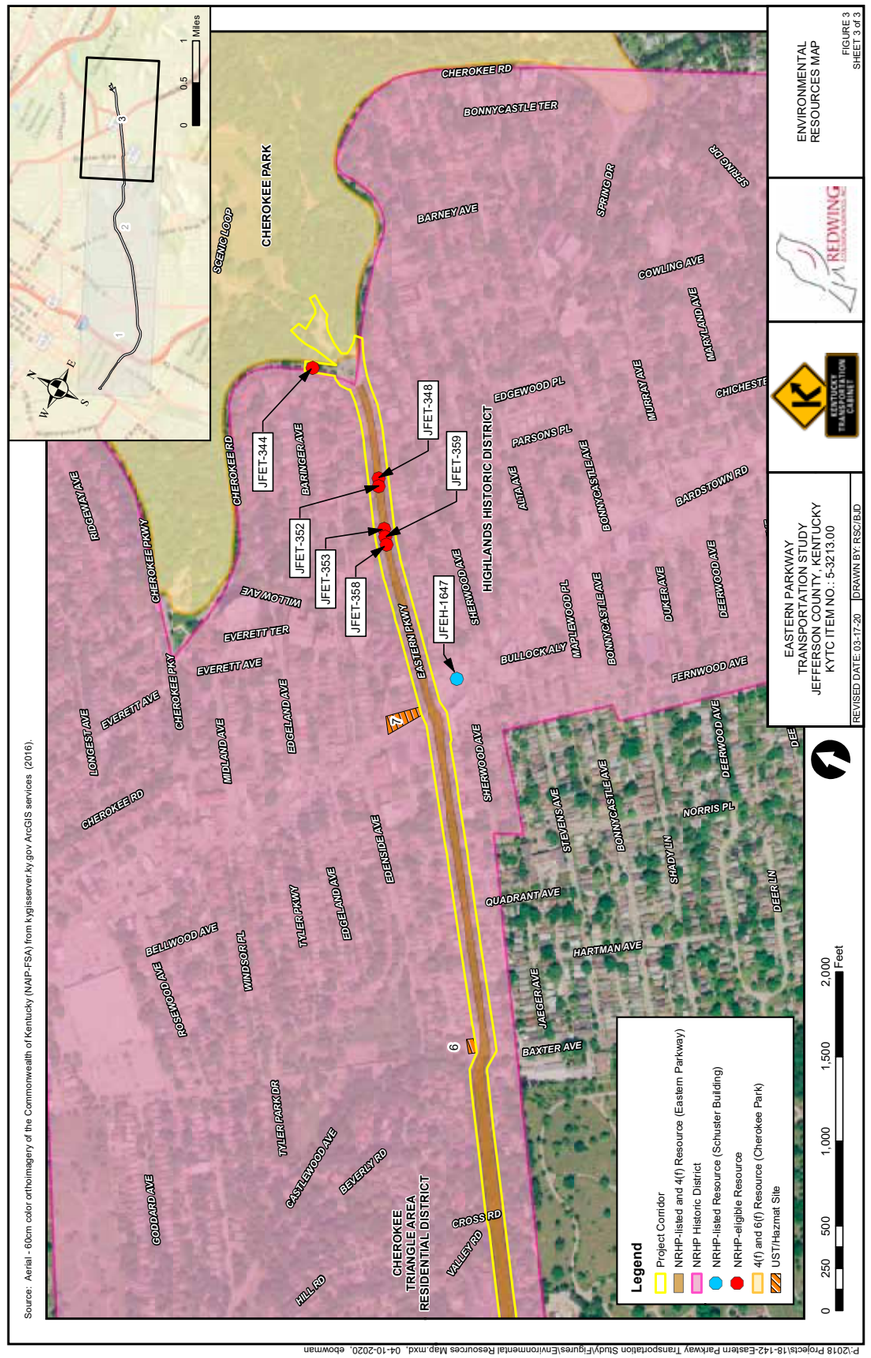

ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 6 of 8
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 04-10-20
DRAWN BY: RSC/BJD/EDB
REDWING
Legend
Project Corridor
Suitable Indiana and Northern Long-eared Bat Summer Roost Tree (225 trees x 0.09 acre = 20.25 acres)
0 100 200 400 600 800 Feet
Source: Esri and the GIS User Community (2017); FEMA National Flood Hazard Layer (NFHL) (2015).
QUADRANT AVE
EASTERN PKWY
TYLER PARK DR
EDENSIDE AVE
JAEGER AVE
BAXTER AVE
CASTLEWOOD AVE
HILL RD CT
BEVERLY RD
CROSS RD
VALLEY RD
HILL RD
BARRET AVE
SUMMIT AVE
ROYAL AVE

NOTE: JURISDICTIONAL WATERS/WETLAND BOUNDARIES WERE IDENTIFIED THROUGHOUT THE LIMITS OF THIS PROJECT DURING WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. HABITAT ASSESSMENT WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 5 of 8
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 04-10-20
DRAWN BY: RSC/BJD/EDB
KENTUCKY TRANSPORTATION CABINET
REDWING ECOLOGICAL SERVICES, INC.
Legend
Project Corridor
AE - 100-Year Floodplain (Base Flood Elevation Determined)
Suitable Indiana and Northern Long-eared Bat Summer Roost Tree (225 trees x 0.09 acre = 20.25 acres)
0 100 200 400 600 800 Feet
0 0.5 1 Miles
SCENIC LOOP
BARNEY AVE
CHEROKEE RD
BARINGER AVE
EASTERN PKWY
SHERWOOD AVE
AE
Source: Esri and the GIS User Community (2017), FEMA National Flood Hazard Layer (NFHL) (2015).
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 04-10-2020, ebowman

NOTE: JURISDICTIONAL WATERS/WETLAND BOUNDARIES WERE IDENTIFIED THROUGHOUT THE LIMITS OF THIS PROJECT DURING WETLAND SCIENTISTS ON AUGUST 14, 2019. THESE BOUNDARIES HAVE NOT BEEN VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS USE OF THIS MAP IS FOR PRELIMINARY PLANNING PURPOSES ONLY. HABITAT ASSESSMENT WAS PERFORMED CONCURRENTLY WITH FIELD RECONNAISSANCE.
ECOLOGICAL RESOURCES MAP
FIGURE 2
SHEET 7 of 8
EASTERN PARKWAY
TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 04-10-20
DRAWN BY: RSC/BJD/EDB
KENTUCKY TRANSPORTATION CABINET
REDWING ECOLOGICAL SERVICES, INC.
Legend
Project Corridor
Suitable Indiana and Northern Long-eared Bat Summer Roost Tree (225 trees x 0.09 acre = 20.25 acres)
0 100 200 400 600 800 Feet
0 0.5 1 Miles
EDGELAND AVE
BARINGER AVE
WILLOW AVE
EASTERN PKWY
SHERWOOD AVE
BULLOCK ALY
STEVENS AVE
BARDSTOWN RD
FERNWOOD AVE
EDENSIDE AVE
NORRIS PL
QUADRANT AVE
JAEGER AVE
Source: Esri and the GIS User Community (2017), FEMA National Flood Hazard Layer (NFHL) (2015).
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Ecological Resources Map.mxd, 04-10-2020, ebowman


ENVIRONMENTAL RESOURCES MAP
FIGURE 3
SHEET 1 of 3
EASTERN PARKWAY TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 03-17-20
DRAWN BY: RSC/BJD
REDWING
KENTUCKY TRANSPORTATION CABINET
Legend
Project Corridor
NRHP-listed and 4(f) Resource (Eastern Parkway)
NRHP Historic District
UST/Hazmat Site
0 250 500 1,000 1,500 2,000 Feet
UNIVERSITY OF LOUISVILLE BELKNAP CAMPUS HISTORIC DISTRICT
Source: Aerial - 60cm color orthoimagery of the Commonwealth of Kentucky (NAIP-FSA) from kygisserver.ky.gov ArcGIS services (2016).
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Environmental Resources Map.mxd, 04-10-2020, ebowman

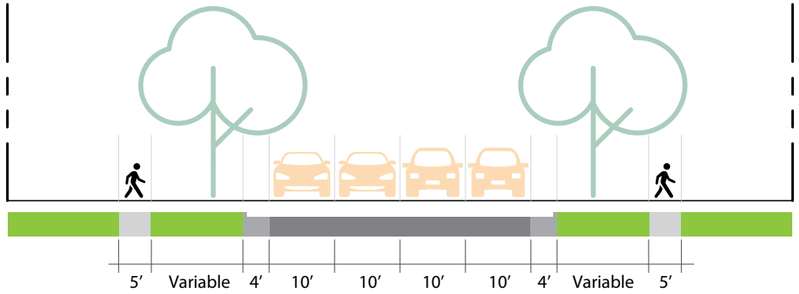

ENVIRONMENTAL RESOURCES MAP
FIGURE 3
SHEET 2 of 3
EASTERN PARKWAY TRANSPORTATION STUDY
JEFFERSON COUNTY, KENTUCKY
KYTC ITEM NO.: 5-3213.00
REVISED DATE: 03-17-20
DRAWN BY: RSC/BJD
REDWING
KENTUCKY TRANSPORTATION CABINET
Legend
Project Corridor
NRHP-listed and 4(f) Resource (Eastern Parkway)
NRHP Historic District
NRHP-eligible Resource
0 250 500 1,000 1,500 2,000 Feet
CHEROKEE TRIANGLE AREA RESIDENTIAL DISTRICT
JFCZ-10
Source: Aerial - 60cm color orthoimagery of the Commonwealth of Kentucky (NAIP-FSA) from kygisserver.ky.gov ArcGIS services (2016).
P:\2018 Projects\18-142-Eastern Parkway Transportation Study\Figures\Environmental Resources Map.mxd, 04-10-2020, ebowman



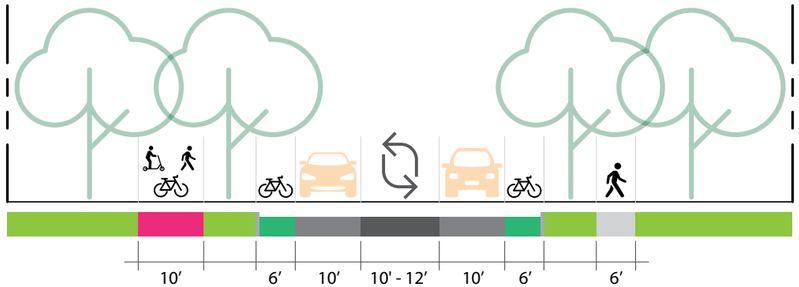
APPENDIX A

TYPICAL SECTIONS

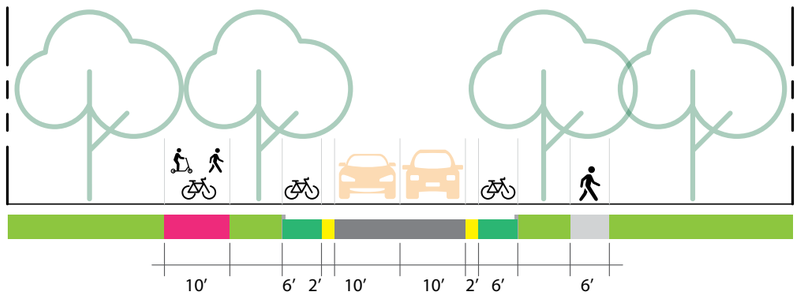
Existing Section



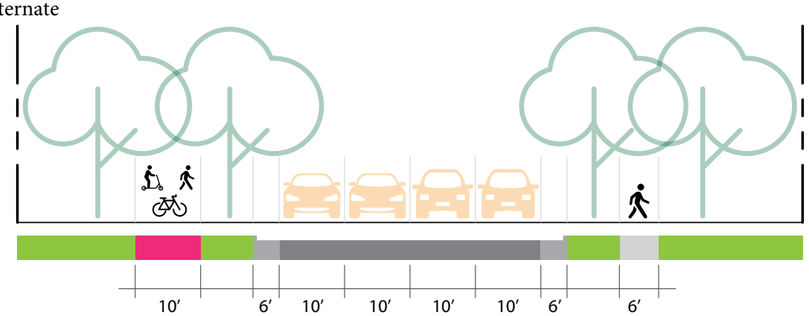
Three Lane Alternate - Selected Alternate



Two Lane Alternate



Four Lane Alternate



APPENDIX B

AGENCY COORDINATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
Phone: (502) 695-0468 Fax: (502) 695-1024
http://www.fws.gov/frankfort/

In Reply Refer To: March 19, 2020
Consultation Code: 04EK1000-2020-SLI-0805
Event Code: 04EK1000-2020-E-02101
Project Name: Eastern Parkway Transportation Study

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

Your concern for the protection of endangered and threatened species is greatly appreciated. The purpose of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA) is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. The species list attached to this letter fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the ESA to provide information as to whether any proposed or listed species may be present in the area of a proposed action. This is not a concurrence letter; additional consultation with the Service may be required.

The Information in Your Species List:

The enclosed species list identifies federal trust species and critical habitat that may occur within the boundary that you entered into IPaC. For your species list to most accurately represent the species that may potentially be affected by the proposed project, the boundary that you input into IPaC should represent the entire “action area” of the proposed project by considering all the potential “effects of the action,” including potential direct, indirect, and cumulative effects, to federally-listed species or their critical habitat as defined in 50 CFR 402.02. This includes effects of any “interrelated actions” that are part of a larger action and depend on the larger action for their justification and “interdependent actions” that have no independent utility apart from the action under consideration (e.g.; utilities, access roads, etc.) and future actions that are reasonably certain to occur as a result of the proposed project (e.g.; development in response to a new road). If your project is likely to have significant indirect effects that extend well beyond the project footprint (e.g., long-term impacts to water quality), we highly recommend that you

coordinate with the Service early to appropriately define your action area and ensure that you are evaluating all the species that could potentially be affected.

We must advise you that our database is a compilation of collection records made available by various individuals and resource agencies available to the Service and may not be all-inclusive. This information is seldom based on comprehensive surveys of all potential habitats and, thus, does not necessarily provide conclusive evidence that species are present or absent at a specific locality. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list.

Please note that “critical habitat” refers to specific areas identified as essential for the conservation of a species that have been designated by regulation. Critical habitat usually does not include all the habitat that the species is known to occupy or all the habitat that may be important to the species. Thus, even if your project area does not include critical habitat, the species on the list may still be present.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and associated information. To re-access your project in IPaC, go to the IPaC web site (https://ecos.fws.gov/ipac/), select “Need an updated species list?”, and enter the consultation code on this letter.

ESA Obligations for Federal Projects:

Under sections 7(a)(1) and 7(a)(2) of the ESA and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

If a Federal project (a project authorized, funded, or carried out by a federal agency) may affect federally-listed species or critical habitat, the Federal agency is required to consult with the Service under section 7 of the ESA, pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). Recommended contents of a Biological Assessment are described at 50 CFR 402.12. For projects other than major construction activities, the Service suggests that a biological evaluation

similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat.

ESA Obligations for Non-federal Projects:

Proposed projects that do not have a federal nexus (non-federal projects) are not subject to the obligation to consult under section 7 of the ESA. However, section 9 of the ESA prohibits certain activities that directly or indirectly affect federally-listed species. These prohibitions apply to all individuals subject to the jurisdiction of the United States. Non-federal project proponents can request technical assistance from the Service regarding recommendations on how to avoid and/or minimize impacts to listed species. The project proponent can choose to implement avoidance, minimization, and mitigation measures in a proposed project design to avoid ESA violations.

Additional Species-specific Information:

In addition to the species list, IPaC also provides general species-specific technical assistance that may be helpful when designing a project and evaluating potential impacts to species. To access this information from the IPaC site (https://ecos.fws.gov/ipac/), click on the text “My Projects” on the left of the black bar at the top of the screen (you will need to be logged into your account to do this). Click on the project name in the list of projects; then, click on the “Project Home” button that appears. Next, click on the “See Resources” button under the “Resources” heading. A list of species will appear on the screen. Directly above this list, on the right side, is a link that will take you to pdfs of the “Species Guidelines” available for species in your list. Alternatively, these documents and a link to the “ECOS species profile” can be accessed by clicking on an individual species in the online resource list.

Next Steps:

Requests for additional technical assistance or consultation from the Kentucky Field Office should be submitted following guidance on the following page http://www.fws.gov/frankfort/PreDevelopment.html and the document retrieved by clicking the “outline” link at that page. When submitting correspondence about your project to our office, please include the Consultation Tracking Number in the header of this letter. (There is no need to provide us with a copy of the IPaC-generated letter and species list.)

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Kentucky Ecological Services Field Office
J C Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670
(502) 695-0468

Project Summary

Consultation Code: 04EK1000-2020-SLI-0805

Event Code: 04EK1000-2020-E-02101

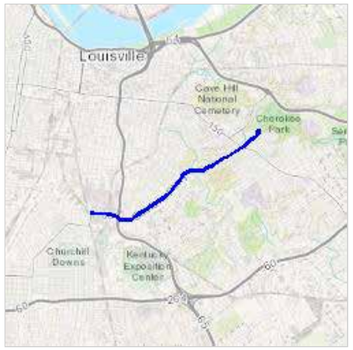
Project Name: Eastern Parkway Transportation Study

Project Type: TRANSPORTATION

Project Description: Improvements to 3.35 mile of Eastern Parkway.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/38.22407783518132N85.73010301088199W



Counties: Jefferson, KY

Endangered Species Act Species

There is a total of 14 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 13 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Bat *Myotis grisescens*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The project area includes potential gray bat habitat.

Species profile: https://ecos.fws.gov/ecp/species/6329
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/21/office/42431.pdf

Indiana Bat *Myotis sodalis* — Endangered

There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:
- The project area includes 'potential' habitat. All activities in this location should consider possible effects to this species.

Species profile: https://ecos.fws.gov/ecp/species/5949
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/1/office/42431.pdf

Northern Long-eared Bat *Myotis septentrionalis* — Threatened

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The specified area includes areas in which incidental take would not be prohibited under the 4(d) rule. For reporting purposes, please use the "streamlined consultation form," linked to in the "general project design guidelines" for the species.

Species profile: https://ecos.fws.gov/ecp/species/9045
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/10043/office/42431.pdf

Clams

NAME	STATUS
Clubshell *Pleurobema clava*	Endangered

Population: Wherever found; Except where listed as Experimental Populations
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/3789
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/352/office/42431.pdf

Fanshell *Cyprogenia stegaria* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, Ohio, Rolling Fork Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/4822
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/368/office/42431.pdf

Northern Riffleshell *Epioblasma torulosa rangiana* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/527
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/374/office/42431.pdf

Orangefoot Pimpleback (pearlymussel) *Plethobasus cooperianus* — Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significanlty impact, directly or indirectly, the following rivers: Green, Ohio, Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/1132
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/340/office/42431.pdf

Purple Cat's Paw (=purple Cat's Paw Pearlymussel) *Epioblasma obliquata obliquata* — Endangered

Population: Wherever found; Except where listed as Experimental Populations
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/5602
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/323/office/42431.pdf

NAME	STATUS
Rabbitsfoot *Quadrula cylindrica cylindrica*	Threatened

There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:

- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Ohio, Rolling Fork Salt, South Fork Kentucky, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/5165
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/3645/office/42431.pdf

Ring Pink (mussel) *Obovaria retusa*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:

- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Ohio, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/4128
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/341/office/42431.pdf

Rough Pigtoe *Pleurobema plenum*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:

- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Licking, or Ohio.

Species profile: https://ecos.fws.gov/ecp/species/6894
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/338/office/42431.pdf

Sheepnose Mussel *Plethobasus cyphyus*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:

- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Green, Kentucky, Licking, Ohio, Salt, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/6903
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/7816/office/42431.pdf

Spectaclecase (mussel) *Cumberlandia monodonta*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:

- The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Barren, Cumberland (below the falls), Green, Little South Fork of the Cumberland, Ohio, or Tennessee.

Species profile: https://ecos.fws.gov/ecp/species/7867
General project design guidelines:
https://ecos.fws.gov/ipac/guideline/design/population/4490/office/42431.pdf

Flowering Plants

NAME	STATUS
Running Buffalo Clover *Trifolium stoloniferum*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2529
Species survey guidelines:
https://ecos.fws.gov/ipac/guideline/survey/population/1041/office/42431.pdf
Habitat assessment guidelines:
https://ecos.fws.gov/ipac/guideline/assessment/population/1041/office/42431.pdf

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

ENERGY AND ENVIRONMENT CABINET
OFFICE OF KENTUCKY NATURE PRESERVES
300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601
(502) 573-2886

ZEB WEESE
EXECUTIVE DIRECDTOR

June 6, 2019

Benjamin Deetsch
Redwing Ecological Services, Inc.
1339 S. Fourth St.
Louisville, KY 40203

Project:	Eastern Parkway Transportation Study; 18-142
Project ID:	19-0131
Project Type:	Other
Site Acreage:	1.88
Site Lat/Lon:	38.220940 / -85.732531
County:	Jefferson
USGS Quad:	LOUISVILLE EAST; LOUISVILLE WEST
Watershed HUC12:	Beargrass Creek; Mill Creek Cutoff; South Fork Beargrass Creek

Dear Benjamin Deetsch,

This letter is in response to your data request for the project referenced above. We have reviewed our Natural Heritage Program Database to determine if any of the endangered, threatened, or special concern plants and animals or exemplary natural communities monitored by the Office of Kentucky Nature Preserves occur within your general project area. Your project does pose a concern at this time, therefore please see the attached reports for more detailed information.

I would like to take this opportunity to remind you of the terms of the data request license, which you agreed upon in order to submit your request. The license agreement states "Data and data products received from the Office of Kentucky Nature Preserves, including any portion thereof, may not be reproduced in any form or by any means without the express written authorization of the Office of Kentucky Nature Preserves." The exact location of plants, animals, and natural communities, if released by the Office of Kentucky Nature Preserves, may not be released in any document or correspondence. These products are provided on a temporary basis for the express project (described above) of the requester, and may not be redistributed, resold or copied without the written permission of the Biological Assessment Branch (300 Sower Blvd - 4th Floor, Frankfort, KY, 40601. Phone: 502-782-7828).

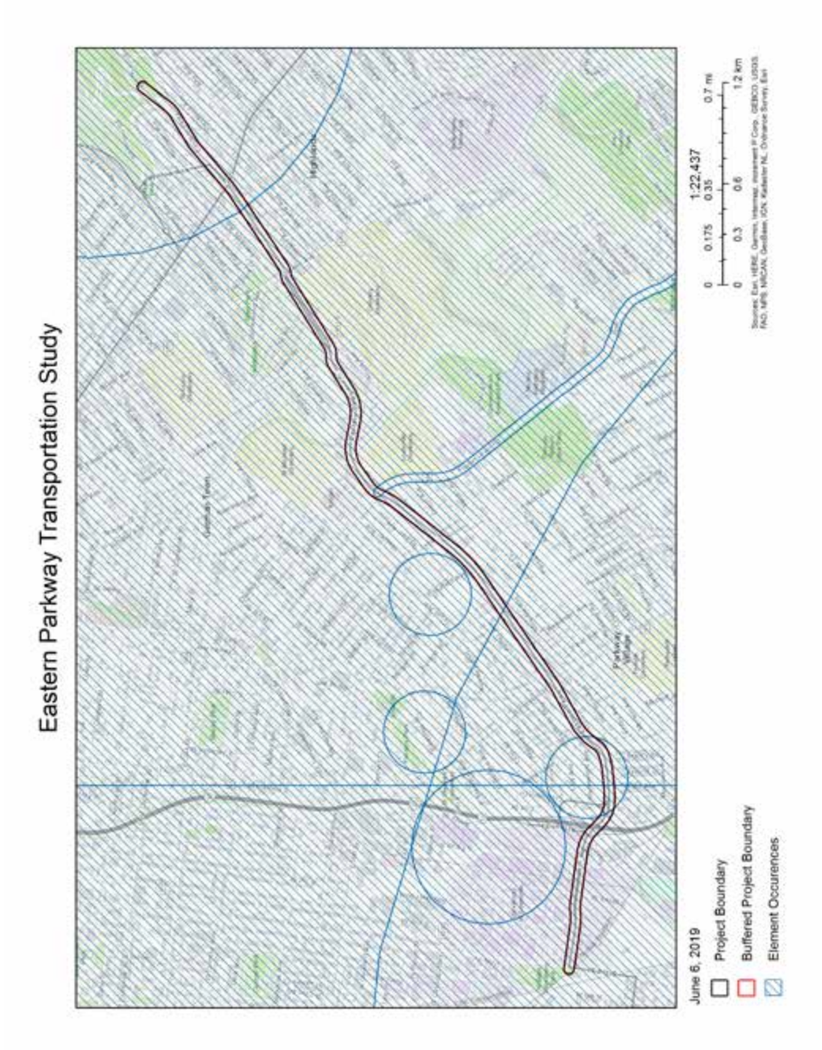
Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed and new plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage

Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. We would greatly appreciate receiving any pertinent information obtained as a result of on-site surveys.

If you have any questions, or if I can be of further assistance, please do not hesitate to contact me.

Sincerely,

Nour Salam
Geoprocessing Specialist



June 6, 2019

Page 5 of 5

Project ID: 19-0131

APPENDIX C

PUBLIC MEETING ADVERTISEMENT

courier journal
PART OF THE USA TODAY NETWORK

A GANNETT COMPANY

Advertiser:

GRESHAM SMITH
111 WEST MAIN STREET, SUITE 201

LOUISVILLE KY 40202

AFFIDAVIT OF PUBLICATION

State of Wisconsin
County of Brown

LEGAL NOTICE ATTACHED

RE: Order # 0003657140

Account #: 5026278940GRES
Total Cost of the Ad: $756.65

I, of The Courier-Journal, a newspaper published and printed in the State of Kentucky, County of Jefferson, and having general circulation in the County of Jefferson, who being duly sworn, deposeth and saith that the advertisement of which the annexed is a true copy and has been published in the said newspaper, once in each issue as follows:

06/29/19

Subscribed and sworn to before me this 1th day of July, 2019

Notary Public

9-14-21

Commission expires

VICKY FELTY NOTARY PUBLIC STATE OF WISCONSIN

of Affidavits 1

Ad Number: 0003657140 06/29/19

PUBLIC MEETING
Eastern Parkway Transportation Study
July 11, 2019 from 5:00 to 7:00 PM
1051 Hess Lane (Audubon Traditional Elementary School)

Item No.: 5-3213
Route: Eastern Parkway
County: Jefferson

Louisville Metro Government will be hosting a public meeting to present the Eastern Parkway Transportation Study project. The meeting will be an opportunity to comment on and collect public input aimed at updating the Eastern Parkway corridor between Cherokee Park and Crittenden Drive to make it more user friendly to motorists, pedestrians and cyclists while improving drainage and landscaping.
Once compiled, the meeting record will be made available for review and copying only after an Open Records Request has been received and approved. All Open Records Requests must be submitted to the KY Transportation Cabinet, Offices of Legal Services, Transportation Cabinet Office Building, 200 Mero Street, Frankfort, KY 40622.
In accordance with the American with Disabilities Act (ADA), if anyone has a disability and will require assistance, please notify John Swintosky of the necessary requirements no later than July 10, 2019. This request does not have to be in writing.
Please address any questions regarding this meeting or project to:
John Swintosky
Louisville Metro Department of Public Works
444 S. 5th Street
Louisville, KY 40202
(502) 574-6435

courier journal
PART OF THE USA TODAY NETWORK

A GANNETT COMPANY

Advertiser:

C2 STRATEGIC COMMUNICATIONS
9300 SHELBYVILLE RD STE 300

LOUISVILLE KY 40222

AFFIDAVIT OF PUBLICATION

State of Wisconsin
County of Brown

LEGAL NOTICE ATTACHED

RE: Order # 0003784345

Account #: 5025236850C2ST
Total Cost of the Ad: $1,889.20

This is not an invoice

of Affidavits: 1

I, of The Courier-Journal, a newspaper published and printed in the State of Kentucky, County of Jefferson, and having general circulation in the County of Jefferson, who being duly sworn, deposeth and saith that the advertisement of which the annexed is a true copy and has been published in the said newspaper, once in each issue as follows:

09/11/2019, 09/15/2019

Subscribed and sworn to before me this 19th day of March, 2020

Notary Public

9/19/21
Commission expires

VICKY FELTY NOTARY PUBLIC STATE OF WISCONSIN

Ad Number: 0003784345 09/11/2019, 09/15/2019

PUBLIC MEETING
Eastern Parkway Transportation Study
Tuesday, September 24, 2019
6:00 - 8:00 p.m.
Audubon Traditional Elementary School Gymnasium
1051 Hess Lane
Louisville KY 40217
Item No: 5-3213
Route: Eastern Parkway
County: Jefferson

Louisville Metro Government will hold a public meeting on the Eastern Parkway Transportation Study to present feedback and input gathered from the public at a prior public meeting and online.

The Eastern Parkway Transportation Study is aimed at updating the Eastern Parkway corridor between Cherokee Park and Crittenden Drive to make it more user friendly to motorists, pedestrians and cyclists while improving drainage and landscaping.

At the meeting, Gresham Smith, the transportation planning and civil engineering firm working with the city on the project, will give a presentation on the data at 6 p.m., and afterward the public can view detailed displays with feedback on each aspect of the project, from trees to traffic patterns. Members of the project team will be available to talk with the public in an open house format until 8 p.m.

The study is considering such elements as sidewalk and curb improvements, shared use pedestrian paths, bike lanes and other alternatives aimed at accommodating the transportation modes of all users of the corridor.

In accordance with the Americans with Disabilities Act (ADA), if anyone has a disability and will require assistance, please notify John Swintosky with the necessary requirements no later than Tuesday, September 17, 2019. This request does not have to be in writing.

Please address any questions regarding this meeting or project to:

John Swintosky
Louisville Metro Department of Public Works
444 S. Fifth St.
Louisville, KY 40202
(502) 574-8435

courier journal
PART OF THE USA TODAY NETWORK

A GANNETT COMPANY

Advertiser:

GRESHAM SMITH
111 WEST MAIN STREET, SUITE 201

LOUISVILLE KY 40202

AFFIDAVIT OF PUBLICATION

State of Wisconsin
County of Brown

LEGAL NOTICE ATTACHED

RE: Order # 0003988788

Account #: 5026278940GRES
Total Cost of the Ad: $860.89

This is not an invoice

I, of The Courier-Journal, a newspaper published and printed in the State of Kentucky, County of Jefferson, and having general circulation in the County of Jefferson, who being duly sworn, deposeth and saith that the advertisement of which the annexed is a true copy and has been published in the said newspaper, once in each issue as follows:

01/11/20

Subscribed and sworn to before me this 13th day of January, 2020

Notary Public

8-25-23
Commission expires

SHELLY HORA
Notary Public
State of Wisconsin

of Affidavits: 1

Ad Number: 0003988788 01/11/20

PUBLIC MEETING
Eastern Parkway Transportation Study
January 28, 2020 6:00-8:00 PM
1051 Hess Lane (Audubon Traditional Elementary School)
Item No.: 5-3213
Route: Eastern Parkway
County: Jefferson

Louisville Metro Government will hold a public meeting on the Eastern Parkway Transportation Study to present feedback and input gathered from the public at prior public meetings and online. The Eastern Parkway Transportation Study is aimed at updating the Eastern Parkway corridor between Cherokee Park and Crittenden Drive to make it more user friendly to motorists, pedestrians and cyclists while improving drainage and landscaping.

At the meeting, Gresham Smith, the transportation planning and civil engineering firm working with the city on the project, will give a presentation on the data at 6 p.m., and afterward the public can view detailed displays with feedback on each aspect of the project, from trees to traffic patterns. Members of the project team will be available to talk with the public in an open house format until 8 p.m.

The study is considering such elements as sidewalk and curb improvements, shared use pedestrian paths, bike lanes and other alternatives aimed at accommodating the transportation modes of all users of the corridor.

In accordance with the American with Disabilities Act (ADA), if anyone has a disability and will require assistence, please notify John Swintosky of the necessary requirements no later than January 27, 2020. This request does not have to be in writing.

Please address any questions regarding this meeting or project to:
John Swintosky
Louisville Metro Department of Public Works
444 S. 5th Street
Louisville, KY 40202
(502) 574-5435

courier journal
PART OF THE USA TODAY NETWORK

A GANNETT COMPANY

Gresham Smith & Partners

FEB 04 2020

Received

Advertiser:

GRESHAM SMITH
111 WEST MAIN STREET, SUITE 201

LOUISVILLE KY 40202

AFFIDAVIT OF PUBLICATION

State of Wisconsin
County of Brown

LEGAL NOTICE ATTACHED

RE: Order # 0004014768

Account #:5026278940GRES
Total Cost of the Ad $1,001.04

This is not an invoice

I, of The Courier-Journal, a newspaper published and printed in the State of Kentucky, County of Jefferson, and having general circulation in the County of Jefferson, who being duly sworn, deposeth a saith that the advertisement of which the annexed is a true copy and has been published in the said newspaper, once in each issue as follows:

01/24/20

Subscribed and sworn to before me this 24th day of January, 2020

Notary Public

8-25-23
Commission expires

SHELLY HORA
Notary Public
State of Wisconsin

of Affidavits: 1

Ad Number: 0004014768 01/24/20

PUBLIC MEETING
Eastern Parkway
Transportation Study
January 28, 2020/6:00-8:00 PM
1051 Hess Lane
(Audubon Traditional
Elementary School)

Item No.: 5-3213
Route: Eastern Parkway
County: Jefferson

Louisville Metro Government will hold a public meeting on the Eastern Parkway Transportation Study to present feedback and input gathered from the public at prior public meetings and online. The Eastern Parkway Transportation Study is aimed at updating the Eastern Parkway corridor between Cherokee Park and Crittenden Drive to make it more user friendly to motorists, pedestrians and cyclists while improving drainage and landscaping.

At the meeting, Gresham Smith, the transportation planning and civil engineering firm working with the city on the project, will give a presentation on the data at 6 p.m., and afterward the public can view detailed displays with feedback on each aspect of the project, from trees to traffic patterns. Members of the project team will be available to talk with the public in an open house format until 8 p.m.

The study is considering such elements as sidewalk and curb improvements, shared use pedestrian paths, bike lanes and other alternatives aimed at accommodating the transportation modes of all users of the corridor.

In accordance with the American with Disabilities Act (ADA), if anyone has a disability and will require assistance, please notify John Swintosky of the necessary requirements no later than January 27, 2020. This request does not have to be in writing.

Please address any questions regarding this meeting or project to:
John Swintosky
Louisville Metro Department of Public Works
444 S. 5th Street
Louisville, KY 40202
(502) 574-6435

Appendix C

Archaeological and Cultural Historic Overview for the Eastern Parkway Planning Study, Jefferson County, Kentucky (KYTC Item No. 5-3213)

The contents of this document are CONFIDENTIAL and on file with the DEA.

ARCHAEOLOGICAL AND CULTURAL HISTORIC OVERVIEW FOR THE EASTERN PARKWAY PLANNING STUDY, JEFFERSON COUNTY, KENTUCKY (KYTC ITEM NO. 5-3213)

KHC Project No. FY19-3404
OSA Project No. FY19-10113

Prepared for:
Mr. David Stills, P.E.
Gresham Smith
111 W Main Street #201
Louisville, KY 40202
(502) 627-8900

Louisville, Kentucky 40299
Phone: 502.890.6795
FAX: 502.907.5012
cornislandarch@twc.com

Project No. PR18014
Cultural Resources Report No. TR19070

(Signature)

Kathryn J. McGrath, MA, RPA
Principal Investigator

August 22, 2019

Appendix D

Greenhaven Tree Assessment

Eastern Pwky Transportation Study
September 2019

Address	Street	Side	Species	DBH	Condition
503	Eastern Parkway	2nd row	Quercus michauxi (Swamp chestnut oak)	3"	Poor
505	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	2"	Good
511	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	48"	Fair… HIST
514	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	46"	Good-Fair …TD
515	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	1"	Fair
516	Eastern Parkway	1st row	Quercus prinus (Chestnut oak)	2"	Fair
518	Eastern Parkway	1st row	Quercus palustris (Pin oak)	37"	Fair-Poor… HIST, TD
519	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	12"	Fair… TD
522	Eastern Parkway	1st row	Quercus palustris (Pin oak)	29"	Fair…
524	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	3"	Good
525	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	34"	Fair…TD
527	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	42"	Good
528	Eastern Parkway	2nd row	Quercus rubra (Northern red oak)	5"	Good
531	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	40"	Fair-Poor….ED
532	Eastern Parkway	1st row	Quercus velutina (Black oak)	2"	Poor
532	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	39"	Good
533	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	1"	Good
533	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	37"	Fair…. HIST
534	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	46"	Good
535	Eastern Parkway	2nd row	Quercus coccinea (Scarlet red oak)	2"	Good
535	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	9"	Good
536	Eastern Parkway	1st row	Quercus palustris (Pin oak)	29"	Poor….HIST…TD

Greenhaven-EasternParkwayTreeAssessment.xlsx

Page 1

Eastern Pwky Transportation Study
September 2019

536	Eastern Parkway	1st row	Quercus pagodifolia (Cherrybark Oak)	3"	Poor….TD
536	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	42"	Poor....TD
536	Eastern Parkway	2nd row	Aesculus glabra (Ohio buckeye)	4"	Fair…GR
539	Eastern Parkway	1st row	Pyrus caleryana (Calery pear)	15"	Fair….WC, PSS
541	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	5"	Fair
541	Eastern Parkway	2nd row	Sassafras albidum(Sassafras)	5"	Good
543	Eastern Parkway	1st row	Quercus palustris (Pin oak)	48"	Fair…. CD, HIST
543	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	37"	Good
545	Eastern Parkway	2nd row	Prunus Sp. (Flowering Cherry)	6"	Good…. PSS
546	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	3"	Poor
546	Eastern Parkway	1st row	Quercus alba (White oak)	2"	Poor…AD
546	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	34"	Good-Fair
547	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	6"	Fair… AD
547	Eastern Parkway	2nd row	Quercus Phellos (Willow Oak)	2"	Good
548	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	4"	Good
548	Eastern Parkway	2nd row	Fraxinus americana (White ash)	30"	Good
549	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	6"	Fair
549	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	16"	Fair…GR, WC
550	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	14"	Good
551	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	6"	Fair- Poor
551	Eastern Parkway	2nd row	Diospyros virginiana (Common persimmon)	9"	Fair
552	Eastern Parkway	1st row	Quercus elipsoidalis (Northern pin oak)	1"	Good

Eastern Pwky Transportation Study
September 2019

552	Eastern Parkway	2nd row	Prunus serotina (Black cherry)	1"	Good
553	Eastern Parkway	2nd row	Tilia americana (Basswood)	5"	Good
554	Eastern Parkway	1st row	Quercus palustris (Pin oak)	37"	Poor…AD,ED, HAZ, HIST,
554	Eastern Parkway	2nd row	Prunus persica (Peach tree)	4"	Good
555	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	4"	Poor....AD
555	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	8"	Good
556	Eastern Parkway	1st row	Quercus palustris (Pin oak)	48"	Fair…. HIST, TD
556	Eastern Parkway	2nd row	Sassafras albidum(Sassafras)	2"	Good
556	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	12"	Poor…ED, TD
557	Eastern Parkway	1st row	Swamp White Oak (quereu bi-color)	2"	Poor….AD
557	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	46"	Good
558	Eastern Parkway	1st row	Quercus palustris (Pin oak)	18"	Fair…AD
558	Eastern Parkway	1st row	Acer rubrum(Red maple)	23"	Fair
558	Eastern Parkway	2nd row	Magnolia acuminata (Cucumber magnolia)	3"	Good
559	Eastern Parkway	1st row	Quercus palustris (Pin oak)	7"	Poor
560	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17"	Fair…WC
561	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	5"	Good
561	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	38.5	Good… CD
562	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	7"	Fair
562	Eastern Parkway	1st row	Quercus alba (White oak)	7.5"	Good
562	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	4"	Good

Eastern Pwky Transportation Study
September 2019

565	Eastern Parkway	1st row	Quercus palustris (Pin oak)	43.5"	Fair…CD, GR, HIST
565	Eastern Parkway	2nd row	Zelkova serrata (Japanese zelkova)	4"	Fair
565	Eastern Parkway	2nd row	Zelkova serrata (Japanese zelkova)	5"	Good
565	Eastern Parkway	2nd row	Zelkova serrata (Japanese zelkova)	7"	Fair…WC, GR
565	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	5"	Good
566	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	3.5"	Good
566	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	42"	Fair…HIST
569	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	5"	Good..
569	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	8"	Good
569	Eastern Parkway	2nd row	Zelkova serrata (Japanese zelkova)	7.5"	Fair….GR, WC
570	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	48.5"	Fair…WC
570	Eastern Parkway	2nd row	Fraxinus americana (White ash)	26.5"	Fair
600	Eastern Parkway	1st row	Quercus elipsoidalis (Northern pin oak)	3"	Poor…AD
600	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	4"	Good
601	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	2"	Good
601	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	1"	Good
601	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	1	Good
601	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16"	Good

Eastern Pwky Transportation Study
September 2019

601	Eastern Parkway	1st row	Querus rubra (Red Oak)	21"	Good
601	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	22.5"	Fair…AD,GR,HIST,WC
601	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	2"	Good
601	Eastern Parkway	2nd row	Platanus x acerifolia (London plane tree)	2"	Good
601	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	6"	Good
601	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	5.5"	Good
601	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	7"	Good
602	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	14"	Fair…AD
602	Eastern Parkway	2nd row	Picea pungens (Colorado blue spruce)	10"	Fair…PSS
602	Eastern Parkway	2nd row	Picea pungens (Colorado blue spruce)	21"	Fair…PSS
604	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	13"	Fair…AD
604	Eastern Parkway	2nd row	Acer rubrum(Red maple)	45"	Fair…GR, WC
606	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	9"	Good
606	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	8"	Good
608	Eastern Parkway	1st row	Quercus phelos (Wilow oak)	2"	Good
608	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	6"	Good
608	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	7"	Good
610	Eastern Parkway	1st row	Quercus alba (White oak)	21"	Good
610	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	10"	Good

Eastern Pwky Transportation Study
September 2019

610	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	15"	Fair… GR,WC
612	Eastern Parkway	1st row	Quercus alba (White oak)	17"	Poor
612	Eastern Parkway	2nd row	Sassafras albidum(Sassafras)	4"	Fair
612	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	16"	Good
614	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	1"	Good
614	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17"	Fair….GR
616	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	6"	Good
616	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	9"	Good
618	Eastern Parkway	1st row	Quercus alba (White oak)	28"	Good
618	Eastern Parkway	2nd row	Ginkgo biloba (Ginkgo)	24"	Fair…WC
620	Eastern Parkway	1st row	Quercus alba (White oak)	30"	Good
620	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	4"	Fair-Poor… GR
735	Eastern Parkway	row2 across street	Cladrastis kentukea (American ye11owwood)	6"	Fair
735	Eastern Parkway	row1 across	Quercus palustris (Pin oak)	29"	Fair-Poor

Eastern Pwky Transportation Study
September 2019

735	Eastern Parkway	row2 across	Quercus palustris (Pin oak)	38.5"	Fair - Poor… TD
735	Eastern Parkway	row1 across street	Quercus bicolor (Swamp white oak)	3"	Good
735	Eastern Parkway	row2 across	Gymnocladus dioicus (Kentucky coffee tree)	6"	Good
735	Eastern Parkway	row1 across	Fraxinus pennsylvanica (Green ash)	18"	Good
735	Eastern Parkway	row2	Liquidambar styraciflua (Sweetgum)	7"	Fair….TD
735	Eastern Parkway	row1	Quercus lyrata (Overcup oak)	7"	Good
735	Eastern Parkway	row2 across street	Magnolia acuminata (Cucumber magnolia)	2.5"	Good
735	Eastern Parkway	row1	Quercus alba (White oak)	26.5"	Good
757	Eastern Parkway	row2	Liquidambar styraciflua (Sweetgum)	32"	Fair… ED, TD
757	Eastern Parkway	row 1 vacant lot	Quercus palustris (Pin oak)	47"	Fair… HIST
757	Eastern Parkway	row 1	Quercus falcata (Southern red oak)	5"	Good
757	Eastern Parkway	row1 vacant lot	Quercus palustris (Pin oak)	33"	Fair… AD
757	Eastern Parkway	row1 across	Quercus bicolor (Swamp white oak)	14"	Good
757	Eastern Parkway	row1 across	Quereus pagodafolia (Cherry bark oak)	4"	Poor
757	Eastern Parkway	row2 across	Cladrastis kentukea (American yellowwood)	15"	Good
757	Eastern Parkway	row2 across	Quercus palustris (Pin oak)	46"	Good

Eastern Pwky Transportation Study
September 2019

757	Eastern Parkway	row2 across	Nyssa sylvatica (Blackgum)	7"	Fair… GR
757	Eastern Parkway	row2 across	Liriodendron tulipifera (Tulip Poplar)	12"	Fair... GR
757	Eastern Parkway	row2 across	Catalpa speciosa (Northern catalpa)	13.5"	Good
757	Eastern Parkway	row2 across street	Quercus palustris (Pin oak)	24"	Fair
760	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	8"	Good
760	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	14	Good
760	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	24"	Fair… GR
760	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	24"	Good… AD
760	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	2"	Good
760	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	22"	Fair… AD
760	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	22"	Fair
760	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	22"	Fair
760	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	3"	Fair
760	Eastern Parkway	2nd row	Prunus serotina (Black cherry)	3"	Good
760	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	15"	Good
760	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	14"	Poor… GR

Eastern Pwky Transportation Study
September 2019

760	Eastern Parkway	2nd row	Fraxinus pennsylvanica (Green ash)	16.5"	Fair
760	Eastern Parkway	2nd row	Fraxinus pennsylvanica (Green ash)	22"	Good
760	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	14"	Good-Fair
760	Eastern Parkway	2nd row	Fraxinus pennsylvanica (Green ash)	23"	Poor … AD
770	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	1"	Good
770	Eastern Parkway	row2 across street	Carya ilinoinensis (Pecan)	2"	Good
771	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	3.5"	Poor
778	Eastern Parkway	1st row	Quercus velutina (Black oak)	29"	Good
778	Eastern Parkway	2nd row	Aesculus flava (Yelow Buckeye)	3"	Fair
780	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	8"	Good
782	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	4.5"	Fair… AD
782	Eastern Parkway	1st row	Quercus phelos (Wilow oak)	2"	Poor
782	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	4"	Fair … AD
782	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	4"	Good

Eastern Pwky Transportation Study
September 2019

782	Eastern Parkway	2nd row	Carya ilinoinensis (Pecan)	2"	Good
783	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	7"	Fair …GR
783	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	9"	Good
783	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	9"	Good
785	Eastern Parkway	1st row	Quercus palustris (Pin oak)	40	Fair-Poor… AD, CD, ED, HIST
785	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	5"	Good
785	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	15"	Good
785	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	12"	Good
786	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	2"	Good
786	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	10"	Good
786	Eastern Parkway	2nd row	Quercus alba (White oak)	34"	Good
787	Eastern Parkway	row1	Quercus coccinea (Scarlet red oak)	2"	Fair
787	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	2.5"	Good
787	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	12.5"	Good- Fair
787	Eastern Parkway	2nd row	Aesculus octandra (Yelow buckeye)	8.5"	Fair… AD

Eastern Pwky Transportation Study
September 2019

787	Eastern Parkway	2nd row	Sassafras albidum(Sassafras)	2"	Fair
789	Eastern Parkway	row1	Quercus macrocarpa (Bur oak)	2"	Good
789	Eastern Parkway	row2 across	Celtis occidentalis (Common hackberry)	2"	Good
789	Eastern Parkway	row2 across	Magnolia acuminata (Cucumber magnolia)	2"	Good
789	Eastern Parkway	2nd row	Sassafras albidum(Sassafras)	2"	Fair
789	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	11.5"	Good
789	Eastern Parkway	2nd row	Acer saccharinum(Silver maple)	9.5	Good
790	Eastern Parkway	1st row	Quercus alba (White oak)	26"	Good
790	Eastern Parkway	2nd row	Quercus alba (White oak)	24"	Good
793	Eastern Parkway	1st row	Ginkgo biloba (Ginkgo)	14"	Poor… AD, PSS
793	Eastern Parkway	1st row	Ginkgo biloba (Ginkgo)	15"	Fair
793	Eastern Parkway	1st row	Ginkgo biloba (Ginkgo)	14"	Fair… AD, PSS
793	Eastern Parkway	1st row	Ginkgo biloba (Ginkgo)	14"	Fair… PSS
793	Eastern Parkway	1st row	Aesculus octandra (Yelow buckeye)	2"	Good
793	Eastern Parkway	2nd row	Magnolia acuminata (Cucumber magnolia)	3"	Fair… AD
796	Eastern Parkway	1st row	Ginkgo biloba (Ginkgo)	13"	Fair…PSS
796	Eastern Parkway	1st row	Ginkgo biloba (Ginkgo)	13"	Fair… PSS

Eastern Pwky Transportation Study
September 2019

796	Eastern Parkway	2nd row	Crataegus spp. (hawthorn)	8"	Poor… PSS
796	Eastern Parkway	2nd row	Crataegus spp. (hawthorn)	6"	Fair… PSS
796	Eastern Parkway	2nd row	Crataegus spp. (hawthorn)	7"	Good… PSS
801	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	1.5"	Good
801	Eastern Parkway	1st row	Quercus mulenberg (Chickapin Oak)	2"	Good
801	Eastern Parkway	1st row	Quercus nigra (Water oak)	1.5"	Good
801	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	2"	Good… GR
801	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	2"	Good
808	Eastern Parkway	1st row	Quercus falcata (Southern red oak)	2.5"	Good
808	Eastern Parkway	1st row	Quercus nuttali (Nuttal)	2.5"	Good
808	Eastern Parkway	1st row	Cladrastis kentukea (American yelowwood)	9"	Fair… WC
808	Eastern Parkway	1st row	Fraxinus americana (White ash)	24.5"	Poor… AD, TD
808	Eastern Parkway	1st row	Fraxinus americana (White ash)	20"	Poor… AD, TD
808	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	6.5"	Good
808	Eastern Parkway	2nd row	Acer saccharinum(Silver maple)	15"	Good
808	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	7"	Fair… WC
808	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	4"	Good
808	Eastern Parkway	2nd row	Quercus coccinea (Scarlet red oak)	30.5"	Good
811	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	2.5"	Good
811	Eastern Parkway	1st row	Quercus elipsoidalis (Northern pin oak)	1"	Fair

Eastern Pwky Transportation Study
September 2019

811	Eastern Parkway	1st row	Quercus palustris (Pin oak)	26"	Good… CD, GR
811	Eastern Parkway	1st row	Quercus alba (White oak)	2"	Fair
811	Eastern Parkway	2nd row	Acer rubrum(Red maple)	5"	Good
811	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17.5"	Fair… GR, WC
811	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	5"	Good
811	Eastern Parkway	2nd row	Malus sp. (Crabapple)	3"	Poor … PSS
811	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20.5"	Fair… WC
811	Eastern Parkway	2nd row	Quercus lyrata (Overcup oak)	2"	Good
812	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	8.5"	Good
812	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	4"	Good
816	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	7	Good
816	Eastern Parkway	2nd row	Acer rubrum(Red maple)	3	Fair
820	Eastern Parkway	2nd row	Quercus coccinea (Scarlet red oak)	38	Poor… TD
822	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	2.5	Good
822	Eastern Parkway	2nd row	Acer rubrum(Red maple)	4	Good
822	Eastern Parkway	2nd row	Acer rubrum(Red maple)	6.5	Good
823	Eastern Parkway	1st row	Quercus palustris (Pin oak)	33	Fair… AD, CD, GR
823	Eastern Parkway	2nd row	Fraxinus pennsylvanica (Green ash)	14.5	Fair-Poor
825	Eastern Parkway	1st row	Quercus pagodifolia (Cherrybark Oak)	7	Fair
825	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	15	Good
828	Eastern Parkway	1st row	Quercus pagodifolia (Cherrybark Oak)	8.5	Fair

Eastern Pwky Transportation Study
September 2019

828	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	25	Good
828	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	10	Good… PSS
829	Eastern Parkway	1st row	Quercus rubra (Scarlet red oak)	13	Good
829	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	4	Good
829	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22	Good… GR
830	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	4	Good
830	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	18	Fair… GR, WC
831	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	4	Good
832	Eastern Parkway	1st row	Quercus palustris (Pin oak)	46	Poor… HIST, CD
832	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	4	Good… PSS
832	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23	Good
833	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	16	Fair… GR
833	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	16	Fair… WC
834	Eastern Parkway	1st row	Pyrus communis (European Pear)	10	Good…PSS
834	Eastern Parkway	1st row	Pyrus communis (European Pear)	7	Good… PSS
834	Eastern Parkway	1st row	Quercus palustris (Pin oak)	25.5	Good
834	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	3	Good… PSS
834	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	4	Good… PSS

Eastern Pwky Transportation Study
September 2019

834	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	2	Good… PSS
837	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	8.5	Good
837	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	30	Fair… WC, GR
838	Eastern Parkway	1st row	Quercus palustris (Pin oak)	7.5	Fair
838	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	30	Fair
840	Eastern Parkway	1st row	Cornus florida (Flowering dogwood)	5	Good…PSS
840	Eastern Parkway	1st row	Ilex opaca (American holy)	10	Good… PSS
840	Eastern Parkway	1st row	Crataegus viridis (Winter king hawthorn)	6	Good.. PSS
840	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	1	Poor... AD
841	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	3	Poor
841	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	25	Fair… ED, HIST, GR
844	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	2	Good… AD
844	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	16.5	Poor …ED
844	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	19	Good
847	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	16.5	Good
847	Eastern Parkway	1st row	Quercus velutina (Black oak)	3	Good
847	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	19	Good
847	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	16	Fair… AD, TD
848	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	1.5	Good

Eastern Pwky Transportation Study
September 2019

848	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	18	Good
850	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	8	Good
850	Eastern Parkway	1st row	Quercus palustris (Pin oak)	45.5	Fair… AD, CD, HIST
850	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	3.5	Good
850	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	14.5	Good
850	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	7	Good
851	Eastern Parkway	1st row	Quercus montana (chestnut oak)	3"	Good
851	Eastern Parkway	2nd row	Acer rubrum(Red maple)	4	Good.. GR
851	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	13	Fair-Poor… GR
853	Eastern Parkway	1st row	Quercus palustris (Pin oak)	46	Good… AD, HIST
853	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22	Good… WC
855	Eastern Parkway	1st row	Quercus montana (chestnut oak)	7	Good
855	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	3	Good
855	Eastern Parkway	2nd row	Acer rubrum(Red maple)	7	Fair
857	Eastern Parkway	1st row	Quercus nigra (Water oak)	5	Good
857	Eastern Parkway	2nd row	Tilia americana (Basswood)	8	Good
860	Eastern Parkway	1st row	Quercus michauxi (Swamp chestnut oak)	6	Good
860	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24	Good
861	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	1.5	Good
861	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	13.5	Fair… GR, WC
862	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	5	Fair
862	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	28	Fair… WC

Eastern Pwky Transportation Study
September 2019

863	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	10	Good
863	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	1.5	Fair
864	Eastern Parkway	1st row	Quercus velutina (Black oak)	28	Fair-Poor… HIST
864	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	29	Fair-Poor… ED, WC
866	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	7	Fair
866	Eastern Parkway	2nd row	Acer rubrum(Red maple)	7	Fair
867	Eastern Parkway	2nd row	Acer rubrum(Red maple)	8	Good… GR
868	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	8.5	Good
868	Eastern Parkway	2nd row	Prunus serotina (Black cherry)	2.5	Good
869	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	6	Good
869	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	19	Poor… TD
870	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	4.5	Good
870	Eastern Parkway	2nd row	Tilia americana (Basswood)	7	Fair… GR
873	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	2.5	Fair…
873	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24	Fair… GR, WC
874	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	1	Good
874	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	28	Fair- Poor.. HIST, ED
875	Eastern Parkway	1st row	Quercus michauxi (Swamp chestnut oak)	5.5	Good
875	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Good-Fair.. GR, WC
875	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	13	Good… GR
876	Eastern Parkway	1st row	Quercus phelos (Willow oak)	2	Poor
876	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20"	Good

Eastern Pwky Transportation Study
September 2019

879	Eastern Parkway	1st row	Quercus palustris (Pin oak)	21.5	Fair… AD
879	Eastern Parkway	2nd row	Acer palmatum(Japanese maple)	8	Poor… TD
884	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16	Fair… AD
884	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	5	Good
884	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Fair-Poor… ED, WC
885	Eastern Parkway	1st row	Quercus palustris (Pin oak)	40	Fair-Poor… AD, ED,TD,
885	Eastern Parkway	1st row	Quercus palustris (Pin oak)	51	Fair…CD, HIST,
885	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	19	Fair… AD,
885	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	16"	Fair… AD, WC
886	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	24	Good… AD
886	Eastern Parkway	2nd row	Acer rubrum(Red maple)	7.5	Good… GR
887	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	3	Good…
887	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	5	Fair… GR, WC
888	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	55	Poor… CD, ED, HIST, TD,
888	Eastern Parkway	2nd row	Celtis occidentalis (Common hackberry)	3	Good
890	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	2.5	Good
890	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	17	Fair… PSS
894	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24	Good
895	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24.5	Good
896	Eastern Parkway	1st row	Quercus palustris (Pin oak)	20	Good
896	Eastern Parkway	1st row	Quercus palustris (Pin oak)	9	Good

Eastern Pwky Transportation Study
September 2019

896	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	13.5	Good
897	Eastern Parkway	1st row	Quercus palustris (Pin oak)	18	Fair-Poor…
897	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	36.5	Fair… GR
899	Eastern Parkway	1st row	Quercus palustris (Pin oak)	17	Fair…
899	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16	Fair… , TD
899	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16	Good…. TD
899	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	16	Good
899	Eastern Parkway	2nd row	Quercus bicolor (Swamp white oak)	9	Good
900	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	9	Fair… AD
900	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	3	Good…GR
900	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	28	Good-Fair
901	Eastern Parkway	1st row	Quercus montana (Chestnut oak)	1.5	Fair
901	Eastern Parkway	2nd row	Celtis occidentalis (Common hackberry)	2	Good
902	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	8	Good… WC
904	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	6	Good
904	Eastern Parkway	1st row	Quercus palustris (Pin oak)	40	Fair… CD, HIST, TD,
904	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	18	Good
905	Eastern Parkway	1st row	Quercus palustris (Pin oak)	21.5	Good
905	Eastern Parkway	2nd row	Acer rubrum(Red maple)	5.5	Good
907	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	27	Fair… AD, CD

Eastern Pwky Transportation Study
September 2019

909	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	2.5	Good
909	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Good… ED, TD,
912	Eastern Parkway	1st row	Quercus palustris (Pin oak)	37	Fair… CD, TD,
912	Eastern Parkway	1st row	Quercus palustris (Pin oak)	44	Fair… AD, CD, TD,
912	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	14	Good
913	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	3	Good
913	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	25.5	Fair… GR
914	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16	Good… AD
914	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	1	Good
915	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	3	Good
915	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24	Fair… GR
916	Eastern Parkway	1st row	Quercus elipsoidalis (Northern pin oak)	5	Good
916	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	10	Poor... PSS
916	Eastern Parkway	2nd row	Ilex opaca (American holy)	16	Good… PSS
917	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	5.5	Good
917	Eastern Parkway	2nd row	Betula nigra (River birch)	3	Fair
918	Eastern Parkway	1st row	Quercus palustris (Pin oak)	17	Good
918	Eastern Parkway	2nd row	Magnolia acuminata (Cucumber magnolia)	4	Good
919	Eastern Parkway	2nd row	Quercus bicolor (Swamp white oak)	3	Good
919	Eastern Parkway	2nd row	Sassafras albidum(Sassafras)	8.5	Good

Eastern Pwky Transportation Study
September 2019

921	Eastern Parkway	2nd row	Acer rubrum(Red maple)	9	Fair… GR
923	Eastern Parkway	1st row	Quercus velutina (Black oak)	8.5	Good
923	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	3	Good
925	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	9	Good
925	Eastern Parkway	2nd row	Tilia americana (Basswood)	3	Good
926	Eastern Parkway	1st row	Quercus pagodifolia (Cherrybark Oak)	18.5	Fair
926	Eastern Parkway	2nd row	Acer rubrum(Red maple)	9	Good
927	Eastern Parkway	1st row	Quercus palustris (Pin oak)	37	Fair… HIST
927	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24	Good
928	Eastern Parkway	1st row	Quercus palustris (Pin oak)	13.5	Good
928	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	2.5	Fair
930	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	3.5	Good
930	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	19	Good
934	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	6.5	Good
934	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	11	Good
936	Eastern Parkway	1st row	Quercus palustris (Pin oak)	15	Fair
936	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22	Good
938	Eastern Parkway	1st row	Quercus palustris (Pin oak)	12.5	Fair… AD
938	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	28.5	Good
939	Eastern Parkway	1st row	Quercus palustris (Pin oak)	39	Fair

Eastern Pwky Transportation Study
September 2019

940	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24	Good
941	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	12	Good… AD
941	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21.5	Fair… GR
942	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	8	Fair
943	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	3	Fair
943	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	27	Fair
944	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	11	Fair… AD
944	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	8	Good
945	Eastern Parkway	1st row	Quercus palustris (Pin oak)	19	Fair… AD
946	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Fair… GR , WC
947	Eastern Parkway	1st row	Quercus palustris (Pin oak)	43	Fair… HIST
947	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21.5	Good
948	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	29	Good
950	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	7.5	Poor
951	Eastern Parkway	1st row	Quercus palustris (Pin oak)	7.5	Fair
951	Eastern Parkway	2nd row	Acer rubrum(Red maple)	7	Good
952	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	29.5	Fair… ED
953	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	8	Good
954	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	16	Good… AD
954	Eastern Parkway	2nd row	Acer rubrum(Red maple)	20	Good… WC
955	Eastern Parkway	1st row	Quercus velutina (Black oak)	8.5	Good
955	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	21.5	Fair… CD

Eastern Pwky Transportation Study
September 2019

956	Eastern Parkway	1st row	Quercus palustris (Pin oak)	22	Fair… GR
956	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	13	Good… PSS
957	Eastern Parkway	2nd row	Prunus serrulata (Japanese flowering cherry)	16.5	Good… PSS
958	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	16	Fair
958	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17	Good
959	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	2	Good… GR
959	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	18	Good
960	Eastern Parkway	1st row	Quercus palustris (Pin oak)	10.5	Fair
960	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	53	Fair-Poor
961	Eastern Parkway	1st row	Quercus elipsoidalis (Northern pin oak)	6.5	Good
961	Eastern Parkway	2nd row	Acer rubrum(Red maple)	7	Good
962	Eastern Parkway	1st row	Quercus palustris (Pin oak)	35	Good-Fair… CD
962	Eastern Parkway	2nd row	Magnolia acuminata (Cucumber magnolia)	9	Good
963	Eastern Parkway	1st row	Quercus palustris (Pin oak)	54.5	Good… CD, GR
963	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	25.5	Good
965	Eastern Parkway	2nd row	Acer rubrum(Red maple)	7	Good
975	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	28	Good… CD , WC,
975	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23	Good… WC
977	Eastern Parkway	1st row	Quercus palustris (Pin oak)	44.5	Fair…AD, CD, HIST,

Eastern Pwky Transportation Study
September 2019

977	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22.5	Fair… HIST, WC
979	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21.5	Fair… HIST, WC
981	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	19.5	Good
981	Eastern Parkway	2nd row	Cladrastis kentukea (American yellowwood)	10	Good… WC
982	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	2	Good… PP
982	Eastern Parkway	1st row	Quercus alba (White oak)	3	Good
982	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	3.5	Good
982	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	17	Good… AD
982	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	23	Good… CD
982	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16.5	Good
982	Eastern Parkway	2nd row	Celtis laevigata (Sugar hackberry)	1.5	Good
982	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24.5	Poor… ED, GR,
982	Eastern Parkway	2nd row	Acer rubrum(Red maple)	8	Fair… GR
982	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	33	Good… GR, WC
982	Eastern Parkway	2nd row	Acer rubrum(Red maple)	6	Good
982	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Good… WC
982	Eastern Parkway	2nd row	Acer rubrum(Red maple)	6.5	Good
985	Eastern Parkway	1st row	Quercus montana (Chestnut oak)	3.5	Fair… GR
985	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Good… GR

Eastern Pwky Transportation Study
September 2019

987	Eastern Parkway	1st row	Quercus velutina (Black oak)	2.5	Poor… AD
987	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17.5	Fair… GR
989	Eastern Parkway	1st row	Quercus palustris (Pin oak)	42	Poor
989	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	11.5	Fair … WC
991	Eastern Parkway	1st row	Quercus palustris (Pin oak)	57	Good… CD
991	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	26	Fair… GR
991	Eastern Parkway	1st row	Quercus velutina (Black oak)	18	Fair
991	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	23.5	Fair… AD
991	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	11.5	Good
991	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26	Good… WC
991	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23.5	Good
991	Eastern Parkway	row1	Quercus lyrata (Overcup oak)	7	Good
991	Eastern Parkway	row1	Quercus bicolor (Swamp white oak)	13	Good
991	Eastern Parkway	row2	Nyssa sylvatica (Blackgum)	8	Good
993	Eastern Parkway	row1	Quercus shumardi (Shumard red oak)	15	Good
993	Eastern Parkway	row2	Acer rubrum(Red maple)	4.5	Good
1000	Eastern Parkway	1st row	Quercus palustris (Pin oak)	22.5	Good
1000	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	8	Fair
1000	Eastern Parkway	1st row	Quercus palustris (Pin oak)	70.5	Fair-Poor… CD, ED, HIST
1000	Eastern Parkway	2nd row	Ginkgo biloba (Ginkgo)	19.5	Good… WC

Eastern Pwky Transportation Study
September 2019

1000	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	18.5	Good
1000	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	2	Good
1000	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	2	Good
1001	Eastern Parkway	1st row	Quercus velutina (Black oak)	1.5	Good
1001	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	21	Fair… AD, HIST
1001	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	13.5	Good
1001	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Good
1001	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22	Good
1001	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	14	Good
1001	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Good
1001	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	13	Fair
1001	Eastern Parkway	3rd row	Acer saccharum(Sugar maple)	26	Good
1001	Eastern Parkway	3rd row	Acer rubrum(Red maple)	51	Good… WC
1015	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	3.5	Good
1015	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	9	Poor
1015	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	6.5	Good
1017	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	21.5	Fair

Eastern Pwky Transportation Study
September 2019

1017	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	10	Good
1019	Eastern Parkway	1st row	Quercus palustris (Pin oak)	20.5	Fair
1021	Eastern Parkway	1st row	Quercus palustris (Pin oak)	20	Fair
1021	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	6.5	Good
1023	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	15	Fair… WC,
1023	Eastern Parkway	2nd row	Diospyros virginiana (Common persimmon)	2	Fair… GR
1025	Eastern Parkway	1st row	Quercus palustris (Pin oak)	48	Fair… AD, CD, HIST
1025	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17	Fair… GR, WC
1027	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	6.5	Good…
1027	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26	Good… GR
1028	Eastern Parkway	1st row	Quercus alba (White oak)	3.5	Good
1028	Eastern Parkway	1st row	Quercus palustris (Pin oak)	21	Good
1028	Eastern Parkway	1st row	Quercus palustris (Pin oak)	46	Good… CD, WC
1028	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16.5	Good
1028	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	4	Good
1028	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	12.5	Good… GR
1028	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22	Good… GR
1029	Eastern Parkway	2nd row	Acer platanoides (Norway maple)	22.5	Fair… GR, PSS, WC
1030	Eastern Parkway	1st row	Quercus palustris (Pin oak)	28	Fair … CD
1030	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	7	Fair-Poor
1032	Eastern Parkway	1st row	Quercus palustris (Pin oak)	43.5	Fair… AD, CD

Eastern Pwky Transportation Study
September 2019

1032	Eastern Parkway	1st row	Quercus palustris (Pin oak)	19	Fair
1032	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20.5	Fair… GR, WC
1032	Eastern Parkway	2nd row	Acer palmatum(Japanese maple)	1	Poor… PSS
1034	Eastern Parkway	1st row	Quercus palustris (Pin oak)	5	Poor…
1034	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	28	Good-Fair… GR
1036	Eastern Parkway	1st row	Quercus palustris (Pin oak)	18	Good… GR
1036	Eastern Parkway	1st row	Betula nigra (River birch)	24	Good-Fair
1037	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	15	Good
1037	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17.5	Poor… GR, WC
1038	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	9.5	Good
1038	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	1.5	Good
1039	Eastern Parkway	1st row	Quercus palustris (Pin oak)	45.5	Fair.. CD, WC
1039	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Fair… GR, WC
1040	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	25	Good… CD
1040	Eastern Parkway	2nd row	Acer rubrum(Red maple)	6	Good-Fair… GR
1041	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	3	Good
1041	Eastern Parkway	1st row	Quercus palustris (Pin oak)	41	Fair… AD, TD, HIST
1041	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	9	Good
1042	Eastern Parkway	1st row	Quercus palustris (Pin oak)	42.5	Good… AD, CD
1042	Eastern Parkway	2nd row	Aesculus x arnoldiana (Autum Splendor Buckeye)	2.5	Good

Eastern Pwky Transportation Study
September 2019

1043	Eastern Parkway	2nd row	Quercus shumardi (Shumard red oak)	2	Good
1044	Eastern Parkway	1st row	Quercus elipsoidalis (Northern pin oak)	10.5	Good
1044	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	17	Poor… GR, WC
1045	Eastern Parkway	1st row	Quercus palustris (Pin oak)	48.5	Fair- Poor… CD, HIST
1045	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	18	Fair… TD
1045	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	15.5	Good
1047	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	18.5	Good
1047	Eastern Parkway	1st row	Quercus palustris (Pin oak)	42	Good… AD
1047	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	19	Good
1047	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20	Good
1048	Eastern Parkway	1st row	Quercus velutina (Black oak)	7.5	Good…
1048	Eastern Parkway	1st row	Quercus palustris (Pin oak)	20.5	Poor… GR, TD
1048	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21.5	Fair… ED
1049	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20	Good
1050	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	10.5	Good-Fair
1050	Eastern Parkway	1st row	Cladrastis kentukea (American yelowwood)	17	Good-Fair… GR, WC
1052	Eastern Parkway	1st row	Quercus palustris (Pin oak)	45.5	Fair… AD, HIST
1052	Eastern Parkway	2nd row	Acer rubrum(Red maple)	4	Good
1053	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	34	Good-Fair… GR, WC
1056	Eastern Parkway	1st row	Quercus palustris (Pin oak)	32	Fair
1056	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20.5	Good- Fair… GR
1057	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23	Fair-Poor… ED, WC
1059	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26	Good-Fair… GR, WC

Eastern Pwky Transportation Study
September 2019

1060	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	18.5	Good-Fair… GR, WC
1063	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17	Poor… AD, ED,
1064	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	27	Good-Fair… GR, WC
1065	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23.5	Good-Fair… WC
1068	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	15	Poor… GR, WC
1069	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	2	Good
1072	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	13.5	Fair… GR, WC
1072	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	27	Good
1074	Eastern Parkway	2nd row	Acer rubrum(Red maple)	9	Good-Fair… GR
1077	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	30	Good-Fair
1079	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	16	Good-Fair… WC
1081	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26	Good… GR
1082	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	6	Good
1090	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	28	Poor… ED, WC
1092	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26	Good… HIST
1106	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	4	Fair
1106	Eastern Parkway	2nd row	Gleditsia triacanthos (Honeylocust)	3	Good
1106	Eastern Parkway		Juglans nigra (Black walnut)	5.5	Fair-Poor
1106	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	1	Fair… PSS
1106	Eastern Parkway	2nd row	Acer disectum (Japanese Thread Leaf	1	Fair… PSS
1106	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	8.5	Fair… GR

Eastern Pwky Transportation Study
September 2019

1106	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	14.5	Fair… GR, WC
1110	Eastern Parkway	1st row	Quercus palustris (Pin oak)	37.5	Poor… AD, ED, TD
1110	Eastern Parkway	row1	Quercus alba (White oak)	1.5	Good
1112	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	3	Good
1112	Eastern Parkway	row2 across	Platanus occidentalis (Sycamore)	28.5	Good
1114	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	19.5	Fair… GR
1114	Eastern Parkway	2nd row	Acer rubrum(Red maple)	22	Fair… ED, WC
1114	Eastern Parkway	row1	Quercus bicolor (Swamp white oak)	2	Good
1116	Eastern Parkway	1st row	Quercus palustris (Pin oak)	17.5	Good
1116	Eastern Parkway	row1 across	Quercus coccinea (Scarlet red oak)	2	Good
1118	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	26.5	Poor… AD
1118	Eastern Parkway	row1	Quercus falcata (Southern red oak)	2	Good-Fair
1120	Eastern Parkway	1st row	Quercus palustris (Pin oak)	21	Good
1120	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	16	Fair-Poor… GR
1122	Eastern Parkway	1st row	Quercus velutina (Black oak)	5	Good
1122	Eastern Parkway	2nd row	Fraxinus americana (White ash)	30.5	Good
1122	Eastern Parkway	row1	Quercus imbricaria (Shingle oak)	2	Good
1124	Eastern Parkway	row1 across	Quercus macrocarpa (Bur oak)	2	Good-Fair… GR
1126	Eastern Parkway	1st row	Quercus palustris (Pin oak)	20.5	Good
1126	Eastern Parkway	row1	Quercus montana (Chestnut oak)	2	Good
1128	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	11	Good

Eastern Pwky Transportation Study
September 2019

1128	Eastern Parkway	row1 across	Juglans nigra (Black walnut)	16	Good… GR
1128	Eastern Parkway	row1	Juglans nigra (Black walnut)	18	Good… GR
1130	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	11.5	Good
1130	Eastern Parkway	2nd row	Aesculus glabra (Ohio buckeye)	9.5	Fair… WC
1130	Eastern Parkway	row1	Quercus muehlenbergi (Chinkapin oak)	2	Good
1132	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	8	Good
1132	Eastern Parkway	2nd row	Acer disectum (Japanese Thread Leaf	2	Poor… PSS
1132	Eastern Parkway	row1	Liquidambar styraciflua (Sweetgum)	34.5	Poor… TD
1134	Eastern Parkway	1st row	Quercus velutina (Black oak)	4	Good
1134	Eastern Parkway	2nd row	Picea pungens (Colorado blue spruce)	10	Fair … PSS
1134	Eastern Parkway		Aesculus (Buckeye)	6	Good… GR
1134	Eastern Parkway	row1 across	Liquidambar styraciflua (Sweetgum)	28.5	Fair
1136	Eastern Parkway	1st row	Quercus palustris (Pin oak)	33.5	Fair… TD
1136	Eastern Parkway	row1 across street	Quercus rubra (Northern red oak)	1.5	Good
1138	Eastern Parkway	1st row	Nyssa sylvatica (Blackgum)	2	Fair

Eastern Pwky Transportation Study
September 2019

1138	Eastern Parkway	1st row	Quercus palustris (Pin oak)	10.5	Good
1150	Eastern Parkway	1st row	Quercus phelos (Wilow oak)	2	Good-Fair
1150	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	1.5	Fair
1150	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	1.5	Good
1150	Eastern Parkway	2nd row	Celtis occidentalis (Common hackberry)	25	Good- Fair… WC
1150	Eastern Parkway	2nd row	Aesculus octandra (Yelow buckeye)	6	Fair-Poor … AD, GR
1155	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	13.5	Good
1155	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	14.5	Good
1155	Eastern Parkway	2nd row	Quercus shumardi (Shumard red oak)	5.5	Good..
1158	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	8.5	Good-Fair … AD, WC
1158	Eastern Parkway	2nd row	Aesculus octandra (Yelow buckeye)	2.5	Good
1160	Eastern Parkway	1st row	Quercus palustris (Pin oak)	40	Fair… AD, CD, ED
1160	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	10	Good-Fair
1160	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	11	Good-Fair
1160	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24.5	Fair… WC

Eastern Pwky Transportation Study
September 2019

1160	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	10.5	Good
1162	Eastern Parkway	1st row	Quercus palustris (Pin oak)	52	Fair… AD, CD, ED, HIST
1162	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16.5	Good… GR
1162	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	18	Good-Fair … GR
1162	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22	Good-Fair
1164	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	2	Poor
1164	Eastern Parkway	1st row	Quercus palustris (Pin oak)	46.5	Good… CD
1164	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	3.5	Fair
1164	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	18.5	Good-Fair… GR, WC
1166	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	3	Good
1166	Eastern Parkway	1st row	Quercus palustris (Pin oak)	30.5	Fair… AD, CD, ED
1166	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Fair
1166	Eastern Parkway	2nd row	Quercus michauxi (Swamp chestnut oak)	4	Good
1168	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	17	Poor… AD, ED
1168	Eastern Parkway	1st row	Quercus palustris (Pin oak)	36	Good-Fair… WC
1169	Eastern Parkway	1st row	Quercus prinus (Chestnut oak)	1	Poor
1169	Eastern Parkway	1st row	Quercus nigra (Water oak)	2	Good

Eastern Pwky Transportation Study
September 2019

1169	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	3	Good
1169	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	2	Fair
1169	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	7	Good… GR
1169	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	4	Fair
1169	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	7.5	Good… GR
1169	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	7.5	Good
1169	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	7	Fair-Poor
1169	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	13	Good-Fair…
1169	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	15	Good
1169	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	4	Fair-Poor
1169	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	3	Fair… AD
1169	Eastern Parkway	2nd row	Celtis occidentalis (Common hackberry)	3	Good
1169	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	2.5	Good
1169	Eastern Parkway	2nd row	Aesculus glabra (Ohio buckeye)	2	Fair… ABN
1169	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	30	Fair
1169	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	32.5	Fair-Poor
1169	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26	Fair- GR, WC
1169	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	5.5	Poor… AD, GR, WC
1169	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	23	Fair-Poor… ED, GR, WC
1169	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	11.5	Fair… WC
1200	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	2	Fair

Eastern Pwky Transportation Study
September 2019

1200	Eastern Parkway	1st row	Quercus alba (White oak)	34	Good- Fair… AD
1200	Eastern Parkway	1st row	Quercus alba (White oak)	28	Good-Fair… WC
1200	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	13.5	Good
1200	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	18	Fair
1200	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	14	Fair… WC
1201	Eastern Parkway	1st row	Quercus palustris (Pin oak)	12	Fair
1201	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	13	Good
1201	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	27	Good… CD
1201	Eastern Parkway	2nd row	Prunus persica (Peach tree)	12	Good
1201	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	25.5	Good
1204	Eastern Parkway	2nd row	Aesculus flava (Yelow Buckeye)	2	Good
1204	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	9	Good-Fair
1204	Eastern Parkway	1st row	Quercus palustris (Pin oak)	40	Fair-poor… ABN
1204	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	35	Fair… ABN, WC
1212	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	11.5	Good-Fair
1212	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	3.5	Poor … ABN
1212	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23	Good-Fair… AD, GR,
1212	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26.5	Good
1212	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23.5	Good-Fair… AD, GR

Eastern Pwky Transportation Study
September 2019

1217	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	9	Good… PSS
1217	Eastern Parkway	2nd row	Magnolia virginiana (Sweetbay magnolia)	9	Fair
1217	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	17	Fair… WC
1219	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	13	Good
1219	Eastern Parkway	2nd row	Magnolia x soulangiana (Saucer magnolia)	17	Good… PSS
1219	Eastern Parkway	2nd row	Ilex opaca (American holy)	13	Good-Fair … PSS
1225	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	13.5	Good
1225	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	2	Fair… PSS
1228	Eastern Parkway	1st row	Quercus palustris (Pin oak)	19	Good… GR
1228	Eastern Parkway	2nd row	Ginkgo biloba (Ginkgo)	31	Good… WC
1229	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	13.5	Good
1229	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23.5	Good
1229	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	9	Good
1233	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	2	Good
1233	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	27	Good
1234	Eastern Parkway	1st row	Quercus phelos (Wilow oak)	2	Fair
1234	Eastern Parkway	1st row	Quercus palustris (Pin oak)	21	Good
1234	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	2	Good
1234	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	28	Good… GR
1237	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	2.5	Good-Fair

Eastern Pwky Transportation Study
September 2019

1237	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23.5	Fair… ABN
1238	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	2	Good
1238	Eastern Parkway	1st row	Quercus palustris (Pin oak)	18	Good-Fair
1238	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	34	Fair… HIST
1238	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	23	Good-Fair… HIST
1241	Eastern Parkway	1st row	Quercus palustris (Pin oak)	47.5	Fair… CD, GR, HIST
1241	Eastern Parkway	2nd row	Carya ilinoinensis (Pecan)	6.5	Good
1241	Eastern Parkway	1st row	Querus palustris (Pin oak)	52.5	Fair- Poor CD, HIST
1245	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	27.5	Good
1246	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	8	Poor… AD
1246	Eastern Parkway	1st row	Quercus velutina (Black oak)	14.5	Good…
1246	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	32	Fair-Poor … ED, GR
1247	Eastern Parkway	1st row	Quercus falcata (Southern red oak)	2	Good
1247	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26	Good
1249	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	2	Fair
1249	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20.5	Fair… WC
1252	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	34.5	Good-Fair
1255	Eastern Parkway	1st row	Quercus alba (White oak)	2	Good
1256	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	12	Good
1256	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	30	Good-Fair … TD
1257	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24	Good

Eastern Pwky Transportation Study
September 2019

1259	Eastern Parkway	1st row	Quercus elipsoidalis (Northern pin oak)	2	Good
1264	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	18	Good… CD
1264	Eastern Parkway	2nd row	Acer rubrum(Red maple)	19	Fair… AD, GR, WC
1264	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	33	Good
1269	Eastern Parkway	1st row	Quercus velutina (Black oak)	3	Good
1269	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	36	Good-Fair… HIST
1270	Eastern Parkway	1st row	Quercus michauxi (Swamp chestnut oak)	5.5	Good
1270	Eastern Parkway	1st row	Quercus palustris (Pin oak)	26	Good
1270	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20	Good- Fair… HIST
1270	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	6.5	Good
1273	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	2.5	Poor… ABN
1273	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	19	Fair… ED, GR,
1273	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	28	Poor… ED, WC
1277	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	3.5	Good
1277	Eastern Parkway	2nd row	Prunus serotina (Black cherry)	1	Good
1277	Eastern Parkway	2nd row	Prunus subhirtela (Weeping cherry)	10	Good-Fair… PSS
1280	Eastern Parkway	1st row	Quercus prinus (Chestnut oak)	6	Good
1280	Eastern Parkway	1st row	Quercus palustris (Pin oak)	39.5	Fair… AD, TD
1280	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	4.5	Good
1281	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	2	Good
1281	Eastern Parkway	2nd row	Tilia americana (Basswood)	11	Good
1285	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	7	Fair

Eastern Pwky Transportation Study
September 2019

1285	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	30	Fair… HIST
1285	Eastern Parkway	2nd row	Acer rubrum(Red maple)	8	Good
1288	Eastern Parkway	1st row	Quercus palustris (Pin oak)	36	Fair-Poor… AD, WC
1288	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	19.5	Good-Fair… WC
1288	Eastern Parkway	2nd row	Ginkgo biloba (Ginkgo)	21.5	Good-Fair… AD
1288	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	13	Good… HIST
1291	Eastern Parkway	1st row	Quercus alba (White oak)	3.5	Poor… AD
1291	Eastern Parkway	1st row	Quercus palustris (Pin oak)	38	Poor… HIST
1291	Eastern Parkway	1st row	Quercus palustris (Pin oak)	27	Fair-Poor
1291	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	12	Good
1291	Eastern Parkway	2nd row	Liquidambar styraciflua (Sweetgum)	23	Fair… GR
1291	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24	Fair-Poor
1298	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	2	Poor… AD
1298	Eastern Parkway	2nd row	Cercis canadensis (Redbud)	3.5	Fair… PSS
1298	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	7	Poor… PSS
1298	Eastern Parkway	2nd row	Ilex opaca (American holy)	18	Good… PSS
1298	Eastern Parkway	2nd row	Ilex opaca (American holy)	10	Good… PSS
1300	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	9	Good
1300	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	12.5	Good

Eastern Pwky Transportation Study
September 2019

1303	Eastern Parkway	1st row	Ilex opaca (American holy)	4	Good
1303	Eastern Parkway	1st row	Quercus palustris (Pin oak)	28	Good
1303	Eastern Parkway	1st row	Prunus kwanzan (Flonering cherry)	10	Good
1303	Eastern Parkway	1st row	Magnolia x soulangiana (Saucer magnolia)	22	Good-Fair… PSS
1303	Eastern Parkway	2nd row	Ilex opaca (American holy)	5	Good… PSS
1303	Eastern Parkway	2nd row	Ilex opaca (American holy)	6	Good… PSS
1303	Eastern Parkway	2nd row	Ilex opaca (American holy)	4	Good… PSS
1303	Eastern Parkway	2nd row	Ilex opaca (American holy)	4	Good… PSS
1303	Eastern Parkway	2nd row	Ilex opaca (American holy)	4	Good… PSS
1303	Eastern Parkway	Traffic	Quercus macrocarpa (Bur oak)	2	Good
1303	Eastern Parkway	Traffic	Quercus pagodifolia (Cherrybark Oak)	19	Good-Fair
1312	Eastern Parkway	Traffic	Carya ilinoinensis (Pecan)	6	Poor… AD
1312	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	22	Fair… AD, GR
1312	Eastern Parkway	Traffic Island	Carya ilinoinensis (Pecan)	8.5	Good-Fair… GR
1318	Eastern Parkway	1st row	Carya ilinoinensis (Pecan)	10.5	Good
1318	Eastern Parkway	1st row	Carya ilinoinensis (Pecan)	7	Good
1318	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	19.5	Fair…
1318	Eastern Parkway	Traffic	Carya ilinoinensis (Pecan)	7.5	Good
1325	Eastern Parkway	1st row	Quercus palustris (Pin oak)	25.5	Good
1325	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	16.5	Good… GR
1325	Eastern Parkway	Traffic	Nyssa sylvatica (Blackgum)	3	Good
1326	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	30	Good
1326	Eastern Parkway	1st row	Quercus velutina (Black oak)	10	Good

Eastern Pwky Transportation Study
September 2019

1326	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	24.5	Fair-Poor… AD, ED
1326	Eastern Parkway	Traffic	Carya ilinoinensis (Pecan)	7.5	Good
1333	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	21.5	Good
1333	Eastern Parkway	1st row	Quercus palustris (Pin oak)	25	Good
1333	Eastern Parkway	1st row	Acer rubrum(Red maple)	11	Good
1333	Eastern Parkway	1st row	Acer rubrum(Red maple)	14.5	Good
1333	Eastern Parkway	row1	Quercus alba (White oak)	2	Good
1333	Eastern Parkway	Traffic	Acer rubrum(Red maple)	16.5	Good
1333	Eastern Parkway	Traffic	Acer rubrum(Red maple)	17	Good
1333	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	17	Fair-Poor… ABN
1333	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	19	Fair… GR
1333	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	16.5	Fair... ED
1334	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	17.5	Good
1334	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	23	Good-Fair… AD, WC
1334	Eastern Parkway	Traffic Island	Nyssa sylvatica (Blackgum)	6	Good
1334	Eastern Parkway	Traffic	Carya ilinoinensis (Pecan)	4	Good
1342	Eastern Parkway	Traffic	Carya ilinoinensis (Pecan)	7.5	Good
1342	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	12	Fair… GR
1343	Eastern Parkway	1st row	Juglans nigra (Black walnut)	16	Good
1343	Eastern Parkway	1st row	Quercus palustris (Pin oak)	46	Poor… HIST

Eastern Pwky Transportation Study
September 2019

1343	Eastern Parkway	Traffic Island	Quercus rubra (Northern red oak)	2	Fair
1343	Eastern Parkway	Traffic	Ostrya virginiana (Eastern hophornbeam)	2	Good
1343	Eastern Parkway	Traffic	Celtis occidentalis (Common hackberry)	7	Good
1343	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	16	Fair… GR, ABN
1343	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	26.5	Fair-Poor… ED, HIST
1343	Eastern Parkway	Traffic	Quercus pagodifolia (Cherrybark Oak)	22.5	Good-Fair
1343	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	22	Good
1350	Eastern Parkway	1st row	Quercus palustris (Pin oak)	48	Good… CD
1350	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	38	Fair…
1350	Eastern Parkway	Traffic Island	Carya ilinoinensis (Pecan)	10	Good
1350	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	14	Fair-Poor… ABN, GR
1360	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	2	Good
1360	Eastern Parkway	1st row	Cladrastis kentukea (American yelowwood)	2	Good
1360	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	2	Good
1360	Eastern Parkway	Traffic Island	Cladrastis kentukea (American yelowwood)	12.5	Poor… ED,
1360	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	10	Poor… AD
1360	Eastern Parkway	Traffic	Acer rubrum(Red maple)	7	Fair… AD
1360	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	10	Poor… AD, ED
1404	Eastern Parkway	1st row	Quercus palustris (Pin oak)	44.5	Good… CD

Eastern Pwky Transportation Study
September 2019

1404	Eastern Parkway	1st row	Quercus palustris (Pin oak)	41	Good-Fair… CD
1404	Eastern Parkway	row1	Liquidambar styraciflua (Sweetgum)	25	Poor… HAZ
1404	Eastern Parkway	Traffic Island	Celtis occidentalis (Common hackberry)	8	Good
1404	Eastern Parkway	Traffic Island	Tilia americana (Basswood)	5.5	Good-Fair
1404	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	18	Fair… ABN, ED, GR
1404	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	14	Poor… ABN, AD, ED, GR
1404	Eastern Parkway	Traffic	Acer rubrum(Red maple)	11	Poor
1404	Eastern Parkway	Traffic Island	Fraxinus pennsylvanica (Green ash)	10.5	Good-Fair… TD
1410	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	11.5	Good
1410	Eastern Parkway	row1 across	Ulmus americana (American elm)	27	Poor
1410	Eastern Parkway	Traffic Island	Celtis occidentalis (Common hackberry)	6.5	Good-Fair… AD, GR
1410	Eastern Parkway	Traffic Island	Aesculus octandra (Yelow buckeye)	12	Good
1410	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	13	Good-Fair .. AD
1412	Eastern Parkway	1st row	Quercus palustris (Pin oak)	42	Good-Fair… AD
1412	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	13	Good-Fair… AD, GR
1412	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	12	Good-Fair… ABN
1414	Eastern Parkway	1st row	Quercus palustris (Pin oak)	33.5	Good-Fair…CD

Eastern Pwky Transportation Study
September 2019

1414	Eastern Parkway	1st row	Quercus palustris (Pin oak)	47	Good… CD
1414	Eastern Parkway	Traffic Island	Aesculus octandra (Yelow buckeye)	11	Good… WC
1414	Eastern Parkway	Traffic	Quercus pagodifolia (Cherrybark Oak)	21	Good-Fair
1420	Eastern Parkway	1st row	Southern Magnolia (grandifoua)	25	Fair… WC
1420	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	15	Good
1420	Eastern Parkway	1st row	Acer rubrum(Red maple)	21	Fair… HIST
1420	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	15	Fair
1420	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	13.5	Poor… AD, GR, TD
1420	Eastern Parkway	Traffic Island	Celtis occidentalis (Common hackberry)	6.5	Good
1425	Eastern Parkway	1st row	Liquidambar styraciflua (Sweetgum)	25	Good… CD
1425	Eastern Parkway	1st row	Liquidambar styraciflua (Sweetgum)	29	Good… CD
1425	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	28	Good
1425	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	21	Good
1425	Eastern Parkway	Traffic	Celtis laevigata (Sugar hackberry)	9	Good
1427	Eastern Parkway	1st row	Tsuga Canadensis (Eastern Hemlock)	6	Good… PSS
1427	Eastern Parkway	Traffic Island	Celtis occidentalis (Common hackberry)	9	Good
1427	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	31.5	Fair

Eastern Pwky Transportation Study
September 2019

1427	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	11	Good-Fair… AD
1427	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	32	Fair… AD, ED
1429	Eastern Parkway	1st row	Quercus palustris (Pin oak)	43	Good… CD
1429	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	17	Fair
1429	Eastern Parkway	Traffic Island	Cercis canadensis (Redbud)	20	Poor… PSS
1429	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	12	Good-Fair… GR
1429	Eastern Parkway	Traffic Island	Celtis occidentalis (Common hackberry)	9	Good
1429	Eastern Parkway	Traffic Island	Quercus macrocarpa (Bur oak)	19.5	Good
1436	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	3	Good
1436	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	12	Fair
1436	Eastern Parkway	1st row	Quercus alba (White oak)	3	Good
1436	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	19"	Fair… GR
1436	Eastern Parkway	Traffic Island	Betula lenta (Sweet birch)	7"	Poor… TD
1444	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	2"	Good
1444	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	15"	Good
1444	Eastern Parkway	row1 across	Acer rubrum(Red maple)	12.5"	Good-Fair… GR

Eastern Pwky Transportation Study
September 2019

1444	Eastern Parkway	row1 across	Acer rubrum(Red maple)	15"	Fair-Poor… ABN, AD, GR
1444	Eastern Parkway	row1 across	Liquidambar styraciflua (Sweetgum)	25"	Poor
1444	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	23.5"	Fair… ABN, AD
1444	Eastern Parkway	Traffic Island	Acer saccharum(Sugar maple)	20"	Good
1444	Eastern Parkway	Traffic Island	Celtis occidentalis (Common hackberry)	6.5"	Good
1444	Eastern Parkway	Traffic Island	Celtis occidentalis (Common hackberry)	8.5"	Fair-Poor… AD
1444	Eastern Parkway	Traffic Island	Nyssa sylvatica (Blackgum)	8.5"	Good
1444	Eastern Parkway	Traffic Island	Acer rubrum(Red maple)	12.5"	Fair
1486	Cherokee Road	1st row	Acer saccharum(Sugar maple)	24.5	Good… GR
1486	Cherokee Road	2nd row	Acer saccharum(Sugar maple)	17"	Poor...TD
1486	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	22"	Good
1540	Eastern Parkway	1st row	Quercus palustris (Pin oak)	28"	Good
1540	Eastern Parkway	row1 across	Quercus palustris (Pin oak)	22"	Fair… AD
1540	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	20"	Good-Fair… ABN, AD,
1540	Eastern Parkway	Traffic Island	Cladrastis kentukea (American yellowwood)	11.5"	Fair… AD

Eastern Pwky Transportation Study
September 2019

1540	Eastern Parkway	Traffic Island	Quercus lyrata (Overcup oak)	12.5"	Good
1540	Eastern Parkway	Traffic	Celtis occidentalis (Common hackberry)	8"	Good
1544	Eastern Parkway	1st row	Quercus palustris (Pin oak)	47"	Fair… AD, CD, HIST
1544	Eastern Parkway	1st row	Quercus palustris (Pin oak)	33"	Fair-Poor… AD, HIST
1544	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	28"	Fair… WC
1544	Eastern Parkway	Traffic	Acer saccharum(Sugar maple)	17"	Poor… AD, TD
1544	Eastern Parkway	Traffic	Magnolia acuminata (Cucumber magnolia)	8"	Good
1600	Eastern Parkway	1st row	Quercus palustris (Pin oak)	14"	Good
1604	Eastern Parkway	1st row	Quercus nigra (Water oak)	5	Good
1608	Eastern Parkway	1st row	Quercus palustris (Pin oak)	24	Good… AD, CD
1608	Eastern Parkway	2nd row	Juniperus virginiana (Eastern red cedar)	8	Good… PSS
1608	Eastern Parkway	2nd row	Cercis canadensis (Redbud)	2"	Good… PSS
1608	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	2"	Good
1610	Eastern Parkway	1st row	Betula nigra (River birch)	33	Good
1613	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	2	Good-Fair… ABN
1615	Eastern Parkway	1st row	Platanus Acerfolia (London Plane)	20.5	Good… CD
1617	Eastern Parkway	1st row	Quercus palustris (Pin oak)	48	Good… CD, HIST
1618	Eastern Parkway	1st row	Quercus nigra (Water oak)	2.5	Fair

Eastern Pwky Transportation Study
September 2019

1620	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	12	Good-Fair… CD
1620	Eastern Parkway	2nd row	Acer palmatum(Japanese maple)	7	Fair… GR, PSS, WC
1620	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	10.5	Fair… PSS
1621	Eastern Parkway	1st row	Quercus alba (White oak)	13	Good… AD, CD
1622	Eastern Parkway	1st row	Quercus palustris (Pin oak)	47	Fair… HIST
1625	Eastern Parkway	1st row	Quercus shumard**i** (Shumard red oak)	23	Good… CD
1625	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	26	Good
1626	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	30	Good… CD
1627	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	19	Good… CD
1627	Eastern Parkway	1st row	Quercus palustris (Pin oak)	19	Good
1627	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	3	Good… PSS
1627	Eastern Parkway	2nd row	Acer palmatum(Japanese maple)	4	Good… PSS
1628	Eastern Parkway	1st row	Quercus velutina (Black oak)	8.5	Good… CD
1631	Eastern Parkway	2nd row	Prunus cerasifera (Purple Plum)	2	Poor… PSS
1632	Eastern Parkway	1st row	Quercus palustris (Pin oak)	23.5	Fair… CD, WC
1633	Eastern Parkway	1st row	Quercus palustris (Pin oak)	44	Fair-Poor… CD, ED
1633	Eastern Parkway	2nd row	Acer palmatum(Japanese maple)	2	Poor… PSS

Eastern Pwky Transportation Study
September 2019

1635	Eastern Parkway	1st row	Quercus palustris (Pin oak)	40	Fair-Poor… ED, TD
1636	Eastern Parkway	1st row	Quercus velutina (Black oak)	4	Good
1637	Eastern Parkway	1st row	Quercus velutina (Black oak)	6.5	Good… CD
1637	Eastern Parkway	1st row	Quercus palustris (Pin oak)	35.5	Fair-Poor… AD, CD
1638	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	9.5	Good… CD
1640	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	16.5	Good… CD
1642	Eastern Parkway	1st row	Quercus falcata (Southern red oak)	1.5	Good
1643	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	25	Good… CD
1645	Eastern Parkway	1st row	Quercus palustris (Pin oak)	21	Fair… CD
1645	Eastern Parkway	2nd row	Picea abies (Norway spruce)	9	Good… PSS
1645	Eastern Parkway	2nd row	Thuja occidentalis (American arborvitae)	3	Good… PSS
1647	Eastern Parkway	1st row	Quercus Mule (Bergi Chinkapin)	3.5	Good
1647	Eastern Parkway	2nd row	Hamamelis virginiana (Witch hazel)	9	Good… PSS
1650	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	7.5	Good-Fair… CD
1650	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	9	Fair… CD
1650	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	7.5	Good

Eastern Pwky Transportation Study
September 2019

1650	Eastern Parkway	1st row	Quercus palustris (Pin oak)	37.5	Fair… AD, CD
1650	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	15	Good
1650	Eastern Parkway	2nd row	Cornus kousa (Chinese dogwood)	25	Good-Fair… TD
1651	Eastern Parkway	2nd row	Malus sp. (apple)	7	Fair
1655	Eastern Parkway	1st row	Quercus velutina (Black oak)	4	Good
1657	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	4	Good
1657	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	5	Fair
1659	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	2	Good
1700	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	17.5	Good… CD
1702	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	15.5	Good-Fair
1704	Eastern Parkway	1st row	Quercus palustris (Pin oak)	22	Good… CD
1704	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	9	Good
1708	Eastern Parkway	1st row	Quercus palustris (Pin oak)	22	Good… CD
1715	Eastern Parkway	1st row	Quercus palustris (Pin oak)	50	Good… CD
1715	Eastern Parkway	2nd row	Acer palmatum(Japanese maple)	5.5	Good… PSS
1717	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	21	Fair… , TD
1719	Eastern Parkway	1st row	Quercus palustris (Pin oak)	24	Good-Fair… AD
1720	Eastern Parkway	1st row	Quercus palustris (Pin oak)	31	Fair-Poor… CD
1721	Eastern Parkway	2nd row	Acer palmatum(Japanese maple)	9.5	Good… PSS

Eastern Pwky Transportation Study
September 2019

1722	Eastern Parkway	1st row	Quercus palustris (Pin oak)	42.5	Poor… CD
1722	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	9	Good… PSS
1723	Eastern Parkway	1st row	Cornus florida (Flowering dogwood)	14	Poor… PSS, TD
1723	Eastern Parkway	1st row	Quercus palustris (Pin oak)	16.5	Fair-Poor… AD, CD
1723	Eastern Parkway	2nd row	Picea abies (Norway spruce)	8.5	Good… PSS
1724	Eastern Parkway	1st row	Quercus velutina (Black oak)	1.5	Good
1724	Eastern Parkway	2nd row	Juniperus virginiana (Alaskan red cedar)	14	Good… PSS
1725	Eastern Parkway	1st row	Quercus prinus (Chestnut oak)	5	Good
1725	Eastern Parkway	2nd row	Acer ginnala (Amur maple)	2	Dead
1725	Eastern Parkway	2nd row	Cercis canadensis (Redbud)	5	Good… PSS, WC
1725	Eastern Parkway	2nd row	Pyrus caleryana (Calery pear)	19.5	Good-Fair… HIST, WC
1725	Eastern Parkway	2nd row	Cercis canadensis (Redbud)	2	Good… PSS
1727	Eastern Parkway	1st row	Juniperus virginiana (Eastern red cedar)	4	Good-Fair… PSS
1727	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	43	Good-Fair… CD
1727	Eastern Parkway	2nd row	Cercis canadensis (Redbud)	1	Good-Poor… PSS
1727	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	3	Fair-Poor…. PSS
1800	Eastern Parkway	1st row	Quercus palustris (Pin oak)	18	Good-Fair… CD
1800	Eastern Parkway	2nd row	Picea pungens (Blue spruce)	10	Good… PSS

Eastern Pwky Transportation Study
September 2019

1801	Eastern Parkway	1st row	Quercus pagodifolia (Cherrybark Oak)	4.5	Good… CD
1801	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	32.5	Good-Fair
1802	Eastern Parkway	1st row	Quercus palustris (Pin oak)	25	Good… CD
1802	Eastern Parkway	1st row	Quercus palustris (Pin oak)	15	Good… CD
1803	Eastern Parkway	1st row	Quercus palustris (Pin oak)	30.5	Good… CD
1805	Eastern Parkway	1st row	Quercus palustris (Pin oak)	46	Poor… CD
1806	Eastern Parkway	1st row	Quercus palustris (Pin oak)	23.5	Good… CD
1808	Eastern Parkway	1st row	Quercus nuttali (Nuttal)	3	Fair… CD
1809	Eastern Parkway	1st row	Ginkgo biloba (Ginkgo)	23.5	Good-FAIR… HIST, WC
1812	Eastern Parkway	1st row	Quercus velutina (Black oak)	4	Good… CD
1812	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	12	Good… PSS
1814	Eastern Parkway	1st row	Quercus velutina (Black oak)	10	Good… CD
1814	Eastern Parkway	2nd row	Picea pungens (Blue spruce)	9	Good… PSS
1817	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	3.5	Good… PSS
1817	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	5	Good
1817	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	5	Good-Fair… PSS
1817	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	3	Good… PSS
1819	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	23.5	Good-Fair…TD, WC

Eastern Pwky Transportation Study
September 2019

1819	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	14	Good… PSS
1821	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	9	Good… PSS
1822	Eastern Parkway	1st row	Quercus phelos (Wilow oak)	1.5	Good
1823	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	7.5	Good…CD
1824	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	21	Good-Fair… CD
1824	Eastern Parkway	2nd row	Maackia amurensis (Amur maple)	6	Good
1825	Eastern Parkway	1st row	Quercus prinus (Chestnut oak)	8	Good… CD
1825	Eastern Parkway	2nd row	Ilex aquipernyi (Dragon lady holly)	4	Good…PSS
1825	Eastern Parkway	2nd row	Ilex opaca (American holy)	5	Good…PSS
1825	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	6	Good…PSS
1826	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	6	Good…PSS
1826	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	5	Good…PSS
1827	Eastern Parkway	2nd row	Pyrus caleryana (Calery pear)	15	Fair… PSS, WC
1828	Eastern Parkway	2nd row	Ilex Foster (Foster holy)	12	Good… PSS
1828	Eastern Parkway	1st row	Acer rubrum(Red maple)	14.5	Good-Fair… CD
1829	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	13.5	Good… CD
1832	Eastern Parkway	1st row	Fraxinus pennsylvanica (Green ash)	19.5	Poor…TD
1833	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	5	Good
1834	Eastern Parkway	2nd row	Celtis occidentalis (Common hackberry)	27	Good-Fair
1836	Eastern Parkway	1st row	Pyrus caleryana (Calery pear)	18.5	Fair… CD, PSS, WC

Eastern Pwky Transportation Study
September 2019

1836	Eastern Parkway	1st row	Pyrus caleryana (Calery pear)	15	Fair… CD, WC
1836	Eastern Parkway	2nd row	Acer rubrum(Red maple)	12	Poor… TD, WC
1840	Eastern Parkway	1st row	Quercus palustris (Pin oak)	25	Poor… ABN
1840	Eastern Parkway	2nd row	Acer rubrum(Red maple)	13.5	Good-Fair… GR
1900	Eastern Parkway	1st row	Quercus pagodifolia (Cherrybark Oak)	6	Good… CD
1901	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	8	Good
1901	Eastern Parkway	1st row	Quercus palustris (Pin oak)	24.5	Good-Fair… AD, CD
1901	Eastern Parkway	1st row	Quercus palustris (Pin oak)	24.5	Fair… AD, CD
1901	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	23.5	Fair-Poor
1901	Eastern Parkway	2nd row	Fraxinus pennsylvanica (Green ash)	27.5	Good… GR
1901	Eastern Parkway	2nd row	Acer rubrum(Red maple)	10	Good
1901	Eastern Parkway	2nd row	Acer rubrum(Red maple)	12.5	Good-Fair
1903	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	4	Good
1904	Eastern Parkway	2nd row	Acer rubrum(Red maple)	12	Good
1908	Eastern Parkway	2nd row	Acer rubrum(Red maple)	13	Good
2000	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	17.5	Good-Fair… CD
2000	Eastern Parkway	2nd row	Acer saccharinum(Silver maple)	14	Fair… GR
2001	Eastern Parkway	2nd row	Quercus alba (White oak)	1	Good
2003	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	19.5	Fair… GR
2003	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	10.5	Good
2005	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	42	Poor… ED, HAZ, WC
2005	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	7	Good
2008	Eastern Parkway	1st row	Quercus phelos (Wilow oak)	2	Good

Eastern Pwky Transportation Study
September 2019

2008	Eastern Parkway	1st row	Quercus falcata (Southern red oak)	2	Good
2008	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	20.5	Poor… AD, ED, GR, TD
2008	Eastern Parkway	2nd row	Acer rubrum(Red maple)	12	Good-Fair … WC
2011	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	27	Fair
2011	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	22	Good
2011	Eastern Parkway	2nd row	Catalpa speciosa (Northern catalpa)	6	Good
2013	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	41	Good… CD, HIST
2013	Eastern Parkway	2nd row	Aesculus octandra (Yelow buckeye)	8.5	Good…
2016	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	12.5	Good
2016	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	19	Good
2016	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	25	Good-Fair… WC
2017	Eastern Parkway	1st row	Aesculus glabra (Ohio buckeye)	5	Good
2017	Eastern Parkway	2nd row	Magnolia acuminata (Cucumber magnolia)	15	Good-Fair… WC
2018	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	25	Good-Fair… WC
2019	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	28	Good… AD, WC
2019	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	9	Good
2019	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	9	Good

Eastern Pwky Transportation Study
September 2019

2019	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	14	Good
2019	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	18.5	Good
2020	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	13	Fair
2020	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	10	Fair-Poor… GR
2022	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	11.5	Fair-Poor…TD
2022	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	12.5	Fair…TD
2023	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	16	Good
2023	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	18	Good
2023	Eastern Parkway	2nd row	Acer saccharinum(Silver maple)	29	Good
2024	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	25.5	Good-Fair… HIST, WC
2026	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	26	Good… GR, WC
2026	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	57	Good
2029	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	12.5	Fair
2029	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	25.5	Fair… , WC
2029	Eastern Parkway	2nd row	Ulmus parvifolia (Lacebark elm)	17.5	Good
2029	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	29	Fair
2030	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	20	Poor… ED, TD, WC,
2032	Eastern Parkway	1st row	Quercus velutina (Black oak)	1	Good

Eastern Pwky Transportation Study
September 2019

2032	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20"	Good-Fair… WC
2033	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	2"	Good
2033	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	11	Good
2033	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	12	Good
2033	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22	Good
2033	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22"	Good
2033	Eastern Parkway	1st	Quercus muhlenberg (Chinkapin oak)	11"	Good
2034	Eastern Parkway	2nd row	Magnolia acuminata (Cucumber magnolia)	2	Good
2034	Eastern Parkway	row2	Quercus rubra (Northern red oak)	20"	Good… AD
2037	Eastern Parkway	1st row	Quercus Rubra (Red Oak)	1.5"	Good
2038	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	22.5"	Fair
2038	Eastern Parkway	2nd row	Fraxinus quadrangulata (Blue ash)	11"	Fair-Poor
2038	Eastern Parkway	row1	Quercus bicolor (Swamp white oak)	2"	Good
2040	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	8.5"	Good
2040	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	8"	Good
2040	Eastern Parkway	2nd row	Liriodendron tulipifera (Tulip Poplar)	3"	Good
2040	Eastern Parkway	row1 across	Quercus bicolor (Swamp white oak)	9.5"	Good
2040	Eastern Parkway	row2	Magnolia acuminata (Cucumber magnolia)	13"	Good
2040	Eastern Parkway	row2	Acer saccharum(Sugar maple)	19.5"	Fair
2044	Eastern Parkway	2nd row	Prunus serotina (Black cherry)	2	Good-Fair
2044	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	6	Fair

Eastern Pwky Transportation Study
September 2019

2044	Eastern Parkway	row1	Acer saccharum(Sugar maple)	29	Good… WC
2046	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	23	Fair… ABN, WC
2046	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	22	Good-Fair… ABN, WC
2046	Eastern Parkway	row1 across	Acer saccharum(Sugar maple)	21	Poor… ABN, GR, WC
2046	Eastern Parkway	row2	Acer saccharum(Sugar maple)	22	Poor… WC
2048	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	8	Good
2048	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	27	Fair… WC
2050	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	16	Fair-Poor… ABN, GR, WC
2050	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21	Fair-Poor… WC
2052	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	15.5	Good
2052	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	5	Good
2054	Eastern Parkway	1st row	Zelkova serrata (Japanese zelkova)	16	Fair… GR, TD, WC
2054	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	15	Fair… ABN
2055	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	13	Good
2055	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	26	Fair… WC
2055	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	46	Fair… HIST
2056	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	20.5	Good
2057	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	25	Fair-Poor… WC
2057	Eastern Parkway	2nd row	Platanus occidentalis (Sycamore)	8.5	Good
2058	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	3.5	Good…
2058	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	19	Fair… GR, WC

Eastern Pwky Transportation Study
September 2019

2058	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	37	Good
2058	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	29.5	Good-Fair… TD
2059	Eastern Parkway		Quercus macrocarpa (Bur oak)	2	Fair
2059	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	1	Good
2059	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	20.5	Fair… TD
2060	Eastern Parkway	1st row	Quercus pagodifolia (Cherrybark Oak)	7	Good
2060	Eastern Parkway	2nd row	Carya ilinoinensis (Pecan)	9.5	Good-Fair… WC
2061	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	3	Good
2061	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	3.5	Good
2061	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	7	Good
2063	Eastern Parkway	1st row	Quercus imbricaria (Shingle oak)	2	Good
2063	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	23.5	Good
2064	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	2	Good
2064	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	4	Good
2065	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	9	Good
2065	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	15.5	Good…
2065	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	22	Fair
2066	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	23	Good- Fair… GR, WC
2066	Eastern Parkway	2nd row	Tilia americana (Basswood)	3.5	Good
2067	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	22"	Fair
2067	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	24"	Poor… ED, GR, HAZ, WC

Eastern Pwky Transportation Study
September 2019

2067	Eastern Parkway	2nd row	Magnolia acuminata (Cucumber magnolia)	6"	Good
2067	Eastern Parkway	2nd row	Quercus palustris (Pin oak)	4.5"	Good
2068	Eastern Parkway	1st row	Quercus alba (White oak)	3"	Good-Fair
2068	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	25.5"	Good
2070	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	17"	Good
2070	Eastern Parkway	2nd row	Nyssa sylvatica (Blackgum)	8.5"	Good-Fair
2072	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	21"	Good-Fair… TD
2072	Eastern Parkway	2nd row	Magnolia acuminata (Cucumber magnolia)	2"	Good
2072	Eastern Parkway	2nd row	Amelanchier x grandiflora (Autumn briliance serviceberry)	6"	Good-Fair… PSS
2072	Eastern Parkway	1st row	Quercus Phellos (Willow Oak)	2"	Good
2074	Eastern Parkway	1st row	Quercus palustris (Pin oak)	19"	Fair
2074	Eastern Parkway	2nd row	Pyrus caleryana (Calery pear)	10"	Good-Fair… PSS, WC
2101	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	20"	Fair... GR, TD, WC
2101	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	17"	Good-Fair… GR

Eastern Pwky Transportation Study
September 2019

2101	Eastern Parkway	2nd row	Quercus rubra (Northern red oak)	31.5"	Good… HIST
2101	Eastern Parkway	2nd row	Quercus rubra (Northern red oak)	36"	Good
2102	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	13"	Good
2102	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	7"	Good
2102	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	24.5"	Good-Fair… WC
2103	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	6.5"	Good
2103	Eastern Parkway	2nd row	Celtis occidentalis(Commonhackberry)	2"	Good-Fair
2104	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	19"	Poor… GR
2104	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	24"	Fair… ED, WC
2104	Eastern Parkway	2nd row	Carya ilinoinensis (Pecan)	7.5"	Good
2106	Eastern Parkway	1st row	Quercus pagodifolia (Cherrybark Oak)	10"	Good
2106	Eastern Parkway	2nd row	Aesculus flava (Yelow Buckeye)	4"	Good
2107	Eastern Parkway	1st row	Quercus rubra (Northern red oak)	2"	Good-Fair… ABN
2107	Eastern Parkway	2nd row	Acer rubrum(Red maple)	18"	Good- Fair…
2108	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	9.5"	Fair-Poor… WC
2108	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20"	Good
2109	Eastern Parkway	1st row	Quercus bicolor (Swamp white oak)	1"	Good-Fair
2109	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	22"	Fair… AD
2110	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	12"	Good

Eastern Pwky Transportation Study
September 2019

2110	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	4"	Good-Fair… WC
2110	Eastern Parkway	2nd row	Cornus florida (Flowering dogwood)	10"	Fair… PSS
2111	Eastern Parkway	1st row	Quercus velutina (Black oak)	4"	Good
2111	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	8"	Good-Fair
2111	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	6.5"	Good
2111	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	4"	Good
2111	Eastern Parkway	2nd row	Cladrastis kentukea (American yelowwood)	14"	Poor … ED, WC
2112	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	18.5"	Fair… ABN
2112	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	10"	Good
2112	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	29"	Fair… ABN , WC
2114	Eastern Parkway	1st row	Pyrus communis (European Pear)	3"	Good
2114	Eastern Parkway	2nd row	Carya ilinoinensis (Pecan)	9.5"	Good
2116	Eastern Parkway	1st row	Quercus lyrata (Overcup oak)	4.5"	Good-Fair… ABN
2117	Eastern Parkway	1st row	Quercus muehlenbergi (Chinkapin oak)	7.5"	Good
2117	Eastern Parkway	2nd row	Gymnocladus dioicus (Kentucky coffee tree)	7.5"	Good
2118	Eastern Parkway	1st row	Acer saccharum(Sugar maple)	30"	Poor… ED
2118	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	21"	Fair… WC
2125	Eastern Parkway	1st row	Quercus macrocarpa (Bur oak)	2"	Good
2125	Eastern Parkway	2nd row	Quercus imbricaria (Shingle oak)	4.5"	Good
2127	Eastern Parkway	1st row	Quercus shumardi (Shumard red oak)	3"	Good
2127	Eastern Parkway	1st row	Quercus coccinea (Scarlet red oak)	5.5	Good

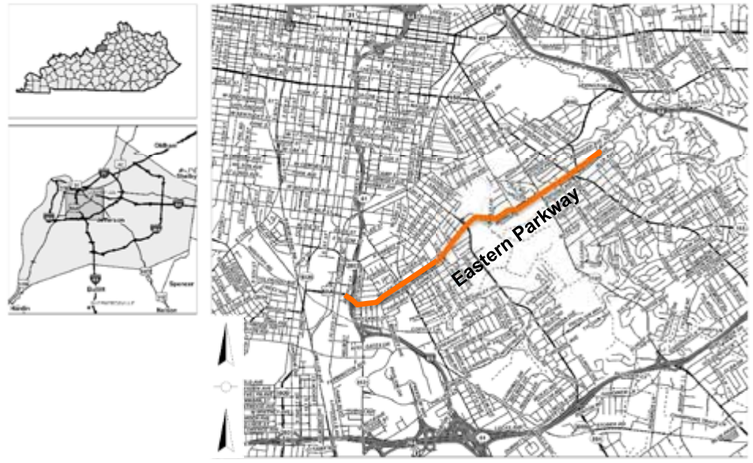
2127	Eastern Parkway	2nd row	Tilia americana (Basswood)	5"	Good
2127	Eastern Parkway	2nd row	Acer saccharum(Sugar maple)	20.5"	Good-Fair… ABN

Appendix E

Traffic Analysis For Eastern Parkway Transportation Study Report and Addendum

Gresham Smith

Traffic Analysis for Eastern Parkway Transportation Study



Project Limits:

Eastern Parkway from Hahn St. to Cherokee Park

Performed for: Louisville's Olmsted Parks and Louisville Metro - Jefferson County Government

Performed by: Gresham Smith and Adam Kirk Engineering

March 3, 2020

Design Services For The Built Environment

111 West Main Street, Suite 201 / Louisville, Kentucky 40202 / Phone 502.627.8900 / www.greshamsmith.com

TABLE OF CONTENTS

Appendices
Appendix A: Traffic Speed Study Data
Appendix B: Traffic Count Data
Appendix C: HCM Analysis
Appendix D: Traffic Analysis Results by Intersection
Appendix E: Corridor Simulation Results

List of Tables

List of Figures

Project Location and Study Area

The goal of the Eastern Parkway Transportation Study is to identify and evaluate alternative designs for the rehabilitation and preservation of Eastern Parkway by means of a complete streets approach. This includes accommodating multiple modes of transportation, landscaping, and drainage along the corridor. This project is a furtherance of the Olmsted Parkway Shared-Use Pathway System Master Plan (2009) with the goal of improving multi-modal mobility and safety while preserving the historic heritage of the Olmsted Parkway System in Louisville, Kentucky.

Eastern Parkway (Alt. U.S. 60) is a four-lane urban collector with an ADT of around 17,000 vehicles, running through a densely populated corridor between the University of Louisville and Cherokee Park. Land use varies along the corridor between commercial, institutional, and residential (both single and multi-family). The project limits are along Eastern Parkway beginning at the Hahn St. intersection and extending to Cherokee Park which is approximately 3.35 miles, while the corridor analysis is performed with the proposed multi-modal improvements between Crittenden Dr. and Bardstown Rd. Gresham Smith and Adam Kirk Engineering developed a traffic simulation model to analyze the effects of the proposed lane drops to accommodate multi-modal uses. See **Figure 1** for the corridor location map.

Figure 1: Eastern Parkway Transportation Study Corridor

In coordination with the city and state government, the following seven major intersections were identified and analyzed as part of the traffic study:

- Eastern Parkway at Crittenden Dr. (Signalized)
- Eastern Parkway at Preston St. (Signalized)
- Eastern Parkway at Shelby St. (Signalized)
- Eastern Parkway at Poplar Level Rd./Goss Ave. (Signalized)
- Eastern Parkway at Barret Ave. (Signalized)
- Eastern Parkway at Baxter Ave. (Signalized)
- Eastern Parkway at Bardstown Rd. (Signalized)

Key Study Assumptions

Analysis Periods (AM & PM peaks, weekday)

A study kick-off meeting was held with the KYTC District 5 and Louisville Metro in the Louisville office of Gresham Smith on January 30, 2019. It was agreed at the meeting to analyze both AM and PM weekday peak hour traffic conditions. Off-peak and special event traffic conditions would not be analyzed. Counts for the AM & PM peaks were collected on Wednesday, April 10, 2019. At the time these counts were collected, both Jefferson County Public Schools and the University of Louisville were in session. Therefore, the traffic count models analyze the system at periods that are the best representation of the corridor weekday peak hour conditions throughout the year, other than for slight seasonal adjustments.

Design Year (2040)

After discussions with Louisville Metro and KYTC, it was decided that the 2040 build year condition would be the only future year analyzed for this study. KIPDA regional travel demand models for 2040 design year estimated that the anticipated traffic will remain the same or decrease within the study area with the proposed multi-modal improvements. Therefore, to conservatively capture the impact of the proposed design with a negative or zero growth rate, a scenario without the project (No-Build Model) would be analyzed along with a scenario including the project (Build Model) to serve the existing traffic volumes.

Corridor Growth

While network changes will relocate trips along the project corridor, the study area along the Eastern Parkway is fully developed and no major changes are expected within the vicinity. The regional planning models have considered a potential lane reconfiguration along Bardstown Rd. and confirmed that there will be no impact on the traffic along the proposed Eastern Parkway Model.

Corridor Characteristics

The existing cross-section for most of the Eastern Parkway has four 10 ft. lanes with some areas of pavement of less than 40 ft. resulting in decreased lane widths. Many of the original trees are approximately 4 ft. from the travel way (adjacent to the gutter pan) while new trees are being planted 8 ft. from the gutter pan. Lighting is typically 4 ft. behind the gutter pan while the occasional utility pole (mostly at intersections) is typically set farther back. All three segments have the same posted speed limit of 35 mph with numerous commercial and residential driveway connections throughout. With the exception of the block between Barret Ave. and Baxter Ave. which has a path down the median, there is a continuous sidewalk on the north side of Eastern Parkway along the entire corridor. The south side lacks continuous sidewalk from Poplar Level/Goss Ave. to Baxter Ave.

As previously stated, the corridor was analyzed in three distinct segments based on the ADT along the corridor. These analysis segments are shown in **Figure 2**.

Figure 2: Eastern Parkway Transportation Study Project Segments

The first corridor segment along Eastern Parkway is a 0.607 mile section between Hahn St. and Preston St. and is represented in red on Figure 2. This segment is a four-lane, two-way undivided street with an ADT of 16,752 (2012).

The second segment along the corridor is 0.973 miles long, starting from Eastern Parkway at Preston St. and Shelby St. intersection to Lydia St. which is the intersection west of the Poplar Level Rd./ Goss Ave. intersection. It is predominantly a tangent section with most

of the intersection approaches at right angles, shown in blue on **Figure 2.** It is a four-lane, two-way, undivided street with an ADT of 15,494 (2013). There are left and right turn lanes at the intersection of Eastern Parkway at Crittenden Dr.

The final segment is 1.308 miles long, starting at the Lydia Street intersection and ending at the Cherokee Park traffic circle. This segment is shown in magenta on **Figure 2**, and is a four-lane, two-way winding roadway with an ADT of 17,066 (2012). There are left turn lanes, and channelized right turn only lanes at the Poplar Level Rd./ Goss Ave. intersection, and left turn only lanes at the Bardstown Rd. intersection along both the eastbound and westbound directions of Eastern Parkway. Along this segment, multiple intersections have been identified with geometric as well as horizontal and vertical sight distance issues.

Traffic Analysis Methodology and Results

The primary goal of this project is to continue the Olmsted park vision, i.e., to accommodate multi-modal improvements while adding green spaces, and restore tree canopy, etc. This includes considering a multi-use path within the corridor, and enhancements to pedestrian and bicycle travel conditions through improved crossing opportunities and improved speed management along the corridor, along with reclaiming the unused pavement as green spaces.

The purpose of microsimulation traffic analysis is to refine these treatments and ensure that they perform in concert to provide an acceptable level of system performance through the corridor. Specific measures of effectiveness evaluated in this analysis include:

- Corridor Travel Times
- Intersection Delay
- Intersection Level of Service
- Intersection Volume-to-Capacity Ratio
- Approach Queues

To identify the impacts of the proposed improvements, microsimulation analysis was also conducted for the existing conditions, under the design year traffic demand. Signal timing for both the proposed and existing conditions maintained existing cycle lengths so as not to identify alternatives that may have unforeseen impacts on the traffic signal grid network. That does not preclude the fact that more favorable cycle lengths at some intersections may be possible, as is noted in following sections. However, evaluation of the entire grid network was outside the scope of this study. Signal timing was obtained from Louisville Metro in the form of Synchro models along with signal timing plans.

Two scenarios have been evaluated:

- Existing Conditions Model (existing geometrics, traffic control and April 2019 counts)

- Proposed Build Condition (project improvements with network changes and updated signal timings)

Existing Conditions Model

Once all analysis data was prepared, peak hour turning movement counts, signal timing, and roadway geometry were entered in Trafficware's Synchro software. A model was created for the existing AM peak hour and PM peak hour conditions as described in earlier sections. Because Synchro analyzes each intersection individually, turning movement counts for each intersection were entered for that intersection's peak hour. This would give a worst-case scenario look at traffic operations for each intersection. The Synchro software was utilized to run Highway Capacity Manual (HCM) 2010 analyses for each intersection. HCM 2000 results are reported for complex intersections which could not be analyzed using HCM 2010.

Proposed Build Model

The proposed corridor changes and alternatives were then added to the design year 2040 No-Build model and operationally analyzed through Synchro's HCM capabilities to create the project build model. The proposed 2040 Build model includes all the key design changes discussed in the prior section to compare it to the No-Build Model.

Traffic Analysis Model Results

The following sections of this report summarize the results of the microsimulation analysis. Simulation analysis was conducted for the network and at the key intersections along with the proposed improvement, so that the impacts of the specific improvement can be isolated from the analysis. Full output from the Simulation Results are provided in **Appendix D**. Key intersection concepts will require further traffic study to develop turn lane queue lengths based on traffic analysis and on site traffic observations. In particular, the intersections with existing medians will require further traffic and geometric design consideration, due to the additional complexity of implementation. These intersections include Crittenden Drive, Poplar Level Road, Barret Avenue, and Baxter Avenue.

The HCM intersection analysis results of the AM peak hour and PM peak hour capacity analyses can be found in **Table 5 through Table 17** below. Full HCM results, by lane and approach, are attached in **Appendix C**. A discussion of pertinent recommended changes to the intersection configurations is provided in the following sections.

Crash Analysis Methodology and Results

Crash history for the corridor was obtained through the Kentucky State Police website. The crashes obtained were from the past five years (2014-2018). Crashes were analyzed

for each of the three corridor segments. Each segment of the study corridor operates differently from the others and the crash history is no exception.

The crash histories for each segment of the corridor were utilized to develop crash rates, given in crashes per hundred million vehicles miles. Using the length of each segment, the ADT, and the sum of crashes in the past five years, crash rates were calculated based on the methods provided in the Highway Safety Manual and can be seen in **Table 1** below. Also located in the table are the statewide crash rates for similar Urban Four-Lane Undivided Parkways, as reported in the "Analysis of Crash Data in Kentucky (2014-2018)" by the Kentucky Transportation Center. In comparing the rates, it is evident that the crash rates along the corridor are higher than the state average. When redesigning operational and geometric aspects of this corridor, increasing safety for all users must be a top priority.

Table 1: Five (5) Year Crash Rates for Each Corridor Segment

Corridor Section	Average Total Crashes	Average Total Crashes with Injury	Length (Miles)	ADT
I-65 to Preston St.	56	8	0.607	16,752
Preston St. to Lydia St.	67	13	0.973	15,494
Lydia St. to Bardstown Rd.	82	8	1.308	17,484

Corridor Section	Corridor Crash Rate (crashes/ HMVM)	Corridor Injury Crash Rate (crashes/ HMVM)	2013-2017 Statewide Crash Rate (crashes/ HMVM)	2013-2017 Statewide Injury Crash Rate (crashes/ HMVM)
I-65 to Preston St.	1,503	216	578	91
Preston St. to Lydia St.	1,210	233	578	91
Lydia St. to Bardstown Rd.	978	96	544*	87*

* Most of the study corridor is Four-Lane Undivided Urban Parkway with a statewide crash rate of 578 (Crashes per 100 MVM). However, within the 1.308 mile corridor segment between Lydia St. and Bardstown Rd., a 0.32 mile section between Barret Ave. and Baxter Ave. is a Four-Lane Divided Urban Parkway with a statewide crash rate of 419 (Crashes per 100 MVM). Therefore, a weighted average of statewide crash rate of 544 (Crashes per 100 MVM) is reported along this segment.

All crashes obtained from the Kentucky State Police website along the corridor for a period of five years between 2014 to 2018 were grouped by manner of collision and the trends in types of crashes were estimated and reported in **Table 2**. The predominant types of

crashes on the corridor - rear end, angle, and sideswipe - are typical of urban signalized corridors. However, as is shown in **Table 1**, the crash rates within the study area are higher than the statewide average, and may be attributed to the higher speeds, imbalanced lane usage, weaving maneuvers, access management issues, and recurring congestion within the study area.

Table 2: Type of Crashes along the Corridor

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	310	23%
Backing	42	3%
Head On	22	2%
Opposing Left Turn	77	6%
Rear End	492	37%
Sideswipe - Opposite Direction	28	2%
Sideswipe - Same Direction	246	18%
Single Vehicle	127	9%

Rear-end collisions accounted for 37 percent of crashes, followed by angle collisions at 23 percent, and sideswipe collisions (both opposite and same direction) at 20 percent within the past 5 years.

A summary of total number of crashes, along with injury crashes at each intersection can be seen in **Table 3 – Table 3j**. The intersections with the highest number of total crashes during the past five years are Baxter/ Newburg, Shelby/Preston, and Bradley. During that same period, one fatal crash was recorded (August 2016) at the Baxter Ave. intersection.

Table 3: Crash Summary by Signalized Intersection for 2014 through 2018

Intersection	Total	Injury
Crittenden Dr.	79	8
Bradley Ave.	76	12
Preston St. & Shelby St.	180	28
Burnett Ave.	55	8
Poplar Level Rd/ Goss Ave.	78	10
Castlevale Dr.	54	6
Barret Ave.	83	15
Baxter Ave.	107	9*
Norris Place	54	5
Bardstown Rd.	221	18

* Includes one fatality.

Table 3a: Crash Summary for the Intersection with Crittenden Drive for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	17	22%
Backing	3	4%
Head On	1	1%
Opposing Left Turn	5	6%
Rear End	31	39%
Sideswipe - Opposite Direction	2	3%
Sideswipe - Same Direction	15	19%
Single Vehicle	5	6%

Table 3b: Crash Summary for the Intersection with Bradley Avenue for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	12	16%
Backing	6	8%
Head On	2	3%
Opposing Left Turn	3	4%
Rear End	30	39%
Sideswipe - Opposite Direction	5	7%
Sideswipe - Same Direction	12	16%
Single Vehicle	6	8%

Table 3c: Crash Summary for the Intersection with S. Preston Street & S. Shelby Street for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	48	27%
Backing	10	6%
Head On	2	1%
Opposing Left Turn	4	2%
Rear End	48	27%
Sideswipe - Opposite Direction	4	2%
Sideswipe - Same Direction	46	26%
Single Vehicle	18	10%

Table 3d: Crash Summary for the Intersection with Burnett Avenue for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	20	36%
Backing	0	0%
Head On	1	2%
Opposing Left Turn	6	11%
Rear End	12	22%
Sideswipe - Opposite Direction	1	2%
Sideswipe - Same Direction	9	16%
Single Vehicle	6	11%

Table 3e: Crash Summary for the Intersection with Poplar Level Road/Goss Avenue for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	7	9%
Backing	2	3%
Head On	2	3%
Opposing Left Turn	3	4%
Rear End	45	58%
Sideswipe - Opposite Direction	1	1%
Sideswipe - Same Direction	13	17%
Single Vehicle	5	6%

Table 3f: Crash Summary for the Intersection with Castlevale Drive for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	4	7%
Backing	2	4%
Head On	0	0%
Opposing Left Turn	2	4%
Rear End	28	52%
Sideswipe - Opposite Direction	2	4%
Sideswipe - Same Direction	11	20%
Single Vehicle	5	9%

Table 3g: Crash Summary for the Intersection with Barret Avenue for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	15	18%
Backing	0	0%
Head On	2	2%
Opposing Left Turn	9	11%
Rear End	20	24%
Sideswipe - Opposite Direction	2	2%
Sideswipe - Same Direction	15	18%
Single Vehicle	20	24%

Table 3h: Crash Summary for the Intersection with Baxter Avenue for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	23	21%
Backing	4	4%
Head On	4	4%
Opposing Left Turn	13	12%
Rear End	46	43%
Sideswipe - Opposite Direction	2*	2%
Sideswipe - Same Direction	13	12%
Single Vehicle	2	2%

* Includes 1 fatality.

Table 3i: Crash Summary for the Intersection with Norris Place for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	22	41%
Backing	3	6%
Head On	0	0%
Opposing Left Turn	6	11%
Rear End	15	28%
Sideswipe - Opposite Direction	1	2%
Sideswipe - Same Direction	4	7%
Single Vehicle	3	6%

Table 3j: Crash Summary for the Intersection with Bardstown Road for 2014 through 2018

Manner of Collision	Number of Crashes (2014-2018)	Percentage of Crashes
Angle	61	28%
Backing	4	2%
Head On	4	2%
Opposing Left Turn	6	3%
Rear End	79	36%
Sideswipe - Opposite Direction	3	1%
Sideswipe - Same Direction	57	26%
Single Vehicle	7	3%

Speed Analysis Results

Traffic volumes and vehicle speeds were collected by Qk4 for a 24-hour period at three different locations within the project limits for each of the three segments. The vehicular speed data was processed and average 15th, 50th, 85th, and 95th percentile speeds were reported for each segment. **Table 4** and **Table 5** depict the traffic speed analysis results along Eastern Parkway for westbound and eastbound respectively. The speed data by count location, and detailed results of the speed data collection can be found in **Appendix A**.

Table 4: Traffic Speed (in MPH) Data by Count Location along Eastern Parkway-Westbound

Cross Street Detector Location	Posted Speed	Average Speed	50th Percentile Speed	85th Percentile Speed	95th Percentile Speed
Sherry Rd.	35	30	28	34	37
Delor Ave.	35	35	34	40	44
Quadrant Ave.	35	35	33	39	43

Table 5: Traffic Speed (in MPH) Data by Count Location along Eastern Parkway-Eastbound

Cross Street Detector Location	Posted Speed	Average Speed	50th Percentile Speed	85th Percentile Speed	95th Percentile Speed
Sherry Rd.	35	32	30	38	51
Delor Ave.	35	35	33	39	43
Quadrant Ave.	35	29	29	36	39

The issue of speeding along the corridor was a large concern stemming from public input at the three public meetings, as well as a concern voiced at the three stakeholder meetings for the corridor. This concern was based on comments about difficulty accessing the many residential driveways and commercial entrances along the corridor, as well as concern for safety for walking, biking, and using electric scooters along the corridor. With the overarching goal of rehabilitating the Eastern Parkway corridor to more closely align with the original Olmsted principles, the design team is tasked with providing a safe, comfortable, and enjoyable experience for all users of this linear park corridor. Speed has a direct impact on the safety and comfort of more vulnerable road users, and the current minimal separation of pedestrians, bicyclists, scooters, and automobile traffic exacerbates the impact of speeding on these concerns. According to FHWA, a pedestrian hit at 40 MPH has an 85 percent chance of fatality, while a pedestrian hit at 20 MPH has only a 5 percent chance of fatality. Providing designs that encourage safer operating speeds of motor vehicle traffic in conflict zones with pedestrians will be a key component of the planning recommendations.

Eastern Parkway Transportation Study Key Design Considerations

Multiple design considerations that will influence traffic operations along the corridor have been evaluated and are included as part of the Eastern Parkway Transportation Study. Many of the design considerations were proposed to create more space for multi-modal facilities and achieve the vision for a safer and more balanced vehicle-pedestrian-bicycle operating environment throughout the corridor. Each major design option is described below.

1. Lane Reconfiguration:

In order to achieve these results, a lane reconfiguration, commonly referred to as a “Road Diet” was evaluated for the Corridor. Within the project limits (along Eastern Parkway between Hahn St. and Bardstown Rd. intersections), the four-lane cross section would be

converted to a three-lane cross section with one travel lane in each direction and a center two-way-left-turn lane (TWLTL). The addition of the TWLTL will remove turning vehicles from the through travel lanes, reducing rear end and sideswipe crashes as well as midblock left-turn angle crashes. The remaining pavement width will be used for a light vehicle lane as well as the creation of additional separation between vehicular traffic and pedestrian facilities.

This alternative is a proven Federal Highway Administration (FHWA) safety countermeasure and has been found to potentially reduce the overall crash rate by 19% to 47%. The number of angle crashes are expected to decrease due to the ease of turning from side streets and entrances with fewer lanes to cross. It is also expected to improve pedestrian and bicyclist safety due to reduced number of conflict points. The reconfiguration will also reduce speed differentials between the two travel lanes, which typically experience slower traffic in the left inside lane than the outside travel lane due to stopped or turning traffic. Additionally, it is expected that 85th percentile speeds will be reduced due to the consolidation of traffic into a single through lane, while average travel speeds are anticipated to remain the same.

While lane reconfiguration studies have shown that capacity is typically not significantly impacted through this reconfiguration, the primary operational concern is queuing. The elimination of a through lane can reduce available queue storage, doubling the length of queue upstream of an intersection. Therefore, evaluation of queues at each intersection is a primary focus in latter sections of this report.

2. Alternative Designs at Key Intersections:

Based on the historic crash data and analysis, the following recommendations are proposed along Eastern Parkway at important intersections:

A. Eastern Parkway at Crittenden Dr.

- The existing I-65 Northbound exit ramp creates a significant weave condition, with traffic exiting into a right turn only lane approximately 133 feet away from the intersection of Crittenden Dr. The vehicles turning left at Crittenden Dr. coming from I-65 Northbound must cross two through lanes before entering the left turn bay. The I-65 Northbound exit ramp would be pulled back from the intersection as shown in Figure 4. This would remove the significant weaving maneuvers resulting from interstate ramp traffic entering Eastern Parkway in the right turn only lane, which is exacerbated by the number of lanes on Eastern Parkway and the close proximity of the ramp to the intersection of Crittenden Drive. It would also improve horizontal sight distance by providing a more perpendicular orientation at the end of the stop-controlled ramp. This would allow traffic

to enter from the ramp into a single through lane. Selection of this alternative would require additional study through an Intersection Modification Report (IMR) and coordination through FHWA.

- The single eastbound through lane at Hahn St. would connect to the previously implemented road diet by the University of Louisville (**Figure 5**), and continue through the Crittenden Dr. intersection.
- The eastbound right turn lane will begin after the off-ramp with reduced storage length to eliminate weaving.
- A single westbound through lane will be carried through the Crittenden Dr. intersection to tie into the existing single through lane at Hahn St.
- Excess pavement due to the lane reconfigurations, shown in **Figure 4** hatched in green, are reclaimed as green space either as an island or verge.

Figure 3: Existing Intersection of Eastern Parkway at Crittenden Dr.

Figure 4: Proposed Alternative Intersection of Eastern Parkway at Crittenden Dr.

*With the proposed changes, capacity analysis indicates that the intersection will operate within acceptable levels of service. During the AM peak the LOS remains unchanged at LOS C with a 2 second increase in delay. During the PM peak period LOS changes from LOS C under the existing conditions to LOS D, however, this is due to an increase of delay less than 6 seconds (See **Table 6**).*

Figure 5: Proposed Intersection of Eastern Parkway at Hahn St.

The proposed changes will tie into the existing one-lane section at Hahn Street.

Table 6: Capacity Analysis Results

Scenario	AM Peak Hour			PM Peak Hour		
	LOS	V/C	Delay	LOS	V/C	Delay
Existing	C	0.46	23.8	C	0.64	31.5
Proposed	C	0.52	25.7	D	0.74	37.4

As expected, queues for the westbound through movement increase due to the reduced number of through lanes at the intersection from an estimated 196 feet to 346 feet during the PM peak hour. Field observations indicate that the existing westbound queue is longer than the estimated 196 feet due to lane imbalance in the through lanes resulting from the lane reduction down stream. Queues from the proposed condition will not interfere with any adjacent intersection operations.

Table 7: 95th Percentile Queue Length by Lane (AM (PM))

Scenario	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBTR
Existing	50 (123)	97 (163)	16 (20)	162 (239)	86 (182)	37 (72)	77 (59)	104 (113)	48 (--)	77 (97)	80 (84)
Proposed	79 (192)	155 (312)	39 (163)	178 (248)	196 (346)	47 (235)	70 (75)	118 (98)	73 (145)	88 (123)	71 (98)

B. Merging of Preston St. and Shelby St. Signals at Eastern Parkway Intersections:

The intersections at Preston St. and Shelby St. were analyzed together with lane reductions due to the proposed road reconfiguration. Due to the unique layout of the intersections, which required split phasing of the Preston and Shelby Street approaches and a long all-red clearance interval for traffic on Eastern Parkway, significant capacity issues were identified with the proposed configuration.

- Multiple alternatives were evaluated at the intersection, including a modern roundabout. However, the high traffic movements on Preston and Shelby Streets prohibited efficient flow from the Eastern Parkway approaches.
- A more effective alternative was identified to consolidate the intersections into a single signalized intersection, eliminating the need for split phasing and the associated long all-red clearance interval shown in **Figure 7**. Consolidation of the intersection can be achieved by converting Preston and Shelby to two-way operation. Preston St. would handle all through traffic while Shelby St. would handle neighborhood traffic either without direct access or right-in/right-out only access to Eastern Parkway. Further enforcement of the right-in/right-out only access should be considered in future design phases, such as the inclusion of non-mountable median in locations that do not restrict access to businesses. This concept eliminates the wasted portion of the signal cycle for clearing out vehicles

between the closely spaced signals. Shelby St. would continue to maintain local access to Preston St. at Lynn St. and Harrison Ave., with Lynn St. converting to two-way operations along with Shelby St. and Preston St. and parking along the south side of Lynn St. There is currently sufficient space for a four-lane section along Preston St., although some widening will be required along Preston St. on the south side of the intersection to accommodate a left turn lane at Eastern Parkway. This widening may have potential utility and right of way impacts along the west side of Preston St. With this alternative, the second northbound through lane will be dropped as a right turn onto Fetter Ave. (along with reversing the direction of travel on Fetter Ave.) with parking allowed north of Fetter Ave. on both sides of Preston St. Further study in future design phases of this alternative should investigate the benefits and impacts to the rehabilitation of the Parkway from the elimination of lanes on Preston St. as shown, or as turn only lanes onto Eastern Parkway.

Figure 6: Existing Intersection of Eastern Parkway at Preston St. and Shelby St.

Figure 7: Proposed Alternative Intersection for Eastern Parkway at Preston St. and Shelby St.

Results of the capacity and queue analysis are shown in **Tables 8 and 9**, respectively. While the individual intersections of Preston and Shelby are shown to operate with LOS B/C during the AM and PM peak periods, average delay combined for both intersections is higher than the proposed conditions in which vehicles only pass through a single intersection. The proposed condition reduces total delay by approximately 9 seconds.

Table 8: Capacity Analysis Results

Scenario	AM Peak Hour			PM Peak Hour		
	LOS	V/C	Delay	LOS	V/C	Delay
Existing	B/C	0.49/0.58	37.4*	C/B	0.73/0.69	41.3*
Proposed	C	0.85	31.9	D	0.87	35.5
			*Combined =14.8+22.6			*Combined =21.8+19.5

Table 9: 95th Percentile Queue Length by Lane (AM (PM))

Scenario	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Existing	-- (--)	103 (545)	129* (566*)	-- (--)	198 (619)	116 (159)	258 (197)	60 (74)	88 (128)	128 (207)	51 (63)
Proposed	96 (135)	219 (443)	55 (235)	123 (121)	490* (480*)	152 (173)	326 (197)	330* (211*)	130 (126)	133 (247)	153* (245*)
			*EBTR		*WBTR			*NBTR			*SBTR

C. <u>Eastern Parkway at Poplar Level Rd./ Goss Ave.:</u>

The traffic volumes along Poplar Level Rd. and Goss Ave. are significantly higher than other intersections in the study area, which will require two travel lanes along Eastern Parkway to provide adequate capacity at the intersection. However, the following changes are proposed to improve vehicular safety, and better accommodate pedestrians and cyclists at the intersection and reclaim greenspace as shown in **Figure 9**.

- Due to limited sight distance, the signal phasing will remain the same to allow for protected left turns to address safety concerns. This phasing contributes to the need for two through lanes.
- Eastbound channelized right turn would be removed due to limited sight lines, which is confirmed to be a safety issue by the historic crash data.
- Ramps will be used to direct light vehicle lane traffic onto the multi-use path (MUP) at this intersection, and they would use the MUP for crossing Poplar Level Rd./Goss Ave.
- To increase capacity through the Poplar Level Rd./Goss Ave. intersection, the single through lane in each direction from the road reconfiguration would need to be widened to two through lanes. Once through the intersection, the second westbound lane will be a drop right at Ash St. while the second eastbound lane will merge before the Beargrass Creek bridge. Further study in future design phases should investigate the benefits and impacts to the rehabilitation of the Parkway from either removing traffic lanes as turn only lanes at the intersection, or extending the four-lane section to the next signalized intersection, in lieu of the concept shown in Figure 9.

Figure 8: Existing Intersection of Eastern Parkway and Poplar Level Rd./ Goss Ave.

Figure 9: Proposed Alternative Intersection of Eastern Parkway and Poplar Level Rd./ Goss Ave.

Results of the capacity and queue analysis are shown in **Tables 10 and 11**, respectively. As no significant changes are proposed at the intersection impacting capacity, the LOS is

minimally impacted. Due to the reduction in size of the intersection and resulting signal timing changes, LOS is shown to improve from LOS E to LOS D for both the AM and PM peak periods. Overall queues are consistent between the two alternatives with an increase in eastbound through queues during the AM peak period resulting from lane imbalance caused by the eastbound lane reduction east of the intersection. This queue increases from 255 ft. to 274 ft. However, it is not anticipated to interfere with any adjacent intersection operations.

Table 10: Capacity Analysis Results

Scenario	AM Peak Hour			PM Peak Hour		
	LOS	V/C	Delay	LOS	V/C	Delay
Existing	E	0.56	57.6	E	0.76	65.9
Proposed	D	0.55	45	D	0.77	53

Table 11: Peak 95th Percentile Queue Length by Lane (AM (PM))

Scenario	EBL	EBT	EBR	WBL	WBT	WBR
Existing	81 (198)	194 (255)	-- (--)	289 (382)	201 (664)	23 (105)
Proposed	99 (178)	216 (274)	94 (73)	327 (336)	280 (400)	225* (376*)

*WBTR

Scenario	NBL	NBT	NBR	SBL	SBT	SBR
Existing	124 (205)	137 (160)	99 (93)	75 (139)	140 (240)	30 (66)
Proposed	94 (218)	144 (189)	78 (99)	97 (159)	128 (221)	48 (63)

D. Geometric Design Adjustments at Eastern Parkway and Barret Ave. Intersection:

Crash analysis at the intersection of Eastern Parkway and Barret Ave. indicates single vehicle crashes, resulting from the lane shift and curvature at the intersection for westbound traffic. Two alternatives were evaluated to address this issue, while maintaining satisfactory traffic operations with the lane reconfiguration along Eastern Parkway.

- The first alternative, shown in **Figure 11,** better aligns the through movements along Eastern Parkway by eliminating a portion of the TWLTL on the west leg of the intersection. A left turn lane is still accommodated at the intersection and no access points are present at this location requiring the use of the TWLTL. The LOS was observed to remain the same with these operational adjustments.
- The second alternative as shown in **Figure 12** shows a proposed roundabout at the Barret Ave. intersection. A roundabout may be appropriate at this location due

to its traffic calming capabilities and safety benefits by eliminating high risk types of crashes. However, the LOS decreases from “B” to “D” for these operational changes which are still considered to be within a functional range because of the lower traffic volumes in these segments of Eastern Parkway.

- Light vehicle lanes included west of the intersection will use ramps to access the multi-use paths on the east side of the intersection. This is true for both alternatives shown in **Figure 11** and **Figure 12**.

Figure 10: Existing Intersection of Eastern Parkway and Barret Ave.

Figure 11: Proposed Alternative 1 for the Intersection of Eastern Parkway and Barret Ave.

Figure 12: Proposed Alternative 2 at the Intersection of Eastern Parkway and Barret Ave.

Results of the capacity and queue analysis are shown in **Tables 12 and 13**, respectively. Due to the relatively low volume at the intersection, LOS is unaffected, operating at LOS A and B during the AM and PM peak periods for both the existing conditions and proposed

Alternative 1. The high volumes of through traffic on Eastern Parkway are approaching the capacity limits of the single lane roundabout proposed in Alternative 2, which operates at LOS D during the PM peak period. During the PM peak period, the eastbound through volume is shown to be the critical volume from a queuing standpoint, increasing from 249 feet during the existing conditions to 440 feet under Alternative 1. Alternative 2 produces a queue of 1,871 feet, which would extend back to Beargrass Creek.

Table 12: Capacity Analysis Results

Scenario	AM Peak Hour			PM Peak Hour		
	LOS	V/C	Delay	LOS	V/C	Delay
Existing	A	0.29	6.7	B	0.61	14.1
Proposed Alternative 1	A	0.49	7.9	B	0.79	18.9
Proposed Alternative 2	B	N/A	12.6	D	N/A	29.5

Table 13: 95th Percentile Queue Length by Lane (AM (PM))

Scenario	EBL	EBTR	WB	NB	SB
Existing	98 (223)*	109 (249)	81 (171)*	26 (30)	89 (208)
Alternative 1	65 (193)	129 (440)	176 (358)	30 (38)	86 (245)
Alternative 2	-- (--)	106 (1871)	92 (642)	21 (38)	64 (108)

*EBLT *WBLT+WBTR

E. Eastern Parkway at Baxter Ave. Intersection:

Traffic volumes along Baxter Avenue are higher than at other intersections, and right of way is limited, which constrains capacity at the intersection. Currently, the intersection prohibits left turns from Eastern Parkway during the AM and PM peak periods through the use of “Blackout” signs. Additionally, the wide median on the west leg of the intersection complicates the geometry similar to that experienced at Barret Avenue.

- The first proposed alternative shown in **Figure 14** uses the existing pavement to better align the eastbound and westbound through movements and a southbound right turn lane is also proposed, which can be accommodated by eliminating the channelized right turn lane and minor widening. This configuration is shown to improve operations to a LOS D. Additional overhead “blackout” signage near the opening of the turn bay may be required to further enforce the closure of the turn lane during peak hour operations, and should be considered for inclusion to signage plans in future design phases.
- A second alternative was also evaluated which uses only the south side of the west leg of Eastern Parkway for through movements while creating an access

road for bikes/pedestrians/local automobiles on the north side. The south side would be used for the traffic to better align with Eastern Parkway on the other side of Baxter Ave. This alternative, seen in **Figure 15,** was abandoned after consultation with the project stakeholders.

Figure 13: Existing Intersection of Eastern Parkway and Baxter Ave.

Figure 14: Proposed Alternative 1 at the Intersection of Eastern Parkway and Baxter Ave.

Figure 15: Proposed Alternative 2 at the Intersection of Eastern Parkway and Baxter Ave.

Results of the capacity and queue analysis are shown in **Tables 14 and 15**, respectively. LOS is shown to remain steady with the intersection operating at LOS C during the AM peak under both conditions. During the PM peak, the LOS is shown to drop from LOS C to LOS D, though this is reflective of only a 3 second increase in delay. Eastbound and westbound queues are estimated to increase from 298 feet to 697 feet eastbound and 149 ft. to 338 ft. westbound due to the reduction in number of lanes on Eastern Parkway. These queues are not anticipated to interfere with operations of major adjacent intersections along Eastern Parkway.

Table 14: Capacity Analysis Results

Scenario	AM Peak Hour			PM Peak Hour		
	LOS	V/C	Delay	LOS	V/C	Delay
Existing	C	0.69	25.9	C	0.87	35
Proposed	C	0.87	32	D	0.88	38.2

Table 15: Existing Peak 95th Percentile Queue Length by Lane (AM(PM))

Scenario	EBT	EBR	WBLT	WBTR	NBL	NBTR	SBL	SBT	SBR
Existing	185* (298)*	218* (335)*	189 (145)	220 (149)	247 (174)	392 (293)	68 (409)	316 (546)*	-- (--)
Proposed	780 (697)	211 (294)	-- (--)	442 (338)	353 (339)	547 (471)	74 (276)	233 (437)	58 (288)

*EBLT *EBTR *SBTR

F. Lane Assignment on Eastbound Eastern Parkway at Bardstown Rd. Intersection:

Due to southbound queuing on Bardstown Road during the PM peak, it was identified from the field operational observations that the eastbound right turns are causing delays along Eastern Parkway. In order to maximize lane utilization through this section, an exclusive right turn lane is proposed allowing for a single, uninhibited through lane along Eastern Parkway while using the same pavement footprint as the existing condition as shown in **Figure 17**.

Figure 16: Existing Intersection of Eastern Parkway and Bardstown Rd.

Figure 17: Proposed Alternative Intersection at Eastern Parkway and Bardstown Rd.

The lane configuration at Bardstown Rd. remains relatively unchanged with the minor reallocation of the eastbound lanes. This results in similar operations between the existing conditions and the proposed conditions. It is noted that this analysis does not reflect the impact of operations on Bardstown Rd outside of the corridor area, and due to the current Bardstown Road Safety Study does not make specific recommendations to Bardstown Road. However, during the analysis process it was determined that in the existing condition, queueing of southbound Bardstown Road traffic negatively impacts eastbound traffic on Eastern Parkway making a right turn onto Bardstown Road and thus negatively impacting eastbound through traffic on Eastern Parkway as the existing lane shares both through and right turning traffic. Therefore, it was recommended to separate right turning traffic from through traffic to facilitate through traffic operations on Eastern Parkway.

Table 16: Capacity Analysis Results

Scenario	AM Peak Hour			PM Peak Hour		
	LOS	V/C	Delay	LOS	V/C	Delay
Existing	C	0.78	31.7	C	0.79	32.3
Proposed	C	0.77	31.3	C	0.79	33.5

Table 17: Peak 95th Percentile Queue Length by Lane (AM(PM))

Scenario	EBL	EBT	EBR	WBL	WBTR	NBLT	NBTR	SBLT	SBTR
Existing	94 (152)	301* (236)*	-- (--)	310 (488)	276 (289)	305 (312)	280 (297)	113 (343)	92 (318)
Proposed	187 (178)	282 (247)	85 (106)	315 (342)	255 (285)	270 (251)	282 (265)	75 (338)	88 (355)

*EBTR

Corridor Analysis

While the previous discussions evaluated individual intersection movements, simulation results were also summarized to evaluate the impact on the project for the entire length of the corridor. These results are summarized in **Tables 18 and Table 19.**

Table 18: Peak Hour Travel Time (in sec) along Eastern Parkway Project Corridor

	AM		PM	
Scenario	**Existing**	**Proposed**	**Existing**	**Proposed**
East Bound	519.3	527	667.3	528
West Bound	532.5	474.6	648.3	544.7

Table 19: Peak Hour Delay (in sec/veh) along Eastern Parkway Project Corridor

	AM		PM	
Scenario	**Existing**	**Proposed**	**Existing**	**Proposed**
East Bound	182.3	202.3	347.4	209.9
West Bound	180.8	156.7	282.8	193.2

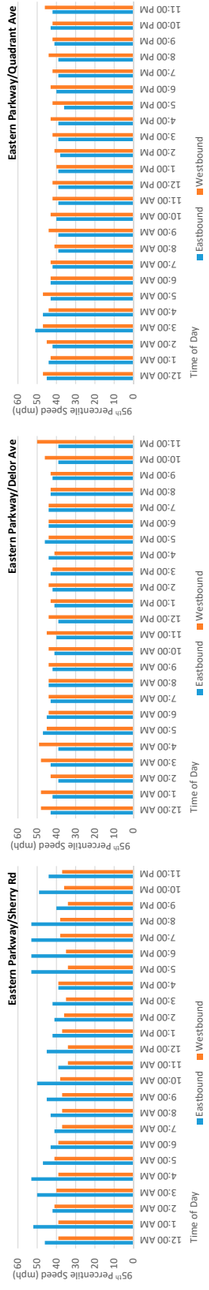
As can be seen from **Tables 18 and 19**, travel time along the corridor is actually reduced in both directions during the PM peak periods, with only a 2 percent increase during the AM peak period for the eastbound direction. Similar results are shown for the total travel delay on the corridor in Table 19. These reductions are the result of improved signal timing on the corridor afforded by the reduction in overall intersection size at most intersections, consolidation of the Preston/Shelby Intersection which is a major constraint on the existing corridor, and the removal of left turns from the through lanes at the intersections. As a result, it is anticipated that the proposed lane reallocation will result in very similar operations as experienced today. In addition, the removal of a through lane will allow for the reduction of maximum speeds along the corridor.

APPENDICES

Appendix A: Traffic Speed Study Data

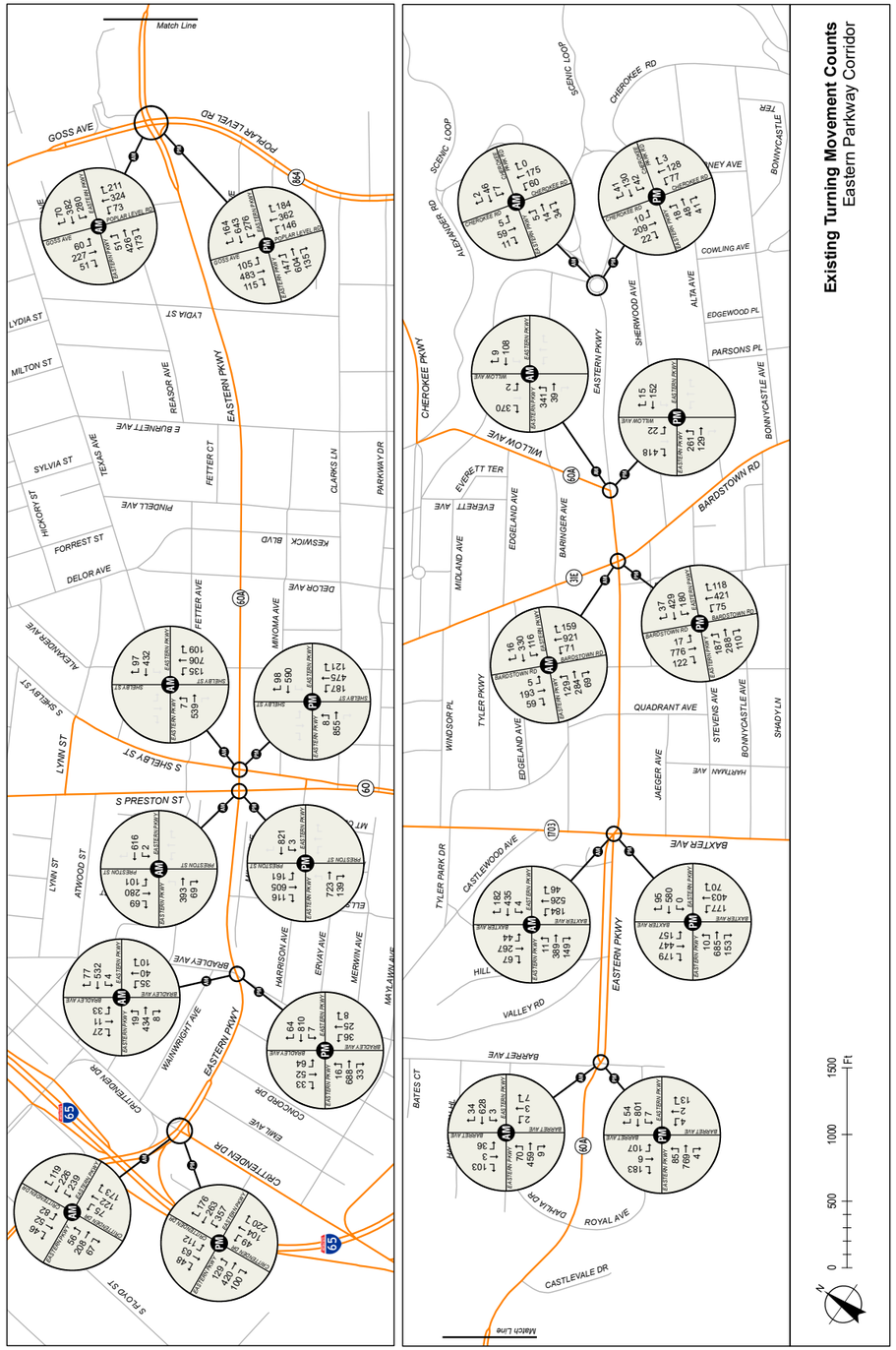
Mid-block Speed Data
Eastern Parkway Corridor
May/June 2019

Data:
Key Metrics at Count Locations and 95th Percentile Speeds, by Hour and Travel Direction



Gresham Smith

Appendix B: Traffic Count Data



Existing Turning Movement Counts
Eastern Parkway Corridor

Gresham Smith

Appendix C: HCM Analysis

HCM Signalized Intersection Capacity Analysis
103: KY-1631/Crittenden Dr & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	208	67	239	226	119	75	122	173	82	52	46
Future Volume (vph)	56	208	67	239	226	119	75	122	173	82	52	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	6.1	5.7	5.7	5.7	5.9	5.9	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1732	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.69	1.00	1.00	0.65	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1281	1863	1583	1211	1732	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	226	73	260	246	129	82	133	188	89	57	50
RTOR Reduction (vph)	0	0	64	0	0	81	0	0	146	0	32	0
Lane Group Flow (vph)	61	226	9	260	246	48	82	133	42	89	75	0
Turn Type	Prot	NA	custom	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			4			6	8		2	4		
Actuated Green, G (s)	6.2	16.0	9.3	16.8	26.6	26.6	15.0	9.2	16.0	15.2	9.3	
Effective Green, g (s)	6.2	16.0	9.3	16.8	26.6	26.6	15.0	9.2	16.0	15.2	9.3	
Actuated g/C Ratio	0.09	0.22	0.13	0.23	0.37	0.37	0.21	0.13	0.22	0.21	0.13	
Clearance Time (s)	6.1	6.1	6.1	5.7	5.7	5.7	5.9	5.9	6.1	6.1	6.1	
Vehicle Extension (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	
Lane Grp Cap (vph)	153	789	205	414	1312	587	307	239	353	302	224	
v/s Ratio Prot	0.03	c0.06		c0.15	0.07		0.02	c0.07		c0.02	0.04	
v/s Ratio Perm			0.01			0.03	0.03		0.03	0.04		
v/c Ratio	0.40	0.29	0.05	0.63	0.19	0.08	0.27	0.56	0.12	0.29	0.33	
Uniform Delay, d1	31.0	23.1	27.3	24.6	15.2	14.6	23.5	29.3	22.2	23.4	28.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.7	0.2	0.1	3.0	0.1	0.1	0.5	3.1	0.2	0.5	1.0	
Delay (s)	32.7	23.4	27.4	27.6	15.3	14.7	24.0	32.4	22.4	24.0	29.4	
Level of Service	C	C	C	C	B	B	C	C	C	C	C	
Approach Delay (s)		25.8			20.2			26.0			27.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	71.7	Sum of lost time (s)	23.8
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
105: KY-61S & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	393	69	0	616	0	0	0	0	101	280	69
Future Volume (vph)	0	393	69	0	616	0	0	0	0	101	280	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		25.8			5.5					5.4	5.4	5.4
Lane Util. Factor		0.95			0.95					1.00	0.95	1.00
Frt		0.98			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		3460			3539					1770	3539	1583
Flt Permitted		1.00			1.00					0.95	1.00	1.00
Satd. Flow (perm)		3460			3539					1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	427	75	0	670	0	0	0	0	110	304	75
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	0	63
Lane Group Flow (vph)	0	488	0	0	670	0	0	0	0	110	304	12
Turn Type		NA			NA					Perm	NA	Perm
Protected Phases		4			8						6	
Permitted Phases										6		6
Actuated Green, G (s)		29.3			49.6					11.6	11.6	11.6
Effective Green, g (s)		29.3			49.6					11.6	11.6	11.6
Actuated g/C Ratio		0.41			0.69					0.16	0.16	0.16
Clearance Time (s)		25.8			5.5					5.4	5.4	5.4
Vehicle Extension (s)		3.0			3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1406			2434					284	569	254
v/s Ratio Prot		0.14			c0.19						c0.09	
v/s Ratio Perm										0.06		0.01
v/c Ratio		0.35			0.28					0.39	0.53	0.05
Uniform Delay, d1		14.8			4.3					27.1	27.8	25.6
Progression Factor		1.00			1.00					1.00	1.00	1.00
Incremental Delay, d2		0.7			0.3					0.9	1.0	0.1
Delay (s)		15.5			4.6					27.9	28.7	25.7
Level of Service		B			A					C	C	C
Approach Delay (s)		15.5			4.6			0.0			28.1	
Approach LOS		B			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	72.1	Sum of lost time (s)	31.2
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
106: KY-61N & US-60A 11/12/2019

Movement	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR	SWR2
Lane Configurations											
Traffic Volume (vph)	539	0	135	706	109	0	0	0	0	432	97
Future Volume (vph)	539	0	135	706	109	0	0	0	0	432	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		5.3	5.3	5.3					25.8	
Lane Util. Factor	0.97		1.00	0.95	1.00					0.88	
Frt	1.00		1.00	1.00	0.85					0.85	
Flt Protected	0.95		0.95	1.00	1.00					1.00	
Satd. Flow (prot)	3433		1770	3539	1583					2787	
Flt Permitted	0.95		0.95	1.00	1.00					1.00	
Satd. Flow (perm)	3433		1770	3539	1583					2787	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	586	0	147	767	118	0	0	0	0	470	105
RTOR Reduction (vph)	0	0	0	0	84	0	0	0	0	18	0
Lane Group Flow (vph)	586	0	147	767	34	0	0	0	0	557	0
Turn Type	Prot		Perm	NA	Perm					Prot	
Protected Phases	4			2						8	
Permitted Phases			2		2						
Actuated Green, G (s)	49.7		24.0	24.0	24.0					29.4	
Effective Green, g (s)	49.7		24.0	24.0	24.0					29.4	
Actuated g/C Ratio	0.59		0.28	0.28	0.28					0.35	
Clearance Time (s)	5.5		5.3	5.3	5.3					25.8	
Vehicle Extension (s)	3.0		3.0	3.0	3.0					3.0	
Lane Grp Cap (vph)	2019		502	1005	449					969	
v/s Ratio Prot	0.17			c0.22						c0.20	
v/s Ratio Perm			0.08		0.02						
v/c Ratio	0.29		0.29	0.76	0.07					0.57	
Uniform Delay, d1	8.6		23.6	27.7	22.1					22.5	
Progression Factor	1.00		1.00	1.00	1.00					1.00	
Incremental Delay, d2	0.4		0.3	3.5	0.1					2.5	
Delay (s)	9.0		23.9	31.1	22.2					24.9	
Level of Service	A		C	C	C					C	
Approach Delay (s)	9.0			29.1			0.0		24.9		
Approach LOS	A			C			A		C		

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	84.5	Sum of lost time (s)	31.1
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
108: KY-864 & US-60A 11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	426	173	280	382	70	73	324	211	60	227	51
Future Volume (vph)	51	426	173	280	382	70	73	324	211	60	227	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.0	6.0	6.5	6.0	6.0	5.8	6.2	6.2	5.8	6.2	6.2
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	463	188	304	415	76	79	352	229	65	247	55
RTOR Reduction (vph)	0	0	151	0	0	57	0	0	143	0	0	35
Lane Group Flow (vph)	55	463	37	304	415	19	79	352	86	65	247	20
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.3	21.3	21.3	13.6	27.6	27.6	8.6	40.5	40.5	7.8	39.7	39.7
Effective Green, g (s)	7.3	21.3	21.3	13.6	27.6	27.6	8.6	40.5	40.5	7.8	39.7	39.7
Actuated g/C Ratio	0.07	0.20	0.20	0.13	0.26	0.26	0.08	0.38	0.38	0.07	0.37	0.37
Clearance Time (s)	6.5	6.0	6.0	6.5	6.0	6.0	5.8	6.2	6.2	5.8	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	119	699	313	223	906	405	141	1330	595	128	1304	583
v/s Ratio Prot	0.03	c0.13		c0.17	c0.12		c0.04	c0.10		0.04	0.07	
v/s Ratio Perm			0.02			0.01			0.05			0.01
v/c Ratio	0.46	0.66	0.12	1.36	0.46	0.05	0.56	0.26	0.14	0.51	0.19	0.03
Uniform Delay, d1	48.3	39.9	35.5	47.1	33.7	30.2	47.7	23.3	22.2	48.1	23.1	21.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.8	2.4	0.2	189.6	0.4	0.0	5.0	0.5	0.5	3.1	0.3	0.1
Delay (s)	51.1	42.2	35.7	236.6	34.1	30.2	52.7	23.8	22.7	51.2	23.4	21.9
Level of Service	D	D	D	F	C	C	D	C	C	D	C	C
Approach Delay (s)		41.2			111.2			26.9			28.1	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	57.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	107.7	Sum of lost time (s)	24.5
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
110: Barret Ave & US-60A 11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	459	9	3	628	34	2	3	7	26	3	103
Future Volume (vph)	70	459	9	3	628	34	2	3	7	26	3	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.9			5.9			6.1			6.1	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			0.99			0.92			0.89	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3507			3511			1695			1650	
Flt Permitted		0.78			0.95			0.92			0.93	
Satd. Flow (perm)		2756			3349			1574			1546	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	499	10	3	683	37	2	3	8	28	3	112
RTOR Reduction (vph)	0	1	0	0	3	0	0	7	0	0	101	0
Lane Group Flow (vph)	0	584	0	0	720	0	0	6	0	0	42	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		59.4			59.4			7.9			7.9	
Effective Green, g (s)		59.4			59.4			7.9			7.9	
Actuated g/C Ratio		0.75			0.75			0.10			0.10	
Clearance Time (s)		5.9			5.9			6.1			6.1	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	2064		2508		156			154				
v/s Ratio Prot												
v/s Ratio Perm	0.21		c0.22		0.00			c0.03				
v/c Ratio	0.28		0.29		0.04			0.27				
Uniform Delay, d1	3.2		3.2		32.3			33.0				
Progression Factor	1.00		1.00		1.00			1.00				
Incremental Delay, d2	0.3		0.3		0.1			1.0				
Delay (s)	3.5		3.5		32.4			34.0				
Level of Service	A		A		C			C				
Approach Delay (s)	3.5		3.5		32.4			34.0				
Approach LOS	A		A		C			C				

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
111: KY-1703 & US-60A 11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	389	149	4	435	182	184	526	46	44	267	67
Future Volume (vph)	11	389	149	4	435	182	184	526	46	44	267	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8			5.8		5.8	5.8		5.8	5.8	
Lane Util. Factor		0.95			0.95		1.00	1.00		1.00	1.00	
Frt		0.96			0.96		1.00	0.99		1.00	0.97	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3392			3382		1770	1840		1770	1807	
Flt Permitted		0.94			0.95		0.36	1.00		0.24	1.00	
Satd. Flow (perm)		3176			3220		671	1840		453	1807	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	423	162	4	473	198	200	572	50	48	290	73
RTOR Reduction (vph)	0	32	0	0	38	0	0	2	0	0	6	0
Lane Group Flow (vph)	0	565	0	0	637	0	200	620	0	48	357	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		30.6			30.6		55.3	44.1		43.7	38.3	
Effective Green, g (s)		30.6			30.6		55.3	44.1		43.7	38.3	
Actuated g/C Ratio		0.31			0.31		0.57	0.45		0.45	0.39	
Clearance Time (s)		5.8			5.8		5.8	5.8		5.8	5.8	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	996		1010		506	832		275	709			
v/s Ratio Prot					c0.05	c0.34		0.01	0.20			
v/s Ratio Perm	0.18		c0.20		0.18			0.07				
v/c Ratio	0.57		0.63		0.40	0.75		0.17	0.50			
Uniform Delay, d1	27.9		28.6		11.7	22.1		16.8	22.4			
Progression Factor	1.00		1.00		1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.7		1.3		0.5	3.7		0.3	0.6			
Delay (s)	28.7		29.9		12.2	25.7		17.1	23.0			
Level of Service	C		C		B	C		B	C			
Approach Delay (s)	28.7		29.9			22.4			22.3			
Approach LOS	C		C			C			C			

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	97.5	Sum of lost time (s)	17.4
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
113: US-31E & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	284	69	116	330	16	71	921	159	5	193	59
Future Volume (vph)	129	284	69	116	330	16	71	921	159	5	193	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.97		1.00	0.99			0.98			0.97	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1808		1770	1850			3455			3414	
Flt Permitted	0.21	1.00		0.20	1.00			0.90			0.93	
Satd. Flow (perm)	394	1808		369	1850			3126			3193	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	309	75	126	359	17	77	1001	173	5	210	64
RTOR Reduction (vph)	0	8	0	0	2	0	0	12	0	0	25	0
Lane Group Flow (vph)	140	376	0	126	374	0	0	1239	0	0	254	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	3	8		7	4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	33.7	25.4		33.7	25.4			54.5			54.5	
Effective Green, g (s)	33.7	25.4		33.7	25.4			54.5			54.5	
Actuated g/C Ratio	0.32	0.24		0.32	0.24			0.52			0.52	
Clearance Time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	235	437		229	447			1622			1657	
v/s Ratio Prot	c0.05	c0.21		0.04	0.20							
v/s Ratio Perm	0.14			0.13				c0.40			0.08	
v/c Ratio	0.60	0.86		0.55	0.84			0.76			0.15	
Uniform Delay, d1	27.6	38.1		27.5	37.8			20.1			13.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.0	15.4		2.8	12.9			3.5			0.2	
Delay (s)	31.6	53.5		30.3	50.7			23.6			13.4	
Level of Service	C	D		C	D			C			B	
Approach Delay (s)		47.7			45.6			23.6			13.4	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	31.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
103: KY-1631/Crittenden Dr & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	208	67	239	226	119	75	122	173	82	52	46
Future Volume (vph)	56	208	67	239	226	119	75	122	173	82	52	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	6.1	5.7	5.7	5.7	5.9	5.9	5.9	6.1	6.1	6.1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.72	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1341	1863	1583	1233	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	226	73	260	246	129	82	133	188	89	57	50
RTOR Reduction (vph)	0	0	56	0	0	82	0	0	155	0	0	41
Lane Group Flow (vph)	61	226	17	260	246	47	82	133	33	89	57	9
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	6.3	17.9	17.9	16.6	28.2	28.2	19.0	13.7	13.7	19.0	13.7	13.7
Effective Green, g (s)	6.3	17.9	17.9	16.6	28.2	28.2	19.0	13.7	13.7	19.0	13.7	13.7
Actuated g/C Ratio	0.08	0.23	0.23	0.21	0.36	0.36	0.25	0.18	0.18	0.25	0.18	0.18
Clearance Time (s)	6.1	6.1	6.1	5.7	5.7	5.7	5.9	5.9	5.9	6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	144	431	366	380	679	577	359	330	280	339	330	280
v/s Ratio Prot	0.03	c0.12		c0.15	0.13		0.02	c0.07		c0.02	0.03	
v/s Ratio Perm			0.01			0.03	0.04		0.02	0.05		0.01
v/c Ratio	0.42	0.52	0.05	0.68	0.36	0.08	0.23	0.40	0.12	0.26	0.17	0.03
Uniform Delay, d1	33.8	26.0	23.1	27.9	18.0	16.1	23.1	28.2	26.7	23.1	27.0	26.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	1.3	0.1	5.0	0.4	0.1	0.3	1.0	0.2	0.4	0.3	0.1
Delay (s)	35.8	27.3	23.1	33.0	18.4	16.1	23.4	29.1	27.0	23.6	27.3	26.4
Level of Service	D	C	C	C	B	B	C	C	C	C	C	C
Approach Delay (s)		27.9			23.9			26.9			25.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	77.3	Sum of lost time (s)	23.8
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
105: KY-61S & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	393	69	30	616	97	135	706	109	101	280	69
Future Volume (vph)	30	393	69	30	616	97	135	706	109	101	280	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5		4.5	4.5		4.5	5.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1825		1770	3468		1770	3434	
Flt Permitted	0.17	1.00	1.00	0.43	1.00		0.42	1.00		0.19	1.00	
Satd. Flow (perm)	308	1863	1583	804	1825		789	3468		357	3434	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	427	75	33	670	105	147	767	118	110	304	75
RTOR Reduction (vph)	0	0	35	0	6	0	0	13	0	0	24	0
Lane Group Flow (vph)	33	427	40	33	769	0	147	872	0	110	355	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	47.0	47.0	47.0	47.0	47.0		28.8	23.3		24.9	20.9	
Effective Green, g (s)	47.0	47.0	47.0	47.0	47.0		28.8	23.3		24.9	20.9	
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.53		0.32	0.26		0.28	0.24	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5		4.5	4.5		4.5	5.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	163	986	837	425	965		316	909		163	808	
v/s Ratio Prot		0.23			c0.42		0.03	c0.25		c0.03	0.10	
v/s Ratio Perm	0.11		0.03	0.04			0.12			0.16		
v/c Ratio	0.20	0.43	0.05	0.08	0.80		0.47	0.96		0.67	0.44	
Uniform Delay, d1	11.0	12.8	10.1	10.3	17.0		22.2	32.3		26.9	28.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	1.4	0.1	0.4	6.8		1.1	20.3		10.5	0.4	
Delay (s)	13.8	14.2	10.2	10.6	23.8		23.3	52.6		37.5	29.3	
Level of Service	B	B	B	B	C		C	D		D	C	
Approach Delay (s)		13.6			23.3			48.4			31.2	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	15.4
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
108: KY-864 & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	426	173	280	382	70	73	324	211	60	227	51
Future Volume (vph)	51	426	173	280	382	70	73	324	211	60	227	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.0	6.0	6.5	6.0		5.8	6.2	6.2	5.8	6.2	6.2
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3457		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3457		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	463	188	304	415	76	79	352	229	65	247	55
RTOR Reduction (vph)	0	0	135	0	11	0	0	0	159	0	0	39
Lane Group Flow (vph)	55	463	53	304	480	0	79	352	70	65	247	16
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	7.1	37.0	37.0	24.1	54.0		8.8	40.4	40.4	5.5	37.1	37.1
Effective Green, g (s)	7.1	37.0	37.0	24.1	54.0		8.8	40.4	40.4	5.5	37.1	37.1
Actuated g/C Ratio	0.05	0.28	0.28	0.18	0.41		0.07	0.31	0.31	0.04	0.28	0.28
Clearance Time (s)	6.5	6.0	6.0	6.5	6.0		5.8	6.2	6.2	5.8	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	95	995	445	324	1419		118	1087	486	74	998	446
v/s Ratio Prot	0.03	c0.13		c0.17	0.14		c0.04	c0.10		0.04	0.07	
v/s Ratio Perm			0.03						0.04			0.01
v/c Ratio	0.58	0.47	0.12	0.94	0.34		0.67	0.32	0.14	0.88	0.25	0.03
Uniform Delay, d1	60.7	39.1	35.1	53.0	26.5		59.9	35.0	33.0	62.7	36.4	34.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.3	0.3	0.1	33.8	0.6		13.5	0.8	0.6	64.1	0.6	0.1
Delay (s)	69.0	39.4	35.3	86.8	27.2		73.4	35.8	33.7	126.8	37.0	34.4
Level of Service	E	D	D	F	C		E	D	C	F	D	C
Approach Delay (s)		40.6			50.0			39.6			52.5	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	45.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	131.5	Sum of lost time (s)	24.5
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
110: Barret Ave & US-60A 11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	459	9	3	628	34	2	3	7	26	3	103
Future Volume (vph)	70	459	9	3	628	34	2	3	7	26	3	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9			5.9			5.9			5.9	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			0.99			0.92			0.89	
Flt Protected	0.95	1.00			1.00			0.99			0.99	
Satd. Flow (prot)	1770	1857			1849			1695			1650	
Flt Permitted	0.40	1.00			1.00			0.92			0.93	
Satd. Flow (perm)	749	1857			1847			1574			1546	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	499	10	3	683	37	2	3	8	28	3	112
RTOR Reduction (vph)	0	0	0	0	1	0	0	7	0	0	101	0
Lane Group Flow (vph)	76	509	0	0	722	0	0	6	0	0	42	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	60.4	60.4			60.4			7.9			7.9	
Effective Green, g (s)	60.4	60.4			60.4			7.9			7.9	
Actuated g/C Ratio	0.75	0.75			0.75			0.10			0.10	
Clearance Time (s)	5.9	5.9			5.9			5.9			5.9	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	564	1400			1392			155			152	
v/s Ratio Prot		0.27										
v/s Ratio Perm	0.10				c0.39			0.00			c0.03	
v/c Ratio	0.13	0.36			0.52			0.04			0.28	
Uniform Delay, d1	2.7	3.3			4.0			32.7			33.5	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	0.5	0.7			1.4			0.1			1.0	
Delay (s)	3.2	4.1			5.4			32.8			34.4	
Level of Service	A	A			A			C			C	
Approach Delay (s)		4.0			5.4			32.8			34.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.1	Sum of lost time (s)	11.8
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
111: KY-1703 & US-60A 11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	389	149	4	435	182	184	526	46	44	267	67
Future Volume (vph)	11	389	149	4	435	182	184	526	46	44	267	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8	5.8		5.8		4.5	5.8		4.5	5.8	5.8
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1860	1583		1788		1770	1840		1770	1863	1583
Flt Permitted		0.98	1.00		1.00		0.36	1.00		0.13	1.00	1.00
Satd. Flow (perm)		1822	1583		1785		673	1840		248	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	423	162	4	473	198	200	572	50	48	290	73
RTOR Reduction (vph)	0	0	88	0	14	0	0	3	0	0	0	52
Lane Group Flow (vph)	0	435	74	0	661	0	200	619	0	48	290	21
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2		2	6			8			4		4
Actuated Green, G (s)		47.7	47.7		47.7		45.7	37.2		34.0	30.0	30.0
Effective Green, g (s)		47.7	47.7		47.7		45.7	37.2		34.0	30.0	30.0
Actuated g/C Ratio		0.45	0.45		0.45		0.44	0.35		0.32	0.29	0.29
Clearance Time (s)		5.8	5.8		5.8		4.5	5.8		4.5	5.8	5.8
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	827	719		810			409	651		138	532	452
v/s Ratio Prot							c0.05	c0.34		0.01	0.16	
v/s Ratio Perm	0.24	0.05		c0.37			0.16			0.10		0.01
v/c Ratio	0.53	0.10		0.82			0.49	0.95		0.35	0.55	0.05
Uniform Delay, d1	20.5	16.4		24.9			19.9	33.0		27.3	31.7	27.1
Progression Factor	1.00	1.00		0.58			1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.4	0.3		8.1			0.9	23.7		1.5	1.1	0.0
Delay (s)	22.9	16.7		22.4			20.8	56.7		28.8	32.9	27.2
Level of Service	C	B		C			C	E		C	C	C
Approach Delay (s)	21.2			22.4				48.0			31.4	
Approach LOS	C			C				D			C	

Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.1
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
113: US-31E & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	284	69	116	330	16	71	921	159	5	193	59
Future Volume (vph)	129	284	69	116	330	16	71	921	159	5	193	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6	5.6	5.6	5.6			5.6			5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			0.95			0.95	
Frt	1.00	1.00	0.85	1.00	0.99			0.98			0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1850			3455			3414	
Flt Permitted	0.21	1.00	1.00	0.34	1.00			0.90			0.93	
Satd. Flow (perm)	396	1863	1583	629	1850			3126			3193	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	309	75	126	359	17	77	1001	173	5	210	64
RTOR Reduction (vph)	0	0	57	0	2	0	0	11	0	0	24	0
Lane Group Flow (vph)	140	309	19	126	374	0	0	1240	0	0	255	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	34.2	25.9	25.9	33.6	25.6			54.3			54.3	
Effective Green, g (s)	34.2	25.9	25.9	33.6	25.6			54.3			54.3	
Actuated g/C Ratio	0.33	0.25	0.25	0.32	0.24			0.52			0.52	
Clearance Time (s)	5.6	5.6	5.6	5.6	5.6			5.6			5.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	237	459	390	288	451			1616			1651	
v/s Ratio Prot	c0.05	0.17		0.03	c0.20							
v/s Ratio Perm	0.15		0.01	0.11				c0.40			0.08	
v/c Ratio	0.59	0.67	0.05	0.44	0.83			0.77			0.15	
Uniform Delay, d1	27.3	35.7	30.1	26.7	37.6			20.3			13.3	
Progression Factor	1.06	1.10	2.81	1.00	1.00			1.00			1.00	
Incremental Delay, d2	3.4	3.3	0.0	1.1	12.3			3.6			0.2	
Delay (s)	32.4	42.5	84.7	27.8	49.9			23.8			13.5	
Level of Service	C	D	F	C	D			C			B	
Approach Delay (s)		45.8			44.3			23.8			13.5	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Roundabout
110: Barret Ave & US-60A

11/13/2019

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	585	723	13	143
Demand Flow Rate, veh/h	597	738	13	146
Vehicles Circulating, veh/h	35	83	616	702
Vehicles Exiting, veh/h	813	546	16	119
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.1	15.2	6.2	10.2
Approach LOS	B	C	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	597	738	13	146
Cap Entry Lane, veh/h	1091	1040	610	560
Entry HV Adj Factor	0.980	0.980	0.995	0.979
Flow Entry, veh/h	585	723	13	143
Cap Entry, veh/h	1069	1019	608	548
V/C Ratio	0.547	0.710	0.021	0.261
Control Delay, s/veh	10.1	15.2	6.2	10.2
LOS	B	C	A	B
95th %tile Queue, veh	3	6	0	1

HCM Signalized Intersection Capacity Analysis
103: KY-1631/Crittenden Dr & US-60A

12/31/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	420	100	357	263	176	49	104	22	112	63	48
Future Volume (vph)	129	420	100	357	263	176	49	104	22	112	63	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	6.1	5.7	5.7	5.7	5.9	5.9	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1742	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.68	1.00	1.00	0.45	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1266	1863	1583	842	1742	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	457	109	388	286	191	53	113	24	122	68	52
RTOR Reduction (vph)	0	0	87	0	0	133	0	0	19	0	26	0
Lane Group Flow (vph)	140	457	22	388	286	58	53	113	5	122	94	0
Turn Type	Prot	NA	custom	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			4			6	8		2	4		
Actuated Green, G (s)	11.6	16.2	16.2	19.6	24.2	24.2	15.4	10.9	16.2	26.0	16.2	
Effective Green, g (s)	11.6	16.2	16.2	19.6	24.2	24.2	15.4	10.9	16.2	26.0	16.2	
Actuated g/C Ratio	0.14	0.20	0.20	0.24	0.30	0.30	0.19	0.14	0.20	0.32	0.20	
Clearance Time (s)	6.1	6.1	6.1	5.7	5.7	5.7	5.9	5.9	6.1	6.1	6.1	
Vehicle Extension (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	
Lane Grp Cap (vph)	255	713	319	432	1066	477	271	252	319	385	351	
v/s Ratio Prot	0.08	c0.13		c0.22	0.08		0.01	c0.06		c0.04	0.05	
v/s Ratio Perm			0.01			0.04	0.03		0.00	0.06		
v/c Ratio	0.55	0.64	0.07	0.90	0.27	0.12	0.20	0.45	0.02	0.32	0.27	
Uniform Delay, d1	31.9	29.4	25.9	29.4	21.3	20.3	27.0	31.9	25.7	19.9	27.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.4	2.1	0.1	20.8	0.2	0.1	0.4	1.5	0.0	0.5	0.5	
Delay (s)	34.3	31.4	26.1	50.2	21.5	20.5	27.4	33.4	25.7	20.4	27.5	
Level of Service	C	C	C	D	C	C	C	C	C	C	C	
Approach Delay (s)		31.2			34.1			30.8			23.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.3	Sum of lost time (s)	23.8
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
105: KY-61S & US-60A

12/31/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	723	139	0	821	0	0	0	0	161	605	116
Future Volume (vph)	0	723	139	0	821	0	0	0	0	161	605	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		25.8			5.5					5.4	5.4	5.4
Lane Util. Factor		0.95			0.95					1.00	0.95	1.00
Frt		0.98			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		3454			3539					1770	3539	1583
Flt Permitted		1.00			1.00					0.95	1.00	1.00
Satd. Flow (perm)		3454			3539					1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	786	151	0	892	0	0	0	0	175	658	126
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	0	0	0	93
Lane Group Flow (vph)	0	920	0	0	892	0	0	0	0	175	658	33
Turn Type		NA			NA					Perm	NA	Perm
Protected Phases		4			8						6	
Permitted Phases										6		6
Actuated Green, G (s)		29.4			49.7					21.5	21.5	21.5
Effective Green, g (s)		29.4			49.7					21.5	21.5	21.5
Actuated g/C Ratio		0.36			0.61					0.26	0.26	0.26
Clearance Time (s)		25.8			5.5					5.4	5.4	5.4
Vehicle Extension (s)		3.0			3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1236			2142					463	926	414
v/s Ratio Prot		c0.27			0.25						c0.19	
v/s Ratio Perm										0.10		0.02
v/c Ratio		0.74			0.42					0.38	0.71	0.08
Uniform Delay, d1		23.1			8.5					24.8	27.5	22.8
Progression Factor		1.00			1.00					1.00	1.00	1.00
Incremental Delay, d2		4.1			0.6					0.5	2.6	0.1
Delay (s)		27.2			9.1					25.3	30.1	22.9
Level of Service		C			A					C	C	C
Approach Delay (s)		27.2			9.1			0.0			28.3	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	31.2
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
106: KY-61N & US-60A 12/31/2019

Movement	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR	SWR2
Lane Configurations											
Traffic Volume (vph)	855	0	187	475	121	0	0	0	0	590	98
Future Volume (vph)	855	0	187	475	121	0	0	0	0	590	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		5.3	5.3	5.3					25.8	
Lane Util. Factor	0.97		1.00	0.95	1.00					0.88	
Frt	1.00		1.00	1.00	0.85					0.85	
Flt Protected	0.95		0.95	1.00	1.00					1.00	
Satd. Flow (prot)	3433		1770	3539	1583					2787	
Flt Permitted	0.95		0.95	1.00	1.00					1.00	
Satd. Flow (perm)	3433		1770	3539	1583					2787	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	929	0	203	516	132	0	0	0	0	641	107
RTOR Reduction (vph)	0	0	0	0	102	0	0	0	0	17	0
Lane Group Flow (vph)	929	0	203	516	30	0	0	0	0	731	0
Turn Type	Prot		Perm	NA	Perm					Prot	
Protected Phases	4			2						8	
Permitted Phases			2		2						
Actuated Green, G (s)	49.6		17.5	17.5	17.5					29.3	
Effective Green, g (s)	49.6		17.5	17.5	17.5					29.3	
Actuated g/C Ratio	0.64		0.22	0.22	0.22					0.38	
Clearance Time (s)	5.5		5.3	5.3	5.3					25.8	
Vehicle Extension (s)	3.0		3.0	3.0	3.0					3.0	
Lane Grp Cap (vph)	2185		397	795	355					1048	
v/s Ratio Prot	c0.27			c0.15						0.26	
v/s Ratio Perm			0.11		0.02						
v/c Ratio	0.43		0.51	0.65	0.08					0.70	
Uniform Delay, d1	7.0		26.5	27.4	23.9					20.5	
Progression Factor	1.00		1.00	1.00	1.00					1.00	
Incremental Delay, d2	0.6		1.1	1.8	0.1					3.8	
Delay (s)	7.7		27.6	29.3	24.0					24.4	
Level of Service	A		C	C	C					C	
Approach Delay (s)	7.7			28.0			0.0		24.4		
Approach LOS	A			C			A		C		

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	77.9	Sum of lost time (s)	31.1
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
108: KY-864 & US-60A 12/31/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	147	604	135	276	643	164	146	362	184	105	483	115
Future Volume (vph)	147	604	135	276	643	164	146	362	184	105	483	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.0	6.0	6.5	6.0	6.0	5.8	6.2	6.2	5.8	6.2	6.2
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	657	147	300	699	178	159	393	200	114	525	125
RTOR Reduction (vph)	0	0	111	0	0	123	0	0	132	0	0	85
Lane Group Flow (vph)	160	657	36	300	699	55	159	393	68	114	525	40
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.4	29.8	29.8	13.6	30.0	30.0	15.5	41.6	41.6	13.2	39.3	39.3
Effective Green, g (s)	13.4	29.8	29.8	13.6	30.0	30.0	15.5	41.6	41.6	13.2	39.3	39.3
Actuated g/C Ratio	0.11	0.24	0.24	0.11	0.24	0.24	0.13	0.34	0.34	0.11	0.32	0.32
Clearance Time (s)	6.5	6.0	6.0	6.5	6.0	6.0	5.8	6.2	6.2	5.8	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	193	859	384	196	865	387	223	1199	536	190	1133	507
v/s Ratio Prot	0.09	0.19		c0.17	c0.20		c0.09	0.11		0.06	c0.15	
v/s Ratio Perm			0.02			0.03			0.04			0.03
v/c Ratio	0.83	0.76	0.09	1.53	0.81	0.14	0.71	0.33	0.13	0.60	0.46	0.08
Uniform Delay, d1	53.5	43.2	36.0	54.6	43.6	36.3	51.5	30.2	28.0	52.2	33.3	29.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.4	4.1	0.1	262.8	5.6	0.2	10.3	0.7	0.5	5.0	1.4	0.3
Delay (s)	78.0	47.3	36.1	317.4	49.2	36.4	61.8	30.9	28.5	57.3	34.6	29.4
Level of Service	E	D	D	F	D	D	E	C	C	E	C	C
Approach Delay (s)		50.7			115.6			36.8			37.2	
Approach LOS		D			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	65.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	122.7	Sum of lost time (s)	24.5
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
110: Barret Ave & US-60A

12/31/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	769	4	7	801	54	4	2	13	107	6	183
Future Volume (vph)	85	769	4	7	801	54	4	2	13	107	6	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.9			5.9			6.1			6.1	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frt		1.00			0.99			0.91			0.92	
Flt Protected		1.00			1.00			0.99			0.98	
Satd. Flow (prot)		3520			3504			1670			1677	
Flt Permitted		0.75			0.95			0.94			0.87	
Satd. Flow (perm)		2637			3319			1578			1490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	836	4	8	871	59	4	2	14	116	7	199
RTOR Reduction (vph)	0	0	0	0	5	0	0	11	0	0	69	0
Lane Group Flow (vph)	0	932	0	0	933	0	0	9	0	0	253	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		54.3			54.3			18.2			18.2	
Effective Green, g (s)		54.3			54.3			18.2			18.2	
Actuated g/C Ratio		0.64			0.64			0.22			0.22	
Clearance Time (s)		5.9			5.9			6.1			6.1	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	1694			2132			339			320		
v/s Ratio Prot												
v/s Ratio Perm	c0.35			0.28			0.01			c0.17		
v/c Ratio	0.55			0.44			0.03			0.79		
Uniform Delay, d1	8.3			7.5			26.2			31.3		
Progression Factor	1.00			1.00			1.00			1.00		
Incremental Delay, d2	1.3			0.7			0.0			12.5		
Delay (s)	9.6			8.2			26.2			43.8		
Level of Service	A			A			C			D		
Approach Delay (s)	9.6			8.2			26.2			43.8		
Approach LOS	A			A			C			D		

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	84.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
111: KY-1703 & US-60A

12/31/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	685	153	0	580	95	177	403	70	157	447	179
Future Volume (vph)	10	685	153	0	580	95	177	403	70	157	447	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8			5.8		5.8	5.8		5.8	5.8	
Lane Util. Factor		0.95			0.95		1.00	1.00		1.00	1.00	
Frt		0.97			0.98		1.00	0.98		1.00	0.96	
Flt Protected		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3442			3465		1770	1821		1770	1783	
Flt Permitted		0.94			1.00		0.09	1.00		0.27	1.00	
Satd. Flow (perm)		3247			3465		176	1821		504	1783	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	745	166	0	630	103	192	438	76	171	486	195
RTOR Reduction (vph)	0	18	0	0	12	0	0	6	0	0	14	0
Lane Group Flow (vph)	0	904	0	0	721	0	192	508	0	171	667	0
Turn Type	Perm	NA			NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		37.8			37.8		51.6	42.4		48.0	40.6	
Effective Green, g (s)		37.8			37.8		51.6	42.4		48.0	40.6	
Actuated g/C Ratio		0.36			0.36		0.49	0.40		0.46	0.39	
Clearance Time (s)		5.8			5.8		5.8	5.8		5.8	5.8	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1168			1247			226	735		319	689	
v/s Ratio Prot					0.21		c0.07	0.28		0.04	c0.37	
v/s Ratio Perm	c0.28						0.34			0.21		
v/c Ratio	0.77			0.58			0.85	0.69		0.54	0.97	
Uniform Delay, d1	29.8			27.2			24.5	25.9		18.9	31.6	
Progression Factor	1.00			0.61			1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.0			1.3			24.6	2.8		1.7	26.2	
Delay (s)	34.8			17.9			49.1	28.7		20.7	57.8	
Level of Service	C			B			D	C		C	E	
Approach Delay (s)	34.8			17.9				34.2			50.3	
Approach LOS	C			B				C			D	

Intersection Summary			
HCM 2000 Control Delay	35.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
113: US-31E & US-60A

12/31/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	187	288	110	180	429	37	75	421	118	17	776	122
Future Volume (vph)	187	288	110	180	429	37	75	421	118	17	776	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.96		1.00	0.99			0.97			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	1785		1770	1841			3417			3465	
Flt Permitted	0.13	1.00		0.26	1.00			0.61			0.94	
Satd. Flow (perm)	238	1785		483	1841			2084			3244	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	203	313	120	196	466	40	82	458	128	18	843	133
RTOR Reduction (vph)	0	14	0	0	3	0	0	19	0	0	11	0
Lane Group Flow (vph)	203	419	0	196	503	0	0	649	0	0	983	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	3	8		7	4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	44.3	33.3		41.5	31.9			45.3			45.3	
Effective Green, g (s)	44.3	33.3		41.5	31.9			45.3			45.3	
Actuated g/C Ratio	0.42	0.32		0.40	0.30			0.43			0.43	
Clearance Time (s)	5.6	5.6		5.6	5.6			5.6			5.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	260	566		308	559			899			1399	
v/s Ratio Prot	c0.08	0.23		0.06	c0.27							
v/s Ratio Perm	0.25			0.19				c0.31			0.30	
v/c Ratio	0.78	0.74		0.64	0.90			0.72			0.70	
Uniform Delay, d1	23.5	32.0		23.1	35.0			24.7			24.4	
Progression Factor	0.77	0.78		1.00	1.00			1.00			1.00	
Incremental Delay, d2	9.8	3.5		4.3	17.5			5.0			3.0	
Delay (s)	27.9	28.5		27.3	52.6			29.7			27.3	
Level of Service	C	C		C	D			C			C	
Approach Delay (s)		28.3			45.5			29.7			27.3	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	104.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
103: KY-1631/Crittenden Dr & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	420	100	357	263	176	49	104	220	112	63	48
Future Volume (vph)	129	420	100	357	263	176	49	104	220	112	63	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1	6.1	5.7	5.7	5.7	5.9	5.9	5.9	6.1	6.1	6.1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.71	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1328	1863	1583	1137	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	457	109	388	286	191	53	113	239	122	68	52
RTOR Reduction (vph)	0	0	78	0	0	113	0	0	204	0	0	44
Lane Group Flow (vph)	140	457	31	388	286	78	53	113	35	122	68	8
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	12.5	27.6	27.6	24.3	39.4	39.4	19.8	14.2	14.2	22.8	15.7	15.7
Effective Green, g (s)	12.5	27.6	27.6	24.3	39.4	39.4	19.8	14.2	14.2	22.8	15.7	15.7
Actuated g/C Ratio	0.13	0.28	0.28	0.25	0.41	0.41	0.20	0.15	0.15	0.24	0.16	0.16
Clearance Time (s)	6.1	6.1	6.1	5.7	5.7	5.7	5.9	5.9	5.9	6.1	6.1	6.1
Vehicle Extension (s)	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5	3.0	3.5	3.5
Lane Grp Cap (vph)	228	530	450	443	756	642	296	272	231	313	301	256
v/s Ratio Prot	0.08	c0.25		c0.22	0.15		0.01	0.06		c0.03	0.04	
v/s Ratio Perm			0.02			0.05	0.03		0.02	c0.06		0.01
v/c Ratio	0.61	0.86	0.07	0.88	0.38	0.12	0.18	0.42	0.15	0.39	0.23	0.03
Uniform Delay, d1	40.0	32.9	25.3	34.9	20.2	18.0	31.7	37.6	36.1	30.5	35.4	34.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.8	13.8	0.1	17.3	0.4	0.1	0.3	1.2	0.4	0.8	0.5	0.1
Delay (s)	44.8	46.7	25.4	52.2	20.6	18.1	32.0	38.8	36.5	31.3	35.8	34.3
Level of Service	D	D	C	D	C	B	C	D	D	C	D	C
Approach Delay (s)		43.1			34.2			36.6			33.2	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	37.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	97.0	Sum of lost time (s)	23.8
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
105: KY-61S & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	723	139	30	590	98	187	475	121	161	605	116
Future Volume (vph)	30	723	139	30	590	98	187	475	121	161	605	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5		4.5	4.5		4.5	5.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1823		1770	3431		1770	3454	
Flt Permitted	0.17	1.00	1.00	0.14	1.00		0.19	1.00		0.19	1.00	
Satd. Flow (perm)	310	1863	1583	257	1823		360	3431		355	3454	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	786	151	33	641	107	203	516	132	175	658	126
RTOR Reduction (vph)	0	0	69	0	7	0	0	25	0	0	18	0
Lane Group Flow (vph)	33	786	82	33	741	0	203	623	0	175	766	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	45.9	45.9	45.9	45.9	45.9		28.4	20.7		29.9	21.0	
Effective Green, g (s)	45.9	45.9	45.9	45.9	45.9		28.4	20.7		29.9	21.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.32	0.23		0.33	0.23	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5		4.5	4.5		4.5	5.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	158	950	807	131	929		234	789		257	805	
v/s Ratio Prot		c0.42			0.41		c0.07	0.18		0.07	c0.22	
v/s Ratio Perm	0.11		0.05	0.13			0.20			0.16		
v/c Ratio	0.21	0.83	0.10	0.25	0.80		0.87	0.79		0.68	0.95	
Uniform Delay, d1	12.1	18.7	11.4	12.4	18.2		25.5	32.6		23.4	34.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	8.2	0.3	4.6	7.1		26.9	5.3		7.2	20.8	
Delay (s)	15.1	26.9	11.6	17.0	25.3		52.5	37.9		30.6	54.8	
Level of Service	B	C	B	B	C		D	D		C	D	
Approach Delay (s)		24.1			25.0			41.4			50.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.4
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
108: KY-864 & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	147	604	135	276	643	164	146	362	184	105	483	115
Future Volume (vph)	147	604	135	276	643	164	146	362	184	105	483	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.0	6.0	6.5	6.0		5.8	6.2	6.2	5.8	6.2	6.2
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3431		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3431		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	657	147	300	699	178	159	393	200	114	525	125
RTOR Reduction (vph)	0	0	108	0	17	0	0	0	140	0	0	91
Lane Group Flow (vph)	160	657	39	300	860	0	159	393	60	114	525	34
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	15.2	35.9	35.9	23.8	44.5		13.2	40.0	40.0	9.6	36.4	36.4
Effective Green, g (s)	15.2	35.9	35.9	23.8	44.5		13.2	40.0	40.0	9.6	36.4	36.4
Actuated g/C Ratio	0.11	0.27	0.27	0.18	0.33		0.10	0.30	0.30	0.07	0.27	0.27
Clearance Time (s)	6.5	6.0	6.0	6.5	6.0		5.8	6.2	6.2	5.8	6.2	6.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	949	424	314	1141		174	1057	473	126	962	430
v/s Ratio Prot	0.09	0.19		c0.17	c0.25		c0.09	c0.11		0.06	c0.15	
v/s Ratio Perm			0.02						0.04			0.02
v/c Ratio	0.80	0.69	0.09	0.96	0.75		0.91	0.37	0.13	0.90	0.55	0.08
Uniform Delay, d1	57.8	44.0	36.7	54.5	39.8		59.7	37.0	34.2	61.6	41.6	36.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	19.2	2.2	0.1	38.6	4.6		44.0	1.0	0.5	51.7	2.2	0.4
Delay (s)	77.0	46.2	36.8	93.1	44.4		103.7	38.0	34.7	113.3	43.9	36.6
Level of Service	E	D	D	F	D		F	D	C	F	D	D
Approach Delay (s)		49.9			56.8			51.0			53.0	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	53.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	133.8	Sum of lost time (s)	24.5
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
110: Barret Ave & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	769	4	7	801	54	4	2	13	107	6	183
Future Volume (vph)	85	769	4	7	801	54	4	2	13	107	6	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.9			5.9			5.9			5.9	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			0.99			0.91			0.92	
Flt Protected	0.95	1.00			1.00			0.99			0.98	
Satd. Flow (prot)	1770	1861			1846			1670			1677	
Flt Permitted	0.29	1.00			0.99			0.94			0.87	
Satd. Flow (perm)	541	1861			1834			1579			1490	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	836	4	8	871	59	4	2	14	116	7	199
RTOR Reduction (vph)	0	0	0	0	2	0	0	11	0	0	68	0
Lane Group Flow (vph)	92	840	0	0	936	0	0	9	0	0	254	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	55.3	55.3			55.3			18.2			18.2	
Effective Green, g (s)	55.3	55.3			55.3			18.2			18.2	
Actuated g/C Ratio	0.65	0.65			0.65			0.21			0.21	
Clearance Time (s)	5.9	5.9			5.9			5.9			5.9	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	350	1206			1188			336			317	
v/s Ratio Prot		0.45										
v/s Ratio Perm	0.17				c0.51			0.01			c0.17	
v/c Ratio	0.26	0.70			0.79			0.03			0.80	
Uniform Delay, d1	6.4	9.6			10.8			26.5			31.8	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	1.8	3.3			5.3			0.0			13.2	
Delay (s)	8.2	13.0			16.1			26.6			45.0	
Level of Service	A	B			B			C			D	
Approach Delay (s)		12.5			16.1			26.6			45.0	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	85.3	Sum of lost time (s)	11.8
Intersection Capacity Utilization	97.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
111: KY-1703 & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	685	153	0	580	95	177	403	70	157	447	179
Future Volume (vph)	0	685	153	0	580	95	177	403	70	157	447	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8	5.8		5.8		4.5	5.8		4.5	5.8	5.8
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1863	1583		1827		1770	1821		1770	1863	1583
Flt Permitted		1.00	1.00		1.00		0.15	1.00		0.13	1.00	1.00
Satd. Flow (perm)		1863	1583		1827		282	1821		239	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	745	166	0	630	103	192	438	76	171	486	195
RTOR Reduction (vph)	0	0	67	0	5	0	0	6	0	0	0	124
Lane Group Flow (vph)	0	745	99	0	728	0	192	508	0	171	486	71
Turn Type		NA	Perm		NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases			2				8			4		4
Actuated Green, G (s)		49.2	49.2		49.2		39.7	31.2		39.7	31.2	31.2
Effective Green, g (s)		49.2	49.2		49.2		39.7	31.2		39.7	31.2	31.2
Actuated g/C Ratio		0.47	0.47		0.47		0.38	0.30		0.38	0.30	0.30
Clearance Time (s)		5.8	5.8		5.8		4.5	5.8		4.5	5.8	5.8
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	872	741		856		227	541		214	553	470	
v/s Ratio Prot	c0.40			0.40		c0.07	c0.28		0.06	0.26		
v/s Ratio Perm		0.06				0.25			0.24		0.04	
v/c Ratio	0.85	0.13		0.85		0.85	0.94		0.80	0.88	0.15	
Uniform Delay, d1	24.7	15.8		24.6		25.6	36.0		25.7	35.1	27.1	
Progression Factor	1.00	1.00		0.59		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	10.4	0.4		7.2		24.0	24.1		18.5	14.7	0.1	
Delay (s)	35.2	16.2		21.8		49.6	60.0		44.2	49.8	27.3	
Level of Service	D	B		C		D	E		D	D	C	
Approach Delay (s)	31.7			21.8			57.2			43.5		
Approach LOS	C			C			E			D		

Intersection Summary			
HCM 2000 Control Delay	38.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.1
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
113: US-31E & US-60A

11/12/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	187	288	110	180	429	37	75	421	118	17	776	122
Future Volume (vph)	187	288	110	180	429	37	75	421	118	17	776	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6	5.6	5.6	5.6			5.6			5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			0.95			0.95	
Frt	1.00	1.00	0.85	1.00	0.99			0.97			0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1841			3417			3465	
Flt Permitted	0.21	1.00	1.00	0.43	1.00			0.58			0.93	
Satd. Flow (perm)	392	1863	1583	808	1841			1982			3242	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	203	313	120	196	466	40	82	458	128	18	843	133
RTOR Reduction (vph)	0	0	78	0	3	0	0	20	0	0	12	0
Lane Group Flow (vph)	203	313	42	196	503	0	0	648	0	0	982	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	47.3	37.0	37.0	47.7	37.2			40.7			40.7	
Effective Green, g (s)	47.3	37.0	37.0	47.7	37.2			40.7			40.7	
Actuated g/C Ratio	0.45	0.35	0.35	0.45	0.35			0.39			0.39	
Clearance Time (s)	5.6	5.6	5.6	5.6	5.6			5.6			5.6	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	311	656	557	463	652			768			1256	
v/s Ratio Prot	c0.06	0.17		0.04	c0.27							
v/s Ratio Perm	0.23		0.03	0.15				c0.33			0.30	
v/c Ratio	0.65	0.48	0.08	0.42	0.77			0.84			0.78	
Uniform Delay, d1	20.6	26.5	22.6	18.0	30.1			29.3			28.3	
Progression Factor	0.88	0.99	1.75	1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.5	1.3	0.1	0.6	8.6			11.0			4.9	
Delay (s)	20.5	27.5	39.7	18.7	38.7			40.3			33.2	
Level of Service	C	C	D	B	D			D			C	
Approach Delay (s)		27.6			33.1			40.3			33.2	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	33.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	104.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Roundabout
110: Barret Ave & US-60A

11/12/2019

Intersection	
Intersection Delay, s/veh	29.5
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	932	938	20	322
Demand Flow Rate, veh/h	951	956	20	328
Vehicles Circulating, veh/h	133	100	1065	900
Vehicles Exiting, veh/h	1095	985	19	156
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	24.3	35.2	10.0	29.1
Approach LOS	C	E	B	D

Lane	Left	Right	Left	Left	Left	Left
Designated Moves	L	TR	LTR	LTR	LTR	
Assumed Moves	L	TR	LTR	LTR	LTR	
RT Channelized						
Lane Util	0.099	0.901	1.000	1.000	1.000	
Critical Headway, s	5.193	5.193	5.193	5.193	5.193	
Entry Flow, veh/h	94	857	956	20	328	
Cap Entry Lane, veh/h	989	989	1022	390	459	
Entry HV Adj Factor	0.979	0.980	0.981	0.998	0.981	
Flow Entry, veh/h	92	840	938	20	322	
Cap Entry, veh/h	968	970	1003	389	451	
V/C Ratio	0.095	0.866	0.935	0.051	0.714	
Control Delay, s/veh	4.6	26.5	35.2	10.0	29.1	
LOS	A	D	E	B	D	
95th %tile Queue, veh	0	11	15	0	6	

Appendix D: Intersection Traffic Analysis Results

Queuing and Blocking Report
Baseline
11/18/2019

Intersection: 103: KY-1631/Crittenden Dr & US-60A

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	57	94	44	55	194	138	168	56	133	134	53	82
Average Queue (ft)	26	49	4	4	120	49	63	7	42	58	3	34
95th Queue (ft)	54	95	21	24	177	106	116	36	86	112	25	66
Link Distance (ft)		438	438			2581	2581			273	273	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			100	190			220	125			200
Storage Blk Time (%)					1				0	1		
Queuing Penalty (veh)					1				0	1		

Intersection: 103: KY-1631/Crittenden Dr & US-60A

Movement	SB
Directions Served	TR
Maximum Queue (ft)	91
Average Queue (ft)	36
95th Queue (ft)	70
Link Distance (ft)	896
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 105: KY-61S & US-60A

Movement	EB	EB	WB	WB	SB	SB	SB	SB
Directions Served	T	TR	T	T	L	T	T	R
Maximum Queue (ft)	118	119	144	151	104	137	108	49
Average Queue (ft)	53	71	90	76	44	71	46	25
95th Queue (ft)	103	115	155	148	88	118	97	46
Link Distance (ft)	2581	2581	117	117		1235	1235	
Upstream Blk Time (%)			4	3				
Queuing Penalty (veh)			13	9				
Storage Bay Dist (ft)					200			200
Storage Blk Time (%)								
Queuing Penalty (veh)								

Queuing and Blocking Report
Baseline
11/18/2019

Intersection: 106: KY-61N & US-60A

Movement	EB	EB	NB	NB	NB	NB	SW	SW
Directions Served	L	L	L	T	T	R	R	R>
Maximum Queue (ft)	128	122	152	290	249	69	223	226
Average Queue (ft)	65	58	78	171	135	30	128	141
95th Queue (ft)	122	123	131	248	221	54	205	218
Link Distance (ft)	117	117		720	720		4246	4246
Upstream Blk Time (%)	2	3						
Queuing Penalty (veh)	5	7						
Storage Bay Dist (ft)			200			200		
Storage Blk Time (%)				4	1			
Queuing Penalty (veh)				5	1			

Intersection: 108: KY-864 & US-60A

Movement	EB	EB	EB	WB	WB	WB	WB	B27	B27	NB	NB	NB
Directions Served	L	T	T	L	T	T	R	T	T	L	T	T
Maximum Queue (ft)	118	232	241	350	580	460	34	657	318	116	153	136
Average Queue (ft)	47	116	130	347	484	127	14	166	11	53	94	59
95th Queue (ft)	93	184	205	362	707	278	31	385	105	105	137	109
Link Distance (ft)		552	552		461	461		2456	2456		1520	1520
Upstream Blk Time (%)					81	0						
Queuing Penalty (veh)					298	0						
Storage Bay Dist (ft)	300			200			200			300		
Storage Blk Time (%)				91		0						
Queuing Penalty (veh)				175		0						

Intersection: 108: KY-864 & US-60A

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	T	T	R
Maximum Queue (ft)	143	91	131	118	42
Average Queue (ft)	49	47	73	24	14
95th Queue (ft)	95	80	133	71	35
Link Distance (ft)			582	582	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	300	200			200
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report
Baseline
11/18/2019

Intersection: 110: Barret Ave & US-60A

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	203	164	139	112	69	127
Average Queue (ft)	64	64	42	35	8	40
95th Queue (ft)	142	144	92	85	34	83
Link Distance (ft)	2456	2456	1659	1659	423	1855
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 111: KY-1703 & US-60A

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	227	266	204	246	350	455	94	401
Average Queue (ft)	83	115	106	125	106	237	25	178
95th Queue (ft)	185	218	189	220	247	392	68	316
Link Distance (ft)	1659	1659	1950	1950		2506		510
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					200		150	
Storage Blk Time (%)						15		16
Queuing Penalty (veh)						28		7

Intersection: 113: US-31E & US-60A

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	LT	TR
Maximum Queue (ft)	103	317	331	250	324	285	151	118
Average Queue (ft)	51	173	153	186	213	204	54	36
95th Queue (ft)	94	301	310	276	305	280	113	92
Link Distance (ft)	1950	1950	459		1416	1416	1550	1550
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)				100				
Storage Blk Time (%)			8	34				
Queuing Penalty (veh)			28	40				

Queuing and Blocking Report
Baseline
11/18/2019

Intersection: 2402: US-60A & Eastern Pkwy

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	111	124
Average Queue (ft)	51	54
95th Queue (ft)	104	87
Link Distance (ft)	459	753
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2502: Cherokee Rd & Eastern Pkwy/Cherokee Park Scenic Loop Access

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	56	53	79	56
Average Queue (ft)	29	21	51	28
95th Queue (ft)	54	48	73	46
Link Distance (ft)	1337	478	597	214
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 617

Queuing and Blocking Report
Baseline
11/19/2019

Intersection: 27: US-60A

Movement	NE	NE
Directions Served	T	R
Maximum Queue (ft)	225	68
Average Queue (ft)	15	4
95th Queue (ft)	94	30
Link Distance (ft)	816	816
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 103: KY-1631/Crittenden Dr & US-60A

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	98	187	52	221	277	56	76	152	101	115	80
Average Queue (ft)	37	88	17	105	88	23	37	62	43	43	35
95th Queue (ft)	79	155	39	178	196	47	70	118	73	88	71
Link Distance (ft)		448			2584			288	288		913
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	150		100	190		220	125			200	
Storage Blk Time (%)		7		1	1			1			
Queuing Penalty (veh)		8		3	4			1			

Intersection: 105: KY-61S & US-60A

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	177	285	104	166	580	242	390	408	138	169	169
Average Queue (ft)	28	116	13	28	274	70	216	221	67	77	93
95th Queue (ft)	96	219	55	123	490	152	326	330	130	133	153
Link Distance (ft)		2584			4388		1133	1133		1251	1251
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	200		200	200		400			400		
Storage Blk Time (%)		1			14		0				
Queuing Penalty (veh)		1			4		0				

Queuing and Blocking Report
Baseline
11/19/2019

Intersection: 108: KY-864 & US-60A

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	T	T	R	L
Maximum Queue (ft)	125	260	258	149	331	332	252	112	172	183	110	122
Average Queue (ft)	48	146	132	49	206	158	117	47	84	85	39	53
95th Queue (ft)	99	216	204	94	327	280	225	94	140	144	78	97
Link Distance (ft)		544	544			816	816		1507	1507		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300			300	200			300			300	200
Storage Blk Time (%)			0		20	3						
Queuing Penalty (veh)			0		39	8						

Intersection: 108: KY-864 & US-60A

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	139	145	63
Average Queue (ft)	77	57	21
95th Queue (ft)	128	110	48
Link Distance (ft)	592	592	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 110: Barret Ave & US-60A

Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	LTR	LTR	LTR
Maximum Queue (ft)	80	161	210	38	99
Average Queue (ft)	31	60	92	8	48
95th Queue (ft)	65	129	176	30	86
Link Distance (ft)		2188	1659	436	1869
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	200				
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Queuing and Blocking Report
Baseline
11/19/2019

Intersection: 111: KY-1703 & US-60A

Movement	EB	EB	WB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	TR	L	T	R
Maximum Queue (ft)	897	225	493	349	622	107	280	112
Average Queue (ft)	300	78	268	152	317	31	139	10
95th Queue (ft)	780	211	442	353	547	74	233	58
Link Distance (ft)	1659		1955		2504		522	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200		200		150		200
Storage Blk Time (%)	16	0		0	26		8	0
Queuing Penalty (veh)	25	0		0	48		9	0

Intersection: 113: US-31E & US-60A

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	LT	TR	LT	TR
Maximum Queue (ft)	224	344	117	399	250	300	316	86	122
Average Queue (ft)	83	157	18	149	168	188	200	37	44
95th Queue (ft)	187	282	85	315	255	270	282	75	88
Link Distance (ft)		1955		459		1418	1418	1563	1563
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	200		250		100				
Storage Blk Time (%)	0	4	0	4	35				
Queuing Penalty (veh)	0	9	0	13	40				

Intersection: 2402: US-60A & Eastern Pkwy

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	138	10	109
Average Queue (ft)	42	0	54
95th Queue (ft)	103	6	88
Link Distance (ft)	459	1337	753
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Baseline
11/19/2019

Intersection: 2502: Cherokee Rd & Eastern Pkwy/Cherokee Park Scenic Loop Access

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	64	55	106	68
Average Queue (ft)	27	25	51	32
95th Queue (ft)	58	51	82	55
Link Distance (ft)	1337	478	597	214
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 213

Queuing and Blocking Report
Baseline
11/18/2019

Intersection: 103: KY-1631/Crittenden Dr & US-60A

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	L	TR
Maximum Queue (ft)	99	182	124	58	240	392	116	88	73	167	107	90
Average Queue (ft)	60	89	33	14	184	144	78	24	28	66	51	36
95th Queue (ft)	100	148	89	44	268	361	122	78	60	123	93	73
Link Distance (ft)		438	438			2581	2581			273		896
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			100	190			220	125		200	
Storage Blk Time (%)		1	0		20					1		
Queuing Penalty (veh)		1	0		27					1		

Intersection: 105: KY-61S & US-60A

Movement	EB	EB	WB	WB	SB	SB	SB	SB
Directions Served	T	TR	T	T	L	T	T	R
Maximum Queue (ft)	1207	1221	165	183	184	236	220	71
Average Queue (ft)	650	662	97	91	74	131	113	32
95th Queue (ft)	1215	1244	162	180	141	197	180	49
Link Distance (ft)	2581	2581	117	117		1235	1235	
Upstream Blk Time (%)			12	11				
Queuing Penalty (veh)			47	42				
Storage Bay Dist (ft)					200			200
Storage Blk Time (%)					0	1	0	
Queuing Penalty (veh)					0	1	0	

Intersection: 106: KY-61N & US-60A

Movement	EB	EB	NB	NB	NB	NB	SW	SW
Directions Served	L	L	L	T	T	R	R	R>
Maximum Queue (ft)	138	147	235	201	180	112	465	460
Average Queue (ft)	117	118	95	136	100	35	201	219
95th Queue (ft)	164	163	164	179	152	72	356	370
Link Distance (ft)	117	117		720	720		4246	4246
Upstream Blk Time (%)	15	14						
Queuing Penalty (veh)	65	62						
Storage Bay Dist (ft)			200			200		
Storage Blk Time (%)			0	0	0			
Queuing Penalty (veh)			1	0	0			

Queuing and Blocking Report
Baseline
11/18/2019

Intersection: 108: KY-864 & US-60A

Movement	EB	EB	EB	WB	WB	WB	WB	B27	B27	NB	NB	NB
Directions Served	L	T	T	L	T	T	R	T	T	L	T	T
Maximum Queue (ft)	248	310	315	350	555	487	350	1424	1415	222	188	162
Average Queue (ft)	140	170	180	342	493	241	51	565	455	105	108	82
95th Queue (ft)	235	271	290	390	664	419	186	1252	1228	177	158	142
Link Distance (ft)		552	552		461	461		2456	2456		1520	1520
Upstream Blk Time (%)					85	0						
Queuing Penalty (veh)					420	2						
Storage Bay Dist (ft)	300			200			200			300		
Storage Blk Time (%)		0	0	90	10	9						
Queuing Penalty (veh)		0	0	288	28	16						

Intersection: 108: KY-864 & US-60A

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	T	T	R
Maximum Queue (ft)	153	140	216	172	147
Average Queue (ft)	46	80	161	102	32
95th Queue (ft)	90	138	220	183	79
Link Distance (ft)			582	582	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	300	200			200
Storage Blk Time (%)			1		
Queuing Penalty (veh)			1		

Intersection: 110: Barret Ave & US-60A

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	294	285	264	273	50	316
Average Queue (ft)	124	116	94	101	7	133
95th Queue (ft)	222	219	191	198	29	234
Link Distance (ft)	2456	2456	1659	1659	423	1855
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Queuing and Blocking Report
Baseline
11/18/2019

Intersection: 111: KY-1703 & US-60A

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	TR	L	TR	L	TR
Maximum Queue (ft)	312	378	144	176	240	384	300	573
Average Queue (ft)	153	185	84	88	100	189	236	529
95th Queue (ft)	298	335	145	149	174	293	409	546
Link Distance (ft)	1659	1659	1950	1950		2506		510
Upstream Blk Time (%)								84
Queuing Penalty (veh)								0
Storage Bay Dist (ft)					200		150	
Storage Blk Time (%)					0	7	1	84
Queuing Penalty (veh)					2	13	7	132

Intersection: 113: US-31E & US-60A

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	LT	TR
Maximum Queue (ft)	210	261	472	250	362	329	347	357
Average Queue (ft)	83	136	254	222	212	198	222	217
95th Queue (ft)	152	236	488	289	312	297	343	318
Link Distance (ft)	1950	1950	459		1416	1416	1550	1550
Upstream Blk Time (%)			2					
Queuing Penalty (veh)			13					
Storage Bay Dist (ft)				100				
Storage Blk Time (%)			6	44				
Queuing Penalty (veh)			27	79				

Intersection: 2402: US-60A & Eastern Pkwy

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	139	32	237
Average Queue (ft)	48	2	86
95th Queue (ft)	106	15	158
Link Distance (ft)	459	1337	753
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
Baseline
11/18/2019

Intersection: 2502: Cherokee Rd & Eastern Pkwy/Cherokee Park Scenic Loop Access

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	119	103	110	149
Average Queue (ft)	40	52	55	61
95th Queue (ft)	76	83	84	99
Link Distance (ft)	1337	478	597	214
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 1274

Queuing and Blocking Report
Baseline
12/30/2019

Intersection: 27: US-60A

Movement	NE	NE
Directions Served	T	R
Maximum Queue (ft)	380	231
Average Queue (ft)	52	23
95th Queue (ft)	234	117
Link Distance (ft)	816	816
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 103: KY-1631/Crittenden Dr & US-60A

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	T	R	L	T
Maximum Queue (ft)	249	345	250	240	428	270	100	116	196	134	118
Average Queue (ft)	99	207	52	189	173	74	35	63	80	71	49
95th Queue (ft)	192	312	163	248	346	235	75	98	145	123	98
Link Distance (ft)		448			2584			288	288		913
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	150		100	190		220	125			200	
Storage Blk Time (%)	3	36	0	12	5			0			
Queuing Penalty (veh)	16	83	1	54	25			0			

Queuing and Blocking Report
Baseline
12/30/2019

Intersection: 105: KY-61S & US-60A

Movement	EB	EB	EB	WB	WB	B23	B23	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	T		L	T	TR	L	T
Maximum Queue (ft)	224	513	225	224	536	108	42	251	248	245	151	281
Average Queue (ft)	44	246	82	32	292	11	1	100	129	135	70	165
95th Queue (ft)	135	443	235	121	480	49	14	173	197	211	126	247
Link Distance (ft)		2584			4388	544	544		1133	1133		1251
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	200		200	200				400			400	
Storage Blk Time (%)		16	0		18							
Queuing Penalty (veh)		27	1		5							

Intersection: 105: KY-61S & US-60A

Movement	SB
Directions Served	TR
Maximum Queue (ft)	267
Average Queue (ft)	176
95th Queue (ft)	245
Link Distance (ft)	1251
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
Baseline
12/30/2019

Intersection: 108: KY-864 & US-60A

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	TR	L	T	T	R	L
Maximum Queue (ft)	188	288	305	112	350	534	495	285	215	210	148	189
Average Queue (ft)	107	204	197	40	217	250	231	137	120	119	48	102
95th Queue (ft)	178	274	273	73	336	400	376	218	189	180	99	159
Link Distance (ft)		544	544			816	816		1507	1507		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300			300	200			300			300	200
Storage Blk Time (%)		0	0		22	14		0				0
Queuing Penalty (veh)		0	0		70	39		0				0

Intersection: 108: KY-864 & US-60A

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	221	220	72
Average Queue (ft)	158	143	36
95th Queue (ft)	221	207	63
Link Distance (ft)	592	592	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)	2	0	
Queuing Penalty (veh)	2	0	

Intersection: 110: Barret Ave & US-60A

Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	LTR	LTR	LTR
Maximum Queue (ft)	224	487	418	53	302
Average Queue (ft)	75	247	201	13	146
95th Queue (ft)	193	440	358	38	245
Link Distance (ft)		2188	1659	436	1869
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	200				
Storage Blk Time (%)		8			
Queuing Penalty (veh)		7			

Queuing and Blocking Report
Baseline
12/30/2019

Intersection: 111: KY-1703 & US-60A

Movement	EB	EB	WB	NB	NB	SB	SB	SB
Directions Served	T	R	TR	L	TR	L	T	R
Maximum Queue (ft)	699	225	336	350	630	300	538	225
Average Queue (ft)	467	147	220	157	301	123	252	136
95th Queue (ft)	697	294	338	339	471	276	437	288
Link Distance (ft)	1659		1955		2504		522	
Upstream Blk Time (%)							1	
Queuing Penalty (veh)							0	
Storage Bay Dist (ft)		200		200		150		200
Storage Blk Time (%)	34	0		0	28	1	23	0
Queuing Penalty (veh)	52	1		0	49	5	79	1

Intersection: 113: US-31E & US-60A

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	LT	TR	LT	TR
Maximum Queue (ft)	224	358	275	389	250	304	301	443	464
Average Queue (ft)	86	136	25	176	193	185	192	216	234
95th Queue (ft)	178	247	106	342	285	251	265	338	355
Link Distance (ft)		1955		459		1418	1418	1563	1563
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	200		250		100				
Storage Blk Time (%)	2	1		7	38				
Queuing Penalty (veh)	9	3		33	68				

Intersection: 2402: US-60A & Eastern Pkwy

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	165	144
Average Queue (ft)	64	76
95th Queue (ft)	135	135
Link Distance (ft)	459	753
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report
Baseline
12/30/2019

Intersection: 2502: Cherokee Rd & Eastern Pkwy/Cherokee Park Scenic Loop Access

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	77	106	75	130
Average Queue (ft)	42	58	50	59
95th Queue (ft)	71	89	70	93
Link Distance (ft)	1337	478	597	214
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 629

Appendix E: Corridor Simulation Results

Arterial Level of Service
Baseline 11/18/2019

Arterial Level of Service: EB US-60A

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
KY-1631	103	21.9	31.1	0.1	11
KY-61S	105	17.6	67.7	0.5	27
KY-61N	106	10.5	16.3	0.0	7
	23	4.2	89.7	0.8	33
KY-864	108	38.6	50.5	0.1	9
	27	3.4	14.4	0.1	26
Barret Ave	110	6.6	49.8	0.5	34
KY-1703	111	21.1	52.6	0.3	22
US-31E	113	46.9	85.3	0.4	16
US-60A	2402	5.7	21.9	0.1	17
Total		176.5	479.2	3.0	22

Arterial Level of Service: WB US-60A

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
US-60A	2402	5.3	29.2	0.2	19
US-31E	113	36.8	54.0	0.1	7
KY-1703	111	20.1	54.7	0.4	26
Barret Ave	110	6.0	38.3	0.3	31
	27	23.4	71.8	0.5	24
KY-864	108	31.5	41.7	0.1	9
	23	2.9	15.7	0.1	28
KY-61N	106	30.5	115.2	0.8	26
KY-61S	105	6.9	16.4	0.0	7
Crittenden Dr	103	16.2	60.5	0.5	30
Total		179.7	497.4	3.0	22

Arterial Level of Service: EB Eastern Pkwy

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Cherokee Rd	2502	5.8	40.1	0.3	26
Total		5.8	40.1	0.3	26

Arterial Level of Service: WB Eastern Pkwy

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
US-60A	2402	1.1	35.1	0.3	30
Total		1.1	35.1	0.3	30

US-60A (Eastern Pkwy) SimTraffic Report
Page 1

Arterial Level of Service
Baseline 11/19/2019

Arterial Level of Service: EB US-60A

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
KY-1631	103	27.3	36.9	0.1	9
KY-61S	105	18.7	67.3	0.5	27
	23	10.0	94.7	0.8	32
KY-864	108	35.5	46.8	0.1	9
	27	8.3	23.7	0.2	26
Barret Ave	110	5.1	39.7	0.4	39
KY-1703	111	49.8	83.2	0.3	14
US-31E	113	36.1	74.9	0.4	19
US-60A	2402	5.8	21.7	0.1	17
Total		196.5	488.9	3.0	22

Arterial Level of Service: WB US-60A

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
US-60A	2402	5.1	28.8	0.2	19
US-31E	113	37.7	54.6	0.1	7
KY-1703	111	35.1	69.0	0.4	20
Barret Ave	110	9.3	42.2	0.3	28
	27	4.7	41.0	0.4	38
KY-864	108	13.6	27.0	0.2	23
	23	4.7	17.3	0.1	25
KY-61S	105	31.6	103.2	0.8	30
Crittenden Dr	103	13.9	52.8	0.5	35
Total		155.6	435.9	3.0	25

Arterial Level of Service: EB Eastern Pkwy

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Cherokee Rd	2502	5.8	38.1	0.3	28
Total		5.8	38.1	0.3	28

Arterial Level of Service: WB Eastern Pkwy

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
US-60A	2402	1.1	38.7	0.3	27
Total		1.1	38.7	0.3	27

Arterial Level of Service
Baseline 11/18/2019

Arterial Level of Service: EB US-60A

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
KY-1631	103	25.5	34.8	0.1	10
KY-61S	105	198.2	237.9	0.5	8
KY-61N	106	12.6	18.5	0.0	6
	23	6.7	93.3	0.8	32
KY-864	108	36.5	47.8	0.1	9
	27	3.5	14.6	0.1	26
Barret Ave	110	13.6	61.8	0.5	28
KY-1703	111	27.6	59.7	0.3	20
US-31E	113	12.6	42.1	0.4	33
US-60A	2402	5.9	22.1	0.1	17
Total		342.8	632.6	3.0	17

Arterial Level of Service: WB US-60A

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
US-60A	2402	8.7	32.3	0.2	17
US-31E	113	40.8	58.0	0.1	6
KY-1703	111	9.9	48.1	0.4	29
Barret Ave	110	11.0	43.2	0.3	27
	27	86.6	133.3	0.5	13
KY-864	108	43.4	54.2	0.1	7
	23	3.7	16.5	0.1	26
KY-61N	106	47.3	133.2	0.8	22
KY-61S	105	11.5	20.8	0.0	5
Crittenden Dr	103	17.7	59.7	0.5	31
Total		280.7	599.4	3.0	18

Arterial Level of Service: EB Eastern Pkwy

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Cherokee Rd	2502	4.6	34.7	0.3	30
Total		4.6	34.7	0.3	30

Arterial Level of Service: WB Eastern Pkwy

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
US-60A	2402	2.1	48.9	0.3	21
Total		2.1	48.9	0.3	21

Arterial Level of Service
Baseline 12/30/2019

Arterial Level of Service: EB US-60A

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
KY-1631	103	35.6	45.5	0.1	8
KY-61S	105	25.8	70.8	0.5	26
	23	12.6	98.2	0.8	31
KY-864	108	34.9	45.7	0.1	9
	27	13.2	31.4	0.2	20
Barret Ave	110	18.3	60.4	0.4	25
KY-1703	111	44.1	75.9	0.3	15
US-31E	113	14.5	44.1	0.4	32
US-60A	2402	6.7	22.8	0.1	16
Total		205.5	494.7	3.0	22

Arterial Level of Service: WB US-60A

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
US-60A	2402	7.3	31.1	0.2	18
US-31E	113	31.3	48.2	0.1	8
KY-1703	111	27.4	66.7	0.4	21
Barret Ave	110	15.2	46.8	0.3	25
	27	5.9	47.9	0.4	32
KY-864	108	38.9	55.9	0.2	11
	23	9.4	22.1	0.1	19
KY-61S	105	29.8	105.1	0.8	29
Crittenden Dr	103	26.1	71.8	0.5	26
Total		191.2	495.7	3.0	22

Arterial Level of Service: EB Eastern Pkwy

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
Cherokee Rd	2502	4.4	33.3	0.3	32
Total		4.4	33.3	0.3	32

Arterial Level of Service: WB Eastern Pkwy

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
US-60A	2402	2.0	49.0	0.3	21
Total		2.0	49.0	0.3	21

Gresham Smith

Traffic Analysis for Eastern Parkway Transportation Study Addendum 1: Eastern Parkway at Bradley Avenue Intersection Analysis

Performed for: Louisville's Olmsted Parks and Louisville Metro- Jefferson County Government

Performed by: Gresham Smith

March 3, 2020

Design Services For The Built Environment

111 West Main Street, Suite 201 / Louisville, Kentucky 40202 / Phone 502.627.8900 / www.greshamsmith.com

TABLE OF CONTENTS

APPENDICIES

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

As part of the Eastern Parkway Transportation Project in Jefferson County, Gresham Smith developed traffic simulation models to analyze the effects of roadway reconfigurations along Eastern Parkway at the busiest intersections between Hahn Street and Cherokee Park. The analysis was documented in the initial traffic report. After the report had been produced, stakeholders pushed for analysis of the Bradley Avenue intersection, which was not included in the initial report. The request for additional analysis stemmed from the offset and skewed intersection, as well as limited sight distance for left turning traffic, contributing to crashes and an unsafe pedestrian area. This intersection and its proposed alternatives have since been analyzed and the outputs are summarized in this addendum.

As in the initial analysis, individual intersection performance studies were conducted to compare the system performance of proposed and/or future models in terms of the following MOEs: delay, V/C ratio, queue lengths and LOS.

PROPOSED DESIGN

Currently, within the vicinity of Bradley Avenue, Eastern Parkway is a four-lane road with two through-lanes in each direction. The proposed design for this section of the corridor is a conventional road diet with one through lane in each direction and a two-way left-turn lane (TWLTL). At signalized intersections, such as Bradley Avenue, it is proposed that the TWLTL be turned into left-turn bays with storage for left-turning vehicles. To address some geometric shortcomings of the intersection, it was also requested that a roundabout be considered at this intersection. To evaluate each of these alternatives and compare them to the existing conditions, it was desired that this analysis be conducted and added to the initial report in this addendum.

TRAFFIC ANALYSIS

Turning movement counts were collected for the Bradley Avenue at Eastern Parkway intersection on Thursday December 12, 2019 for traffic analysis purposes. These counts can be found in **Appendix B**.

Synchro analysis models were built for each a No-Build scenario, a conventional Road Diet scenario, and a Roundabout scenario. The No-Build model was analyzed with the existing two-phase timing scheme. For the Road Diet scenario, left-turning vehicles were separated out into an auxiliary left-turn lane with protected/permissive phasing for the Eastern Parkway approaches. Finally, the Roundabout scenario was modeled as a single-lane roundabout with an oblong “peanut” shaped central island. This option has four full access legs while still allowing exit onto the one-way alley on the northwest corner of the intersection. Each of these scenarios are shown in **Figures 1-3** below.

Figure 1: No-Build Scenario

Figure 2: Road Diet Scenario

Figure 3: Roundabout Scenario

INTERSECTION ANALYSIS

HCM analyses of each scenario were processed and output MOE's are summarized in the tables below. Full analysis results of these intersection analyses are available in **Appendix F**.

Table 1: Bradley Ave. at Eastern Pkwy. AM Intersection Analysis

	NO-BUILD	ROAD DIET	ROUNDABOUT
MAX V/C	0.37	0.65	0.65
DELAY	12.1	16.3	10.8
LOS	B	B	B

Table 2: Bradley Ave. at Eastern Pkwy. PM Intersection Analysis

	NO-BUILD	ROAD DIET	ROUNDABOUT
MAX V/C	0.52	0.96	0.90
DELAY	12.8	27.0	23.6
LOS	B	C	C

Table 3: Bradley Ave. at Eastern Pkwy. AM Queue Lengths (FT)

	NO-BUILD	ROAD DIET	ROUNDABOUT
NORTHBOUND BRADLEY AVE	78	100	0
SOUTHBOUND BRADLEY AVE	65	85	0
EASTBOUND EASTERN PKWY	150	298	75
WESTBOUND EASTERN PKWY	213	448	125

Table 4: Bradley Ave. at Eastern Pkwy. PM Queue Lengths (FT)

	NO-BUILD	ROAD DIET	ROUNDABOUT
NORTHBOUND BRADLEY AVE	65	80	25
SOUTHBOUND BRADLEY AVE	150	110	50
EASTBOUND EASTERN PKWY	238	603	200
WESTBOUND EASTERN PKWY	255	868	325

The intersection analysis results tabulated in **Tables 1 through 4** help show the operational differences and similarities in each scenario considered. In the AM peak hour, traffic operations are comparable for all configurations, with similar delays and LOSs of B. Queue lengths, while still relatively small, approximately double along Bradley Avenue with the Road Diet scenario and are reduced with the Roundabout scenario.

The PM peak hour shows even more operational differences between the scenarios. While both proposed options change from LOS B to C with delay approximately doubling, these are still acceptable levels of operation. Queue lengths give even more insight into the impacts of each scenario. For all three options, Bradley Avenue queue lengths remain relatively similar and are expected to have between one and five vehicles on average. However, the Eastern Parkway queue lengths in the Road Diet option are about three times higher than the other two scenarios' queue lengths for the same approaches.

SUMMARY/CONCLUSION

This addendum to the initial Eastern Parkway Traffic Analysis focuses on alternative intersection configurations for the Eastern Parkway at Bradley Avenue intersection. No-Build, Road Diet, and Roundabout scenarios were each analyzed and considered. Upon reviewing the analysis output, it is evident that each scenario will operate somewhat differently than the others. In the worst hour of the day, the PM peak hour, the LOS of both the Road Diet and Roundabout scenarios reduce to a C while only the Road Diet scenario's queue lengths sees significant increases changes along Eastern Parkway.

Considering these outputs, it is recommended that each of these scenarios be considered along with their potential safety, multi-modal, and green space improvements as well as potential right-of-way, construction, and maintenance costs.

Appendix F:
HCM Analysis Results

HCM 2010 Signalized Intersection Summary
2: Eastern Parkway & Bradley Avenue 01/14/2020
No-Build AM

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	35	40	10	27	11	33	19	434	8	4	532	77
Future Volume (veh/h)	35	40	10	27	11	33	19	434	8	4	532	77
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	38	43	11	29	12	36	21	472	9	4	578	84
Adj No. of Lanes	0	1	0	0	1	0	0	2	0	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	250	270	63	221	102	236	91	1879	35	43	1737	250
Arrive On Green	0.33	0.33	0.33	0.33	0.33	0.33	0.57	0.57	0.57	0.57	0.57	0.57
Sat Flow, veh/h	591	823	192	507	313	720	83	3283	62	4	3035	438
Grp Volume(v), veh/h	92	0	0	77	0	0	257	0	245	355	0	311
Grp Sat Flow(s),veh/h/ln	1606	0	0	1540	0	0	1745	0	1684	1859	0	1618
Q Serve(g_s), s	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0	9.1
Cycle Q Clear(g_c), s	3.3	0.0	0.0	2.8	0.0	0.0	6.2	0.0	6.5	9.1	0.0	9.1
Prop In Lane	0.41		0.12	0.38		0.47	0.08		0.04	0.01		0.27
Lane Grp Cap(c), veh/h	583	0	0	560	0	0	1042	0	964	1104	0	926
V/C Ratio(X)	0.16	0.00	0.00	0.14	0.00	0.00	0.25	0.00	0.25	0.32	0.00	0.34
Avail Cap(c_a), veh/h	583	0	0	560	0	0	1042	0	964	1104	0	926
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.4	0.0	0.0	21.3	0.0	0.0	9.6	0.0	9.6	10.2	0.0	10.2
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.5	0.0	0.0	0.6	0.0	0.6	0.8	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.1	0.0	0.0	2.6	0.0	0.0	6.0	0.0	5.7	8.5	0.0	7.7
LnGrp Delay(d),s/veh	22.0	0.0	0.0	21.8	0.0	0.0	10.1	0.0	10.3	10.9	0.0	11.2
LnGrp LOS	C			C			B		B	B		B
Approach Vol, veh/h		92			77			502			666	
Approach Delay, s/veh		22.0			21.8			10.2			11.1	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		34.0		56.0		34.0		56.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		29.5		51.5		29.5		51.5
Max Q Clear Time (g_c+I1), s		0.0		0.0		0.0		0.0
Green Ext Time (p_c), s		0.0		0.0		0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	12.1
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
2: Eastern Parkway & Bradley Avenue 01/14/2020
Road Diet AM

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	35	40	10	27	11	33	19	434	8	4	532	77
Future Volume (veh/h)	35	40	10	27	11	33	19	434	8	4	532	77
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	38	43	11	29	12	36	21	472	9	4	578	84
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	171	182	41	153	73	154	454	1089	21	587	951	138
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.06	0.60	0.60	0.06	0.60	0.60
Sat Flow, veh/h	569	861	194	487	345	731	1774	1822	35	1774	1591	231
Grp Volume(v), veh/h	92	0	0	77	0	0	21	0	481	4	0	662
Grp Sat Flow(s),veh/h/ln	1624	0	0	1563	0	0	1774	0	1857	1774	0	1822
Q Serve(g_s), s	0.6	0.0	0.0	0.0	0.0	0.0	0.4	0.0	14.0	0.1	0.0	22.8
Cycle Q Clear(g_c), s	4.3	0.0	0.0	3.7	0.0	0.0	0.4	0.0	14.0	0.1	0.0	22.8
Prop In Lane	0.41		0.12	0.38		0.47	1.00		0.02	1.00		0.13
Lane Grp Cap(c), veh/h	394	0	0	380	0	0	454	0	1110	587	0	1090
V/C Ratio(X)	0.23	0.00	0.00	0.20	0.00	0.00	0.05	0.00	0.43	0.01	0.00	0.61
Avail Cap(c_a), veh/h	394	0	0	380	0	0	454	0	1110	587	0	1090
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.6	0.0	0.0	32.4	0.0	0.0	8.7	0.0	10.9	7.0	0.0	12.6
Incr Delay (d2), s/veh	1.4	0.0	0.0	1.2	0.0	0.0	0.2	0.0	1.2	0.0	0.0	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.0	0.0	0.0	3.4	0.0	0.0	0.4	0.0	11.9	0.1	0.0	17.9
LnGrp Delay(d),s/veh	34.0	0.0	0.0	33.6	0.0	0.0	8.9	0.0	12.1	7.0	0.0	15.2
LnGrp LOS	C			C			A		B	A		B
Approach Vol, veh/h		92			77			502			666	
Approach Delay, s/veh		34.0			33.6			12.0			15.1	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		25.5	10.0	64.0		25.5	10.0	64.0
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		21.0	5.5	59.5		21.0	5.5	59.5
Max Q Clear Time (g_c+I1), s		0.0	2.1	0.0		0.0	2.4	0.0
Green Ext Time (p_c), s		0.0	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	16.3
HCM 2010 LOS	B

HCM 2010 Roundabout
2: Eastern Parkway & Bradley Avenue 02/19/2020
Roundabout AM

Intersection	
Intersection Delay, s/veh	10.8
Intersection LOS	B

Approach	NB	SB	NE	SW
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	91	76	491	652
Demand Flow Rate, veh/h	93	78	500	665
Vehicles Circulating, veh/h	521	619	46	102
Vehicles Exiting, veh/h	25	148	651	512
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.0	7.6	8.6	13.3
Approach LOS	A	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	93	78	500	665
Cap Entry Lane, veh/h	671	608	1079	1020
Entry HV Adj Factor	0.980	0.971	0.982	0.980
Flow Entry, veh/h	91	76	491	652
Cap Entry, veh/h	658	591	1059	1000
V/C Ratio	0.139	0.128	0.463	0.652
Control Delay, s/veh	7.0	7.6	8.6	13.3
LOS	A	A	A	B
95th %tile Queue, veh	0	0	3	5

HCM 2010 Signalized Intersection Summary
2: Eastern Parkway & Bradley Avenue 01/14/2020
No-Build PM

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	36	25	8	64	52	33	16	688	33	7	810	64
Future Volume (veh/h)	36	25	8	64	52	33	16	688	33	7	810	64
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	39	27	9	70	57	36	17	748	36	8	880	70
Adj No. of Lanes	0	1	0	0	1	0	0	2	0	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	286	189	57	242	192	107	59	1951	93	45	1923	152
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.59	0.59	0.59	0.59	0.59	0.59
Sat Flow, veh/h	738	619	185	605	628	350	29	3282	156	8	3235	256
Grp Volume(v), veh/h	75	0	0	163	0	0	416	0	385	506	0	452
Grp Sat Flow(s),veh/h/ln	1542	0	0	1583	0	0	1800	0	1668	1849	0	1650
Q Serve(g_s), s	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	11.0	0.0	0.0	13.8
Cycle Q Clear(g_c), s	2.8	0.0	0.0	6.8	0.0	0.0	10.5	0.0	11.0	13.6	0.0	13.8
Prop In Lane	0.52		0.12	0.43		0.22	0.04		0.09	0.02		0.15
Lane Grp Cap(c), veh/h	532	0	0	541	0	0	1111	0	991	1140	0	981
V/C Ratio(X)	0.14	0.00	0.00	0.30	0.00	0.00	0.37	0.00	0.39	0.44	0.00	0.46
Avail Cap(c_a), veh/h	532	0	0	541	0	0	1111	0	991	1140	0	981
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.6	0.0	0.0	24.0	0.0	0.0	9.5	0.0	9.6	10.2	0.0	10.2
Incr Delay (d2), s/veh	0.6	0.0	0.0	1.4	0.0	0.0	1.0	0.0	1.1	1.3	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.6	0.0	0.0	6.0	0.0	0.0	9.5	0.0	9.1	11.7	0.0	10.8
LnGrp Delay(d),s/veh	23.2	0.0	0.0	25.4	0.0	0.0	10.5	0.0	10.8	11.4	0.0	11.7
LnGrp LOS	C			C			B		B	B		B
Approach Vol, veh/h		75			163			801			958	
Approach Delay, s/veh		23.2			25.4			10.6			11.6	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		32.0		58.0		32.0		58.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		27.5		53.5		27.5		53.5
Max Q Clear Time (g_c+I1), s		0.0		0.0		0.0		0.0
Green Ext Time (p_c), s		0.0		0.0		0.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	12.8
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
2: Eastern Parkway & Bradley Avenue
01/14/2020

Road Diet PM

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	36	25	8	64	52	33	16	688	33	7	810	64
Future Volume (veh/h)	36	25	8	64	52	33	16	688	33	7	810	64
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	39	27	9	70	57	36	17	748	36	8	880	70
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	147	43	193	152	83	239	1010	49	348	976	78
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.06	0.57	0.57	0.06	0.57	0.57
Sat Flow, veh/h	716	622	182	598	645	352	1774	1763	85	1774	1703	135
Grp Volume(v), veh/h	75	0	0	163	0	0	17	0	784	8	0	950
Grp Sat Flow(s),veh/h/ln	1520	0	0	1596	0	0	1774	0	1848	1774	0	1839
Q Serve(g_s), s	0.0	0.0	0.0	4.7	0.0	0.0	0.4	0.0	31.3	0.2	0.0	45.4
Cycle Q Clear(g_c), s	3.6	0.0	0.0	8.3	0.0	0.0	0.4	0.0	31.3	0.2	0.0	45.4
Prop In Lane	0.52		0.12	0.43		0.22	1.00		0.05	1.00		0.07
Lane Grp Cap(c), veh/h	414	0	0	429	0	0	239	0	1059	348	0	1053
V/C Ratio(X)	0.18	0.00	0.00	0.38	0.00	0.00	0.07	0.00	0.74	0.02	0.00	0.90
Avail Cap(c_a), veh/h	414	0	0	429	0	0	239	0	1059	348	0	1053
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.3	0.0	0.0	32.1	0.0	0.0	17.6	0.0	15.8	11.9	0.0	18.8
Incr Delay (d2), s/veh	1.0	0.0	0.0	2.6	0.0	0.0	0.6	0.0	4.7	0.1	0.0	12.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.2	0.0	0.0	7.4	0.0	0.0	0.5	0.0	24.1	0.2	0.0	34.7
LnGrp Delay(d),s/veh	31.3	0.0	0.0	34.6	0.0	0.0	18.2	0.0	20.4	12.0	0.0	31.1
LnGrp LOS	C			C			B		C	B		C
Approach Vol, veh/h		75			163			801			958	
Approach Delay, s/veh		31.3			34.6			20.4			30.9	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		28.0	10.0	61.5		28.0	10.0	61.5
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		23.5	5.5	57.0		23.5	5.5	57.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	0.0		0.0	0.0	0.0
Green Ext Time (p_c), s		0.0	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C

HCM 2010 Roundabout
2: Eastern Parkway & Bradley Avenue
02/19/2020

Roundabout PM

Intersection	
Intersection Delay, s/veh	23.6
Intersection LOS	C

Approach	NB	SB	NE	SW
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	72	155	768	918
Demand Flow Rate, veh/h	74	158	783	936
Vehicles Circulating, veh/h	816	907	130	83
Vehicles Exiting, veh/h	97	112	935	807
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.4	14.0	19.9	29.5
Approach LOS	A	B	C	D

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	74	158	783	936
Cap Entry Lane, veh/h	500	456	992	1040
Entry HV Adj Factor	0.979	0.981	0.980	0.981
Flow Entry, veh/h	72	155	768	918
Cap Entry, veh/h	489	447	973	1020
V/C Ratio	0.148	0.346	0.789	0.900
Control Delay, s/veh	9.4	14.0	19.9	29.5
LOS	A	B	C	D
95th %tile Queue, veh	1	2	8	13

Appendix F

Eastern Parkway Existing Sidewalk and Ramp Inventory

Eastern Parkway Existing Sidewalk Inventory 2019

Seg #	Sidewalk Location	Flow of Traffic	Material	Avg Width	Avg Cross Slope	Cross Slope Range	Grade	General Comments
S1	Cherokee Park Road to N. Cherokee Road	WB	Asphalt	8.5	3.7%	3.7%	Follows Cherokee Park Road	Multi-use path for park
S2	N. Cherokee Road to Alley (0.23 miles)	WB	Concrete (Historic Mix)	5.0	1.5%	0.2 to 3.7%	Follows Eastern Pkwy	~8 tripping hazards ranging from 0.25" to 1.00"
S3	Alley (0.23 miles) to Willow Ave	WB	Concrete (Historic Mix)	5.0	1.4%	0.9 to 1.9%	Follows Eastern Pkwy	~8 tripping hazards ranging from 0.25" to 1.00"
S4	Willow Ave to Bardstown Road	WB	Concrete (Historic Mix)	5.0	2.3%	1.0 to 3.5%	Follows Eastern Pkwy	~8 tripping hazards ranging from 0.25" to 1.00"
S5	Bardstown Road to Alley (0.44 miles)	WB	Concrete (Historic Mix)	7.8	1.9%	1.4 to 2.1%	Follows Eastern Pkwy	~2 tripping hazards ranging from 0.25" to 0.75"
S6	Alley (0.44 miles) to Norris Place	WB	Concrete (Historic Mix)	5.2	0.6%	0.3 to 0.9%	Follows Eastern Pkwy	~7 tripping hazards ranging from 0.25" to 1.00"
S7	Norris Place to Quadrant Ave	WB	Concrete (Historic Mix)	6.0	2.6%	0.7 to 4.2%	Follows Eastern Pkwy	~9 tripping hazards ranging from 0.25" to 1.00"
S8	Quadrant Ave to Alley (0.74 miles)	WB	Concrete (Historic Mix)	6.0	1.8%	0.3 to 4.5%	Follows Eastern Pkwy	25+ tripping hazard could have been
S9	Alley (0.74 miles) to Baxter Ave	WB	Concrete (Historic Mix)	7.0	1.7%	1.7%	Follows Eastern Pkwy	Bike rack & business frontage. Sidewalk is public
S10	Baxter Ave to Hill Road	WB	Asphalt	5.3	1.7%	1.0 to 2.4%	Rolling	Center Line sidewalk
S11	Hill Road to Cross Road/Valley Road	WB	Asphalt	5.0	1.8%	0.2 to 4.4%	Rolling	Depression
S12	Cross/Valley Road to Barret Ave	WB	Asphalt	5.1	1.7%	0.7 to 2.8%	Rolling	3.5' and 4' pinchpoints
S13	Barret Ave to Dahlia Drive	WB	Concrete (Historic Mix)	6.0	1.8%	0.8 to 2.6%	Follows Eastern Pkwy	Curb between sidewalk and grass. 3 grates. Width
S14	Dahlia Drive to Medical Arts Bldg Entrance	WB	Concrete (Historic Mix)	4.5	1.1%	0.5 to 2.2%	Follows Eastern Pkwy	~4 tripping hazards ranging from 0.25" to 0.75"
S15	Medical Arts Bldg Entrance to Landmark of	WB	Concrete (Historic Mix)	8.0	0.5%	0.3 to 0.6%	Follows Eastern Pkwy	Pedestrian Bridge
S16	Landmark Entrance to Goss Ave	WB	Concrete (Historic Mix)	5.0	2.3%	0.2 to 3.6%	Extreme divergence from Eastern Pkwy	Sidewalk dips below Eastern Pkwy with 5.9% slope
S17	Goss Ave to Ast St	WB	Concrete (Historic Mix)	5.0	1.0%	0.8 to 1.1%	Follows Eastern Pkwy	2 tripping hazards
S18	Ash St to Lydia St	WB	Concrete (Historic Mix)	5.0	1.0%	0.2 to 1.8%	Follows Eastern Pkwy	5 tripping hazards
S19	Lydia St to E Burnett Ave	WB	Concrete (Historic Mix)	5.0	0.7%	0.1 to 1.6%	Follows Eastern Pkwy	11 tripping hazards
S20	E Burnett Ave to Pindell Ave	WB	Concrete (Historic Mix)	4.9	0.8%	0.5 to 1.3%	Follows Eastern Pkwy	2 tripping hazards
S21	Pindell Ave to Keswick Blvd	WB	Concrete (Historic Mix)	5.0	2.1%	1.7 to 2.4%	Follows Eastern Pkwy	No tripping hazards
S22	Keswick Blvd to Delor Ave	WB	Concrete (Historic Mix)	5.0	0.7%	0.4 to 0.8%	Follows Eastern Pkwy	2 tripping hazards—photo 165 shows 1.5" hazard
S23	Delor Ave to Alexander Ave	WB	Concrete (Historic Mix)	5.0	0.7%	0.2 to 1.2%	Follows Eastern Pkwy	8 tripping hazards
S24	Alexander Ave to Shelby St	WB	Concrete (Historic Mix)	5.0	2.1%	0.5 to 4.2%	Follows Eastern Pkwy	6 tripping hazards. Water meter & manhole. Photo
S25	Shelby St to Preston St	WB	Concrete (Historic Mix)	5.0	0.2%	0.2%	Follows Eastern Pkwy	1 tripping hazard
S26	Preston St to Bradley Ave	WB	Concrete (Historic Mix)	5.0	0.6%	0.0 to 1.1%	Follows Eastern Pkwy	Sidewalk begins @ 9.5' width and narrows to 5'
S27	Bradley Ave to Alley (2.35 miles)	N/A	N/A	N/A	N/A	N/A	N/A	No sidewalk all ramp
S28	Alley (2.35 miles) to Crittenden Dr.	WB	Concrete (Historic Mix)	5.0	1.4%	0.2 to 3.4%	Follows Eastern Pkwy	11+ tripping hazards, too many to document
S29	Crittenden Dr to Crittenden WB turn lane	WB	Concrete (Historic Mix)	5.0	0.7%	0.6 to 0.8%	Follows Eastern Pkwy	No tripping hazards
S30	Crittenden WB turn lane to Clubhouse	WB	Concrete (Class A)	10.0	0.8%	0.8 to 0.8%	Follows Eastern Pkwy	No tripping hazards
S31	Clubhouse entrance/Lilly Ave to Arthur St	WB	Concrete (Class A)	5.0	0.9%	0.4 to 1.4%	Follows Eastern Pkwy	5 tripping hazards. Sidewalk widens from 5' to 5.7'
S32	Arthur St WB	WB	N/A	N/A	N/A	N/A	N/A	Sidewalk closed for construction
S33	Hahn St to 65 S On-ramp	EB	Concrete (Class A)	7.5	1.7%	1.6 to 1.7%	Follows Eastern Pkwy	2 tripping hazards
S34	65 S On-ramp to 65 N Off-ramp	EB	Concrete (Class A to Historic Mix)	4.5	0.9%	0.8 to 1.0%	Follows Eastern Pkwy	8 tripping hazards. Photo 235 shows 4' pinch point
S35	65 N Off-ramp to Crittenden Dr	EB	N/A	N/A	N/A	N/A	N/A	No sidewalk, no ramps—break in accessibility
S36	Crittenden Dr to Emil Ave	EB	Concrete (Historic Mix)	4.5	2.6%	2.4 to 2.7%	Follows Eastern Pkwy	9 tripping hazards
S37	Emil Ave to Concord Dr	EB	Concrete (Historic Mix)	4.9	0.8%	0.6 to 0.9%	Follows Eastern Pkwy	~2 tripping hazards; photo 259 shows 2.8' pinch
S38	Concord Dr to Sherry Road	EB	Concrete (Historic Mix)	5.0	0.7%	0.0 to 1.2%	Follows Eastern Pkwy	~5 tripping hazards
S39	Sherry Road to Bradley Ave	EB	Concrete (Historic Mix)	5.0	1.4%	0.4 to 2.5%	Follows Eastern Pkwy	~2 tripping hazards, grass in utility strip
S40	Bradley Ave to Ellsworth Ave	EB	Concrete (Historic Mix) to Asphalt	6.0' (4.8 asphalt)	0.5%	0.4 to 0.6%	Follows Eastern Pkwy	~3 tripping hazards, 295 shows 4' pinch point, 276
S41	Ellsworth Ave to Preston St	EB	Asphalt to Concrete (Historic Mix)	5' (9' concrete)	1.5% (3.1% concrete)	1.0%	Follows Eastern Pkwy	Overgrown, arch in sidewalk throughout
S42	Preston St to Shelby St	EB	Concrete (Historic Mix)	5.0	1.0%	0.2 to 2.3%	Follows Eastern Pkwy	No hazards
S43	Shelby St to Alexander Ave	EB	Concrete (Historic Mix)	5.0	1.2%	0.2 to 0.4%	Follows Eastern Pkwy	~2 tripping hazards
S44	Alexander Ave to Delor Ave	EB	Concrete (Historic Mix)	5.0	0.3%	0.1 to 1.1%	Follows Eastern Pkwy	~7 tripping hazards
S45	Delor Ave to Keswick Blvd	EB	Concrete (Historic Mix)	5.0	0.6%	0.4 to 0.6%	Follows Eastern Pkwy	~6 tripping hazards
S46	Keswick Blvd to Pindell Ave	EB	Concrete (Historic Mix)	5.0	0.5%	0.1 to 0.8%	Follows Eastern Pkwy	~2 tripping hazards
S47	Pindell Ave to Burnett Ave	EB	Concrete (Historic Mix)	5.0	0.6%	0.4 to 1.6%	Follows Eastern Pkwy	~12 tripping hazards
S48	Burnett Ave to Lydia St	EB	Concrete (Historic Mix)	5.0	0.8%	0.8 to 2.3%	Follows Eastern Pkwy	~9 tripping hazards
S49	Lydia St to Poplar Level Road	EB	Concrete (Historic Mix)	5.0	1.6%	N/A	Follows Eastern Pkwy	12+ tripping hazards, too many to document. Photo
S50	Poplar Level Road to 1136 Eastern Pkwy	N/A	N/A	N/A	N/A	1.4 to 2.3%	Follows Eastern Pkwy	No sidewalk until S. Fork Beargrass Creek
S51	1136 Eastern Pkwy to Castlevale Dr	EB	Concrete (Historic Mix)	5.0	1.8%	2.4%	Follows Eastern Pkwy	Sidewalk resumes @ 1136 Eastern Pkwy. Widens to
S52	Castlevale Dr to Baxter Ave	EB	Concrete (Historic Mix)	5.0	2.4%	0.5 to 3.3%	Follows Eastern Pkwy	Ends @ bus stop—shown in photo 354
S53	Baxter Ave to Quadrant Ave	EB	Concrete (Historic Mix)	5.8	2.5%	1.4 to 2.3%	Follows Eastern Pkwy	~13 tripping hazards
S54	Quadrant Ave to Norris Pl	EB	Concrete (Historic Mix)	5.5	1.9%	2.4 to 3.5%	Follows Eastern Pkwy	No hazards
S55	Norris Pl to Bardstown Road	EB	Concrete (Historic Mix)	5.5	2.9%	2.4 to 3.5%	Follows Eastern Pkwy	~7 tripping hazards. Widens to 8' @ alley behind
S56	Bardstown Road to S. Cherokee Road	EB	Concrete (Historic Mix)	4.8	1.4%	0.2 to 2.6%	Follows Eastern Pkwy	~10+ tripping hazards, too many to document.
S57	S. Cherokee Road to Cherokee Park Road	N/A	N/A	N/A	N/A	N/A	N/A	No sidewalk, crosswalk, or SE ramp

Eastern Parkway Existing Ramp Inventory 2019

Seq #	Ramp Side Street	General Comments	Corner	Type	Width (ft)	Cross Slope	Running Slope	Grade Breaks	Landing Comments	Top Landing Dimensions	Bottom Landing Dimensions	DW?	DW Dimensions	Steps	Obstacles	Obstacle Comments	Ped Buttons	Ped Comments	Parking Comments	CW	CW Width	CW Comments	Median	Median Comments
R1	Cherokee Park Road	Asphalt, not true ramp	NW	1	7.0	2.4%	5.8%	N/A	N/A	> Required	In Road	No	N/A	No	No	N/A	No	N/A	On-street parking	No	N/A	N/A	No	N/A
R2	Cherokee Road	N/A	NE	1	4.8	0.3%	4.0%	N/A	N/A	5' × 5'	In Road	Yes	2' × 5'	No	No	N/A	No	N/A	On-street parking	No	N/A	N/A	No	N/A
R3	Cherokee Road	N/A	NW	1	5.0	2.4%	2.6%	N/A	N/A	5' × 5'	In Road	Yes	2' × 5'	No	No	N/A	No	N/A	On-street parking	No	N/A	N/A	No	N/A
R4	Alley (0.23 miles)	N/A	NE	1	5.0	3.7%	11.7%	N/A	No true top landing	No true top landing	In Road	No	N/A	No	No	N/A	No	N/A	On-street parking	No	N/A	N/A	No	N/A
R5	Alley (0.23 miles)	N/A	NW	1	5.0	4.4%	4.0%	12.1%	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	On-street parking	No	N/A	N/A	No	N/A
R6	Willow Ave	Gas utility crosses ramp	NE	1	5.0	2.3%	3.7%	N/A	No true top landing	No true top landing	In Road	Yes	2' × 4'	No	No	N/A	No	N/A	On-street parking	No	N/A	N/A	No	N/A
R7	Willow Ave	Ramp tapers from 5'–7.3'	NW	1	5.0	0.9%	3.8%	N/A	N/A	5' × 5'	In Road	Yes	2' × 4'	No	Yes	Electric Junction MH	No	N/A	On-street parking	No	N/A	N/A	No	N/A
R8	Bardstown Road	N/A	NE	4	20.0	0.2%	1.7%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 20'	No	No	N/A	Both Crossings	Audio Features	No parking	Yes	8'	N/A	No	N/A
R9	Bardstown Road	N/A	NW	4	11.5	0.0%	2.6%	N/A	N/A	> Required	In Road	Yes	2' × 11.5'	No	Yes	LG&E MH	Both Crossings	Audio Features	No parking	Yes	8'	N/A	No	N/A
R10	Alley (0.44 miles)	Trip hazard at edge of pavement	NE	1	8.0	3.0%	0.3%	N/A	No true top landing	No true top landing	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R11	Alley (0.44 miles)	Severely broken concrete	NW	1	5.0	0.7%	1.0%	N/A	Severly broken concrete	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R12	Norris Place	N/A	NE	3.1	11.0	0.0%	6.8%	N/A	No true top landing	No true top landing	6' × 8'	Yes	2' × 11'	No	Yes	Water Meter Cap	Both Crossings	Display facing West obstructed by utility pole	No parking	Yes	6'	East-most CW only measures 5.5'	No	N/A
R13	Norris Place	Facing East	NW	4	5.0	2.4%	–7.7%	N/A	Top landing shared with 46b	4.5' × 6'	In Road	Yes	2' × 4'	No	No	N/A	Both Crossings	Ped pole between the 2 directional ramps	No parking	Yes	6'	N/A	No	N/A
R14	Norris Place	Facing South	NW	4	5.0	1.2%	2.8%	N/A	Top landing shared with 46a	4.5' × 6'	In Road	Yes	2' × 4'	No	No	N/A	Both Crossings	Ped pole between the 2 directional ramps	No parking	Yes	6'	N/A	No	N/A
R15	Quadrant Ave	N/A	NE	1	5.0	3.1%	2.4%	4.4%	Crack in ramp	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R16	Quadrant Ave	N/A	NW	1	5.5	0.7%	11.9%	N/A	No true top landing	No true top landing	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R17	Alley (0.74 miles)	N/A	NE	1	6.0	1.7%	1.4%	Ramp Bowled	N/A	5' × 5'	Trip hazard at base of ramp	No	N/A	No	No	N/A	No	N/A	Parking lot in place of sidewalk to Baxter	No	N/A	N/A	No	N/A
R18	Alley (0.74 miles)	N/A	NW	1	8.0	2.6%	4.4%	N/A	No true landings	No true top landing	No true bottom landing	No	N/A	No	No	N/A	No	N/A	Business parking	No	N/A	N/A	No	N/A
R19	Baxter Ave	N/A	NE	1	7.0	1.0%	0.5%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 4'	No	No	N/A	Yes	South only—single button	Corner is Cherokee Animal Clinic parking lot	Yes	S=6.5' N=7'	Ped traffic diverts S over Eastern, W over Baxter, N over Eastern	Yes	Not refuge
R20	Baxter Ave	N/A	Center	1	5.0	5.1%	1.0%	N/A	N/A	5' × 5'	In Road	Yes	2' × 4'	No	No	N/A	Yes	South only—single button	No parking	Yes	S=6.5' N=7'	Ped traffic diverts S over Eastern, W over Baxter, N over Eastern	Yes	Not refuge
R21	Hill Road	N/A	CE	1	4.8	3.3%	12.8%	N/A	No true top landing	No true top landing	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R22	Hill Road	Curb blocking 2' of ramp	CW	1	3.0	0.2%	4.7%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R23	Cross Road/Valley Road	N/A	CE	1	4.5	2.4%	13.3%	N/A	No true top landing	No true top landing	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R24	Cross Road/Valley Road	N/A	CW	1	4.7	1.2%	2.6%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R25	Center of Eastern Pkwy to Barret Ave	This is end of sidewalk in median.	CE	1	4.5	1.2%	7.2%	N/A	N/A	5' × 5'	In Road	Yes	2' × 4'	No	No	N/A	Yes	S–N both directions	No parking	Yes	14.5' N–S	N/A	No	N/A
R26	S Barrett	No sidewalk—crosswalk to bus stop. Back curb	SE	3	10.0	0.2%	1.7%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 9'	No	No	N/A	Yes	North and West	No parking	Yes	W=6.5' N=14.5'	N/A	No	N/A
R27	S Barrett	No ramp, no sidewalk—crosswalk only	SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	East	No parking	Yes	E=6.5'	Grass between crosswalk and bus stop	No	N/A
R28	Barret Ave	Note trash can/bench/gas meter	NE	4	E=4.5' W=5'	E=0.7% W=1.2%	E=0.3% W=1.9%	N/A	N/A	E=5' × 5' W=7' × 7'	E=In Road W=In Road	Yes	2' × 4' Both Directions	No	No	N/A	Yes	West and South	No parking	Yes	N=14.5' S=9'	N/A	No	N/A
R29	Barret Ave	N/A	NW	2	8.5	NE=0.7% NW=0.9%	NE=0.3% NW=3.3%	N/A	N/A	NE=4.5' × 5' NW=4.5' × 5'	5' × 6'	Yes	2' × 7'	No	Yes	Water Valve Cover × 2	Yes	East	No parking	Yes	N=14.5' S=9'	N/A	No	N/A
R30	Dahlia Drive	N/A	NE	1	5.0	0.7%	2.0%	N/A	N/A	5' × 5'	In Road	Yes	2' × 5'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R31	Dahlia Drive	N/A	NW	1	4.5	0.8%	0.7%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 4.5'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R32	Med Arts Bldg Entrance	Commercial entrance w/median	NE	4	E=5.5' W=5'	E=1.1% W=0.5%	E=7.5% W=1.5%	N/A	N/A	E= > required W=5' × 5'	E=In gutter W=In Entrance	Yes	2' × 4' Both Directions	No	No	N/A	Yes	West and South	No parking	Yes	S=6.8' W=6.5'	N/A	Yes	13' refuge, 2' × 4' DW on both ends, E–W, photo 118
R33	Med Arts Bldg Entrance	Commercial entrance w/median	NW	1	4.5	0.7%	1.4%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 4'	No	No	N/A	Yes	East	No parking	Yes	E=6.5'	N/A	Yes	13' refuge, 2' × 4' DW on both ends, E–W, photo 118
R34	Landmark Entrance	Commercial Entrance	NE	1	5.5	0.4%	4.0%	N/A	N/A	8' × 8'	In Entrance	Yes	2' × 4'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R35	Landmark Entrance	Commercial Entrance	NW	1	5.0	0.4%	0.4%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 4'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R36	Goss Ave	N/A	NE	3	5.0	0.5%	2.6%	N/A	N/A	5' × 5'	In Gutter	Yes	2' × 4'	No	No	N/A	Yes	West and South	No parking	Yes	S=8' W=8'	N/A	No	N/A
R37	Goss Ave	N/A	NW	3	13.0	0.2%	5.5%	N/A	N/A	8' × 13'	In Gutter	Yes	2' × 13'	No	No	N/A	Yes	East and South	No parking	Yes	S=8' E=8'	N/A	No	N/A
R38	Ash St	N/A	NE	1	3.5	0.3%	6.2%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R39	Ash St	N/A	NW	1	3.5	0.1%	4.6%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R40	Lydia St	N/A	NE	1	4.8	0.4%	3.8%	N/A	N/A	No true landing	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R41	Lydia St	N/A	NW	1	5.0	0.1%	1.1%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R42	E Burnett Ave	N/A	NE	3.1	17.0	0.4%	0.6%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 17'	No	No	N/A	Yes	West and South	No parking	Yes	S=6' W=6'	N/A	No	N/A
R43	E Burnett Ave	N/A	NW	4	S=5' E=6'	S=0.3% E=0.8%	S=1.1% E=1.2%	N/A	S=All-in-one E=All-in-one	S=All-in-one E=All-in-one	S=All-in-one E=All-in-one	Yes	S=2' × 4' E=2' × 5'	No	No	N/A	Yes	South and East	No parking	Yes	S=6' E=6'	N/A	No	N/A
R44	Pindell Ave	N/A	NE	1	4.0	0.0%	5.5%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R45	Pindell Ave	N/A	NW	1	4.0	0.2%	4.8%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R46	Keswick Blvd	N/A	NE	1	5.0	0.4%	3.8%	N/A	Long ramp: 26.3'	5' × 5'	Behind curb	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R47	Keswick Blvd	N/A	NW	1	3.8	1.0%	4.2%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R48	Delor Ave	N/A	NE	1	5.3	0.2%	3.6%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R49	Delor Ave	N/A	NW	1	4.5	1.5%	3.3%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R50	Alexander Ave	N/A	NE	1	4.0	1.2%	9.5%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R51	Alexander Ave	N/A	NW	1	5.0	0.0%	1.9%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R52	Shelby St	N/A	NE	3	16.0	1.0%	0.3%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 15'	No	Yes	Ped button handhole	Yes	South and West	No parking	Yes	S=8' W=9.5'	N/A	No	N/A
R53	Shelby St	N/A	NW	3	23.0	0.7%	0.1%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 22'	No	Yes	Water meter cap	Yes	South and East	No parking	Yes	S=8' E=9.5'	N/A	No	N/A
R54	Preston St	N/A	NE	3	20.0	0.5%	0.3%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 20'	No	No	N/A	Yes	South and West	No parking	Yes	S=8' W=8'	N/A	No	N/A
R55	Preston St	N/A	NW	3	17.0	0.8%	1.0%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 16.5'	No	No	N/A	Yes	South and East	No parking	Yes	S=8' E=8'	N/A	No	N/A
R56	Bradley Ave	N/A	NE	3	11.5	0.1%	2.9%	N/A	N/A	7' × 7'	Behind curb	Yes	2' × 11'	No	No	N/A	Yes	South only—single button	No parking	Yes	S=6' W=6'	N/A	No	N/A
R57	Bradley Ave	N/A	NW	1	5.0	1.1%	3.6%	N/A	N/A	6.5' × 6.5'	Behind curb	Yes	2' × 4'	No	No	N/A	No	N/A	No parking	Yes	E=6'	N/A	No	N/A
R58	Alley (2.93 miles)	N/A	NE	1	From 7.0' to 4.7'	0.3%	1.9%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 4'	No	Yes	Fire Hydrant	No	walk sign—no button	Business parking	Yes	W=6'	N/A	No	N/A
R59	Alley (2.93 miles)	N/A	NW	4	S=5.5' E=5'	S=0.2% E=0.1%	S=0.7% E=1.3%	N/A	Shared top landing	5' × 7'	S=Behind curb E=Behind curb	Yes	S=2' × 4.5' E=2' × 4'	No	No	N/A	Yes	South only—single button	No parking	Yes	E=6' S=?????	N/A	No	N/A
R60	Crittenden Dr	N/A	NE	2?	5.0	E=0.1% W=0.7%	E=2.0% W=4.0%	N/A	N/A	E=5' × 5' W=5' × 5'	Behind curb	Yes	2' × 5'	No	No	N/A	No	N/A	No parking	Yes	S=6'	N/A	Yes	Refuge—photo 215. S&W ped buttons, Gas cap obstacle, 3 ramps, 2' × 4' det warnings all ways, 6' crosswalks all ways
R61	Crittenden Dr	N/A	NW	3	11.0	0.1%	0.6%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 10.5'	No	No	N/A	Yes	South and East	No parking	Yes	E=6' S=?????	N/A	Yes	Refuge—photo 215. S&W ped buttons, Gas cap obstacle, 3 ramps, 2' × 4' det warnings all ways, 6' crosswalks all ways
R62	Crittenden Dr WB turn lane	No Ramp	NE	N/A	N/A	0.6%	0.1%	N/A	All-in-one	All-in-one	All-in-one	N/A	N/A	Yes—one to road, 18.5% slope	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R63	Crittenden Dr WB turn lane	N/A	NW	1	5.8	1.0%	1.4%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 5'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R64	Clubhouse entrance/Lilly Ave	N/A	NE	1	16.0	0.7%	1.5%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 15'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R65	Clubhouse entrance/Lilly Ave	Construction—No ramp	NW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No parking	No	N/A	N/A	No	N/A
R66	Arthur St	N/A	NE	1	5.0	0.4%	7.3%	N/A	N/A	5.7' × 6'	No bottom landing	Yes	2' × 5'	No	No	N/A	No	N/A	No parking	Yes	W=6.5'	N/A	No	N/A
R67	Arthur St	N/A	NW	2	13.5	N=2.4% W=0.7%	N=10.9% W=1.0%	N/A	N/A	N=5' × 5' W=Inclusive 7' × 6'	Out of compliance	Yes	2' × 13.5'	No	No	N/A	No	N/A	No parking	Yes	E=6.5'	N/A	No	N/A
R68	Hahn St	No sidewalk going south	SW	2	13.0	W=2.3% S=N/A	W=2.1% S=N/A	N/A	N/A	W=5' × 5' S=N/A	In road	Yes	2.5' × 13'	No	No	N/A	No	N/A	No parking	Yes	E=8'	N/A	No	N/A
R69	Hahn St	No sidewalk going south	SE	2	7.0	E=1.2% S=N/A	E=5.1% S=N/A	N/A	N/A	E=7' × 7' S=N/A	Behind curb	Yes	2' × 10.5' *subsided 1.25"	No	Yes	Subsided detectables	No	N/A	No parking	Yes	W=8'	N/A	No	N/A
R70	65 S On-ramp	No sidewalk going south	SW	2	W=7.5' S=N/A	W=0.2% S=N/A	W=1.7% S=N/A	N/A	N/A	W=7.5' × 7.5' S=N/A	Behind curb	Yes	2' × 7.5'	No	No	N/A	No	N/A	No parking	Yes	NE=8'	N/A	No	N/A
R71	65 S On-ramp	N/A	SE	2	E=7.5' W=N/A	E=1.9% W=N/A	E=4.3% W=N/A	N/A	No true landing	No top landing	No bottom landing	Yes	2' × 7.5'	No	No	N/A	No	N/A	No parking	Yes	SW=8'	N/A	No	N/A
R72	65 N Off-ramp	No ramps, no sidewalk	SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No parking	No	N/A	N/A	No	N/A
R73	Crittenden Dr	N/A	SW	3	9.5	1.1%	1.7%	N/A	Top landing < minimum size	4.3' × 5'	All-in-one	Yes	2' × 9.5'	No	No	N/A	Yes	East and North	No parking	Yes	N=6' E=6'	N/A	Yes	Photos 245 & 246. 3 leg refuge. Det warnings all ways, 6' crosswalks N and W only. N & W Ped buttons
R74	Crittenden Dr	N/A	SE	2	NE=4' SW=4'	NE=1.1% SW=0.5%	NE=3.5% SW=3.5%	N/A	N/A	NE=4' × 4' SW=4' × 4'	Behind curb	Yes	2' × 9'	No	No	N/A	No	N/A	No parking	Yes	N=6' E=6'	N/A	Yes	Photos 245 & 246. 3 leg refuge. Det warnings all ways, 6' crosswalks N and W only. N & W Ped buttons
R75	Emil Ave	N/A	SW	2	3.5	E=1.0% S=N/A	E=3.6% S=N/A	N/A	N/A	5' × 5'	In road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R76	Emil Ave	N/A	SE	1	4.0	2.0%	2.6%	N/A	N/A	4.5' × 5'	In road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R77	Concord Dr	N/A	SW	1	4.8	0.9%	1.5%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R78	Concord Dr	N/A	SE	1	4.8	1.1%	0.1%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R79	Sherry Road	N/A	SW	1	4.0	1.2%	0.6%	Settled, full of sediment	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R80	Sherry Road	N/A	SE	1	5.0	1.4%	0.8%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R81	Bradley Ave	N/A	SW	3	11.0	0.3%	1.0%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 10.3'	No	No	N/A	Yes	North only	No parking	Yes	N=6' E=6'	N/A	No	N/A
R82	Bradley Ave	N/A	SE	4	E=5' N=4'	E=0.9% N=0.4%	E=3.4% N=2.8%	N/A	N/A	E=5' × 5' N=6' × 6'	Behind curb	Yes	E=2' × 5' N=2' × 4'	No	Yes	N=2 water caps	Yes	E=signal only N=button	No parking	Yes	N=6' E=6'	N/A	No	N/A
R83	Ellsworth Ave	Asphalt ramp	SW	1	4.5	0.5%	0.7%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R84	Ellsworth Ave	Asphalt ramp	SE	1	5.5	0.3%	0.7%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R85	Preston St	N/A	SW	3	19.0	0.2%	0.9%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 18.5'	No	No	N/A	Yes	East and North	No parking	Yes	N=8' E=9'	N/A	No	N/A
R86	Preston St	N/A	SE	3	16.0	1.4%	1.6%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 15.5'	No	No	N/A	Yes	West and North	No parking	Yes	N=8' W=9'	N/A	No	N/A
R87	Shelby St	N/A	SW	3	24.0	0.2%	1.2%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 22'	No	No	N/A	Yes	East and North audible	No parking	Yes	N=8' E=10'	N/A	No	N/A
R88	Shelby St	N/A	SE	3	17.0	1.7%	0.9%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 17'	No	No	N/A	Yes	West and North audible	No parking	Yes	W=10' N=7.5'	N/A	No	N/A
R89	Alexander Ave	N/A	SW	2	5.0	1.1%	6.2%	N/A	N/A	E=6' × 6' N=N/A	In road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R90	Alexander Ave	N/A	SE	1	4.5	0.5%	4.1%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R91	Delor Ave	N/A	SW	1	5.0	0.2%	1.1%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 5'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R92	Delor Ave	N/A	SE	1	5.0	0.4%	0.8%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 5'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R93	Keswick Blvd	N/A	SW	1	5.0	1.0%	0.8%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R94	Keswick Blvd	N/A	SE	1	2.7	0.1%	4.4%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R95	Pindell Ave	N/A	SW	1	4.7	1.0%	0.4%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R96	Pindell Ave	N/A	SE	1	4.7	0.2%	1.1%	N/A	All-in-one	All-in-one	All-in-one	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R97	Burnett Ave	N/A	SW	4	N=5' E=5'	N=1.1% E=0.7%	N=0.9% E=0.5%	N/A	Shared top landing	5' × 5'	N=Behind curb E=Behind curb	Yes	N=2' × 4' E=2' × 4'	No	Yes	Utility cap, abandoned power pole hole	Yes	North and East	No parking	Yes	N=6' E=6'	N/A	No	N/A
R98	Burnett Ave	N/A	SE	4	N=5' W=5'	N=0.1% W=0.3%	N=0.4% W=0.6%	N/A	Shared top landing	5' × 5'	N=Behind curb W=Behind curb	Yes	N=2' × 4' W=2' × 4'	No	Yes	Gas cap	Yes	North and West	No parking	Yes	N=6' W=6'	N/A	No	N/A
R99	Lydia St	N/A	SW	1	4.5	0.5%	7.4%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R100	Lydia St	N/A	SE	1	3.9	0.9%	6.4%	N/A	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R101	Poplar Level Road	N/A	SW	2	W=7.5' S=4.8'	W=0.5% S=3.5%	W=8.6% S=2.3%	N/A	No true top landing	No true top landing	Shared behind curb	Yes	2' × 4'	No	No	N/A	No	N/A	No parking	Yes	N to refuge=7.5'	N/A	Yes	Refuge—photos 347 & 348. 3 ramps, 2' × 4' det warnings all ways, 7.5' crosswalk N and 6' crosswalk E. Bus stop bench.
R102	Poplar Level Road	N/A	SE	3.2	14.0	0.0%	1.0%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 13'	No	No	N/A	Yes	North and East	No parking	Yes	N=8' W=7.5'	N/A	Yes	Refuge—photos 347 & 348. 3 ramps, 2' × 4' det warnings all ways, 7.5' crosswalk N and 6' crosswalk E. Bus stop bench.
R103	1136 Eastern Pkwy	No intersection—sidewalk resumes in front of house	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No parking	No	N/A	N/A	No	N/A
R104	Castlevale Dr	N/A	SW	1	6.0	3.5%	1.0%	N/A	N/A	5' × 5'	In Road	Yes	2' × 4'	No	No	N/A	Yes	East	No parking	No	N/A	N/A	No	N/A
R105	Castlevale Dr	N/A	SE	4	W=5.5' N=6.5'	W=0.0% N=0.3%	W=3.0% N=4.9%	N/A	Shared top landing	5' × 5'	W=In road N=In road	Yes	W=2' × 4' N=2' × 4'	No	Yes	W=Electric handhole	Yes	North and West	No parking	No	N/A	N/A	No	N/A
R106	Baxter Ave	N/A	SW	4	N=5' E=6'	N=0.5% E=1.9%	N=9.5% E=1.9%	5.2% CS between ramps, fallen leaves obstructing	N/A	N=None E=All-in-one	N=In Road E=All-in-one	Yes	N=2' × 4' E=2' × 4'	No	Yes	E=Electric handhole	Yes	North and East	No parking	Yes	N = 7' E=6'	N to center sidewalk	No	N/A
R107	Baxter Ave	N/A	SE	3	6.0	1.4%	1.0%	5.2% CS between ramps, fallen leaves obstructing	All-in-one	All-in-one	All-in-one	Yes	N=2' × 4' W=2' × 4'	No	No	N/A	Yes	North and West	No parking	No	N/A	N/A	No	N/A
R108	Quadrant Ave	N/A	SW	1	5.0	3.5%	8.0%	N/A	N/A	None	In Road	No	N/A	No	Yes	Fiber optic box	No	N/A	No parking	No	N/A	N/A	No	N/A
R109	Quadrant Ave	N/A	SE	1	5.0	2.0%	2.0%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 6'	No	No	N/A	No	N/A	No parking	No	N/A	N/A	No	N/A
R110	Norris Place	N/A	SW	3	10.0	3.7%	0.2%	N/A	N/A	None	In Road	Yes	2' × 10'	No	No	N/A	Yes	North and East	No parking	Yes	N=6' E=6'	N/A	No	N/A
R111	Norris Place	N/A	SE	3	13.0	3.7%	1.4%	N/A	N/A	E=No S=6' × 6'	In Road	Yes	2' × 12'	No	No	N/A	Yes	North and West	No parking	Yes	N=6' W=6'	N/A	No	N/A
R112	Bardstown Road	N/A	SW	3	21.0	0.0%	0.9%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 21'	No	Yes	Ped button	Yes	North and East—Audible	No parking	Yes	N=8' E=9'	N/A	No	N/A
R113	Bardstown Road	N/A	SE	3	14.0	0.2%	1.2%	N/A	All-in-one	All-in-one	All-in-one	Yes	2' × 15'	No	No	N/A	Yes	North and West—Audible	No parking	Yes	N=8' W=9'	N/A	No	N/A
R114	Cherokee Road	Ramp angle puts pedestrian into circle traffic w/o sidewalk or crosswalk	SW	1	5.0	2.4%	1.7%	Curb is cracked—tripping hazard	N/A	5' × 5'	In Road	No	N/A	No	No	N/A	No	N/A	Driveway & street parking on Eastern Pkwy	No	N/A	N/A	No	N/A
R115	Cherokee Road	No ramp, no sidewalk	SE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No parking	No	N/A	N/A	No	N/A

Appendix G

Eastern Parkway Existing TARC Transit Stop Inventory 2019

Eastern Parkway Existing TARC Transit Stop Inventory 2019

FID	OBJECTID	LON	LAT	STOPID	STOPABBR	STOPNAME	SHELTER	BENCH	TRASHCAN	ACCESSIBLE	LENGTH_FT	SIGN_ONLY	NOTES
0	1	-85.76207616	38.2143908	7639	50410	3rd @ Eastern Parkway	Y	Y	Y	Y	30	N	Newer shelter; NB side of 3rd St
1	2	-85.76018909	38.21361602	4393	14580	Eastern Parkway @ Speed School WB	Y	Y	Y	Y	32	N	Newer shelter; WB side of Eastern Pkwy
2	3	-85.76002532	38.21338964	4258	13760	Eastern Parkway @ Speed School	Y	Y	Y	Y	22	N	Newer shelter; EB side of Eastern Pkwy
3	4	-85.75122691	38.21210979	145	1155	Crittenden @ Eastern Parkway	N	N	N	Y	0	Y	Sign on utility pole; sidewalk only, no grass verge; NB side of Crittenden
4	5	-85.75174697	38.21177451	4391	14570	Eastern Parkway @ Crittenden	N	N	N	N	0	Y	Sign in grass verge; WB side of Eastern Pkwy
5	6	-85.75029737	38.2114819	4260	13770	Eastern Parkway @ Emil	N	N	Y	N	0	Y	Sign in grass verge; EB side of Eastern Pkwy
6	7	-85.74947109	38.21175053	4390	14565	Eastern Parkway @ Concord	N	N	N	N	0	Y	Sign on light pole in grass verge; WB side of Eastern Pkwy
7	8	-85.749258	38.211602	4261	13775	Eastern Parkway @ Concord	N	N	N	N	0	N	TARC data indicates a stop at this location, however, there is no sign/feature present; EB side of Eastern Pkwy
8	9	-85.74718134	38.21216678	4263	13785	Eastern Parkway @ Bradley	N	N	N	N	0	Y	Sign on utility pole at edge of sidewalk; EB side of Eastern Pkwy
9	10	-85.74704269	38.21264963	4388	14555	Eastern Parkway @ Bradley	N	N	N	Y	8	Y	Sign on utility pole in grass verge; small concrete pad at curb; WB side of Eastern Pkwy
10	11	-85.74562622	38.21338185	4264	13790	Eastern Parkway @ Ellsworth	N	N	N	N	0	Y	Sign on light pole in grass verge; EB side of Eastern Pkwy
11	12	-85.74545314	38.21363151	4387	14550	Eastern Parkway @ Ellsworth	N	N	N	N	0	Y	TARC data indicates stop at location but sign appears to have been removed from light pole; WB side of Eastern Pkwy
12	13	-85.74318471	38.21447002	4265	13795	Eastern Parkway @ Preston	Y	Y	Y	Y	10	N	Older domed shelter; EB side of Eastern Pkwy
13	14	-85.74351388	38.21447866	4386	14545	Eastern Parkway @ Preston	Y	Y	Y	Y	27	N	Older domed shelter; WB side of Eastern Pkwy
14	15	-85.74232091	38.21492039	4266	13800	Eastern Parkway @ Shelby	Y	Y	Y	Y	15	N	Older domed shelter; EB side of Eastern Pkwy
15	16	-85.74239939	38.21506215	4385	14520	Eastern Parkway @ Shelby	N	N	N	N	0	Y	Sign in grass verge; WB side of Eastern Pkwy
16	17	-85.74052094	38.21591036	4267	13805	Eastern Parkway @ Alexander	N	N	N	Y	0	Y	Sign on light pole in grass verge; sidewalk access to curb; EB side of Eastern Pkwy
17	18	-85.74039247	38.21616711	4384	14515	Eastern Parkway @ Alexander	N	N	N	N	0	N	Stop relocated to Shelby as of 2-16-18 per TARC notice on pole; WB side of Eastern Pkwy
18	19	-85.73856929	38.21697787	4268	13810	Eastern Parkway @ Delor	N	N	N	N	0	Y	Sign in grass verge; EB side of Eastern Pkwy
19	20	-85.73847789	38.2172043	4383	14510	Eastern Parkway @ Delor	N	N	N	N	0	Y	Sign on light pole in grass verge; WB side of Eastern Pkwy
20	21	-85.73703702	38.21781337	4269	13815	Eastern Parkway @ Keswick	N	N	N	N	0	Y	Sign in grass verge; EB side of Eastern Pkwy
21	22	-85.73692944	38.21805083	4382	14505	Eastern Parkway @ Pindell	N	N	N	N	0	Y	Sign in grass verge; WB side of Eastern Pkwy
22	23	-85.73534959	38.21874912	4270	13820	Eastern Parkway @ Burnett	N	N	N	N	0	Y	Sign on light pole in grass verge; EB side of Eastern Pkwy
23	24	-85.73524236	38.21901875	4111	14500	Eastern Pkwy @ Burnett	N	N	N	N	0	Y	Sign on light pole in grass verge; WB side of Eastern Pkwy
24	25	-85.73406974	38.21974577	4089	13825	Eastern Pkwy @ Kosair Hospital	N	N	N	N	0	Y	Sign in grass verge; Small concrete pad where a bench may have been, does not extend to curb; EB side of Eastern Pkwy
25	26	-85.7338237	38.22021227	4110	14495	Eastern Pkwy @ Kosair Hospital	N	N	N	N	0	Y	Sign on light pole in grass verge; WB side of Eastern Pkwy
26	27	-85.7331934	38.22059466	4090	13830	Eastern Pkwy @ Lydia	N	N	N	N	0	Y	Sign in grass verge; EB side of Eastern Pkwy
27	28	-85.73317085	38.22087615	4109	14490	Eastern Pkwy @ Lydia	N	N	N	N	0	Y	Sign in grass verge; WB side of Eastern Pkwy
28	29	-85.73137105	38.22264308	0	0	Eastern Pkwy @ Ash	N	N	N	N	0	Y	There is a sign in the grass verge, however, TARC data does not indicate a stop at location; EB side of Eastern Pkwy
29	30	-85.73130506	38.22248884	4091	13835	Eastern Pkwy @ Ash	N	N	N	N	0	Y	Sign on light pole in grass verge; EB side of Eastern Pkwy
30	31	-85.73049967	38.22367158	4107	14480	Eastern Pkwy @ Poplar Level	N	N	N	Y	8	N	There is a small concrete pad in the verge that is immediately accessible at the curb; WB side of Eastern Pkwy
31	32	-85.73014704	38.22379065	4271	13840	Eastern Parkway @ Poplar Level	N	Y	Y	Y	8	N	Sign on utility pole in traffic island; EB side of Eastern Pkwy
32	33	-85.729888	38.223561	4092	14525	Poplar Level @ Eastern Parkway	N	N	N	N	0	N	TARC data indicates a stop at this location, however, there is no sign present; SB side of Poplar Level
33	34	-85.727826	38.225266	3398	13845	Eastern Pkwy @ 1138	N	N	N	N	0	N	TARC data indicates a stop at this location, however, there is no sign present; EB side of Eastern Pkwy
34	35	-85.72602528	38.22525136	3399	13850	Eastern Pkwy @ Castlevale	N	N	N	Y	18	N	Sign with concrete pad; EB side of Eastern Pkwy
35	36	-85.72621531	38.22543157	4380	14470	Eastern Parkway @ Castlevale	Y	Y	Y	Y	28	N	Older domed shelter; WB side of Eastern Pkwy
36	37	-85.72413362	38.22514577	3400	13855	Eastern Pkwy @ Royal	N	N	N	N	12	N	Sign in grass with a small concrete pad at the curb that is not accessible from any sidewalk; EB side of Eastern Pkwy
37	38	-85.72432169	38.22528654	4379	14465	Eastern Parkway @ Dahlia	N	N	N	Y	18	N	Sign in grass verge with small, accessible concrete pad; WB side of Eastern Pkwy
38	39	-85.72057618	38.22639747	3401	13860	Eastern Pkwy @ Barrett	N	N	Y	N	20	N	Sign on light pole with small concrete pad that is not accessible from a sidewalk; EB side of Eastern Pkwy
39	40	-85.72047383	38.22663716	4378	14460	Eastern Parkway @ Barrett	N	N	N	Y	0	Y	Sign on light pole at sidewalk; WB side of Eastern Pkwy
40	41	-85.71805606	38.22780543	4377	14455	Eastern Parkway @ Cross	N	N	N	N	0	Y	Sign on light pole on grass; WB side of Eastern Pkwy
41	42	-85.71790531	38.22759474	3402	13865	Eastern Pkwy @ Cross	N	N	N	N	0	Y	Sign on light pole in grass; EB side of Eastern Pkwy
42	43	-85.71544393	38.22879954	0	0	Eastern Pkwy @ Baxter	N	N	N	Y	0	Y	TARC data does not indicate a stop at this location, however, there is a sign at edge of sidewalk; EB side of Eastern Pkwy
43	44	-85.71510132	38.22902289	4376	14450	Eastern Parkway @ Baxter	N	N	N	Y	0	Y	Sign on utility pole at edge of sidewalk; WB side of Eastern Pkwy
56	45	-85.71463833	38.22905899	3403	13870	Eastern Pkwy @ Baxter	N	N	N	N	0	Y	Sign in grass verge; EB side of Eastern Pkwy
44	46	-85.712665	38.2301	3404	13875	Eastern Pkwy @ Quadrant	N	N	N	N	0	Y	Sign in grass verge; EB side of Eastern Pkwy
45	47	-85.71258447	38.23030552	4375	14445	Eastern Parkway @ Quadrant	N	N	N	N	0	Y	Sign in grass verge; WB side of Eastern Pkwy
46	48	-85.71120631	38.2308696	3405	13880	Eastern Pkwy @ Norris	N	N	N	N	0	Y	Sign in grass verge; EB side of Eastern Pkwy
47	49	-85.71154758	38.23085099	4374	14440	Eastern Parkway @ Norris	N	N	N	N	0	Y	Sign in grass verge; WB side of Eastern Pkwy
48	50	-85.709345	38.23185	4272	13885	Eastern Parkway @ Bardstown	N	N	Y	Y	0	N	Sign on light pole in sidewalk; EB side of Eastern Pkwy
49	51	-85.70974174	38.23181869	4373	14435	Eastern Parkway @ Bardstown	Y	Y	Y	Y	15	N	Sign is in grass verge but shelter and sidewalk are accessible; WB side of Eastern Pkwy
50	52	-85.70763741	38.23301869	4273	13895	Eastern Parkway @ Willow	N	N	N	Y	0	Y	Sign on light pole adjacent to sidewalk; EB side of Eastern Pkwy
51	53	-85.70777531	38.23311347	4372	14430	Eastern Parkway @ Willow	N	N	N	N	0	Y	Sign in grass verge; WB side of Eastern Pkwy
52	54	-85.70593188	38.23405228	4274	13900	Eastern Parkway @ 2068	N	N	N	N	0	Y	TARC data indicates a stop at this location, however, the sign appears to have been removed; EB side of Eastern Pkwy
53	55	-85.70614227	38.23411629	4371	14425	Eastern Parkway @ 2061	N	N	N	N	0	Y	TARC data indicates a stop at this location, however, it appears that the sign has been removed; WB side of Eastern Pkwy
54	56	-85.70374309	38.2352985	4276	13905	Eastern Parkway @ Cherokee	N	N	N	N	0	Y	Sign in grass verge; EB side of Eastern Pkwy
55	57	-85.7038	38.235528	7661	14420	Eastern Pkwy @ Cherokee	N	N	N	N	0	N	TARC data indicates a stop at this location, however, there is no sign/feature present; WB side of Eastern Pkwy

Appendix H

Cost Estimate Assumptions

Several assumptions were made during the development of this estimate, including:

- A 30% contingency was applied to all estimates.
- Roadway improvements include, but are not limited to, the following items: full depth pavement replacement, driveways, earthwork, signing, striping, arborist oversight during construction, tree protection during construction, mobilization, demobilization, and maintenance of traffic.
- Multimodal improvements include, and are limited to, the following items: shared-use path and sidewalk construction.
- An allowance of $125,000 was allocated in this estimate for signal upgrades and equipment relocation at Bardstown Road, Baxter Avenue, Barret Avenue, Poplar Level Road (Goss Avenue), the combined S. Preston Street and S. Shelby Street intersection, Bradley Avenue, and Crittenden Drive. Additionally, an allowance of $10,000 was allocated for signal removal for each of the roundabout alternatives at Barret Avenue and Bradley Avenue, as well as the signal removal for consolidation alternatives at S. Preston Street and S. Shelby Street.
- For the combined S. Preston Street and S. Shelby Street intersection Alternates 1 and 2, minor pavement widening and pavement overlay was assumed for S. Preston Street to accommodate the four-lane, two-way traffic on S. Preston Street.
- The costs for Design (D) were calculated as 15% of the roadway construction cost.
- The costs for Right-of-Way (R) were calculated using a combination of $10,000 per parcel impacted in appraisal, title report, deed recording, mortgage release, and acquisition fees plus $6 per square foot land value for residential properties and $20 per square foot land value for commercial properties.
- The estimates for Zone 2 Utility (U) relocation include approximately 5,000 linear feet (LF) each of existing telephone, fiber, and cable utilities; 1,250 LF of existing double quad circuit overhead electric on 16 poles; and 800 LF of existing standard three circuit overhead electric on 14 poles.

Two options for relocation of the existing overhead utilities relocation in Zone 2 were developed:

1. Relocation of overhead utilities in the parkway right-of-way to overhead utilities behind the houses in the alleys. This would require that the services to houses be relocated or adjusted and would require right-of-way easements or consent release for the services to be reconnected to the houses. An allowance of $800,000 was allocated in the estimate for this option, which does not include right-of-way needs-title research, easement costs, labor, or costs for the service reconnection.
2. Relocation of overhead utilities in the parkway right-of-way to underground, assumed location under the pavement between the existing sewer facilities and edge of pavement in order to avoid impacting tree infrastructure. An allowance of $1,500,000 was allocated in the estimate for this option, which does not include right-of-way needs-title research, easement costs, labor, or costs for the service reconnection.

- The costs for maintenance of traffic were calculated as 5% of the roadway construction cost.
- The costs for mobilization were calculated as 3% of the roadway construction cost, and the costs for demobilization were calculated as 1.5% of the roadway construction cost.
- This estimate assumes that Eastern Parkway will be re-curbed with a new curb and gutter and drainage system for the length of the study area to address drainage, flooding, and driveway access as well as provide continuity throughout the parkway. Additionally, this estimate assumes the roadway pavement for the entire Eastern Parkway study area will be replaced, in conjunction with a new drainage system including new storm sewer pipes and inlets for the Parkway.
- All crosswalks are estimated with a width of 10 ft, with enhanced crossings including ladder crosswalks for shared use path across all roadways.

Additional enhanced crosswalk treatments, such as raised crossings or rectangular rapid flashing beacons, are not included in this estimate and should be considered where appropriate in future design phases.

- An allowance of $350,000 was allocated in this estimate for each zone for an on-site arborist to oversee tree care and protection during construction. This includes monitoring of construction activities, recommendations for construction methods to avoid negatively impacting existing trees, and mitigation strategies for protecting trees during construction activity. This allowance assumes a construction duration of 1.5 years for each zone.
- Tree location, condition, and count data was obtained from the Tree Inventory from the Louisville Metro Parks Department. Tree inventory data was verified with an on-site tree assessment for the entire corridor. Additional geolocated tree locations were taken from the LOJIC Database. An estimate for tree and landscaping concepts for each zone was developed from all available data sets assuming that all missing gaps in the tree sequence will be filled.

Appendix I

Corridor Road Safety Audit: US60A/Eastern Parkway Jefferson County, Kentucky

CORRIDOR

Road Safety Audit

US 60A/Eastern Parkway
Jefferson County, Kentucky

Louisville's Olmsted Parkways
EASTERN PARKWAY

October 2019

Prepared for
Louisville Metro Public Works and
the Kentucky Transportation Cabinet

Prepared by
Gresham Smith

[Page Intentionally Left Blank]

EXECUTIVE SUMMARY

A Road Safety Audit (RSA) was performed for US 60A/Eastern Parkway from Hahn Street to Cherokee Road in Jefferson County, Kentucky Transportation Cabinet (KYTC) District 5 on August 21, 2019. The findings and top recommendations are detailed in the following report.

The audit team included representatives from Louisville Metro Public Works, the Kentucky Transportation Cabinet, and the consultant team.

An extensive field inspection along this corridor was conducted for the audit. Findings were discussed at length and are summarized both for the corridor and at specific intersections.

The history of the corridor was discussed briefly, but as appropriate for a Road Safety Audit, the focus of this exercise was on existing conditions, the planned improvements, the potential safety issues of their implementation, and the identification of practical and implementable mitigation solutions. These are detailed and evaluated in the full report.

1.0 Background

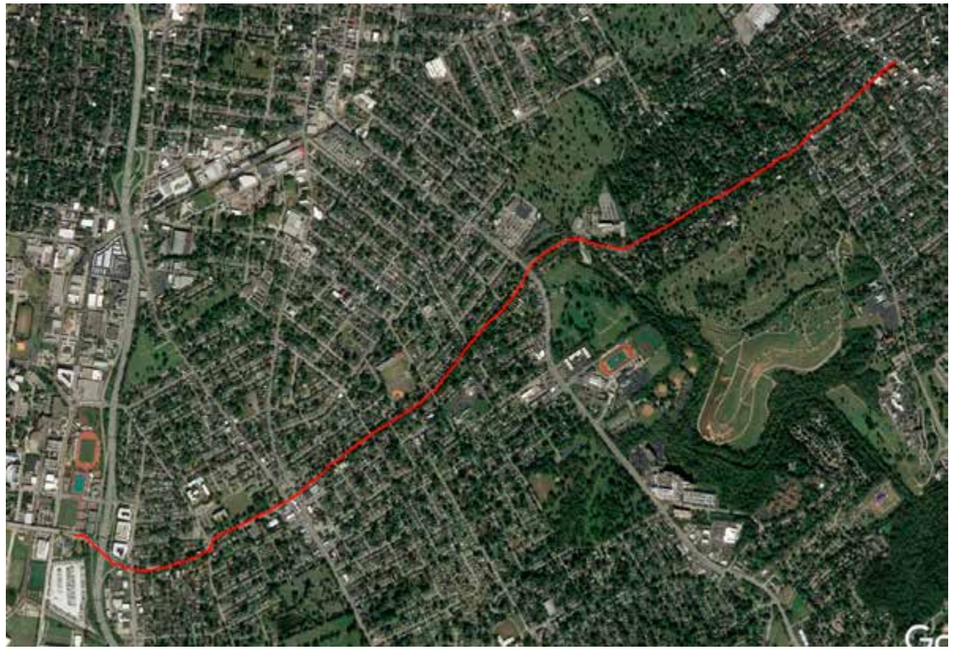
This document is the final report for the Road Safety Audit (RSA) for the portion of US 60A/Eastern Parkway beginning at Hahn Street and extending eastward to Cherokee Road, in Louisville, Jefferson County. The study was commissioned by Louisville Metro Public Works and was conducted by the Gresham Smith consulting team with the assistance of professional staff from Louisville Metro Public Works and the Kentucky Transportation Cabinet on August 21st, 2019.

The corridor was originally designed by Frederick Law Olmsted as part of a historic parkways system. Eastern Parkway, paired with Algonquin, Southern, and Southwestern Parkway make up Louisville's Olmsted Parkways.

The consultant team has begun looking at solutions to problems along the corridor in addition to ongoing efforts by Louisville Metro Public Works and the Kentucky Transportation Cabinet. A HSIP project is in-progress at the intersections with S Preston Street and S Shelby Street. Coordination with this effort will be required.

Study corridor in relation to Louisville.

Road Safety Audit October 2019



Project Location/Layout Map.

Project Location/Layout Map.

2.0 The Audit

A Road Safety Audit is a formal safety performance examination of an existing or future road or intersection by an audit team. RSAs have been used successfully for a wide variety of locations to identify potential solutions leading to both short-term improvements and longer term efforts including construction projects. It is a proactive tool, not solely dependent on crash data, but rather an innovative approach to identify safety issues to be considered in improvement projects.

The actual audit is a three-step process for the gathered team. These steps are: 1) the pre-audit meeting to review the project information, 2) the field review, and 3) the audit analysis. During these three key steps, the audit team has the opportunity to provide an objective, unbiased summary of safety issues, identify site needs and consider local conditions, then make suggestions for future short, intermediate, and long term improvements.

In preparation for the team audit meeting, a number of data sets about the corridor were researched, compiled, reviewed, and analyzed. These included crash data, traffic counts, and an ongoing HSIP project at the intersections with S Preston Street and S Shelby Street.

3.0 Overview of the Study Area

The study area was the segment of Eastern Parkway beginning at Hahn Street and extending to Cherokee Road. Eastern Parkway is co-routed with US 60A. It is a minor arterial, with a speed limit for the majority of the corridor of 35 mph. Between Hahn Street and Crittenden Drive and between Bardstown Road and Cherokee Road the speed limit is 25 mph.

Eastern Parkway is an important east-west connection between the University of Louisville Belknap Campus and the Cherokee/Highlands area. It links these locations, services many other neighborhoods in between, and even provides a connection to I-65. Eastern Parkway also provides local access to commercial nodes, like Baxter Avenue and Bardstown Road.

The majority of the corridor is 4-lanes (two in each direction) in width but in two distinct configurations. Most is an undivided section while the section between Barret Avenue and Baxter Avenue is a divided section where the median is approximately 35 feet in width and includes a sidewalk bound on both sides by trees. Trees are a leading feature of the corridor as the original character of the design included rows of mature trees bordering both sides of the roadway.

4.0 Meeting Summary

The audit team met on the project site on August 21st, 2019. The team assembled at 8:00 AM and commenced with a brief introduction to RSA's. The audit team then discussed the corridor history, known issues, and crash data. The field inspection began after this discussion and lasted several hours, concluding around 12:30 PM. The team discussed their observations from the field inspection and further detailed considerations and potential solutions. The audit adjourned at approximately 2:00 PM.

A list of attendees can be found in Appendix B.

5.0 Crash Data

Crash data was acquired from the Kentucky State Police Collision Database and is summarized in Appendix E. Analysis of the crash data was performed on a macro level to look for certain trends which included abnormally high rates for certain types of crashes. Further analysis was done to determine if crashes were concentrated at a particular location or by other characteristics.

An analysis of crashes was conducted along the overall corridor. According to the Collision Database there were 598 reportable crashes within the corridor from 2016 to 2018. These included 184 crashes in 2016 (31%), 224 crashes in 2017 (37%), and 190 crashes in 2018 (32%).

During the three-year crash history period examined, it was noted that the most frequent crash type was rear-end. Rear-end collisions accounted for 39% of crashes within the period. Angle was the second most frequent crash type, accounting for 24% of crashes within the period. Sideswipe was the only other crash type accounting for a double-digit percentage as it came in at 19% of crashes. 9% of collisions involved only one motor vehicle while Opposing Left-Turn crashes made up 6% of the total. 16 head-on collisions (3%) were reported.

From 2016 to 2018, nearly 13% of crashes were injury or fatal (one) crashes leaving 87% of crashes as resulting in only property damage. The fatality was recorded at the intersection with Baxter Avenue.

During the three-year period, more than 40% of all of the crashes and more than 35% of crashes involving a fatality or injury occurred at one of the corridor's ten signalized intersections. The location with the highest reported number of crashes was the intersection with Baxter Avenue, with 18% of signalized intersection crashes. Over 16% of signalized intersection crashes occurred at the S Preston Street and S Shelby Street intersection. The next highest crash-occurring signalized intersection, and the one that had the highest likelihood that a crash resulted in injury, was at Bradley Street. More than 12% of crashes at signalized intersections occurred there and about one in four resulted in injury.

In an analysis of roadway surface conditions, the majority of crashes occurred in dry conditions. Approximately 25% of crashes reported during the three-year period occurred in wet conditions.

Lighting conditions were also analyzed and most crashes occurred during daylight. Approximately, 24% of crashes occurred during non-daylight conditions.

While a very detailed crash analysis using the actual descriptions of the crashes provided by investigating officers might provide more granular information, there are some general conclusions that can be drawn from the high level analysis and results provided above. They are:

1. The types of crashes (predominately property damage only and rear-end collisions) are very typically associated with congestion.
2. Many of the signalized intersections warrant further study to identify potential trends in the collision information.
3. The number of crashes that happened during periods of darkness or in wet conditions does not appear to be outside of the average.

6.0 Issues and Potential Enhancement Summary

During the audit meeting and field inspection, it was realized that a number of similar comments were common throughout the corridor. These have been identified in the report as "common corridor" items. These are followed by recommendations specific to individual intersections identified by the audit team as potential actionable items.

7.0 Eastern Parkway

The audit team evaluated Eastern Parkway from Hahn Street to Cherokee Road, concentrating on the corridor as a whole as well as individual intersections/segments. For intersections, the crossing streets were also evaluated. The observations of the audit team are listed below. Recommendations, as this project is in the planning stage, were only rated based on 2 criteria: safety benefit and cost. They were rated as high, moderate, and low. Cost ratings are based on an initial estimate of implementing the specified improvement outside of considering the planned improvements being examined by the Eastern Parkway Transportation Plan.

7.1 Common Corridor Recommendations

7.1.1 FINDINGS & TEAM OBSERVATIONS

1. Striping and pavement markings should be enhanced to meet current MUTCD guidelines as well as KYTC Traffic Operations Memo No. 01-19 concerning pavement markings on the State Primary Road System.
2. Review and adjust, as necessary, sign type and placement details to meet current MUTCD signing guidelines. Additional signage may be required throughout corridor.
3. Upgrade mainline signal head assemblies to utilize reflective backplates, 12" signal bulbs, and (where applicable) 4-section Flashing Yellow Arrows.
4. Drainage network and inlet grates need to be able to handle higher chance of clogging due to tree-lined character of corridor.
5. Review all right-turn slip-lanes for potential reconfiguration to a traditional right-turn lane.
6. Bicycle lane interaction points with potential right-turn lanes and connections to bicycle facilities on intersecting roads to be conscious of vertical grade, horizontal alignment, and vehicular sight distance.
7. Ensure pedestrian facilities, including sidewalks ramps and push buttons, meet ADA requirements.
8. Add lighting, as needed, at the intersections along the corridor.
9. Clear dangerous encroachments (utilities, trees, etc.) from the right-of-way.

Damaged and faded signage.

One ideal location for upgraded signal heads that include reflective backplates.

Tree canopy restricts signal.

Drainage structures are blocked with debris (L) and ponding is occurring in the roadway (R).

Right-turn slip-lane with severely restricted sight distance.

Bicycle – Right-turn lane interaction point involving vertical grade.

Sidewalk damage from tree growth.

Bicyclists using various facilities to navigate the corridor.

7.1.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Enhance striping and pavement markings.	**High**	**Low**
2. Update signage. Replace old signs, remove excess signs, and reposition signage to better locations.	**High**	**Low**
3. Make signage consistent throughout corridor.	**High**	**Low**
4. Upgrade signal heads and include reflective backplates on mainline signal heads.	**High**	**Moderate**
5. Specify bicycle-friendly, clog-resistant drainage grates for curb inlets.	**High**	**Moderate**
6. Install enhanced lighting at intersections.	**High**	**High**
7. Trim canopy over roadway to decrease tunneling and improve wet surface drying time.	**High**	**Moderate**
8. Eliminate all right-turn slip-lanes.	**High**	**High**
9. Rebuild diagonal-span signal arrangements to a box-span configuration.	**High**	**High**

7.2 Eastern Parkway @ Crittenden Drive

7.2.1 FINDINGS & TEAM OBSERVATIONS

1. Ramp from NB I-65 ties to Eastern Parkway too close to intersection and negatively affects the EB Eastern Parkway right-turn and thru lanes.
2. The SB right-turn from Crittenden generally operates free-flow even though it is stop-controlled.
3. Pedestrian crossing in SB right-turn lane not properly located.
4. Removing concrete median from both Eastern Parkway approaches may allow for positive-offset left-turn lanes if permissive left turns are necessary for traffic operations.
5. Access from Eastern into Denny's can contribute to congestion.

Stop-controlled channelized lane and pedestrian crossing.

Concrete median on both Eastern Parkway approaches.

7.2.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Reconstruct I-65 exit ramp more parallel to I-65 to "T" into Eastern Parkway. Reduce the development of the EB Eastern Parkway right-turn lane until after the "T". Close the Eastern Parkway access to Denny's. Construct connecting sidewalk to intersection.	**High**	**High**
2. Remove SB channelized right-turn lane from Crittenden Drive and WB channelized right-turn lane from Eastern Parkway.	**High**	**High**

Reconfigured ramp and approach with access management and upgraded pedestrian facility.

7.3 Eastern Parkway @ Bradley Avenue

7.3.1 FINDINGS & TEAM OBSERVATIONS

1. Lane departures likely due to absent striping in the intersection while in a horizontal curve. This should be considered when preparing the typical section as the bike lane width will feel and operate narrower than actual.
2. The skew and permissive-only phasing causes vehicles turning left from Eastern Parkway to sit in the middle of intersection when waiting for a gap.
3. The transit stop locations may need to be relocated to the far side of the intersection to not interfere with a dedicated right-turn lane.
4. EB Eastern Parkway has short sight distance of span-mounted signal heads and tree foliage can obscure the pole-mounted supplemental head.
5. This is a diagonal-span signal arrangement.
6. Because of the horizontal curves bounding the intersection vehicles queued in the EB and WB Eastern Parkway planned left-turn lanes will obstruct sight distance significantly more than existing conditions.
7. Dairy Castle (in NW corner) generates significant multi-modal traffic during summer months. This contributes to the congestion and turning volumes, especially during the PM peak.

Existing intersection layout.

7.3.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Make the left-turn movements from Eastern Parkway operate under protected-only phasing.	**High**	**Low**
2. Provide skip striping through the intersection to better guide vehicles.	**High**	**Low**
3. Relocate TARC stops to far side.	**Moderate**	**Low**

7.4 Eastern Parkway @ S Preston Street / S Shelby Street

7.4.1 FINDINGS & TEAM OBSERVATIONS

1. The area is highly congested.
2. There are multiple different TARC lines that stop here making it a very pedestrian-heavy site.
3. S Preston Street is one-way SB thru the intersection while S Shelby Street is one-way NB.
4. Left turns from Eastern Parkway onto both are not permitted. This is generally followed but not always. Adjacent business access is also used to subvert the restriction.

Existing intersection layout.

7.4.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Add a Leading Pedestrian Interval to the signal cycle.	**High**	**Low**
2. Consider reconstructing intersection to bowtie roundabout.	**High**	**High**
3. Investigate the use of a reversible TWLTL between the signals that can allow the restriction on the left turns to be lifted strategically.	**Low**	**Moderate**

7.5 Eastern Parkway @ E Burnett Avenue

7.5.1 FINDINGS & TEAM OBSERVATIONS

1. This is a diagonal-span signal arrangement.
2. Tree canopy overhang can shorten the sight distance of the signals.
3. DuPont Manual High School has athletic fields adjacent that generate additional vehicular and pedestrian traffic to the area.
4. Numerous residential entrances will increase the potential for vehicle-bike/ped conflicts.

Intersection proximity to DuPont Manual athletic fields.

7.5.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Restripe crosswalks (consider ladder with rungs instead of just rails).	**High**	**Low**
2. Enhance lighting.	**High**	**Moderate**

7.6 Eastern Parkway @ Goss Avenue / Poplar Level Road

7.6.1 FINDINGS & TEAM OBSERVATIONS

1. This is a congested area.
2. WB Eastern Parkway and Poplar Level Road approach the intersection on an upward grade. EB Eastern Parkway approaches on a downgrade that can contribute to rear end crashes, especially under wet pavement conditions.
3. Poor sight distance along Eastern Parkway reinforces protected-only let-turn phasing.
4. All approaches have one dedicated left-turn and one dedicated right-turn lane.
5. The EB Eastern Parkway right-turn lane is channelized and is stop-controlled. The grades and orientation angle can negatively impact the sight distance. Additionally, the crosswalk across the channelized lane is located with extremely reduced sight distance.

EB approach lane into the channelized right-turn lane (L) and the vertical upgrade of the WB Eastern Parkway approach (R).

7.6.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. If dual WB Eastern Parkway thru-lanes are necessary through the intersection, transition WB Eastern Parkway bicyclists onto multi-use path near Castlevale Drive before transitioning back to dedicated bike lane following lane drop. Consider crossing impacts with pedestrian walk sign.	**N/A**	**Low**

7.7 Eastern Parkway @ Castlevale Drive

7.7.1 FINDINGS & TEAM OBSERVATIONS

1. Signal heads mounted by a pair of Mast Arms.
2. The intersection services the Medical Arts Building and a short cul-de-sac of multi-family homes.

Mast arms mount the signal heads.

Stop Bar absent from entrance.

7.7.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Install Stop Bar in Medical Arts Building entrance.	**Moderate**	**Low**

7.8 Eastern Parkway @ Barret Avenue

7.8.1 FINDINGS & TEAM OBSERVATIONS

1. Signal heads mounted by a pair of Mast Arms.
2. Intersection is very nearly the crest of a vertical curve.
3. The EB Eastern Parkway approach navigates a reverse horizontal curve sequence that involves multiple small radii. Sight distance to the signal heads is very short for this approach.
4. WB Eastern Parkway begins into the reverse horizontal curve sequence immediately upon entering the intersection. This contributes to lane departures and increases the risk of head on and sideswipe crashes.
5. SB Barret Avenue approaches the intersection through densely lined trees and has extremely limited sight distance of the Eastern Parkway approaches. "NO TURN ON RED" sign is mounted on the mast arm facing this approach.
6. There are a couple of Chevrons placed throughout the curves to help direct movement.
7. This intersection is the western boundary of the typical section change from undivided to divided. There is a pedestrian facility located in the median.

Chevrons along the curve for the EB Eastern Parkway approach. Sight distance of the signals is restricted.

Restricted sight distance from SB Barret Avenue.

WB approach where horizontal curve sequence begins at intersection (L) and the EB approach curving through the intersection and transitioning to outside the median (R).

7.8.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Reconfigure curve geometry through intersection to begin curve (WB) prior to intersection to reduce sharpness. Consider reshaping median nose to contribute to smoother alignment.	**High**	**Moderate**
2. Remove tree encroaching on the EB approach. At very least, trim branches and clear foliage to improve sight distance of signal.	**High**	**Low**
3. Upgrade horizontal curve signage.	**High**	**Low**
4. Consider replacing signal with a single lane roundabout.	**High**	**High**
5. Remove extraneous signal heads on southern mast arm installed during MOT for waterline replacement project.	**Low**	**Low**

7.9 Eastern Parkway @ Baxter Avenue

7.9.1 FINDINGS & TEAM OBSERVATIONS

1. The area is highly congested.
2. This intersection is the eastern boundary of the typical section change from undivided to divided. There is a pedestrian facility located in the median.
3. Pedestrian crossings can be difficult to maneuver because sidewalk and ramp in SW corner is not ADA-compatible.
4. WB Eastern Parkway begins into the reverse horizontal curve sequence immediately upon entering the intersection. This contributes to lane departures and increases the risk of head on and sideswipe crashes.
5. Left turns from Eastern Parkway are permissive for the majority of the day but are restricted weekdays from 7:00am-9:00am and from 3:00pm-6:00pm.
6. SB Baxter Avenue has a channelized right-turn lane onto Eastern Parkway but the orientation causes restricted sight distance for vehicles making the maneuver.

WB Eastern Parkway approach (L) and EB Eastern Parkway approach with restricted left-turn blackout signs (R).

SB Baxter Avenue channelized right-turn lane.

7.9.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Reconfigure curve geometry through intersection to begin curve (EB) prior to intersection to reduce sharpness. Consider reshaping median nose to contribute to smoother alignment.	**High**	**Moderate**
2. Consider reducing expanse of entrance to Cherokee Animal Clinic to deter cut-through movement by WB Eastern Parkway motorists planning to turn right onto Baxter Avenue.	**High**	**Low**
3. Remove extraneous signal head facing EB Eastern Parkway installed during MOT for waterline replacement project.	**Low**	**Low**

7.10 Eastern Parkway @ Bardstown Road

7.10.1 FINDINGS & TEAM OBSERVATIONS

1. The area is very highly congested by motor vehicles, bicyclists, and pedestrians.
2. A Leading Pedestrian Interval exists for the crossing of Eastern Parkway. This is consistent with other crossings along Bardstown Road.
3. Bardstown Road is currently a four-lane undivided roadway with full reversible lane striping. Possible future adjustments include removing the reversible capability and striping traditionally for one travel lane per direction with dedicated left-turn lanes at signalized intersections, allowing for left-turn signal phases to be introduced along the corridor.
4. The EB Eastern Parkway approach involves the inner lane becoming a left-turn only lane while the outer lane services the thru and right-turn movements.

Reversible lane guidance signage that may be removed in the future (L) and lane assignments of EB Eastern Parkway approach (R).

7.10.2 RECOMMENDATIONS & RATING

	SAFETY BENEFIT	COST
1. Add a Leading Pedestrian Interval to the signal cycle for pedestrians crossing Bardstown Road.	**High**	**Low**
2. Consider interaction point between bike lane and thru-right lane.	**High**	**Low**

8.0 Conclusion

This report formally summarizes the findings and recommendations of the audit team. The audit team suggests that the recommendations stated in this report be reviewed and their intention considered during the planning and design stages of this corridor's future. The responsible agency(s) should document any decisions to modify or eliminate recommendations based on engineering judgment or lack of feasibility.

It was the conclusion of the audit team that there are opportunities for improvement to safety related items as noted in the findings and recommendations sections on the previous pages. From the discussion at the audit and during the field inspection, the corridor suffers from sight distance restrictions, drainage inefficiencies, horizontal curve issues, and multi-modal facility limitations. The corridor's signs, pavement markings, and striping should be comprehensively replaced and refreshed.

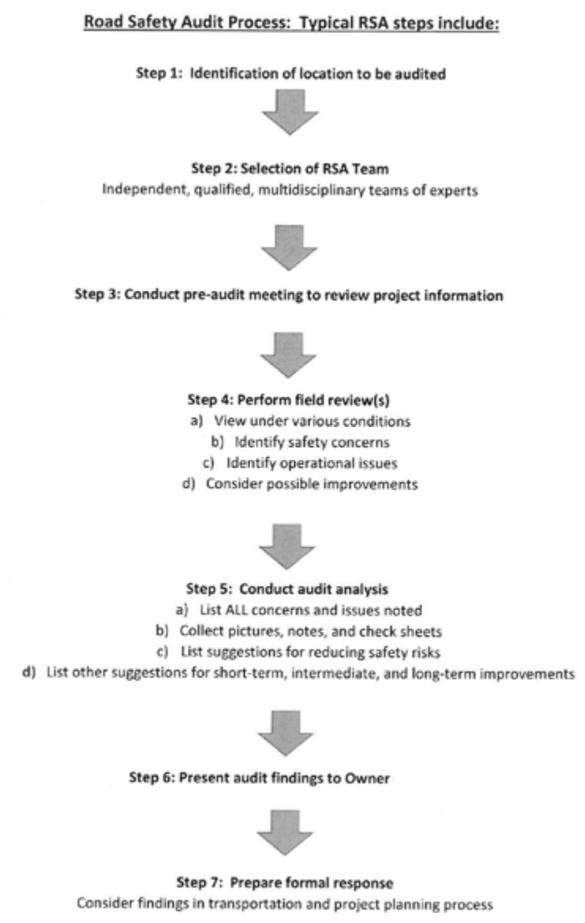
The area has a significant history of congestion-related crashes that should be helped by the reconfiguration for a road diet. The details of this configuration, though, will be vital to the successful reduction in these crash types. Locations of heightened attention will be the signalized intersections as they were the sites of greater than 35% of the existing studied fatal and injury crashes.

The corridor has a unique history and the preservation of its character is important. This effort, though, needs to balance with the safety of the future users. Providing dedicated multi-modal facilities is critical to the growth in use of those modes but without correction to the issues identified in this report those facilities will expose users more vulnerable to injury/death to danger.

Operational efficiency is going to play a significant role in the safety performance of the corridor. As mentioned, congestion-related crashes are most prevalent and unless alleviated the safety performance is unlikely to improve. This report, which specifically focuses on improving safety, should be used in the planning and design of potential improvements but recommendations should be carefully studied and weighed with the other elements of the project.

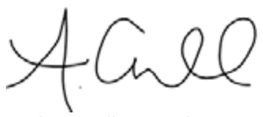
[Page Intentionally Left Blank]

Appendix A – RSA Process: Typical RSA Steps

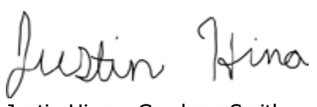


[Page Intentionally Left Blank]

Appendix B – Road Safety Audit Team



Andrea Cull – Gresham Smith



Justin Hina – Gresham Smith

Zachary Neihof – KYTC District 5

Adam Kirk – Adam Kirk PE

Brandon Shelley – LMPW Traffic Engineering & Operations

[Page Intentionally Left Blank]

Appendix C – Crash Data

Dawn/Dusk/Night	29	5	8	7	44	23	27
Daylight	111	4	8	29	191	88	24

Wet	36	2	7	4	64	23	16
Dry	104	7	9	32	171	88	35

Description of Manner of Collision	Number of Collisions	Percent of Total Number of Collisions	Number of Injury Collisions	Percent of Total Number of Injury Collisions
Angle Collisions	140	23.41%	25	32.05%
Backing Collisions	9	1.51%	0	0.00%
Head On Collisions	16	2.68%	4	5.13%
Opposing Left Turn Collisions	36	6.02%	12	15.38%
Rear End Collisions	235	39.30%	13	16.67%
Sideswipe Collisions	111	18.56%	7	8.97%
Single Vehicle Collisions	51	8.53%	17	21.79%
Total Number of Collisions:	598	100%	Total Number of Injury Crashes:	78

Description of Roadway Condition	Number of Collisions	Percent of Total Number of Collisions	Number of Injury Collisions	Percent of Total Number of Injury Collisions
Dry Conditions	446	74.58%	64	82.05%
Wet Conditions	152	25.42%	14	17.95%

Description of Lighting Condition	Number of Collisions	Percent of Total Number of Collisions	Number of Injury Collisions	Percent of Total Number of Injury Collisions
Daylight Conditions	455	76.09%	50	64.10%
Dawn/Dusk/Night Conditions	143	23.91%	28	35.90%

Study Range: 2016 - 2018

Works Cited

Chapter 1

City of Louisville. 1999. Feasibility study to re-curb eastern parkway. Louisville, KY: City of Louisville Department of Public Works, Division of Architecture and Engineering \\global.gsp\data\mktg\na_mktg\Pursuits\2017\07\17200707222\W2W\previous_studies

Cornerstone 2020 Livability Committee. 1995. Parks and open space master plan. Louisville, KY: Louisville and Jefferson County Parks Department. https://louisvilleky.gov/sites/default/files/parks/pdfs/parksandopenspacemasterplan.pdf

Louisville Metro Government and Metro Council. 2015. Louisville urban tree canopy assessment. Louisville, KY: Louisville-Jefferson County Metropolitan Government. https://louisvilleky.gov/sites/default/files/community_forestry/community_foresty_files/louisvilleutcreport-24march2015_draft.pdf

Louisville Metro Parks 2009. Olmsted parkway shared-use pathway system master plan. Louisville KY: Louisville-Jefferson County Metropolitan Government. https://louisvilleky.gov/government/parks/olmsted-parkways-shared-use-path

Louisville Olmsted Parks Conservancy, Inc. 1994. Master plan for Louisville's Olmsted parks and parkways: A guide to renewal & management. Louisville, KY: Louisville Olmsted Parks Conservancy. https://louisville.edu/cepm/westlou/park-plans/olmstead-master-plan-table-of-contents/at_download/file https://louisvilleky.gov/sites/default/files/parks/planning_and_design/mpchapter6olmstedparkways.pdf

Louisville Olmsted Parks Conservancy, Inc. 2005. Louisville Olmsted parkways design standards. Louisville, KY: Louisville Olmsted Parks Conservancy.

City of Louisville. 2016. Move Louisville 2035 transportation plan. Louisville, KY: Louisville-Jefferson County Metropolitan Government. https://louisvilleky.gov/sites/default/files/advanced_planning/movelouisville_april2016draft.pdf

Chapter 3

Ames, David L and Linda Flint McClelland. 2002. Historic Residential Suburbs in the United States, 1830-1960, National Register of Historic Places, Multiple Property Documentation Form. National Park Service, Washington, D.C.

Clay, Grady. 2002. Salmagundi Club. In Louisville Encyclopedia, J. E. Kleber, ed. University Press of Kentucky, Lexington.

Courier-Journal Staff. 1904. Gravel Road: Eleven Miles Long Will Be Constructed. Courier-Journal January 26, 1904.

Cowan, Andrew. 1887. Louisville Park System. Louisville Courier-Journal. Louisville, Kentucky.

Durrett, Reuben T. 1891. Indian Names for Our Parks. Suggestions to the Louisville Board of Park Commissioners. July 28. Reuben Durrett, Papers: 1831-1921, Folder 61. Available at The Filson Historical Society, Louisville, Kentucky.

Historic Photos of Louisville KY and Environs blog. 2019. Professional Baseball Parks of the Past. Electronic document at https://historiclouisville.weebly.com/four-baseball-parks.html. Accessed 7-31-2019.

HNTB. 2010. Olmsted Parkways Shared-Use Pathway System Master Plan. HNTB Corporation, Louisville. Prepared for Louisville Metro Parks.

Kleber, John E., editor(s).

1992. The Kentucky Encyclopedia. The University Press of Kentucky, Lexington.

2002. Oakland. In Louisville Encyclopedia, J. E. Kleber, ed. University Press of Kentucky, Lexington.

Kricher, John C. 1988. A Field Guide to Eastern Forests: North America. Houghton Mifflin Company, Boston, Massachusetts.

L.A.Williams & Co. 1882. History of the Ohio Falls Cities and Their Counties: with Illustrations and Biographical Sketches. L. A. Williams & Co., Cleveland.

Louisville Metro Department of Planning and Design Services. 2019. Historic Preservation, Landmarks and Overlay Districts. Electronic document at https://louisvilleky.gov/government/planning-design/historic-preservation-landmarks-and-overlay-districts. Accessed 7-31-2019.

Morgan, David and Richard Jett. 2002. Jefferson County History and Timeline. Electronic document at www.jefferson.ky.us/AboutHistory.html.

Muller, J. D. 1986. Archaeology of the Lower Ohio River Valley. Academic Press, New York, New York.

National Park Service Gallery

1976a. University of Louisville Belknap Campus Historic District National Register of Historic Places Nomination Form. Accessed 7-31-2019a. U.S. Department of the Interior, Washington, D.C.

1980. Schuster Building National Register of Historic Places Nomination Form. Electronic document at https://npgallery.nps.gov/GetAsset/dedf5672-bc46-440f-b062-6b99b688362a. Accessed 7-31-2019. U.S. Department of the Interior, Washington, D.C.

1982a. Olmsted Park System of Louisville National Register of Historic Places Nomination Form. Electronic document at https://npgallery.nps.gov/GetAsset/f054b939-5487-408b-b897-a9bb62193cf4/. Accessed 7-31-2019a. U.S. Department of the Interior, Washington, D.C.

1982b. Highlands Historic District National Register of Historic Places Nomination Form. Electronic document at https://npgallery.nps.gov/GetAsset/a1c7ae64-9a5b-4f17-982a-402f0028b3d7. Accessed 7-31-2019b. U.S. Department of the Interior, Washington, D.C.

Newton, Norman T. 1971. Design on the Land: The Development of Landscape Architecture. Belknap Press of Harvard University Press, Cambridge, Massachusetts.

Parola, Aurthur C. Jr, William S. Vesely, Michael A. Croasdaile, Chandra Hansen, and Margaret Swisher Jones. 2007. Geomorphic Characteristics of Streams in the Bluegrass Physiographic Region of Kentucky. University of Louisville Stream Institute and the Kentucky Division of Water, Frankfort.

Pollack, David, editor(s) 2008a. Introduction. In The Archaeology of Kentucky: An Update, Volume I, Kentucky Heritage Council State Historic Preservation Comprehensive Plan Report No. 3, David Pollack, ed. pp. 1-26. Kentucky Heritage Council, Frankfort, Kentucky.

University of Louisville. 2019. Campus Map. Electronic document at http://louisville.edu/about/campuses.html#belknap. Accessed 7-31-2019.

Watrous, Gary B. 1977. Louisville Survey West. Prepared for the City of Louisville, Kentucky. Prepared by Preservation Alliance of Louisville and Jefferson County Inc.

Yater, George H. 1992. Jefferson County. In The Kentucky Encyclopedia, J. E. Kleber, ed. pp. 464-467. University of Kentucky, Lexington, Kentucky.

Zimmerman, William H. 1966. Soil Survey: Jefferson County, Kentucky. United States Department of Agriculture, U. S. Government Printing Office.

Chapter 5

Safety. 2017. *Proven Safety Countermeasures - Road Diets - (Roadway Reconfiguration)*. | Federal Highway Administration. [online] Available at: <https://safety.fhwa.dot.gov/provencountermeasures/road_diets/> [Accessed 25 March 2020].

Safety. 2020. *Road Diets And Emergency Response: Friends, Not Foes.* | Federal Highway Administration [online] Available at: https://safety.fhwa.dot.gov/road_diets/resources/pdf/fhwasa17020.pdf> [Accessed 25 March 2020].

Louisville's
Olmsted Parkways
EASTERN PARKWAY

Gresham
Smith