GET THERE TOGETHER.

KENTUCKY 2022-2045

LONG-RANGE STATEWIDE TRANSPORTATION PLAN

TEAM KENTUCKY
TRANSPORTATION CABINET


COMMONWEALTH OF KENTUCKY
UNITED WE STAND
DIVIDED WE FALL

MESSAGE FROM THE SECRETARY

Dear Kentuckians,

Where are your favorite places to travel across the Commonwealth? Maybe it's a vacation spot on Lake Cumberland, a weekend of racing at Keeneland, or even a cross-state trip to visit friends and family. Our mission at the Kentucky Transportation Cabinet (KYTC) is to provide all of you and those who travel through Kentucky with a best-in-class transportation system to get you where you want to go safely and efficiently.

As we strive to meet the transportation needs of the Commonwealth's diverse, growing population and business community, a key element to support those efforts is our 2022-2045 Long-Range Statewide Transportation Plan (LRSTP). Through a 14-month process, we've developed this policy-based document with input from the public that identifies the goals, policies, needs, and analysis tools to set the direction of Kentucky's transportation system as we look toward 2045.

The vision of the 2022-2045 LRSTP is to offer a viable, reliable, and resilient multimodal transportation system to provide access and mobility for all users — highways, freight, rail, marine, active transportation (bicyclists-pedestrians), aviation, transit — for the safe movement of people and goods.

This plan is focused on all aspects of transportation and takes into account various changes that may impact our transportation network, as well as priorities the public has identified through open public comment periods over the course of the past year. You can read more about how we developed this plan on our project website: GetThereTogetherKY.org.

And finally, an implementation plan is included in the 2022-2045 LRSTP, outlining actions designed to support our mission, vision, goals, objectives, and performance measures, as defined in this document.

If you were able to take the time to provide input into the LRSTP, we sincerely thank you. Please know that your feedback is an important part of shaping our statewide transportation planning between now and 2045.

Sincerely,

Jim Gray
Secretary
Kentucky Transportation Cabinet

TEAM KENTUCKY
TRANSPORTATION CABINET

ACKNOWLEDGMENTS

Kentucky's GET THERE TOGETHER KY 2022-2045 Long-Range Statewide Transportation Plan (LRSTP) serves all people by helping us provide a great transportation system! The LRSTP is a collaborative effort among our government, businesses, and private residents. The Kentucky Transportation Cabinet (KYTC) appreciates the involvement of the public for providing input essential for this process. The KYTC executive leadership comprised the Vision/Executive Committee which met three times during the LRSTP process. This group helped identify early needs, participated in a scenario workshop to create a vision of the future, and provided guidance for implementation tasks. The Multimodal Advisory Committee met twice during the LRSTP process, with various representatives from across the state. Numerous KYTC staff members engaged in sessions to evaluate Department, Division, and District needs and joined the Metropolitan Planning Organizations (MPOs) and Area Development Districts (ADDs) to participate as part of the Statewide Planning Group.

ACKNOWLEDGMENTS

The Project Team leaders included:

- Mikael Pelfrey, Director, KYTC Division of Planning
- Jacob Huber, Project Manager, KYTC Division of Planning

The Vision/Executive Committee included:

- Jim Gray, Secretary
- Michael Hancock, Deputy Secretary
- James Ballinger, State Highway Engineer
- John Moore, Deputy State Highway Engineer
- Jason Siwula, Deputy State Highway Engineer
- Tracy Nowaczyk, Assistant State Highway Engineer
- Ron Rigney, Director, Division of Program Management
- Amanda Spencer, Innovative Finance Manager
- Robin Brewer, Executive Director, Office of Budget and Fiscal Management

KYTC Office of Public Affairs staff included:

- Naitore Djigbenou, Executive Director
- Chuck Wolfe, Deputy Executive Director

KYTC Department of Vehicle Regulation staff included:

- Matthew Cole, Director

The Multimodal Advisory Committee members included:

- Kentucky Association of Highway Contractors
- Kentucky Association of Riverports
- Kentuckians for Better Transportation
- Kentucky Department for Public Health, SPAN/Active Living Program
- Kentucky Public Transit Association
- KYTC – Division of Planning
- KYTC – Division of Highway Design
- KYTC – Division of Environmental Analysis
- KYTC – Office of Transportation Delivery
- KYTC – Division of Right of Way & Utilities
- KYTC – Division of Structural Design
- KYTC – Division of Construction
- KYTC – Division of Traffic Operations
- KYTC – Division of Maintenance
- KYTC – Division of Materials
- KYTC – Department of Aviation
- Louisville Metro
- Transit Authority of Louisville (TARC)
- Transit Authority of Northern Kentucky (TANK)

The Kentucky Division of the Federal Highway Administration (FHWA) partners included:

- Steven Jacobs
- John Ballantyne
- Bernadette Dupont

Statewide Planning Group members included:

- 12 KYTC Highway District Offices
- Barren River ADD
- Big Sandy ADD
- Bluegrass ADD
- Buffalo Trace ADD
- Cumberland Valley ADD
- FIVCO ADD
- Gateway ADD
- Green River ADD
- Kentuckiana Regional Planning & Development Agency (KIPDA) ADD & MPO
- Kentucky River ADD
- Lake Cumberland ADD
- Lincoln Trail ADD
- Northern Kentucky ADD
- Pennyrile ADD
- Purchase ADD
- Bowling Green/Warren County MPO
- Ohio-Kentucky-Indiana (OKI) MPO
- Clarksville Area MPO
- Evansville Area MPO
- Huntington Area MPO
- Lexington Area MPO
- Owensboro-Daviess County MPO
- Radcliff/Elizabethtown MPO

KYTC appreciates the public's assistance in providing input and comments for the development of this plan. KYTC contracted with Michael Baker International, along with teaming partners High Street Consulting Group, Rasor Communications, TSW Design Group, Anne Morris & Associates, and Decision Lens to deliver the 2045 LRSTP. The Michael Baker team was led by Patty Dunaway, Project Manager, assisted by Jeff Moore and Karen Mohammadi as Deputy Project Managers.

EXECUTIVE SUMMARY

Kentucky
2022-2045 Long-Range
Statewide Transportation Plan
(LRSTP)

WHY?

In keeping with Federal transportation planning requirements, the 2022-2045 LRSTP provides a basis for meeting the vision for Kentucky's multimodal transportation system by clearly identifying goals, guiding principles, and implementable actions which support the achievement of that shared vision so that we can...

GET THERE TOGETHER.

HOW?

KYTC worked together with local, state, and federal leadership to gather valuable input from public and private sectors for developing the transportation vision, goals, and objectives. The development of the LRSTP began in the fall of 2021 as Kentucky was slowly emerging from the disruptions created by the COVID-19 pandemic and heightened socio-political tensions. During that timeframe, the 2020 Census results provided the identification of major shifts within the demographics of Kentucky's population. In November 2021, the United States Congress passed the Bipartisan Infrastructure Law (BIL) to address the investment need in the nation's infrastructure, providing a funding framework for the coming years. These challenges and opportunities have been fully considered within the development of the LRSTP.

WHAT?

The 2022-2045 LRSTP is a policy-oriented document that establishes broad goals, guiding principles, and strategic actions to work toward the vision for the Commonwealth's multimodal transportation system. The LRSTP is considered a living document to be adjusted as future conditions warrant.

The 2022-2045 LRSTP vision, goals, and guiding principles were drafted through input from KYTC leadership, multimodal stakeholders, and public comments from a survey conducted during the last three months of 2021.

The LRSTP Vision is an overarching statement describing the desired transportation system to be delivered regardless of the challenges or opportunities within the possible futures or scenarios. The Vision is for a viable, reliable, and resilient multimodal transportation system to provide access and mobility for all users for the safe movement of people and goods.

To achieve the expressed vision, a set of five goals was derived from the collected input and were aligned with the seven National Performance Goals of: Safety, Infrastructure Condition, Congestion Reduction, System Reliability, Freight Movement and Economic Vitality, Environmental Sustainability, and Reduced Project Delivery Delays.

NATIONAL PERFORMANCE GOALS

Safety

To achieve a significant reduction in traffic fatalities and serious injuries on all public roads

Infrastructure Condition

To maintain the highway infrastructure asset system in a state of good repair

Congestion Reduction

To achieve a significant reduction in congestion on the National Highway System (NHS)

System Reliability

To improve the efficiency of the surface transportation system

Freight Movement & Economic Vitality

To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development

Environmental Sustainability

To enhance the performance of the transportation system while protecting and enhancing the natural environment

Reduced Project Delivery Delays

To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

National Performance Goals Source: https://www.fhwa.dot.gov/tpm/about/goals.cfm

LRSTP Vision and Goals

The Kentucky LRSTP VISION is for a viable, reliable, and resilient multimodal transportation system to provide access and mobility for all users for the safe movement of people and goods.

The five interconnected LRSTP Goals which support the delivery of the LRSTP Vision for the Commonwealth of Kentucky are:

- Enhance safety
- Deliver a high level of maintenance and resiliency
- Establish a reliable flow of people and freight
- Provide local, regional, and global connectivity for communities
- Deliver and operate a system that protects or enhances the natural and human environment

The five LRSTP Guiding Principles were also derived from stakeholder and public input. These Guiding Principles provide the process framework for the delivery of improvements or policies supporting the achievement of all five LRSTP Goals and are outlined as follows:

Quality of Life
Create a clean and efficient system that promotes healthy and fully engaged lifestyles while protecting the natural and human environment

Equity
Seek fairness in mobility and accessibility to meet the needs of all community members

Adaptability/Sustainability
Develop and operate a system that can adjust to the potentially disruptive forces of advances in technology, funding challenges, or human-made and natural disasters

Seamlessness
Integrate connectivity across all modes to provide reliable trip choices for people and freight

Economic Vitality
Deliver and operate a system that improves the ability of the state to provide employment and market opportunities

Scenario Planning

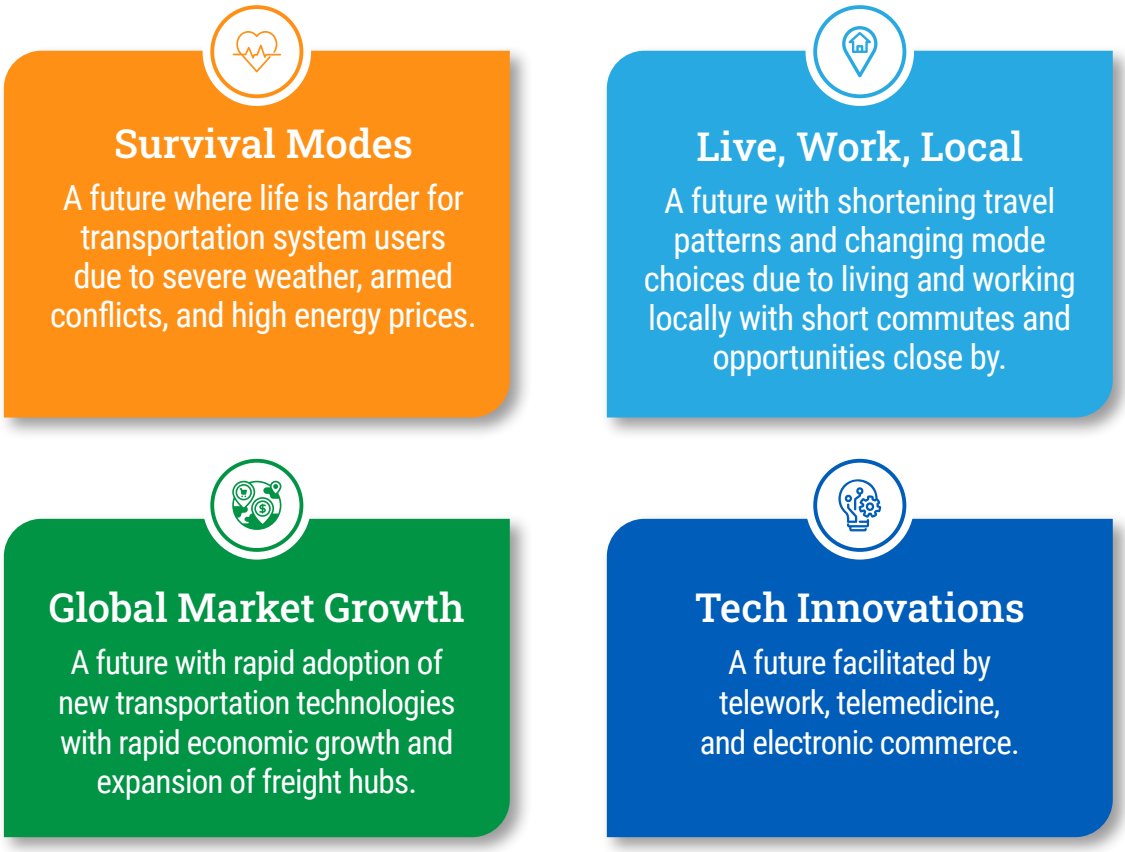
In April 2022, a scenario planning workshop was convened to discuss and identify what kinds of transportation networks, new investment strategies, and new policies or policy changes could be needed. Additionally, the analysis identified what parts of the transportation network might be most vulnerable and how internal business processes and structures might need to change. Within the workshop, a wide representation of transportation professionals and advocates tackled the challenges and opportunities of four possible scenarios with the LRSTP Vision, Goals, and Guiding Principles informing the decision-making within those discussions.

Workshop participants also explored impacts to how transportation projects should be prioritized for each scenario through KYTC's Strategic Highway Investment Formula for Tomorrow (SHIFT) process. Finally, participants worked together in small groups to allocate the transportation revenue that is expected to be raised under each scenario (accounting for differences in economic growth, vehicle usage, and vehicle fuel types among other factors) in programmatic investment areas to achieve necessary transportation performance. This exercise required trade-offs to prioritize the portions of the multimodal transportation system that were most essential under each scenario.

Four common investment decision themes emerged from the scenario planning analysis across the four scenarios.

- Moderate increase in investment in system preservation
- Restrained investment in the capacity of the highway system
- Expectation of improved safety due to advancing technology
- Growing investment in active transportation facilities such as sidewalks, bike lanes and transit stops

Possible Future Scenarios



The scenario planning analysis, the analysis of the system's existing conditions, and individual modal transportation plans provided input for the development of the 2022-2045 LRSTP Plan of Action.

This Plan of Action includes recommendations on policies, policy changes, investment strategies, new programs, changes to program structure, and organizational changes to help KYTC better prepare for the impacts of the alternative futures on the transportation system.

The Plan of Action's recommendations were grouped into four categories:

- **Funding and Revenue**
- **Programming and Project Decision Making**
- **KYTC's Organizational Structure**
- **Standards and Processes**

Together, the recommendations help advance the Commonwealth toward all the LRSTP Goals and Objectives and achieve the LRSTP Vision for a viable, reliable, and resilient multimodal transportation system to provide access and mobility for all users for the safe movement of people and goods.

Pathways to the Plan of Action & Implementation Plan

As shown in the Pathways figure above, the Kentucky 2022-2045 LRSTP was developed and finalized using the evaluation of existing conditions, scenario planning analyses, and input from KYTC leadership, multimodal transportation stakeholders, resource agency partners, and the general public.

LRSTP Implementation Plan

An important component of this process was the creation of the LRSTP Implementation Plan in which identified tasks were formulated to support the recommendations of the LRSTP Plan of Action. Included in the Implementation Plan is a breakdown of tasks and responsibility for accomplishing each item within the four categories derived from the Plan of Action. The LRSTP Implementation Plan includes tasks such as:

Funding and revenue adjustments through engagement with Legislative and Executive Branches of State Government to:

- Identify additional potential dedicated and sustainable transportation funding opportunities to reach the proper allocation of revenues that will address the state's transportation needs.
- Consider legislative changes that could capture transportation-related costs created from redevelopment or new development (impact fees, special taxation districts, etc.).
- Consider funding possibilities that would permit the use of Road Funds for matching federal funds or providing financial assistance to the non-highway transportation modes.

Programming and project decision-making considerations in the programming of future investment strategies to:

- Consider resiliency and vulnerability in seeking investment in more reliable transportation solutions to serve areas of historical disasters more effectively.
- Provide continued investment in Intelligent Transportation Systems (ITS) to address human-made or natural disruptions to the transportation system.
- Evaluate investments in projects that increase accessibility at a lower cost such as transit or active transportation (pedestrians and bicyclists).

KYTC organizational structure changes such as:

- Continue to promote the development of a data management framework to allow real-time data integration from multiple data sources (historical KYTC data, automobiles, transit vehicles, trucks, mobile devices, infrastructure) and communication channels (fiber optics, Wi-Fi, 5G, digital short-range communications [DSRC], and other radio communications).
- Explore the possibility of creating personal service contracts with individuals who could work directly with and for KYTC to meet advancing technologies, trends, and emergency response needs.

Standards and process updates to meet growing needs that:

- Incorporate the roll-out of emerging vehicular technologies (EV, C/AV, etc.) into the planning, design, delivery, and maintenance of the system that allows flexibility in adapting the system with minimal additional expense if technologies change.
- Institute policies and legislation on the testing and operation of C/AVs in Kentucky, in particular to transit, C/AV freight, and truck platooning.
- Adjust the design process and the investment in materials to promote durability in all transportation assets, including pavement, bridges, and transit vehicles.

GET THERE TOGETHER.

KENTUCKY 2022-2045

LONG-RANGE STATEWIDE TRANSPORTATION PLAN

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SECTION

1

LRSTP Framework

Why? How? What?

WHY?

In keeping with Federal transportation planning requirements, the 2022-2045 LRSTP provides a basis for meeting the vision for Kentucky's multimodal transportation system by clearly identifying goals, guiding principles, and implementable actions which support the achievement of that shared vision so that we can...

GET THERE TOGETHER.

As part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the US Department of Transportation (USDOT) required each state department of transportation to develop a "continuing, cooperative, and comprehensive" statewide multimodal planning process, to include the development of a long-range statewide transportation plan. The state long-range transportation plan development process is guided by federal regulations and statutes under CFR 23: 450.214 and Title 23, U.S.C. Sec. 135 (as detailed on the following page). This includes a series of factors that each statewide planning process should consider, as well as the identification of basic plan components[1].

[1] https://highways.dot.gov/federal-lands/programs-planning/lrtps

23 U.S. Code § 135: Statewide and Non-metropolitan Transportation Planning

1. **Development of plans and programs.**
   Subject to section 134, to accomplish the objectives stated in section 134(a), each State shall develop a statewide transportation plan and a statewide transportation improvement program for all areas of the State.
2. **Contents**
   The statewide transportation plan and the transportation improvement program developed for each State shall provide for the development and integrated management and operation of transportation systems and facilities (including accessible pedestrian walkways, bicycle transportation facilities, and intermodal facilities that support intercity transportation, including intercity buses and intercity bus facilities and commuter van pool providers) that will function as an intermodal transportation system for the State and an integral part of an intermodal transportation system for the United States.
3. **Process of development**
   The process for developing the statewide plan and the transportation improvement program shall provide for consideration of all modes of transportation and the policies stated in section 134(a) and shall be continuing, cooperative, and comprehensive to the degree appropriate, based on the complexity of the transportation problems to be addressed.

   (b) Coordination With Metropolitan Planning; State Implementation Plan.—A State shall—

   (1) Coordinate planning carried out under this section with the transportation planning activities carried out under section 134 for metropolitan areas of the State and with statewide trade and economic development planning activities and related multistate planning efforts; and

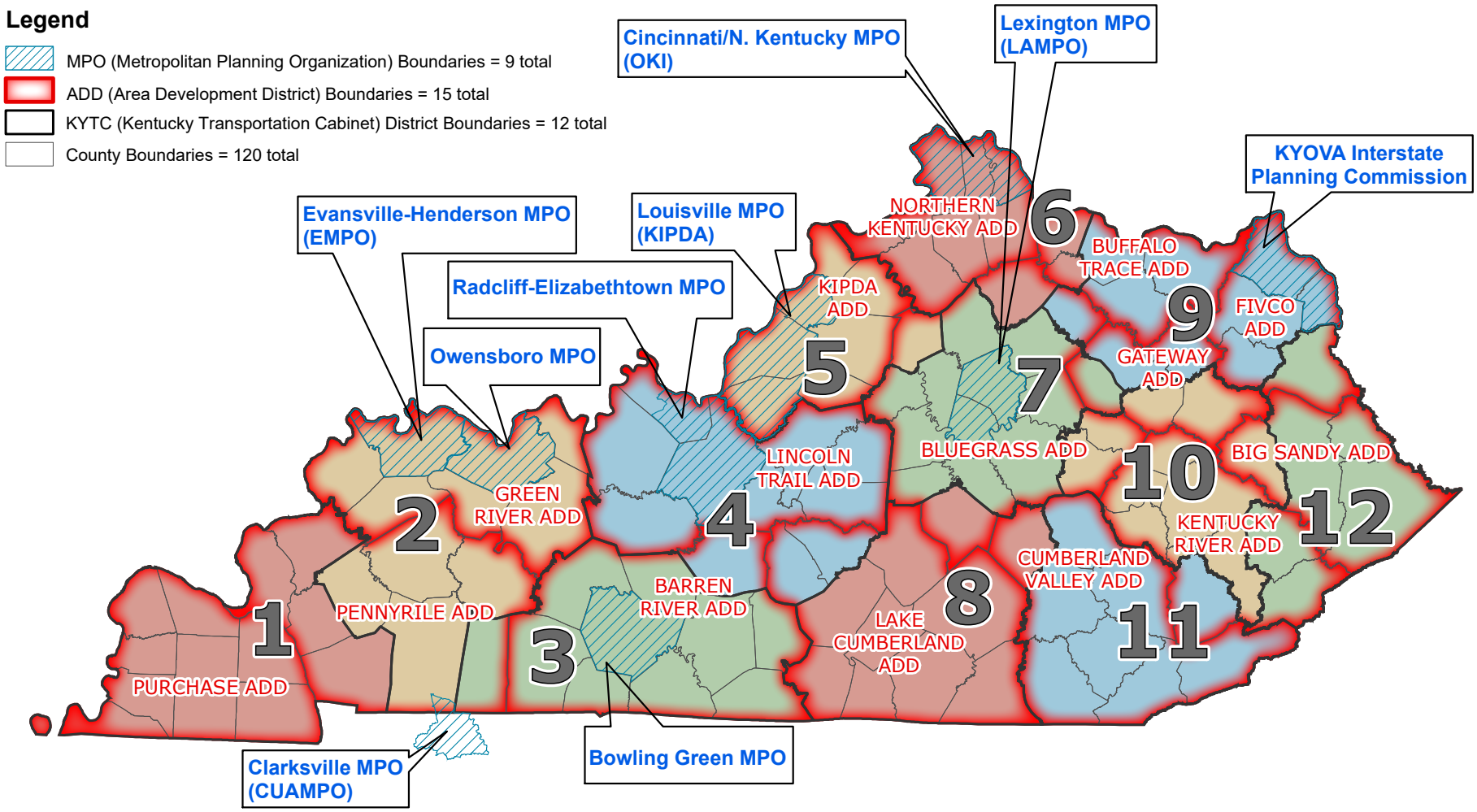
   (2) Develop the transportation portion of the State implementation plan as required by the Clean Air Act (42 U.S.C. 7401 et seq.).

How?

The development of the Kentucky LRSTP is a knowledge-driven process based upon valid, broad-based input. The outcomes of this process are beneficial to the effective transportation decision-making required to address the maintenance and improvement of Kentucky's multimodal transportation system. The input that fuels the LRSTP planning process originates from government, public, and technical sources and is gathered to answer fundamental questions such as those illustrated to the right.

One of the most important elements of the planning process is the engagement and communications efforts used to collect meaningful input for plan development. In developing these communications and engagement procedures, KYTC complied with Title 23 of the Code of Federal Regulations under Chapter 1, Subchapter E, Part 450, Subpart B, 450.210 (23 CFR 450.210) "Interested Parties, Public Involvement, and Consultation" processes by providing opportunities for public review and comment at key decision points. In the fall of 2021, meetings were held with the KYTC Vision/Executive Committee, the Multimodal Advisory Committee, and the Statewide Transportation Planning Group. The Kentucky Statewide Transportation Survey was created to provide a broad engagement opportunity for the public. These engagement and communications efforts generated the input necessary for the creation of the LRSTP Vision, Goals, and Guiding Principles and to lead the development of the overall LRSTP document. This statewide interaction continued through the drafting of the LRSTP and its release in the fall of 2022 for a 30-day public review and comment period.

ADD, MPO and KYTC Highway District Boundaries



WHAT?

The initial Long-Range Statewide Transportation Plan (LRSTP) was developed by the Kentucky Transportation Cabinet (KYTC) in 1995 and updated in 1999. Both plans included policy direction and specific projects for each transportation mode for two timeframes: a short-range element of up to six years and a long-range element of six to twenty years. A 2006 LRSTP update shifted away from a hybrid policy/project-oriented format to one that is purely policy-based, providing a basis for meeting the vision for Kentucky's transportation system by clearly identifying goals, policies, and needs as well as the necessary analysis tools. The 2014 LRSTP continued the policy-based focus and incorporated the tenets of performance-based planning and programming. This 2022-2045 LRSTP continues this policy-based format. The LRSTP is a policy plan with a scope of **OVER 20 YEARS** that sets the vision for state transportation across all modes and defines the goals, objectives, and performance measures for the system's development, maintenance, and operations. The LRSTP is also mandated by the Fixing America's Surface Transportation (FAST) Act of 2015 and the 2021 Bipartisan Infrastructure Law (BIL) as continued through subsequent reauthorizations, the Congressional Acts that authorize ongoing federal aid to transportation programs. The LRSTP is updated approximately every seven years to ensure it stays current and is able to meet the needs of today's rapidly changing transportation environment.

With each update, KYTC has evolved its LRSTP planning process to meet the challenges of limited resources, emerging technologies, and the demands of future transportation users. Improvements to the 2022-2045 LRSTP planning process included enhancing the public input and participation process (especially within the confines of the COVID-19 pandemic restrictions) the incorporation of the Scenario Planning Analysis, and the development of the LRSTP Implementation Plan.

In previous transportation-authorizing legislation, metropolitan and statewide planning processes were enhanced to incorporate performance goals, measures, and targets into the process of identifying needed transportation improvements and project selection. The performance-based planning and programming framework identified within the 2014 LRSTP was continued within the 2022-2045 LRSTP with the description of KYTC's SHIFT process that provides a data-driven pathway for improvements from need identification to prioritization and programming.

The LRSTP plan includes a comprehensive transportation inventory, forecasts, and analysis of trends, issues, and possible future scenarios affecting all modes of transportation throughout Kentucky. Detailing that inventory and analysis, technical reports have been published in conjunction with this revision. The technical reports should be referred to for details on specific aspects of the current conditions and future challenges or opportunities faced by each of the transportation modes operating within Kentucky's transportation infrastructure. The white papers should be referred to for current assessments of key trends and demographic changes.

Although primarily a statewide policy plan, the 2022-2045 LRSTP also incorporates, by reference, the Metropolitan Transportation Plans (MTPs) of Kentucky's nine Metropolitan Planning Organizations (MPOs), which include fiscally constrained projects as well as policy.

FOR ADDITIONAL INFORMATION:

Details of the engagement and communications activities can be found in the LRSTP Public Involvement Notebook

SECTION

2

Existing Conditions and Trends

A key first step in the development of the LRSTP involves understanding who the plan is prepared for, what the current transportation system looks like, what plans have been done to help determine needs, and how we can address gaps. This section includes:

- **Who Are We? Statewide Demographic Analysis**
  Completed first to gain an understanding of the residents of Kentucky
- **Transportation At-A-Glance**
  A quick overview of the existing transportation system
- **Summary of Modes**
  Additional details on the systems and needs
- **Statewide Transportation Survey**
  Feedback from the public on their transportation needs
- **Forces of Change**
  A review of anticipated changes in transportation due to items such as technology and environment
- **Summary of Transportation Needs**
  Information on the gaps identified from each system review supported by data from the survey

Who Are We? Statewide Demographics Analysis

In an effort to determine who "Kentucky" is, demographic information from the 2020 US Census was compiled to create a fact-based portrait of the state's residents which included the characteristics of race, age, income, disability, population growth, and travel behaviors. Special emphasis was made to identify those who have been traditionally transportation disadvantaged such as minorities, low-income households, those who had low literacy or English language proficiency, and households with limited or no broadband internet access.

The information contained within this section provided the framework for an extensive and equitable communication plan for involving all Kentuckians, regardless of circumstances, in the decision-making process of how we can deliver an implementable LRSTP as we **"GET THERE TOGETHER."**

Additionally, this demographic information was vital in the determination of possible trends that could produce both challenges and opportunities embodied within the possible futures in the Scenario Planning Analysis.

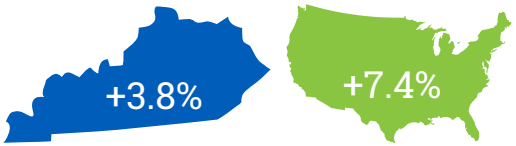
This demographic analysis aims to break down the data relating to certain trends within the population of Kentucky and its counties. The specific transportation needs of individual Kentuckians will often vary based on factors such as age, income, race, commuting patterns, and access to internet. An accurate, fact-based portrait of the Commonwealth is the foundation of any plan that hopes to provide the best possible service to Kentucky residents and the most efficient use of their tax dollars.

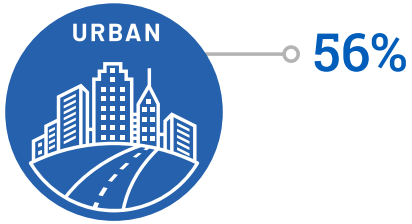
POPULATION TRENDS

The 2020 data from the Decennial Census shows Kentucky's total population at 4,505,836. This is a 3.8% increase in population from 2010 Census versus a 7.4% nationwide growth rate during the same period.

4,505,836
Kentuckians

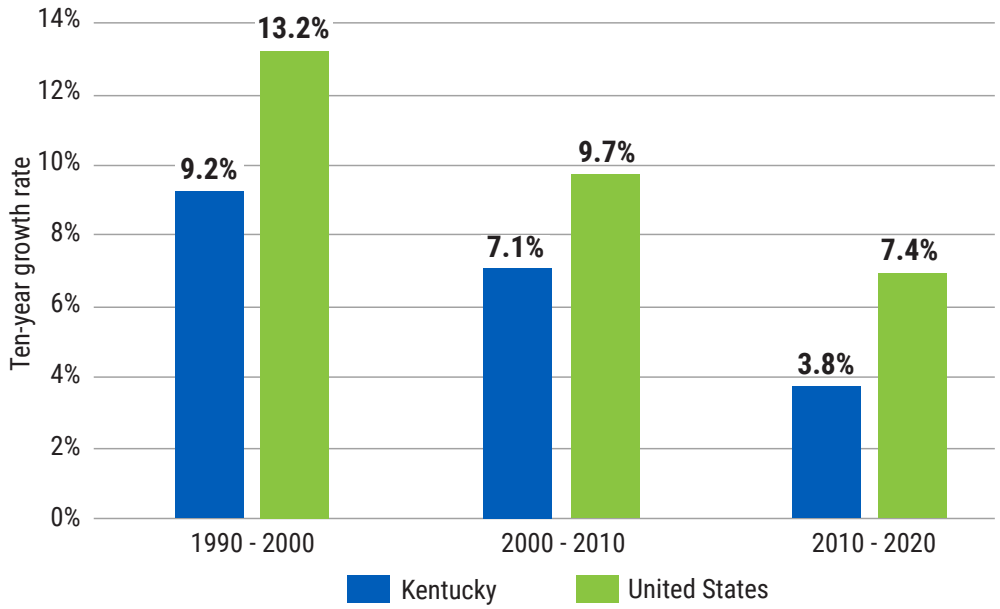
2010 - 2020
Growth



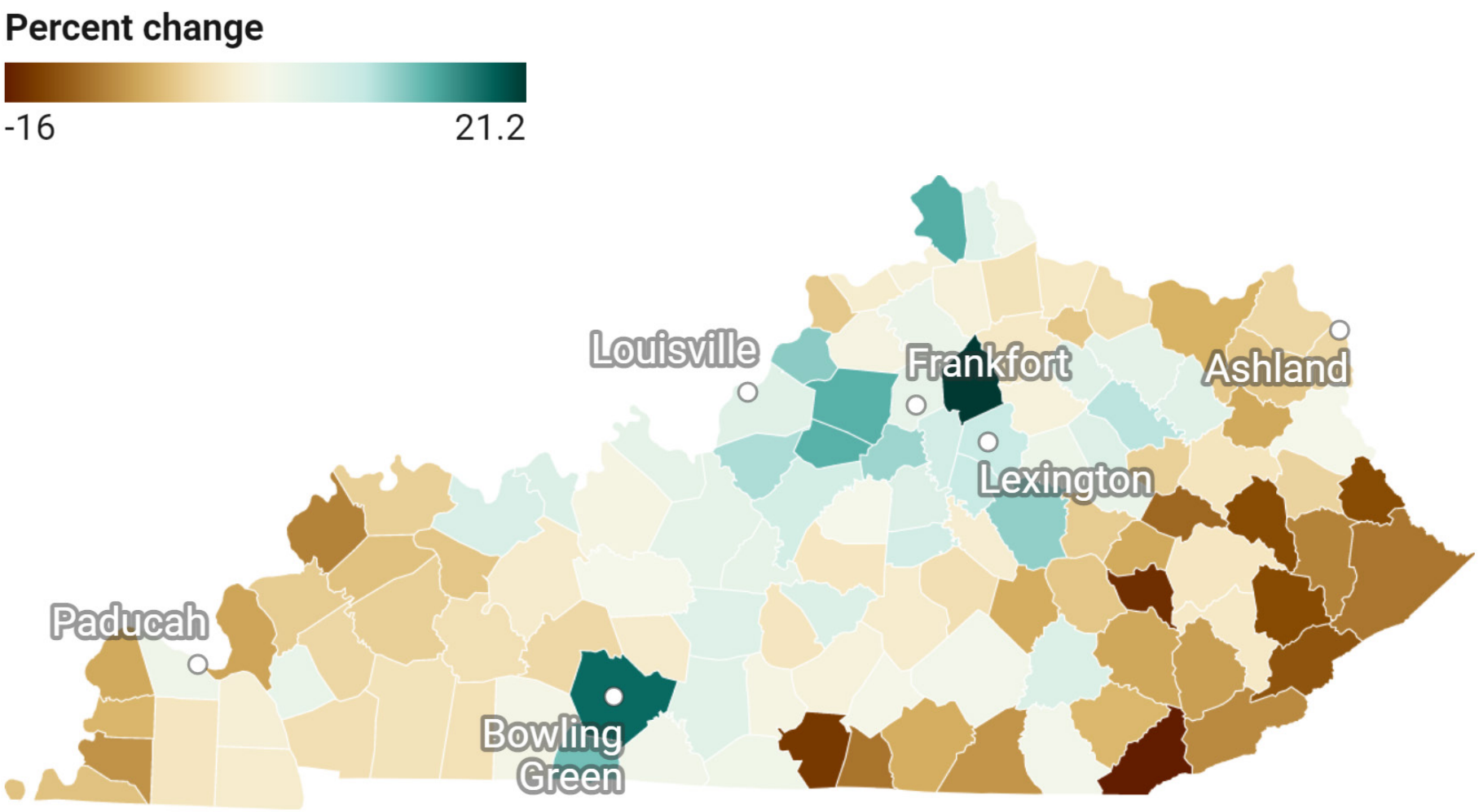


Source: U.S. Census Bureau, Population Division
Annual Estimates of the Resident Population for Incorporated Places (cities) in Kentucky: April 1, 2020 to July 1, 2021 (SUB-IP-EST2021-POP-21)

Population Change in Kentucky vs. United States from 1990 to 2020



2010-2020 Population Growth



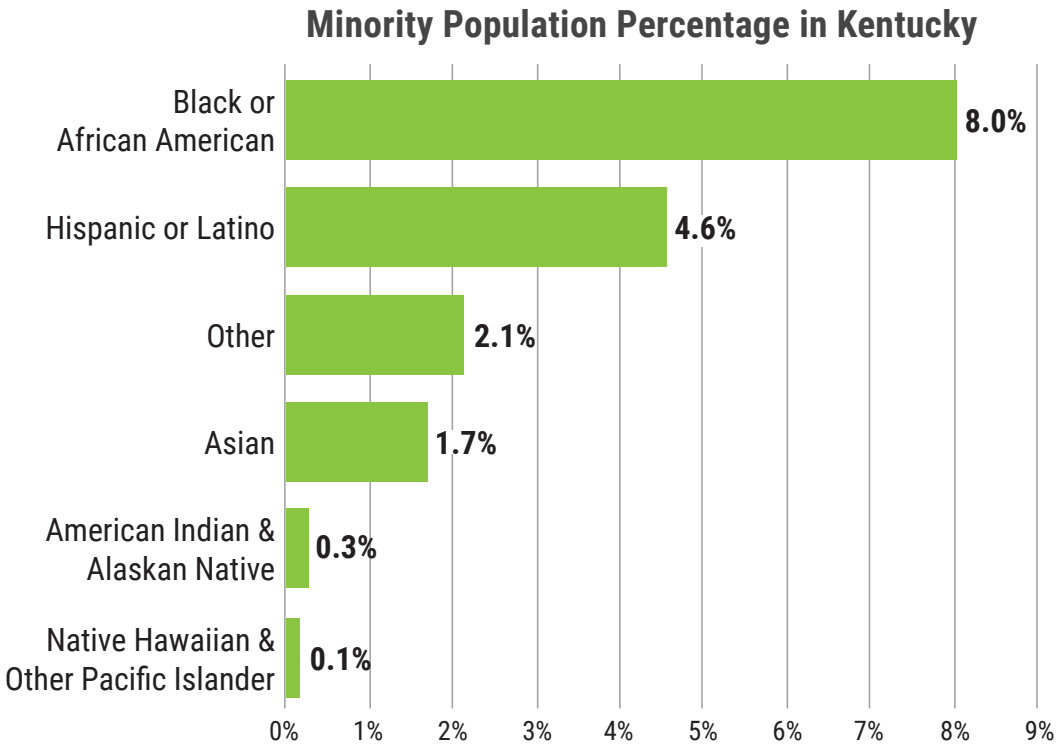
Source: U.S. Census Bureau Get the data Created with Datawrapper

AGE TRENDS

The Kentucky Data Center's 2016 Vintage shows population projections up to the year 2040. In raw numbers, age groups between 0 and 74 years are greater in populace than those in the 75 to 85+ groups. However, the projections for the 65+ age groups have a significantly higher average rate of population growth compared to younger age groups. The 85+ group has the highest rate at a 15.7% growth projected between 2010 to 2040. Those aged 0 to 15 years are projected to hold a minimal rate of growth, with less than 1%. The only age group projected to have a population decline are those between 45 to 64 years. The counties with the highest percentage population of those 65 years and older are Lyon, Hickman, Trigg, Marshall, and Cumberland.

RACE TRENDS

Kentucky's population is predominantly white, although it shows the national trend of increasing representation by minority populations. The state's Black/African American population is the largest minority group; however, the state's Hispanic population continues to increase, now accounting for almost 5% of Kentucky's total population. The top five counties with the highest total Black/African American population are Jefferson, Fayette, Christian, Hardin, and Warren. These counties also have the highest population of those who identify as Hispanic.



LANGUAGE TRENDS

English remains the majority spoken language throughout the state. Statewide, 5.6% reported to speak a language other than English, with 2.3% reporting to speak English less than "very well". Spanish-speaking constituents make up the largest percentages of this group at 2.7%, with "Other Indo-European languages" at 1.5% and "Asian and Pacific Islander languages" at 0.9%. Fayette, Warren, Todd, Christian, and Jefferson counties have the top 5 lowest English-only speaking populations.

INCOME TRENDS

Kentucky's median household income is $52,295 per year, compared to $65,712 nationwide. While many Kentucky counties fell below the national median income, five counties exceed it: Boone, Oldham, Spencer, Shelby, and Scott. Conversely, Wolfe, Lee, Clay, Bell, and Harlan counties are shown to have the lowest median incomes, each falling under $30,000.

Kentucky has an individual poverty rate of 17.3%, compared to 13.4% nationwide. Of Kentucky's 120 counties, 106 show an individual rate higher than the national rate of 13.4%. The counties with the highest poverty rates in Kentucky include Owsley, Martin, Clay, Lee, and Floyd.

$52,295
Median
Household Income

106 out of 120
Counties with poverty rates
HIGHER than
national average

EDUCATION TRENDS

For those age 25 years and older in Kentucky, 12.0% have not received a high school diploma, as reported on the 2019 American Community Survey (ACS) estimates. However, 34.3% of Kentuckians have a college degree. On a county level, Oldham County has the highest percentage of its population that has completed a bachelor's degree.

Educational Level for Population 25 years and Over

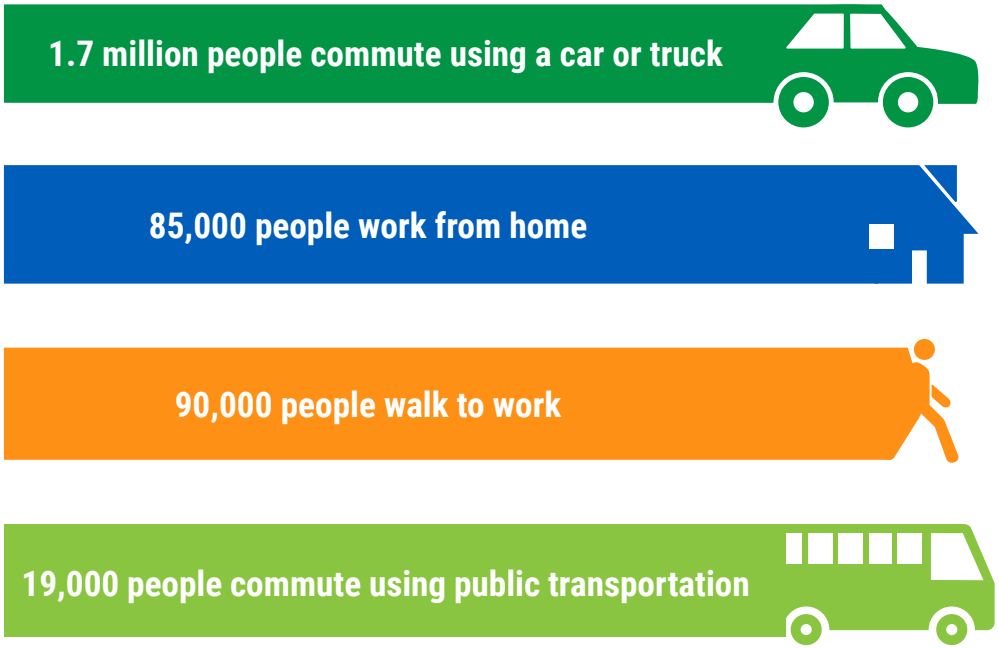
Highest Degree Achieved	Kentucky	Unites States	Percent Difference
Master's Degree, Professional Degree or Doctorate Degree	11.8%	13.0%	-1.2%
Bachelor's Degree	14.2%	19.8%	-5.6%
Associate's Degree	8.3%	8.5%	-0.2%
Some College Coursework	20.8%	20.4%	0.4%
High School Diploma	32.9%	27.0%	5.9%
Less than High School Diploma or GED	12.0%	11.3%	0.7%

FOR ADDITIONAL INFORMATION: See Appendix A: Who Are We? A Demographic Overview of Kentucky

COMMUTING TRENDS

On average, a Kentuckian's travel time is approximately 24.2 minutes to work, compared to the national average of 27.6 minutes as reported by the ACS.

Kentucky continues to be a predominantly rural state, with the personal automobile as the primary method by which workers commute. More than 125,000 people have no personal vehicles available. The top five counties with the highest population without a personal vehicle are Jefferson, Fayette, Kenton, Campbell, and Pike. Of the workers 16 years of age and older, 9.0% use means other than a personal vehicle to travel to work. Of these, approximately 85,000 people work at home, over 90,000 people walk, about 19,000 people use public transportation, and another 28,000 people travel to work using "other means" such as bicycling, carpooling or shared vehicles. The largest gap between Kentucky and the nation is in the use of public transportation, which has a rate five times higher nationally than in the Commonwealth.



INTERNET ACCESS TRENDS

Internet Subscriptions

- Out of the total households in Kentucky, 81.6% have an internet subscription.
- Of those with an internet subscription, 62.8% have a broadband internet connection, categorized as cable, fiber optic, or DSL internet.
- Basic Internet subscriptions are available to 94.4% of Kentuckians leaving 5.6% without the option to acquire service due to a lack of infrastructure.

Income and Internet Access Relation

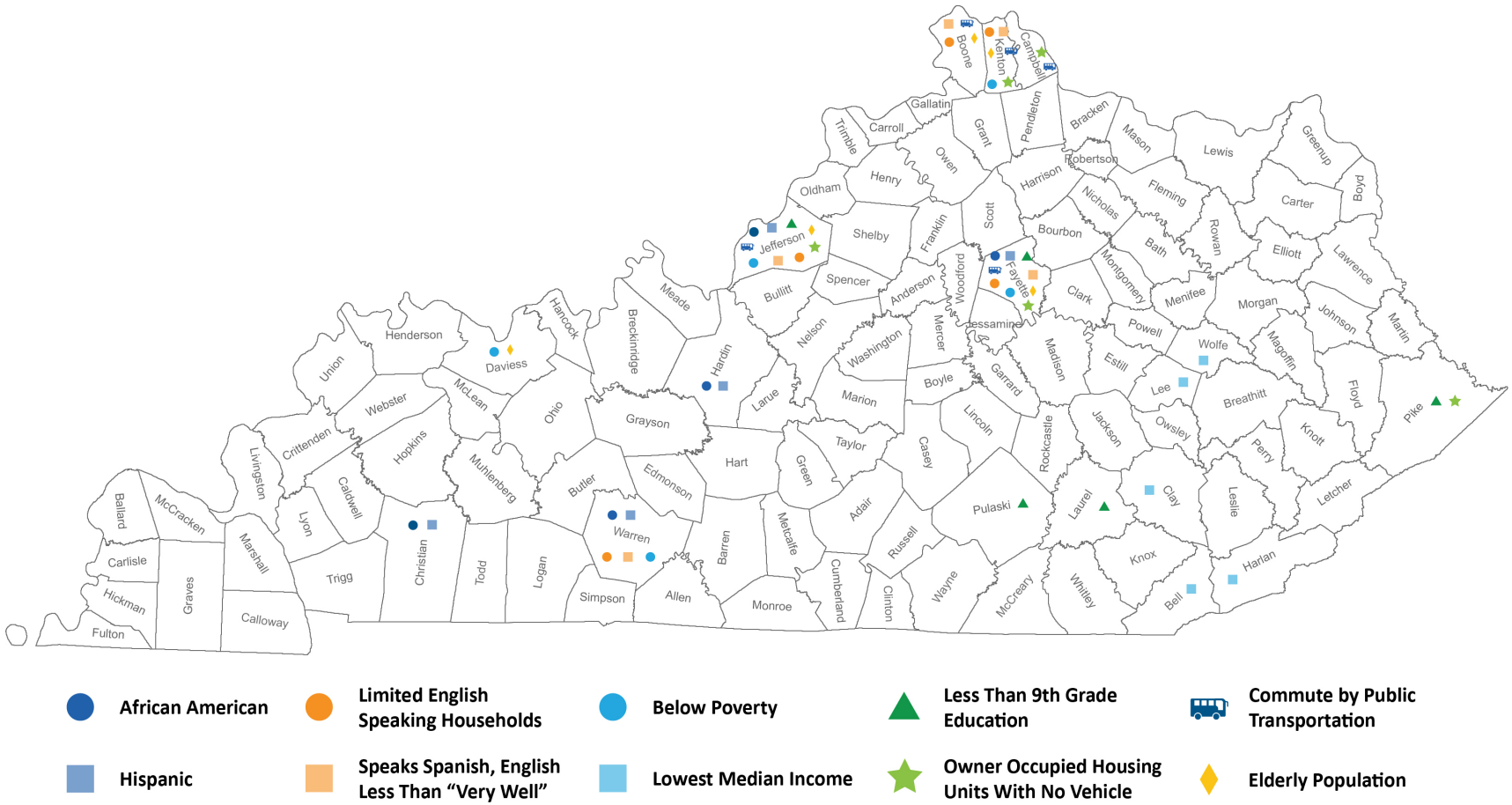
- Prevalent in homes where the household income is below $20,000 a year; 45.8% of those in this income group have no internet subscription.
- Households with incomes ranging between $20,000 and $74,999 a year still have 21.2% without internet subscriptions.
- Those most likely to have an internet subscription are among the households where the income is above $75,000 or more a year, with only 6.4% of this group reporting not having an internet subscription.

Internet Devices

- As for devices to access the internet, there is a range of computers and computing devices used by those in Kentucky. In Kentucky, 86.4% of households have one or more computing device, leaving 13.6% having "no computer".

5.6%
with
NO ACCESS
to internet

Traditionally Underserved Populations
Five Most Populated Kentucky Counties per Category*



African American
Limited English Speaking Households
Below Poverty
Less Than 9th Grade Education
Commute by Public Transportation
Hispanic
Speaks Spanish, English Less Than "Very Well"
Lowest Median Income
Owner Occupied Housing Units With No Vehicle
Elderly Population

*A full data resource for all Kentucky Counties can be found at: https://www.census.gov/programs-surveys/acs

This map illustrates the top five counties by highest percentage of the population identified within these traditionally underserved categories. This information was used to identify target communities for outreach efforts within the public engagement of the LRSTP.

Summary of Modes

Kentucky has a robust transportation system ranging from national hiking trails and global freight airports to Amtrak routes and a highway system that provides access to two-thirds of the United States' population within a day's drive. To capture these assets, a two-part process was completed. Existing modal studies were reviewed and summarized for traffic, active transportation (pedestrians and bicyclists), transit, aviation, rail, and riverport. The following pages highlight those assets in Kentucky's Transportation At-A-Glance, and the modal summaries as well as a list of all modal reports reviewed are in the Appendices. Key findings, trends, threats, and opportunities for each of the modes are discussed in more detail in subsequent sections.

The study also looked at 'Forces of Change' to gain an understanding of other factors that may influence transportation needs. Next, KYTC examined gaps between the existing transportation systems and identified long-term needs to address congestion, pavement, bridges, signs and markings, Transportation Systems Management and Operations (TSMO), maintenance, and ferries. These needs are described in detail in the Appendices J–P. The findings from the modal reviews, gaps analysis, and forces of change are shown in the Summary of Transportation Needs.

120
COUNTIES

3
GLOBAL AIR CARGO HUBS

3
U.S. BIKE ROUTES

3.1+ Million
LICENSED DRIVERS

59
PUBLIC AIRPORTS

~2,000
BUS ROUTE MILES

26 Billion
POUNDS OF AIR FREIGHT LANDED ANNUALLY

30 Million
PUBLIC TRANSPORTATION PASSENGERS ANNUALLY

80,000+
MILES OF PUBLIC ROADS AND STREETS

13
FREIGHT RAILROADS

14,000+
BRIDGES

1,900
MILES OF NAVIGABLE WATERWAYS

94.4%
OF POPULATION HAS ACCESS TO INTERNET

10
PUBLIC RIVERPORTS

FOR ADDITIONAL INFORMATION:
See Appendix B: Transportation At-A-Glance

DID YOU KNOW?

Kentucky Stats

- 120 Counties
- 2020 Population of 4,505,836
- 15 Regional Area Development Districts (Rural Planning)
- 9 Metropolitan Planning Organizations
- 12 Highway Districts
- Land Area of 39,728 Square Miles

Active Transportation

- 2% of Kentuckians Walk to Work
- 3 U.S. Bike Routes (AASHTO approved)
- 938 Miles of 3 U.S. Bike Routes
- 300+ Miles of Shared Use Paths
- 82 Miles of Rail Trails

Air Transportation

- 6 Commercial Carrier Airports including 2 International Airports
- 59 Public Airports and 90 Private Airports
- 115 Heliports and 2 Ultralights
- 5+ Million Passengers Annually
- 26+ Billion Pounds of Air Freight Landed Annually
- Home to 3 Global Air Cargo Hubs

FOR ADDITIONAL INFORMATION:
See Appendix B: Transportation At-A-Glance

Highways

- 80,000+ Miles of Public Roads and Streets
- 16 Interstate Highways, 11 State Parkways and 1 Expressway
- 27,620 Miles of State-Maintained Highways
- 49.5 Billion Vehicle Miles of Travel Annually
- 28,000+ Freight Drivers Licensed to Operate in Kentucky
- 14,000+ Bridges including 9,080 State-Maintained Bridges
- 3,310 Miles on the National Highway System
- 3,716 Miles of Designated Federal/State Truck Routes
- 110.8 Million Miles of Daily Travel
- 26.1 Million Miles of Daily Truck Travel

Technology

- 94.4% of the Population has Access to Internet
- 500+ Public Electric Vehicle Charging Ports

Logistics

- Within a Day's Drive of Two-Thirds of the U.S. Population
- 2nd in the Nation in Total Air Cargo Shipments
- 3 Global Air Cargo Hubs
- At The Center of a 34-State Distribution Area in the Eastern United States
- 907,000 Jobs Dependent on Transportation
- 3.1+ Million Licensed Drivers
- 3.5+ Million Registered Vehicles

Public Transportation

- 26 Rural Public Transportation Services
- 9 City Bus/Transit Systems
- Regional Coordinated Human Service Delivery Program with 15 Regions
- 2,000+ Bus Route Miles
- Nearly 30 Million Passengers Annually
- Almost 3 Million Elderly and Handicapped Passengers Annually

Railroads

- 2,400+ Miles of Active Railroad Track
- 4,707 At-grade Railroad Crossings
- 13 Freight Railroads
- 11 Intermodal Facilities
- 4 Amtrak Stations
- 129 Million Tons Carried by Rail Annually
- 8,367 Amtrak Passengers Annually

Waterways

- 1,900 Miles of Navigable Waterways
- 1,090 Miles of Commercially Navigable Waterways
- 10 Public Riverports: 7 Active and 3 Developing
- 160+ Private Port Terminals
- 90 Million Tons Shipped and Received Annually
- 10 Ferry Operations: 7 State, 2 Private and 1 Federally Funded

As KYTC envisions the future to **"GET THERE TOGETHER"**, the belief is that every mode has a role in moving people and freight. KYTC recognizes that planning for the state's multimodal transportation system is a collaborative process involving highways, bicycle and pedestrian facilities, public transit, aviation, rail, and waterways. The management of the state's multimodal transportation system is answerable directly to the Secretary of Transportation with the State Highway Engineer leading the Department of Highways including its 12 Highway District Offices. The KYTC Department of Aviation and Office of Transportation Delivery (transit) are led by their respective commissioners. The Office of Transportation Delivery closely cooperates with the Kentucky Cabinet for Health and Family Services (CHFS) to coordinate transit services to and from healthcare facilities. The efficient, effective use of all KYTC resources is important to support critical, publicly owned components of the system such as highways, sidewalks, bicycle lanes, transit, and general aviation airports. Additionally, a close working relationship is vital with the private sector owners of other modes such as rail, commercial aviation, and waterways. KYTC's Department of Highways serves to facilitate modal collaboration through its planning function with waterway, rail, and bike/pedestrian concerns coordinated by the Division of Planning.

For the purpose of the 2022-2045 LRSTP, the needs, available funding, KYTC policies and strategic plans for the components of the Kentucky multimodal transportation system have been analyzed and synthesized into reports and fact sheets. The following order of discussion (Traffic, Active Transportation, Transit, Aviation, Rail and Riverport) for the modes is based upon the degree by which KYTC interfaces directly with each of these modes.

STATE OF THE SYSTEM: TRAFFIC

KYTC manages the eighteenth largest interstate lane-miles network in the United States. Residents, tourists, and commercial vehicles moving goods collectively generate funds to help KYTC take care of 27,620 miles of public roads and over 14,000 bridges. In addition, KYTC also maintains and operates support systems and facilities like signs, lights, sidewalks and paths, maintenance facilities, and a fleet of equipment vehicles. KYTC is responsible for maintaining safe and reliable access to destinations for all types of trips, working with partners to ensure requirements are met, and seeking input from citizens and private interests to deliver an integrated multimodal transportation system.

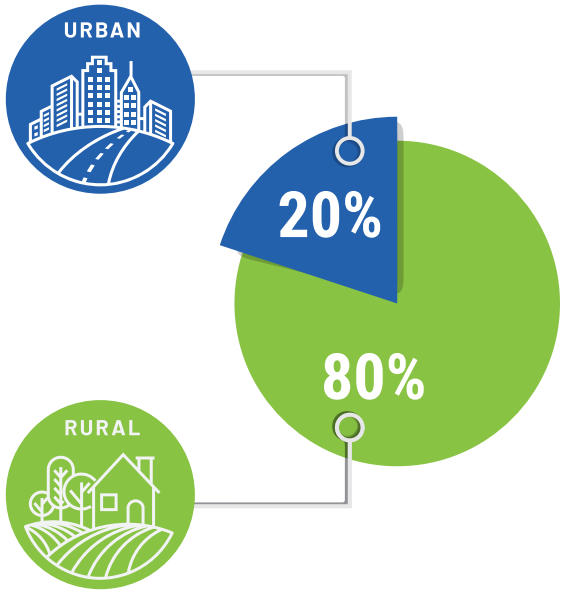
37th
LARGEST STATE (BY LAND AREA)

18th
LARGEST INTERSTATE LANE-MILES NETWORK IN US

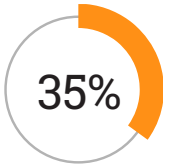
26th
MOST POPULOUS STATE

PUBLIC ROADS

Kentucky has over 80,000 miles of public roads of which 27,620 are state-maintained.



40,129 miles
Maintained by individual county governments

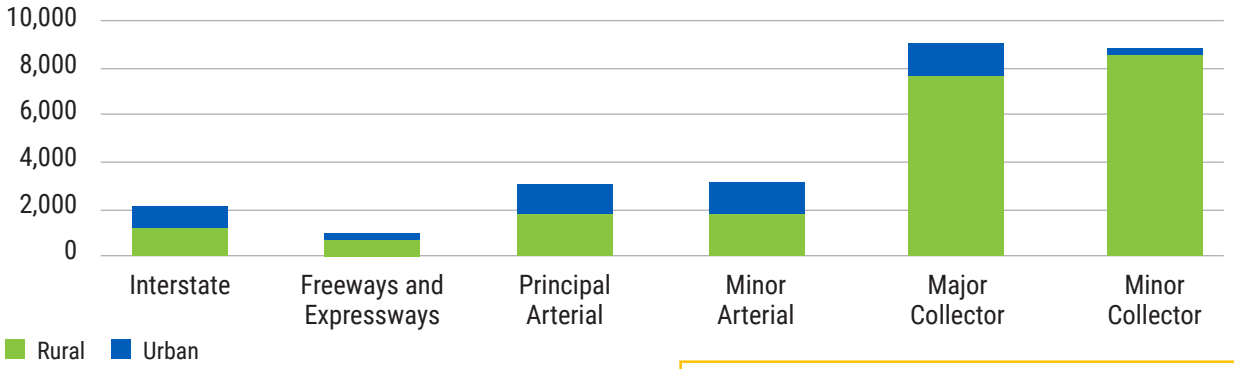


27,260 miles
Maintained by the state

10,723 miles
Maintained by city/municipal governments

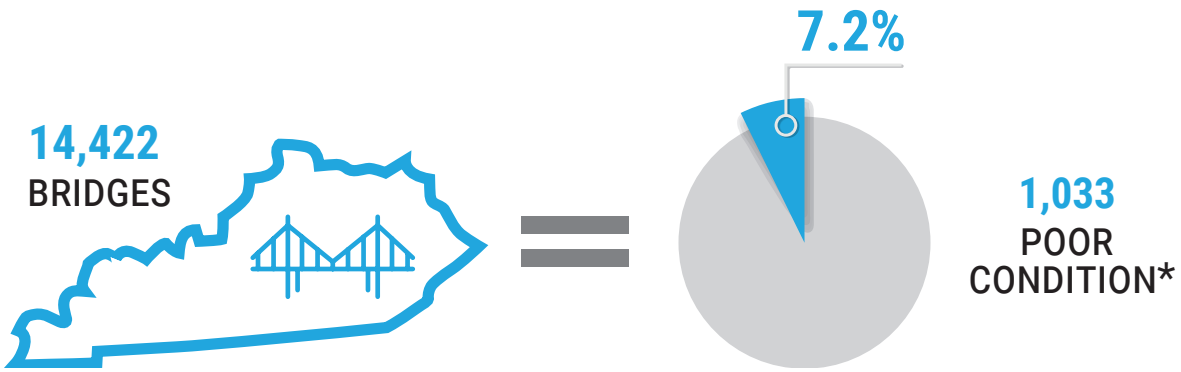
1,597 miles
Maintained by other federal, state, and local agencies

State-Maintained Roadway Miles by Functional Class

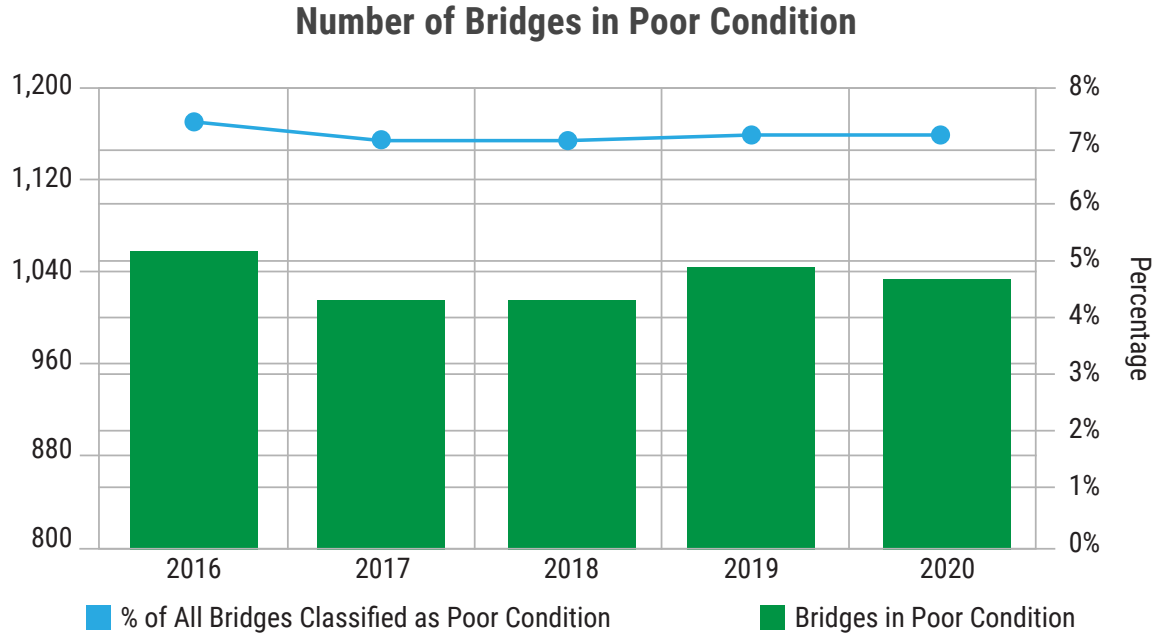


FOR ADDITIONAL INFORMATION:
See Appendix C: Traffic, Highways, and Safety

KENTUCKY'S BRIDGES



*This number is down from 1,059 bridges in 2016.



Poor bridge deck areas account for 4.9% of the total bridge deck area in KY.

25 of the bridges in poor condition are on the Interstate Highway System. Bridge deck areas in poor condition account for 3.6% of the total bridge deck area in KY on the National Highway System, which includes the interstates and other key roads linking major airports, ports, rail, and truck terminals.

4,569 bridges are posted for load limits, which may restrict the size and weight of vehicles crossing the structure.

The state has identified needed repairs on 3,328 bridges at an estimated cost of $2.7 billion. This compares to 3,502 bridges that needed work in 2016.

Kentucky State Highways

Trends in Highway Travel and Performance

VEHICLE DELAY

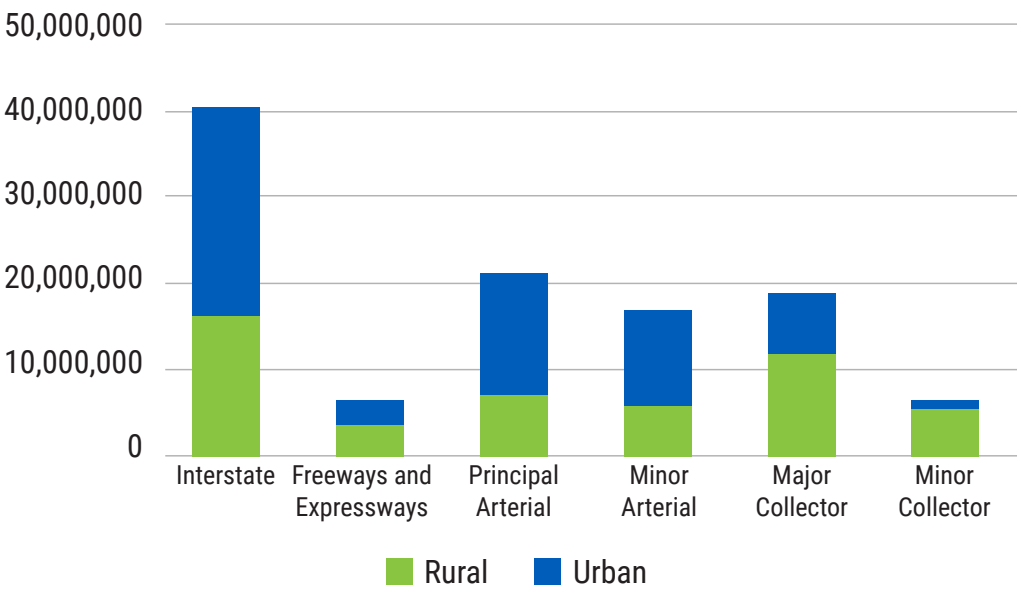
Delay is the additional travel time required due to recurring or nonrecurring congestion. Interstates and principal arterials experience the most delay, and it is expected to be even more pronounced on interstates in the future.

Total delay is forecast to increase by

142% FROM 2018 TO 2045

Most of the delay increase will occur in the urban areas of the state and on interstate facilities.

Daily Vehicle-Miles Traveled by Functional Class



VEHICLE MILES TRAVELED (VMT)

Despite interstates comprising less than 10% of roadway mileage, they represent the largest portion of total VMT at 36%. The second most-traveled non-local functional class is principal arterials at 34% which comprise 23% of the roadway mileage. Major roads in urban population centers carry the highest traffic volume. Between 2018 and 2045, non-local daily VMT for all roadway classes is forecast to increase from 110.8 million to 142.2 million, an increase of 28%.

PAVEMENT CONDITIONS

KYTC maintains

63,845

LANE-MILES OF PAVEMENT

The pavement network managed by KYTC is worth an estimated $45 billion. The network is essential for the economic wellbeing and safety of Kentuckians. Summarized below is the investment and performance for all pavement systems with the exception of the rural secondary system. The rural secondary system consists of 25,655 lane miles of pavement that are managed separately. Much of the rural secondary system is managed by cities and counties and performance data was not available from all local governments.

TRANSPORTATION ASSET MANAGEMENT PLAN

KYTC is responsible for managing the infrastructure of the Commonwealth's transportation system. This transportation system is critical to Kentucky's economic vitality and quality of life. The Transportation Asset Management Plan (TAMP) provides a strategic and systematic framework for managing the infrastructure that holds our transportation system together.

KYTC's Department of Highways manages Kentucky's state-maintained roads and bridges, including the signs, lighting, and messaging boards that ensure safe system operations. KYTC has made a strong commitment to on-going investments to preserve asset conditions and system performance in a cost-effective manner. This commitment keeps in line with the main principles of Transportation Asset Management (TAM); linking planned investments to performance expectations, using low-cost treatments early to extend asset life, reducing agency risk or exposure, and enhancing resilience of the system. To accomplish this, TAM relies on asset inventory and condition data to drive performance-based resource allocation and project selection decisions.

Investment

In 2019, KYTC spent $313 million to provide treatments for roughly 3,053 lane miles of the system. This level of investment requires network pavements to last 12.5 years on average between treatments.

Pavement Sustainability Ratio

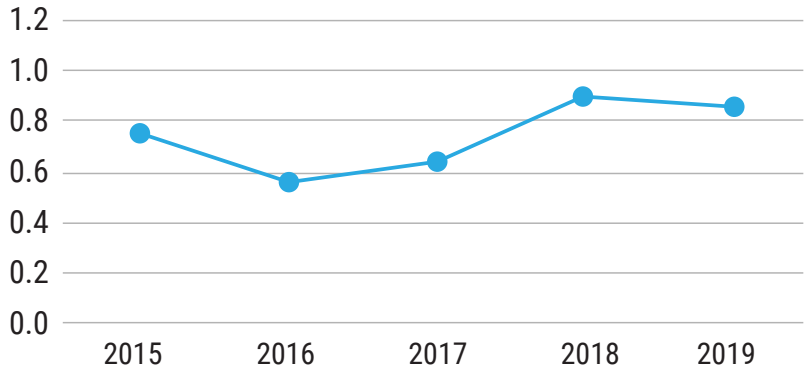
A sustained focus on preservation in 2019 resulted in only a slight decrease in the pavement sustainability ratio (PSR) despite a decrease in funding. In 2019, 64% of the budget for pavement asset management was spent on pavement preservation, 28% went to rehabilitative treatments, and 7% was used for lower cost preventive maintenance treatments meant to preserve existing conditions. In addition, KYTC spent $355 million on widening, new construction, and safety improvements.

Preservation Liability

Preservation liability is an estimate of the accumulated costs to fund the backlog of deferred pavement work. Without increased preservation budget, the pavement liability will increase to $1.25 billion by 2023. Though increased spending in 2019 decreased the current pavement liability from $1 billion to $875 million, projected spending shows a steady increase in pavement liability over the next four years. Continued focus on low cost preservation treatments will be needed to combat this budget deficit.

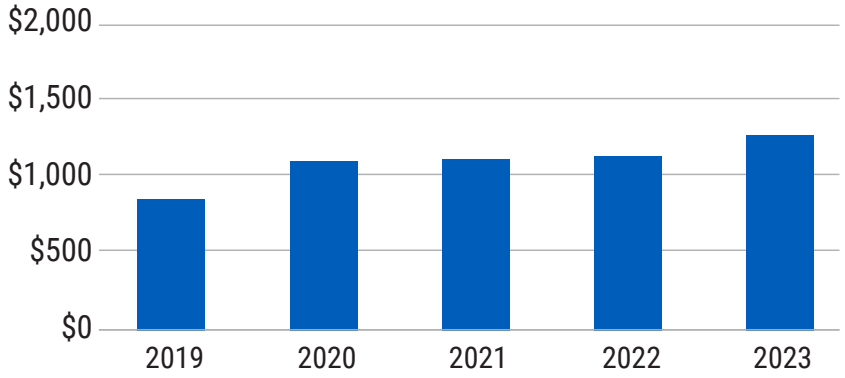
Pavement Sustainability Ratio

Needs to equal one to maintain current system conditions



Statewide Pavement Preservation Liability

Funding necessary to address the backlog of pavement projects for all pavement types. (Dollars are in millions.)



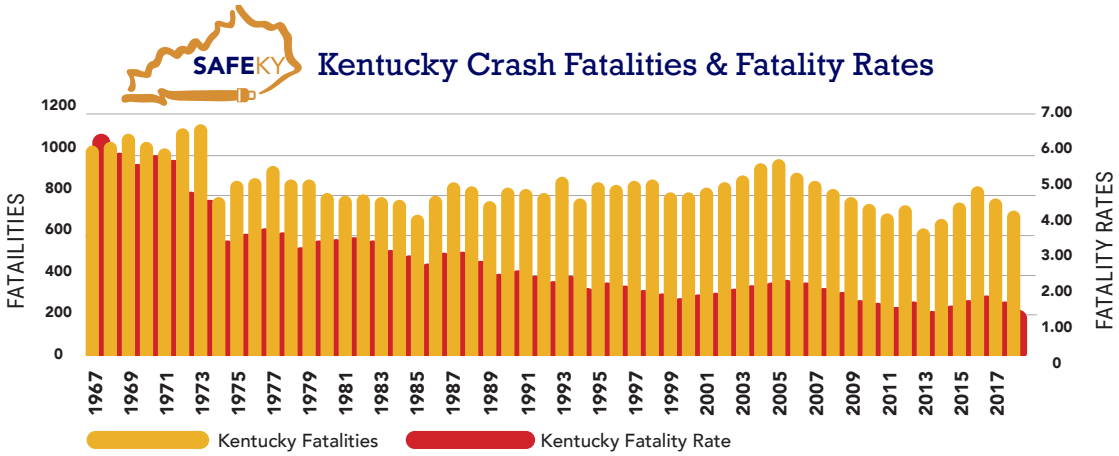
HIGHWAY SAFETY

Kentucky's 2020-2024 Strategic Highway Safety Plan (SHSP), which serves as the guiding document to coordinate the highway safety improvement activities of state, federal, and local agencies, has the following mission, vision, and goals:

Mission
To enhance the lives of those who use Kentucky's transportation system by preventing crashes that result in deaths and serious injuries.

Vision
Through the coordinated and bold efforts of all stakeholders, improve highway safety in Kentucky such that those travelling on roads in the Commonwealth – every person, every trip – arrive at their destination unharmed.

Goal
Through implementation of this SHSP, prevent serious crashes on Kentucky's highways such that the annual number of deaths falls at or below 500 by the year 2024.



Fatality Rates are per 100 million vehicle miles of travel (HMVMT)

The long-term crash fatality trends in Kentucky largely mirror the national trends. From 1967 to 2018, Kentucky's proportion of nationwide fatal crashes averaged 1.98% (HMVMT). By and large, over the years as fatality totals rose and fell nationally, they also rose and fell in Kentucky. However, since 2000, Kentucky has not experienced the same levels of reductions that have been seen in the country at large. From 1967 to 1999, Kentucky's average annual share of crash fatalities averaged 1.89% of the national totals; however, since 2000, Kentucky's annual share has risen to 2.13%. A similar pattern is also evident in the crash fatality rates. From 1967 to 1999, Kentucky's annual fatality rate was on average 11% higher than the national rate; however since 2000 Kentucky's annual rate has risen to 34% higher than the national rate. Additionally, Kentucky's fatality rate was higher than all bordering states. From 2013 to 2017, Kentucky had the 5th highest fatality rate among the 50 states in the U.S.

The SHSP identifies six emphasis areas to guide highway safety improvements. These six are selected for both the urgency of the problem and the opportunity for improvements. They are: aggressive driving, distracted driving, impaired driving, occupant protection, roadway departure, and vulnerable road users.

Emphasis Areas

Aggressive Driving
Driving behavior characterized by speeding, disregarding traffic control, following too closely, weaving in traffic, failure to yield the right of way, or improper passing.

Distracted Driving
Driving behavior characterized by cell phone usage, distraction, or inattention.

Impaired Driving
Driving while under the influence of alcohol or drugs.

Occupant Protection
Failure to use seat belt or child restraint while driving or riding in a vehicle.

Roadway Departure
A crash type that results from a vehicle leaving its lane to the left or right.

Vulnerable Road Users
Crashes involving pedestrians, bicycles, motorcycles, electric scooters, or other vehicles besides cars and trucks.

STATE OF THE SYSTEM: ACTIVE TRANSPORTATION

Recognizing the need and the benefits of an active transportation element in the transportation network, the efforts of KYTC and local agencies have supported the widespread development of active transportation facilities. The underlying principle of active transportation is to provide a strategy for a system that allows a choice in modes of transportation and a reasonable balance in accommodations with the utmost priority of user safety. Efforts over the last three decades have developed and broadened active transportation elements within the Kentucky transportation system.

KYTC and the Kentucky Department for Public Health, SPAN/Active Living Program have developed a partnership to create Transportation Equity Reviews. To date, these have been completed for twelve communities in the past three years. These two Kentucky Cabinets are working together on programs like the State Physical Activity and Nutrition (SPAN) and Walk/Bike programs. KYTC also partners with Local Public Agencies (LPAs) around Kentucky on bicyclist and pedestrian projects.

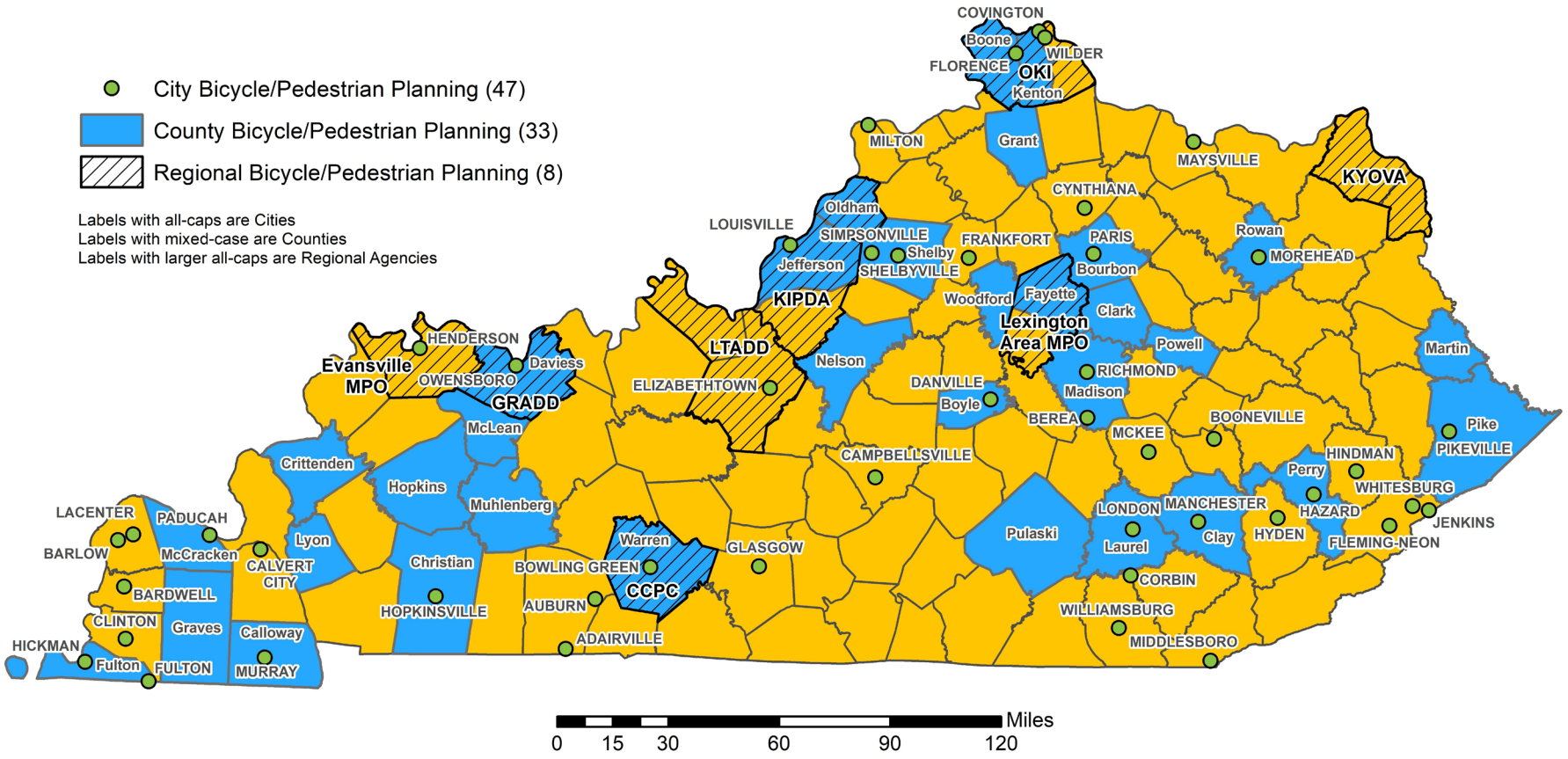
Active transportation refers to any self-propelled, human-powered mode of transportation, such as walking, bicycling, and even kayaking. Within the realm of active transportation, pedestrian travel includes those who travel on foot or by wheelchair. Bicycle travel functions like motor vehicle travel with the exception of also being able to operate on the roadway shoulder or in a designated bicycle lane. The elements of the infrastructure that support active transportation can take multiple forms including sidewalks, multi-use paths, dedicated bicycle lanes, shared roadways, and blueway trails using streams or rivers. Many of these elements are often found within urban areas, but the development of regional active transportation networks and independent long-distance hiking and biking trails have provided active transportation opportunities for many rural areas.

THE BENEFITS OF ACTIVE TRANSPORTATION

Walking and bicycling are healthy and sustainable means of transport. There are a number of benefits to active transportation which fall under five broad categories:

FOR ADDITIONAL INFORMATION:
See Appendix D: Active Transportation

Areas with Bicycle and Pedestrian Planning



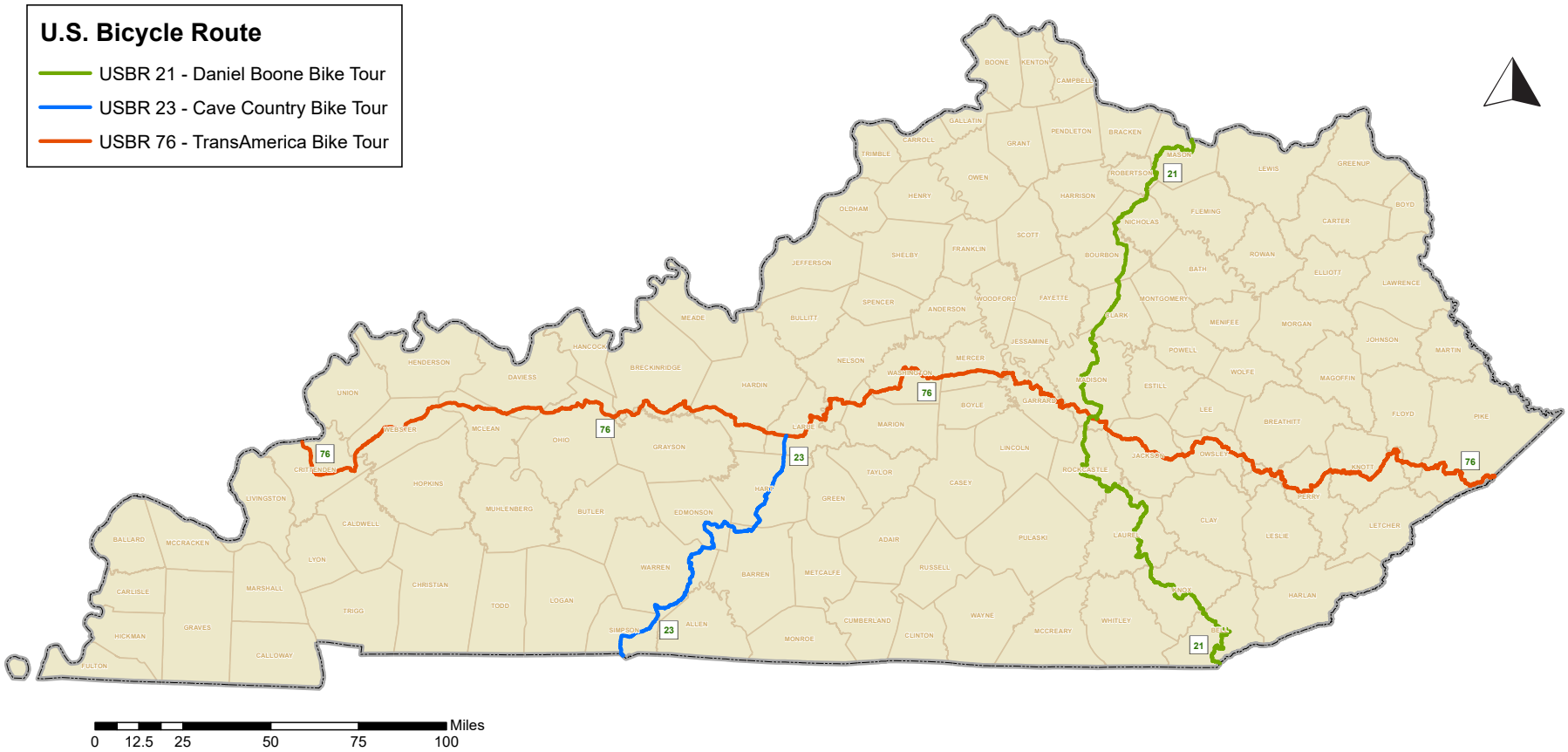
Active transportation elements across Kentucky includes the following:

- 80+ officially adopted city, county, or regional pedestrian/bicycle plans as illustrated on the map on the previous page.
- Over 300 miles of shared use paths
- 35 designated rails to trails facilities (82 miles) and 7 planned rails to trails facilities (278 miles)
- Rails to Trails Facilities are shared-use paths on railway right of way.
- These rail trails are usually constructed adjacent on abandoned railways.
- 3 U.S. Bike Routes (AASHTO approved)
  - USBR 21 = 251: Daniel Boone Bike Tour
  - USBR 23 = 109: Cave Country Bike Tour
  - USBR 76 = 578: TransAmerica Bike Tour
- 520 miles of water trails including a National Blueway Trail (Nolin/Green Rivers Blueway Trail)

CHALLENGES TO PROVIDING WALKING AND BICYCLING INFRASTRUCTURE

- While sidewalks may be present, many of them do not meet today's Americans with Disabilities Act (ADA) standards due to narrow widths or lack of curb ramps.
- While streetlights and trees increase pedestrian comfort, when space is limited, they can become obstacles.
- Long crossing times and intimidating intersections, particularly along arterials, make it difficult for pedestrians to access key destinations across the state.
- Narrow roadways and limited right-of-way make it challenging to implement separated bikeways.
- High traffic corridors are intimidating to most bicyclists.
- Gaps in the bikeway network make it difficult to choose biking as a safe and efficient commute choice.
- Lack of bikeways through intersections pose a significant safety risk.
- Steep hills can make bicycling and walking difficult in some areas.
- Highway Road funds can not be used to finance bicycle or pedestrian projects unless included as part of the roadway design such as sidewalks and bike lanes.

U.S. Bicycle Routes in Kentucky



Source: Kentucky Transportation Cabinet. Map updated August 2022

STATE OF THE SYSTEM: TRANSIT

Public transportation provides people with mobility and access to employment, community resources, medical care, and recreational opportunities in communities across America. It benefits those who choose to ride, as well as those who have no other choice.

In Kentucky, more than **40 TRANSIT** providers supply rides to the state's 120 counties through at least one mode of transportation:

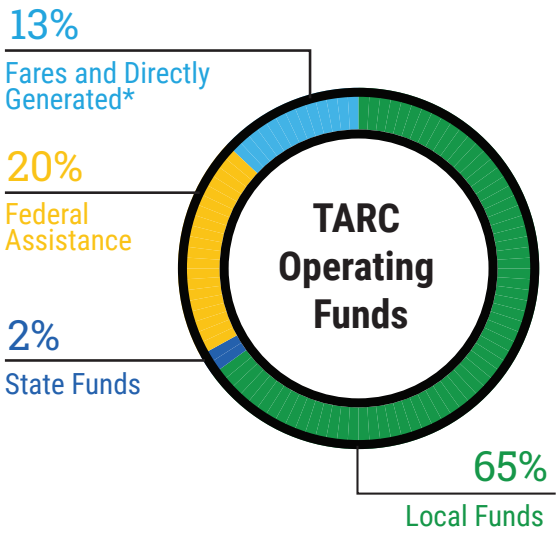
- fixed-route
- demand response
- bus transportation
- passenger rail

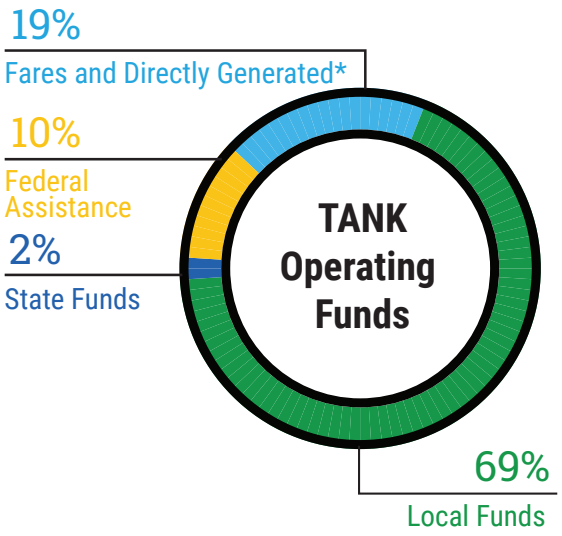
Each type of transit has unique operating characteristics, program goals, customer expectations, and funding sources. The three largest providers of these services are the Transit Authority of River City (TARC) in Louisville, the Transit Authority of Northern Kentucky (TANK), and Lextran in Lexington.

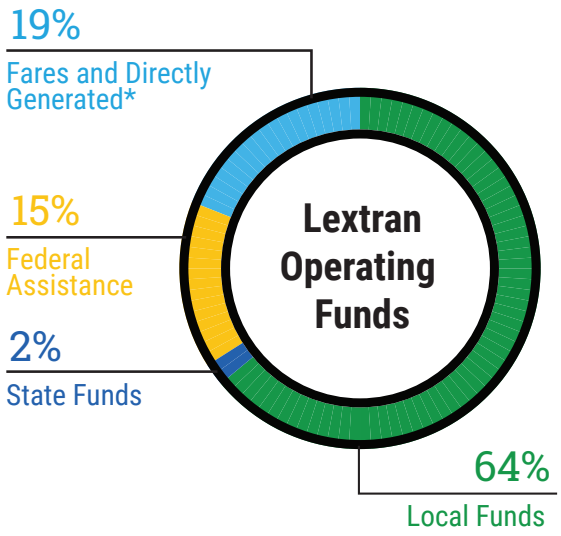
FUNDING

The federal government is a major provider of funding for the state's transit systems, providing significant funds based on the revenue generated in the state by the federal motor fuel tax. However, Kentucky has been struggling with Road Fund revenue in recent years. Revenue from the motor fuel tax has been flat since 2015 when the price of gas dropped by almost $2 per gallon.

The following figures below show the source percentage of 2019's operating funds for Kentucky's three largest transit providers. The majority of these agencies' operating funds come from local funding sources with very little contribution from the state, whereas the American Public Transportation Association (APTA) reports a national average of around 25% state funding for transit operations.







*Note: Directly generated funds may include items such as advertising revenues and charter service fees.

FOR ADDITIONAL INFORMATION:
See Appendix E: Transit

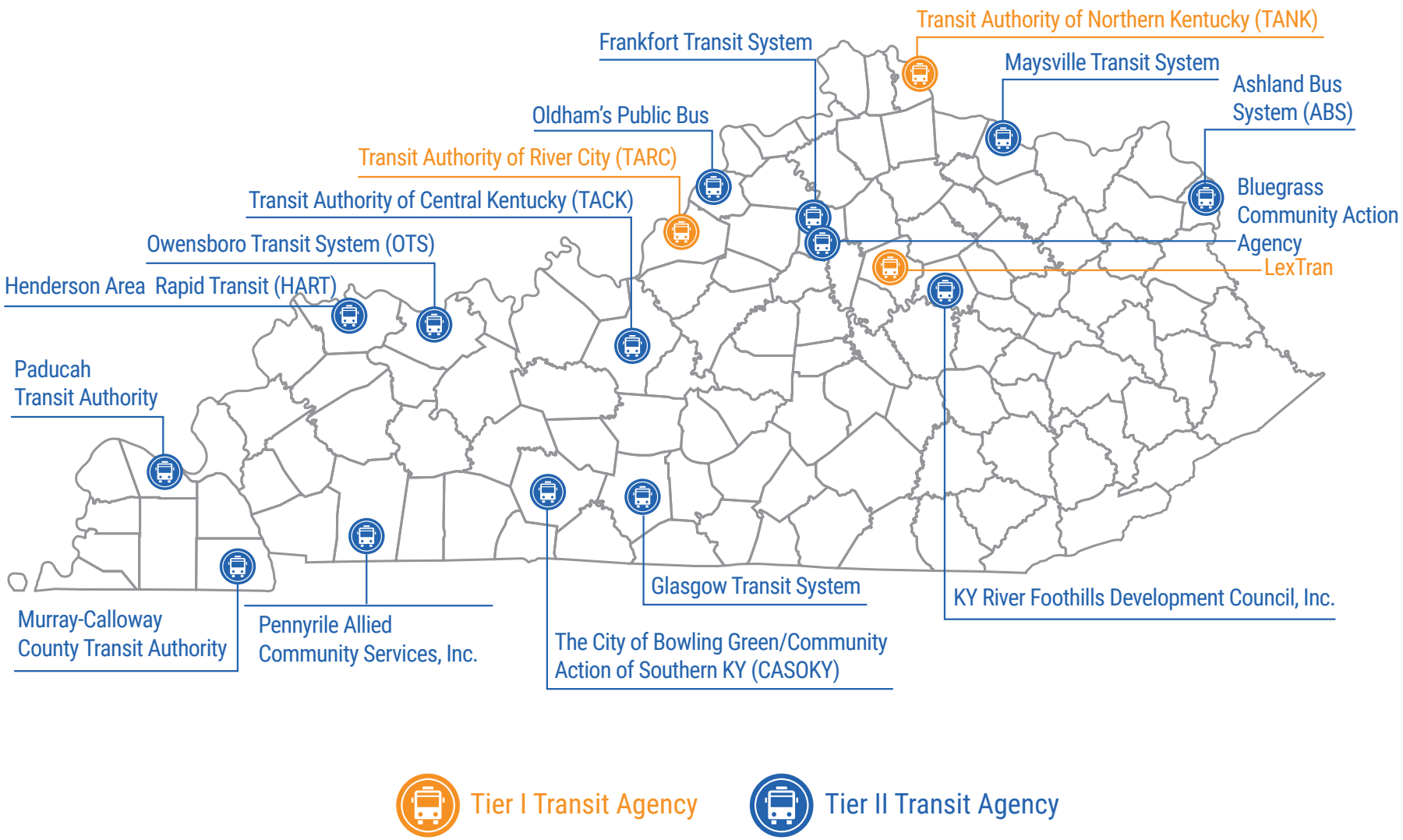
TRANSIT AGENCIES

In Kentucky, residents in all 120 counties have access to public transportation. The state's transit network includes a mix of urban and rural transit providers, with services ranging from fixed-route bus service that operates on a regular schedule; to demand-response service that provides call-ahead, door-to-door trips; to deviated fixed-route service, a hybrid of demand-response and fixed-route service. Fixed-route service areas are federally categorized as either urban or rural based on demographics and funding sources.

Among Kentucky's transit providers, TARC, Lextran, and TANK are federally classified as Tier I and termed "large urban" systems at the state level. There are another 14 Tier II transit agencies which provide fixed-route service. The table below provides a list of Kentucky's Tier I and Tier II fixed-route providers, per the National Transit Database's 2019 reporting.

	Transit Agency	City Served	Urban/Rural	Total Fixed-Route Ridership in 2019
Tier I	Transit Authority of River City (TARC)	Louisville	Urban	10,832,836
	Lextran	Lexington	Urban	4,364,637
	Transit Authority of Northern Kentucky (TANK)	Fort Wright & Suburban Cincinnati	Urban	2,910,241
Tier II	Ashland Bus System (ABS)	Ashland	Urban	116,944
	Bluegrass Community Action Agency	Frankfort	Rural	16,052
	Frankfort Transit System	Frankfort	Rural	148,243
	Glasgow Transit System	Glasgow	Rural	8,075
	Henderson Area Rapid Transit (HART)	Henderson	Urban	107,282
	KY River Foothills Development Council, Inc.	Richmond	Rural	114,632
	Maysville Transit System	Maysville	Rural	27,672
	Murray-Calloway County Transit Authority	Murray	Rural	34,875
	Oldham's Public Bus	La Grange	Urban	14,902
	Owensboro Transit System (OTS)	Owensboro	Urban	295,210
	Paducah Transit Authority	Paducah	Rural	178,761
	Pennyrile Allied Community Services, Inc.	Hopkinsville	Rural	77,969
	The City of Bowling Green/Community Action of Southern Kentucky (CASOKY)	Bowling Green	Urban	85,894
	Transit Authority of Central Kentucky (TACK)	Elizabethtown, Radcliff	Urban and Rural	32,508

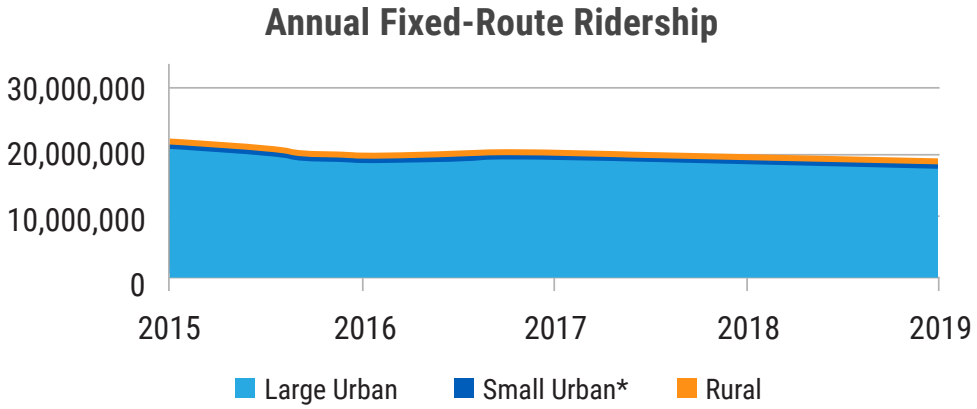
Kentucky Transit by County



TRANSIT PERFORMANCE

Over the past, ridership within the Commonwealth has remained steady, with only small increases or decreases. The COVID-19 pandemic and related restrictions led to major transit disruptions for many public transit systems in the United States. In Kentucky, large transit agencies were no exception, experiencing drops in ridership of roughly 50% or more.

Nationally, transit ridership in 2020 dropped by 79% compared to 2019 levels at the start of the pandemic. While some riders have returned to public transit, ridership from summer to winter 2020 remained about 65% below pre-pandemic levels. In addition, transit providers are coping with higher costs related to training, personal protective equipment (PPE), personnel absences, and growing labor costs. To that end, 2019 data was chosen to offer a view of transit data in a normal fiscal year.



*Small urban areas are those serving areas of populations less than 50,000

TRENDS IN TRANSIT

AUTONOMOUS AND CONNECTED VEHICLES

As autonomous and connected vehicles become more prevalent and the technology surrounding these innovations improves, transit systems may adapt and employ more of this technology.

MOBILITY AS A SERVICE

Transit is drifting toward "Mobility as a Service" (MaaS), where an individual pays for access to a public and private network of vehicles (buses, cars, bikes, scooters) and reserves service with mobile apps.

MICROTRANSIT

Microtransit is becoming more widespread, and is where customers reserve trips with private or publically operated vehicles through companies that use algorithms for matching passengers with similar routes (e.g. UberPool or LyftLine).

TRACKING APPS

Tracking apps provide real-time information on public transportation vehicles. For the public, tracking apps can help current and potential riders plan trips and find the nearest transit stop or station. The apps track vehicle locations and provide predicted departure times based on real-time data.

CHALLENGES

Several traits of the transit system that are challenging to KYTC/OTD mission:

- The level of funding for operating and capital expenses is very low compared to other states. The local match must meet the entirety of the FTA match requirement, even for smaller agencies. This limits the ability of transit providers to deliver needed services.
- Intercity routes are being abandoned by intercity private bus providers. Demand response trips by rural agencies into urban areas are filling the void, but there may be a need for scheduled commuter bus services between major urban areas.
- Public transportation services must be expanded to meet the needs of an aging population. The percentage of the state's population over the age of 55 is growing rapidly. By 2030, it is forecasted that over 30% of the state's population will be over 55.
- Traffic congestion is increasing each year on the state's highways. For example, the average delay for rush-hour drivers has increased from 9 to 46 hours per year in Louisville over the past 10 years.
- Kentucky is in the top five states when it comes to the percentage of persons with disabilities. Only three states have a higher percentage than Kentucky: Arkansas, Louisiana, and West Virginia. Statewide, 9% of the state's population is disabled, and most of them are dependent on transit for trips to the healthcare, jobs, and school. Many disabled citizens do not work because of the lack of transportation; an estimated 70% of persons with disabilities are not employed.

OPPORTUNITIES

Opportunities that are consistent with that mission include:

- The Human Services Transportation Delivery (HSTD) Program has been effective at delivering comprehensive services while streamlining costs. The program currently partners with the Department for Medicaid Services, Office of Vocational Rehabilitation, and Office of the Blind. It is currently working to expand its partnerships to the Department of Aging and Independent Living, Veteran groups, and recipients participating in Department for Medicaid Services' Money Follows the Person program. The program has been able to contain costs below financial estimates and is an industry leader in coordinated human services transportation.
- The State Management Plan for public transportation allows administrative expenses incurred by local transit providers to be separated from capital or operating expenses. This creates a category of non-operating expenses which includes traditional overhead costs such as administrative and executive salaries, office supplies, insurance, professional services, and interest on short-term loans. KYTC/OTD states, "Indirect cost expenses may be eligible for reimbursement if a cost allocation methodology has been established and approved by the appropriate authority and KYTC/OTD."
- Kentucky allows income from contracts with human service agencies to be used to provide local match under Section 5311 operating assistance. Kentucky Medicaid non-emergency contract revenues may also be used for local match.

The KYTC's / Office of Transportation Delivery (KYTC/OTD) mission is "the promotion of accessible, safe, cost-effective transportation that fulfills the needs of citizens of Kentucky."

STATE OF THE SYSTEM: AVIATION

Kentucky is home to a broad aviation system providing a crucial role in connecting the state's transportation network to its diverse communities. Not only does the aviation system serve the needs of the transportation public, but it also ensures timely delivery of goods and services, plays a critical role in attracting commerce, supports public safety and emergency services, and trains our future aviation professionals. Kentucky is home to 263 aviation facilities including 90 private airports, 59 public use airports, and 115 heliports.

KENTUCKY STATEWIDE AVIATION SYSTEM PLAN

KYTC recognizes the importance of aviation and maintains the Kentucky Statewide Aviation System Plan (SASP) to plan for and analyze the state's airport system. The SASP monitors the system's condition and plans for meeting current and future needs based upon the goals, objectives, and performance measures of the system. As described in the 2017 Kentucky SASP Technical Report, Kentucky's public airports fall into one of following five roles:

- Commercial Service Airports
  These airports serve commercial airlines and are grouped separately from the general aviation (GA) airports in order to focus on the distinctions among the GA airports.
- Economic Level 1
  These GA airports have the greatest economic potential. In general, these airports have 20 or more based aircraft, provide jet fuel, have the most effective instrument approach procedures, and offer pilot services such as automated weather reporting.
- Economic Level 2
  These GA airports have significant economic potential. In general, these airports have 10 or more based aircraft, provide jet fuel, and have some type of instrument approach.
- Economic Level 3
  These GA airports have developing economic potential. In general, these airports provide aviation gasoline (avgas) and some offer additional services, such as automated weather reporting or an instrument approach.
- Economic Level 4
  These GA airports have limited economic potential. Some, but not all, of these airports offer avgas. Most do not have an instrument approach.

Public Airport Roles in the Kentucky SASP

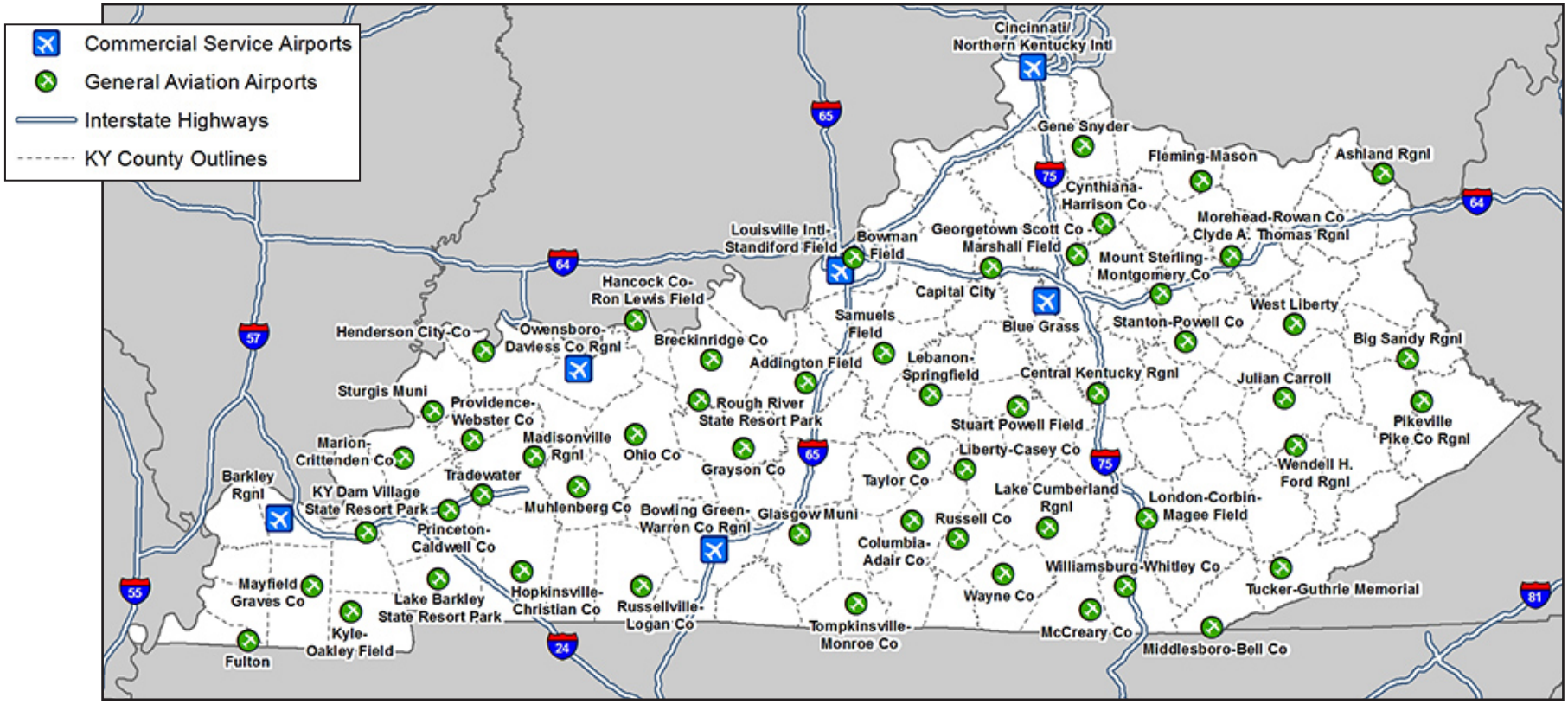
Airport Role	Number of Airports
Commercial Services Airports	6
Economic Level 1	24
Economic Level 2	8
Economic Level 3	10
Economic Level 4	11

Source: 2017 Kentucky Statewide Aviation System Plan Technical Report

FOR ADDITIONAL INFORMATION:
See Appendix F: Aviation

The state's public airports are presented in the figure below.

Kentucky Airport System



Source: https://transportation.ky.gov/kyaviationsystem/Pages/Airport-System-Map.aspx

Note: Jet planes require a runway length of at least 5000 feet.
Note: Gallatin County has a general aviation airport under construction to be completed in 2023.

AIRPORT PAVEMENT MAINTENANCE SYSTEM

One of the largest capital investments in the Kentucky aviation system is pavement. Maintaining airport pavements is crucial to the system for both cost effectiveness and safety. To protect this critical investment, KYTC monitors the condition of its core infrastructure using the statewide Airport Pavement Management System (APMS). The APMS provides a tool to airport owners, KTYC, and the FAA to insure proactive planning for preservation of its pavements. Based upon the conclusions of the assessment, $120.2 million is needed for maintenance and repair projects over the next seven years.

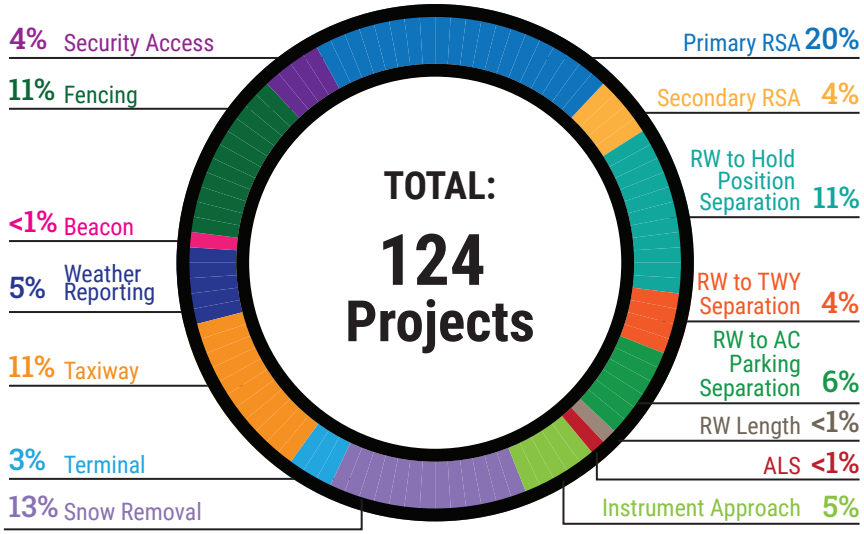
ECONOMIC IMPACT OF AIRPORTS

In addition to evaluating the role, service, and facility requirements of the system plan airports, the 2017 Kentucky SASP also calculated the economic impacts of airports, limited to on-airport employment and payroll. This evaluation did not include direct economic activity such as visitor spending or multiplier effects associated with direct impacts. Based on this limited analysis, the report found that the 59 public use airports in Kentucky generated more than 23,000 direct jobs and over $1.44 billion in annual payroll.

SASP RECOMMENDED SYSTEM AND COSTS ESTIMATES

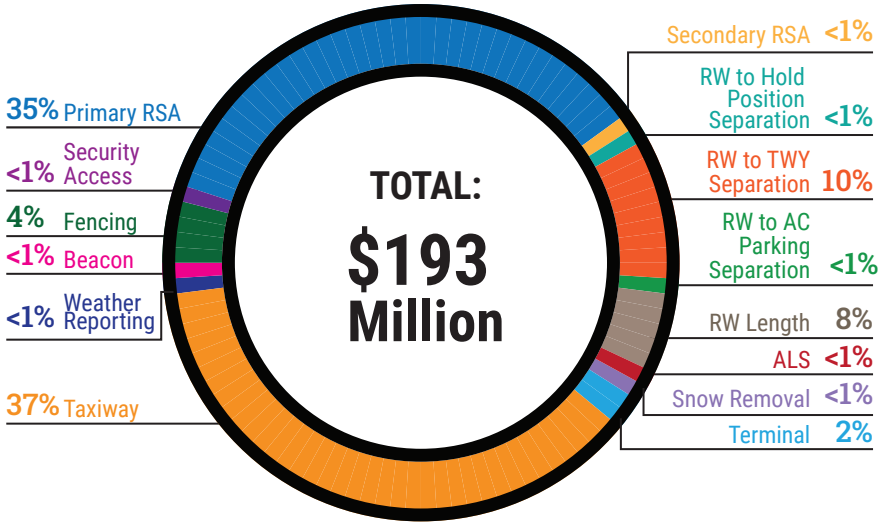
Based upon the recommendations of the Kentucky SASP, a total of 124 projects were proposed for a cost of $193 million in 2017 dollars.

Percentage of Total SASP Project Recommendations by Facility or Service



Source: 2017 Kentucky Statewide Aviation System Plan Technical Report

Project Recommendation Estimated Costs by Facility or Service



Source: 2017 Kentucky Statewide Aviation System Plan Technical Report

TRENDS

General Aviation Trends

A key trend is the number and type of new GA aircraft entering the fleet, the number of active GA aircraft, and the number of pilots flying in the U.S. An analysis of GA parameters shows that recent trends have not been positive. New aircraft deliveries, the number of active aircraft, and the overall pilot population have suffered from the recession that began in late 2007 and have not recovered to pre-recession levels. The high cost of aviation has contributed to the decline in aviation activity. While there are some segments of GA that have shown promise, such as the business use of GA aircraft, the niche markets of experimental aircraft, and the sport pilot sector, the overall trend in GA is likely to be negative for at least the short term, if not longer.

Air Cargo Trends

Air cargo plays a vital role in global commerce, and Kentucky's airports play a major role in facilitating the flow of air cargo on global, national, and regional scales. Air cargo activity is supported at Kentucky's commercial service airports in the form of belly cargo carried on passenger airlines and express freight carried by integrated express carriers. Statewide, total air cargo tonnage is driven by the two air cargo hub operations at Cincinnati/Northern Kentucky International Airport (CVG) and Louisville Muhammad Ali International Airport (SDF). These two major air cargo hubs are operated by integrated express carriers DHL at CVG and UPS at SDF. These hubs serve as sorting facilities that handle significant volumes of air cargo throughput, a small fraction of which originates in or is destined for Kentucky. In addition, Amazon is also providing air cargo operations in Kentucky at CVG.

Unmanned Aerial Vehicle Trends

The growth in unmanned aerial vehicles (UAV) has been spurred by improvements in engine technology, battery life, and miniaturization of components, all of which have driven down the costs of these easy-to-operate vehicles. As a result, recreational and especially business use of UAVs has proliferated. Demand for commercial UAV services appears to be growing despite uncertainty around how the FAA plans to integrate UAV operations safely into the national airspace system. The use of UAVs is expected to impact airspace and airport operational standards.

- Real Estate – UAV use is expected to be a boon for the real estate industry, giving the ability to view hard to reach areas of properties and provide views that are inaccessible to those on the ground.
- Law Enforcement – Police departments are interested in using UAVs to aid in tracking suspects and monitoring for illegal activity.
- Search and Rescue – UAV operations are ideal for when search and rescue is undertaken in remote areas where access is limited.

CHALLENGES

Avgas is the primary aviation fuel used by piston-powered aircraft and it is generally acknowledged that avgas will not be available in the future for distribution, safety, and environmental reasons. In addition, the air cargo industry has experienced significant volatility that has resulted in rapid maturation of the industry. High fuel costs and a recessed economic climate caused an industry shift to trucks where unit cost savings became higher priority than shipment time.

OPPORTUNITIES

Kentucky does have a number of positive attributes in terms of aviation. Recent initiatives have helped boost the student pilot population in Kentucky, thanks to aviation education. Additionally, aerospace products manufactured in Kentucky have continued to be the number one export for several years, surpassing even automobiles and automotive parts. In 2016, Kentucky's aerospace businesses exported $10.8 billion worth of products.

STATE OF THE SYSTEM: RAIL

Kentucky's railroad system includes approximately 3,200 route miles as of 2014. The five Class I railroads represent approximately 2,300 miles, or about 73% of the statewide rail system. These railroads are Burlington Northern Santa Fe (BNSF), Canadian National (CN), CSX Transportation (CSXT), Norfolk Southern (NS), and Union Pacific (UP).

In Kentucky...

CSXT is the **LARGEST** railroad company in terms of mainline route mileage, accounting for 1,685 miles, or 53% of the total route miles.

Norfolk Southern is the **SECOND LARGEST** railroad company in terms of mainline route mileage, operating on 428 route miles, or 13% of the statewide rail system.

The **THIRD LARGEST** railroad company by mainline route mileage is the Paducah and Louisville Railway, Inc. (PAL), and this is Kentucky's only Class II (regional) railroad. PAL operates 280 miles of mainline railroad, approximately 9% of the statewide rail system.

FOR ADDITIONAL INFORMATION:
See Appendix G: Rail and Riverports

2013 Mainline Railroad Mileage Reported Owned, Leased, or Under Trackage Rights	RR Company Class	Mileage					
		Owned by Self	Owned by Proprietary	Leased	Trackage	Total	% of Total
Burlington Northern Santa Fe	I	13	0	0	86	99	3.10%
Canadian National (Illinois Central) (Grand Trunk Corp.)	I	86	12	0	0	98	3.07%
CSX Transportation	I	1,564	64	11	46	1,685	52.80%
Norfolk Southern	I	154	0	212	63	429	13.44%
Union Pacific	I	0	0	0	12	12	0.38%
Paducah & Louisville	II	265	0	0	15	280	8.77%
Carrollton Railroad	III	15	0	0	0	15	0.47%
Fedonia Valley Railroad	III	10	0	0	0	10	0.31%
Kentucky and Tennesse Railway	III	0	0	0	8	8	0.25%
KWT Railway (Ky. West Tn.)	III	12	0	0	0	12	0.38%
Louisville & Indiana Railroad	III	4	0	0	0	4	0.13%
Paducah & Louisville	III	15	0	0	0	15	0.47%
RJ Corman - Bardstown Line	III	20	0	0	0	20	0.63%
RJ Corman - Central Line	III	114	0	0	0	114	3.57%
RJ Corman - Memphis Line	III	63	0	0	0	63	1.97%
TennKen	III	12	0	0	0	12	0.38%
Transkentucky Transportation	III	50	0	0	0	50	1.57%
West Tennessee Railroad	III	1	0	0	0	1	0.03%
Western KY Railway	III	16	0	0	0	16	0.50%
Amtrak	III	0	0	0	207	207	6.49%
Big South Fork Scenic Railroad	III	12	0	0	0	12	0.38%
Blue Grass Railroad Museum	Rec.	6	0	0	0	6	0.19%
Kentucky Railroad Museum	Rec.	23	0	0	0	23	0.72%
TOTAL		**2,455**	**76**	**223**	**437**	**3,191**	**100%**

$578 BILLION in goods **SHIPPED ANNUALLY**

According to the Surface Transportation Board (STB) Carload Waybill Sample (CWS) data, the Kentucky rail network carried 255.4 million tons of freight in 2010 and 267.5 million tons of freight in 2011. The largest share of freight on the Kentucky rail network in 2011 was overhead freight, the phrase for movements that cross through Kentucky, both originating and terminating in other states.

> Outbound freight, which originates in Kentucky and terminates in another state, was almost double the tonnage of inbound freight, which originates in another state and terminates in Kentucky. Intrastate freight, freight movements that take place within Kentucky, comprised the smallest percentage of freight movements in 2011, at less than 2% of carloads/units and less than 3% of tonnage that year.

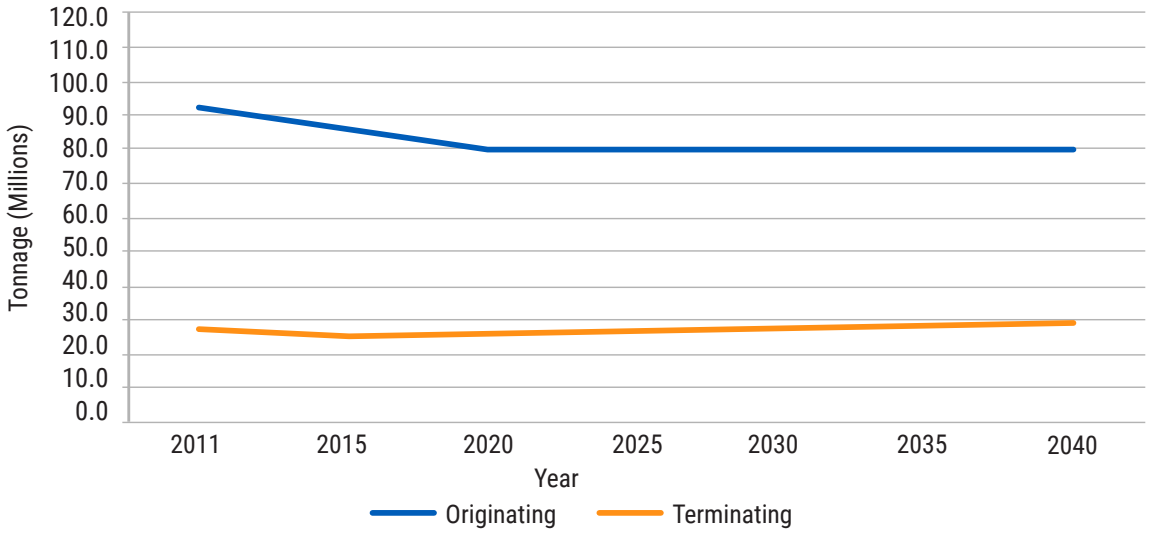
Forecasted Trends

In Kentucky, termination inbound rail movements are expected to increase slightly from 27 million tons in 2011 to 30 million tons in 2040. Origination outbound rail movements are expected to decline from just over 90 million tons in 2011 to 80 million tons in 2040. This also considers potential increases in shipments for the automobile and oil industries.

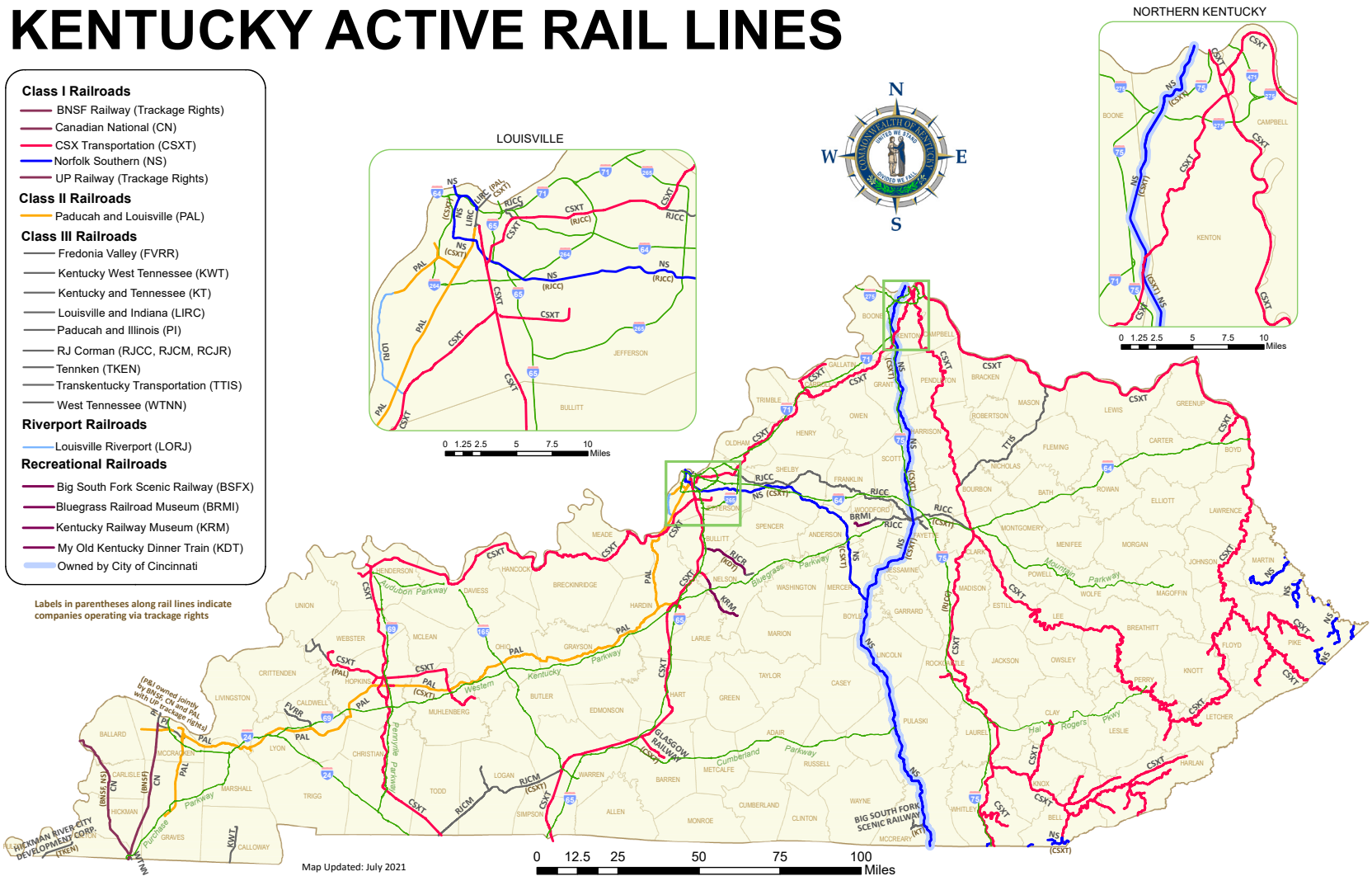
Tonnage and Carloads / Units by Movement type (2011)

Direction	Tons	Percent	Carloads/Units	Percent
Overhead	165,172,308	61.7	3,251,725	74.7
Outbound	65,439,913	24.5	690,064	15.9
Inbound	29,713,888	11.1	341,599	7.8
Intrastate	7,216,502	2.7	69,042	1.6
TOTAL	**267,542,611**	**100.0**	**4,351,430**	**100.0**

Projected Rail Tonnage Inbound and Outbound in Kentucky, 2011-2040



Freight Railroads in Kentucky



Source: https://transportation.ky.gov/MultimodalFreight/Pages/Railroads.aspx

MODAL SUMMARIES: RAIL AND RIVERPORT

SUSTAINABILITY

Railroads are the most fuel-efficient way to move freight over land. It would have taken approximately 12.9 million additional trucks to handle the 23 million tons of freight that moved by rail in Kentucky in 2019.

On average, railroads move
1 TON OF FREIGHT
470+ miles on 1 gallon of fuel

1 TRAIN can carry as much freight as several hundred trucks

RAIL FAST FACTS FOR 2019

13
Freight Railroads

3,200
Railroads Miles

2,916
Freight Rail Employees

$127,710
Averages Wages & Benefits per Employee

13,500
Railroad Retirement Beneficiaries

$337 M
Railroad Retirement Benefits Paid

STATE OF THE SYSTEM: RIVERPORTS AND WATERWAYS

Many marine industries are located along Kentucky's extensive network of inland waterways. The state's 10 public riverports include seven that are operating and three that are developing. The ports largely do not compete with one another, and each can stimulate economic development in the surrounding region.

Kentucky lies in the heart of the nation at the hub of the nation's inland waterways. With the Ohio River, Mississippi River, Big Sandy River, and Tug Fork bordering the Commonwealth, Kentucky offers unique advantages for efficient year-round freight transport of bulk materials, agricultural products, chemicals, minerals, metals, wood, manufactured goods, and containerized freight. Kentucky's well-developed terminals and riverports (supported by enterprise zones, warehouse facilities, ports of entry, and foreign trade zones) link with an intermodal transportation system that forms a network with the world. Containing over 1,590 miles of United States Army Corps of Engineers (USACE) navigable inland waterways, Kentucky is the linchpin between the Great Lakes, Canada, and Mexico, as well as the deep-draft ports of New Orleans, LA and Mobile, AL for shipments overseas. The Ohio River accounts for over 30% of these miles on Kentucky's navigable waterways. The Kentucky Riverports map to the right illustrates the location of the riverports and the market hinterland. The hinterland refers to the area surrounding a service from which customers are attracted.

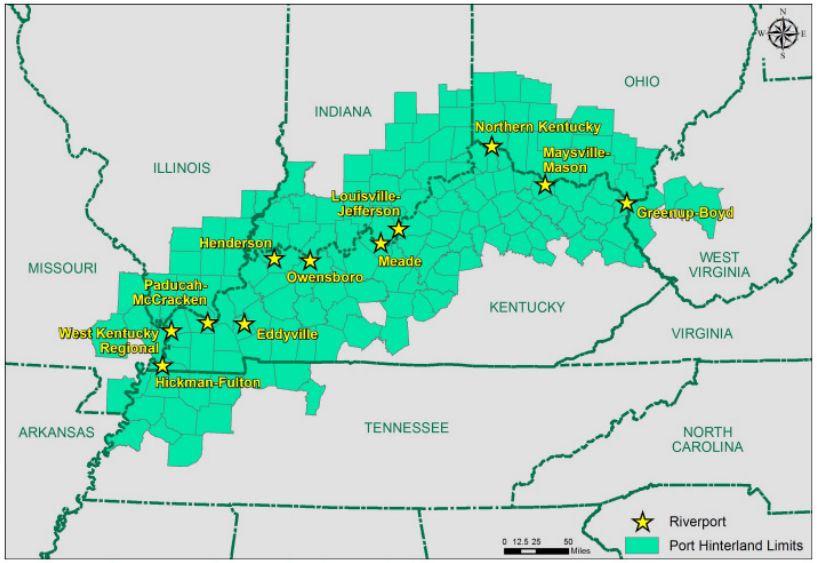
Waterway Conditions

Five navigable rivers in Kentucky also have a total of 10 locks and dams. The USACE has jurisdiction over all these locks and dams except for those on:

- the Kentucky River, which are owned and maintained by the Kentucky River Authority. Eight of the locks and dams in Kentucky are operated by the USACE Louisville District and the remaining two locks and dams are operated by the USACE Huntington District. These were constructed in the 1950s and 1960s.
- the USACE Louisville District operates the two locks and dams on the Green River. The Green River Locks and Dam No. 1 is located near Henderson. The Green River Locks and Dam No. 2 is located near Calhoun. Both locks and dams were constructed in the 1950s. The only Cumberland River lock and dam in Kentucky is operated by the USACE Nashville District. Constructed in the 1960s, this lock and dam is located near Grand Rivers. The USACE Nashville District also operates the only Tennessee River lock and dam in Kentucky. This lock and dam is located 20 miles east of Paducah.

The majority of the locks and dams on the rivers in Kentucky are over 50 years old. Those constructed in the 1930s and 1940s need major rehabilitation or replacement.

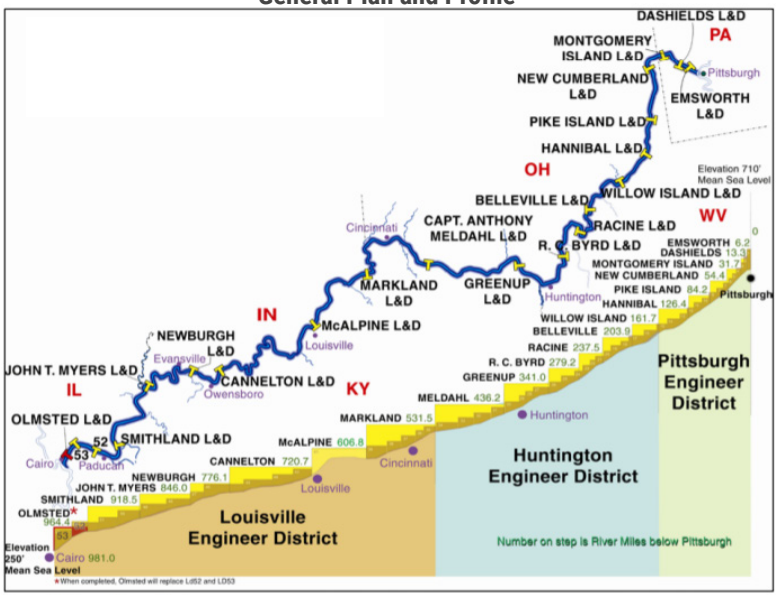
Kentucky Riverports



Source: Kentucky Riverport Authorities and Market Hinterland

Ohio River Mainstem Navigation System

General Plan and Profile



Source: U.S. Army Corps of Engineers

TRENDS

The inland waterway system carries a significant amount of Kentucky's coal to customers throughout the Mississippi and Ohio River Valleys. Kentucky is no longer a top 3 leading coal provider in the United States. In 2021, about 578 million short tons of coal were produced in 23 states. The table depicts the five largest coal-producing states with production in million short tons and their percentage shares of total U.S. coal production in 2021.

State	Tons	Percent
Wyoming	239.2	41.4%
West Virginia	78.6	13.6%
Pennsylvania	42.4	7.3%
Illinois	36.8	6.4%
Kentucky	26.6	4.9%

Source: https://www.eia.gov/tools/faqs/faq.php?id=69&t=2

CHALLENGES

Connectivity

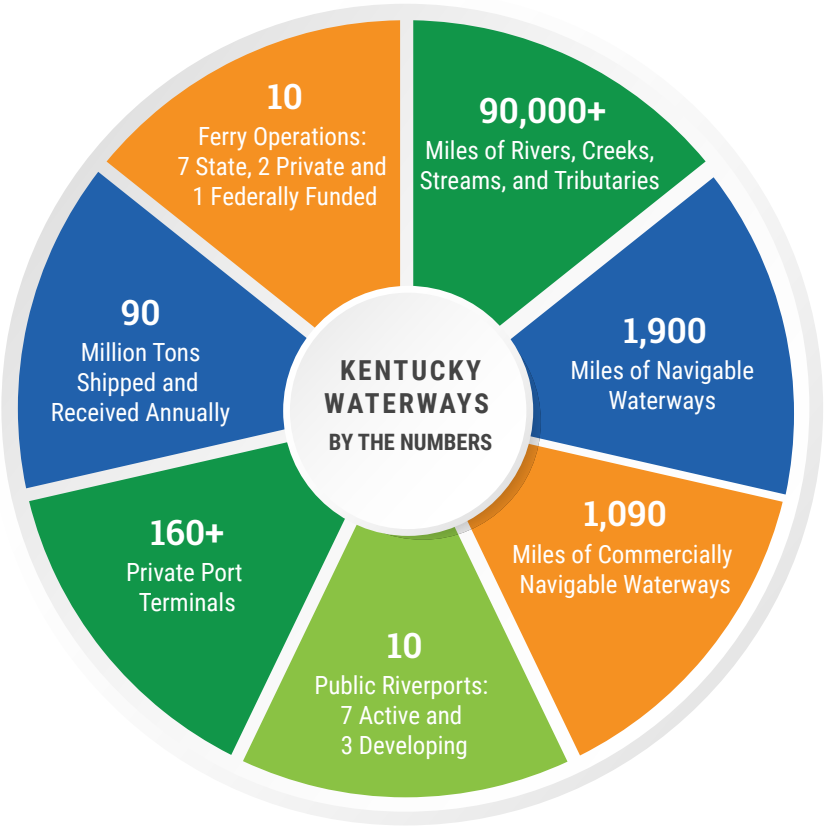
Navigable rivers in Kentucky depend on the lock and dam system. For instance, the purpose of the Ohio River's locks and dams is to maintain a minimum depth of 9 feet for commercial navigation. The locks and dams constructed in the 1930s and 1940s are aging and are in need of major rehabilitation or replacement.

System Operation

Freight rail bypasses large sections of the Ohio River Basin, limiting inland connectivity. Potential exists for the creation of a container-on-barge terminal on a waterway in the western part of Kentucky. However, the challenges include an aging and less reliable lock and dam system.

OPPORTUNITIES

Since 2013, the Transportation Cabinet budget crafted by the Governor and enacted by the Legislature has included $500,000 annually in general fund revenue for riverport improvement. KYTC utilizes the general funds appropriated to it through the budget bill for the Riverport Improvement grants. Kentucky is constitutionally prohibited from using road fund dollars for non-highway modes of transportation; therefore, there is no line item for riverports in the highway plan. If riverport authorities and operators want to advocate for a dedicated revenue stream, a place to start is to identify advocates who can enact necessary legislation that the KYTC could help administer.



Statewide Transportation Survey

One of the most important elements of the transportation planning process is a community discussion about needs, concerns, and goals regarding how people and goods move from one place to another. Accomplishing an inclusive and diverse discussion about the multimodal transportation system for an entire state proves to be a challenging undertaking under ordinary circumstances. Even with the restrictions and uncertainties of the COVID-19 pandemic, a dedicated and safe effort was made to enable broad public input into the development of the LRSTP.

In October 2021, an online Kentucky Statewide Transportation Survey was released for a 45-day period to identify the issues that matter most for the future of Kentucky's multimodal transportation system. Over 8,300 people participated in the survey. The survey was the method of gathering the input necessary to develop the necessary to develop the LRSTP Vision, Goals and Objectives, and Guiding Principles which will help shape the direction of statewide transportation planning between now and 2045.

In October 2021, on online survey was conducted to identify the issues that matter most for the future of Kentucky's transportation system. The input provided will help shape the direction of statewide transportation planning between now and 2045.

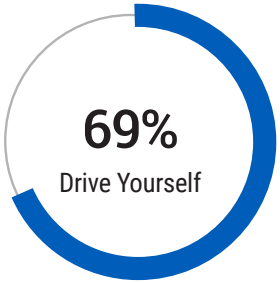
What We Heard

MORE THAN 8,300 KENTUCKY RESIDENTS PARTICIPATED

TRANSPORTATION

Travel behavior

What types of transportation do you use weekly to get to where you want to go?



- 15% Bicycle
- 7% Walk

Road Priorities

What are your top priorities for road improvements in Kentucky?

- 20% Increased safety with fewer crashes
- 18% Better traffic flow during rush hour

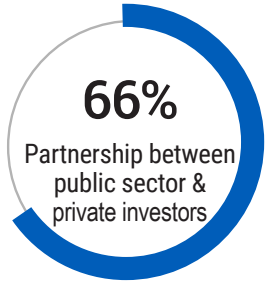
Multimodal Priorities

What are your top priorities for improvements to other types of transportation in Kentucky?

- 17% Additional rail, air, or port for passenger travel
- 14% Safe & easy transition between different types of transportation

Funding Options

Which of the following options would you most support as funding sources for transportation improvements?



- 20% Government bonds (borrowing)
- 14% Tolls on roads or bridges

INVESTING IN THE FUTURE

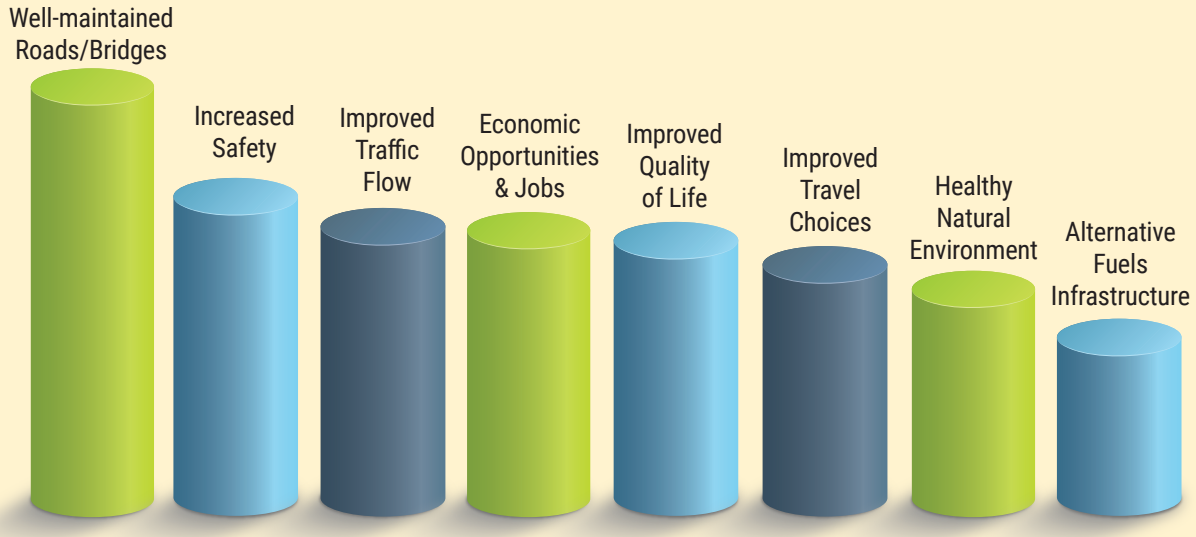
HOW WOULD YOU SPEND THE TRANSPORTATION BUDGET?

Given $100... respondents on average would spend it on:

$ 34	Well-Maintained Roads & Bridges
$ 18	Improved Traffic Flow
$ 14	Railways, Airports, and Riverports
$ 13	Safety and Health for All Users
$ 11	Pedestrian and Bicycle Facilities
$ 10	Bus Services
$100	

YOUR VISION OF THE FUTURE

WHAT ARE THE MOST IMPORTANT PROJECT OUTCOMES TO YOU?



SURVEY OVERVIEW

The initial engagement with the statewide public involved the Kentucky Statewide Transportation Survey (Survey #1) and was designed to capture the issues, needs, and priorities across all modes of the transportation system. A web-based tool was used to obtain public and stakeholder input on different topics to support the development of the LRSTP. Survey #1 was prepared to determine transportation issues, needs, preferences, and collect comments from the public. This survey collected input to inform the decision-making for the next two steps of the LRSTP: step 1) Vision, Goals & Objectives, and Performance Measures, and step 2) Scenario Planning. The survey provided an opportunity for the public to communicate general information about the existing system and how it is funded. The survey questions fell into three categories: Participant Demographics and Transportation Behaviors, Transportation Issues / Needs / Priorities, and Survey Performance.

SURVEY PURPOSE

Survey #1 had two overall purposes as shown below:

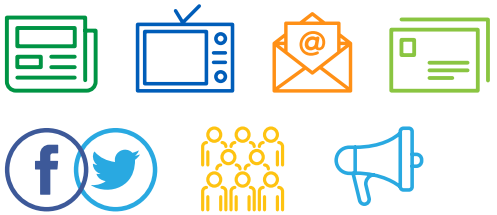
1. Inform Kentuckians and other system users of the importance of the LRSTP, the process and schedule for its development, and how input will be used in the creation of the Draft and Final LRSTP and Implementation Plan.
2. Involve Kentuckians and other system users in meaningful ways to generate useful input that will support the decision-making to develop the LRSTP.

PUBLIC COMMENT PERIOD

Survey #1 was open for 45 days to provide a reasonable time period for participants to learn and respond. The survey was open from October 22 through December 6, 2021.

Survey Process

The survey was created using a web-based tool due to the user-friendly format and was offered both online and in printed copies. To encourage broad participation, a variety of tools were used to increase the public's general awareness of the survey. A website was developed that included information about the LRSTP, a link to the survey, a video from KYTC Secretary Jim Gray encouraging survey participation, and a sign-up form for future information. Press releases were distributed to media outlets across the state, along with a major outreach effort through social media platforms. Posters and fact sheets were developed and mailed to businesses. Emails were sent to elected officials for every county and all cities with populations over 20,000 as well as key leaders representing modal areas and interests. To track the effectiveness of the outreach methods, participants were asked how they learned about Survey #1. In addition, about halfway through the survey period, geographic regions with the lowest responses were identified and then targeted with paid Facebook advertisements.

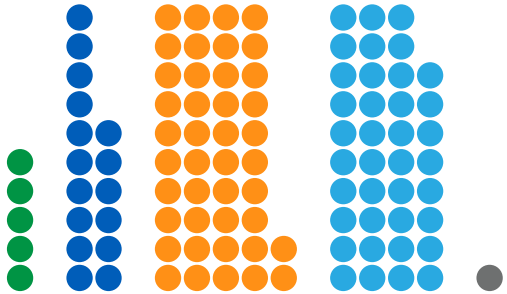


The response rate to Survey #1 is considered to be highly successful compared to similar efforts according to the web-based tool developer. Citizens representing all **120 COUNTIES** provided feedback on issues and preferences across all modes of transportation.

SURVEY PARTICIPANTS

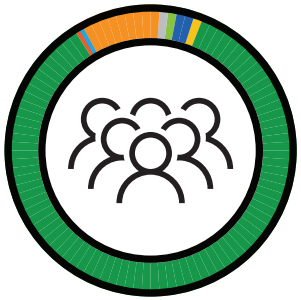
Kentucky has a diverse population in terms of race, age, education, and income, and Survey #1 captured the responses and preferences that diversity.

PARTICIPANTS BY AGE



Under 24	5%
25 - 34	16%
35 - 54	42%
55+	36%
Prefer Not to Say	1%

PARTICIPANTS BY RACE

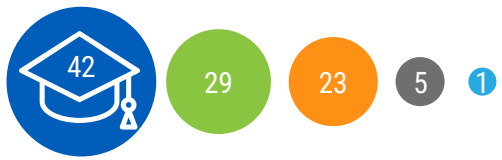


White	86%
Prefer Not to Say	8%
Black or African American	2%
Asian	1%
Hispanic or Latino	1%
Other	1%
American Indian or Alaska Indian	0.5%
Native Hawaiian or Pacific Islander	0.5%

YEARLY HOUSEHOLD INCOME

Under $20,000	4%
$21,000 - $40,000	10%
$41,000 - $60,000	13%
$61,000 - $80,000	15%
$81,000 - $100,000	15%
Over $100,000	31%
Prefer Not to Say	12%

EDUCATION LEVEL

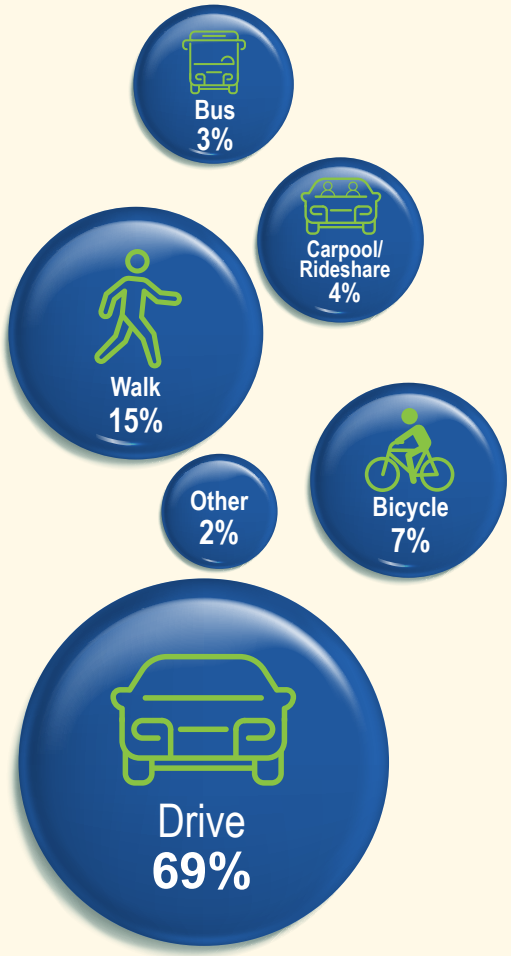


Bachelor's Degree	42%
Master's Degree/PhD	29%
High School Diploma/GED	23%
Prefer Not to Say	5%
No High School Diploma	1%

HOW DID YOU LEARN ABOUT THIS SURVEY?

Social Media	Email	Friend/ Colleague	TV/Radio	Newspaper	Prefer Not to Say	Flyer/Poster Postcard
49%	24%	12%	6%	4%	3%	2%

HOW DO YOU TRAVEL?



PARTICIPANTS WITH DISABILITIES

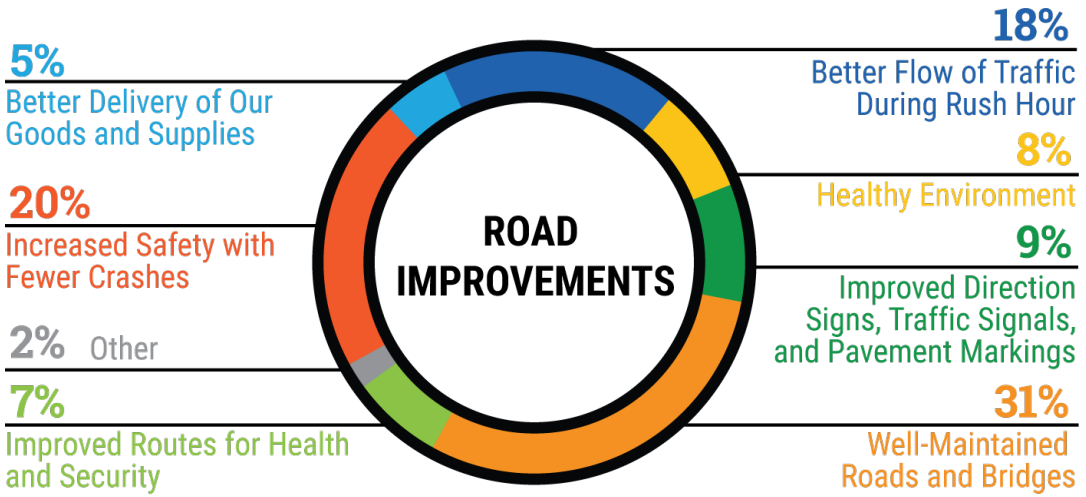
Visually Impaired	Mobility Impaired	Hearing Impaired
4.1%	3.4%	3.4%

A series of questions within the survey were developed to gain a better understanding of the public's preferences on roadway improvements and other modal transportation options. Participants also shared their preferences regarding what funding mechanisms should be used for transportation projects.

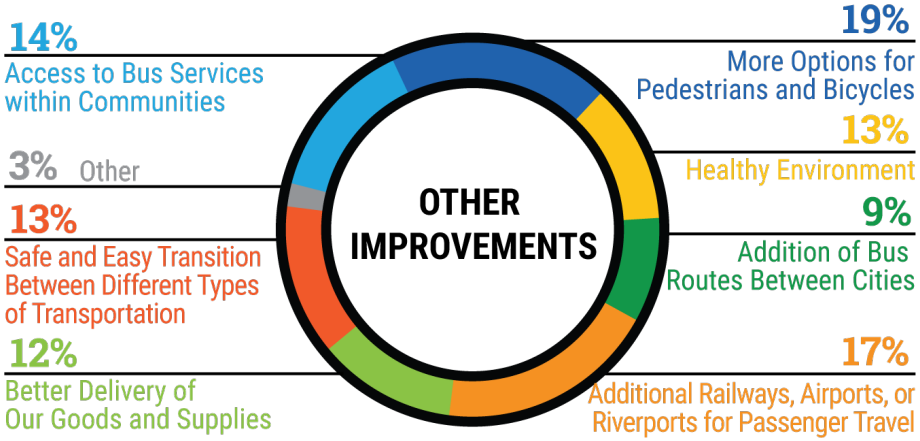
OVERVIEW OF TRANSPORTATION PRIORITIES

When it comes to Kentucky roads, survey respondents expressed a desire to maintain roads and bridges, increase safety, and improve traffic flow as the top three priorities. For other forms of transportation, there was no alternate mode of transportation provided that received more than a 19% response. Priorities were fairly evenly distributed among all options with the exception of additional bus routes between cities receiving less than 10%. In terms of funding mechanisms, public-private partnerships and government bonds received the most responses, at 22% and 20%, respectively, but there was not a general consensus on the best funding alternative.

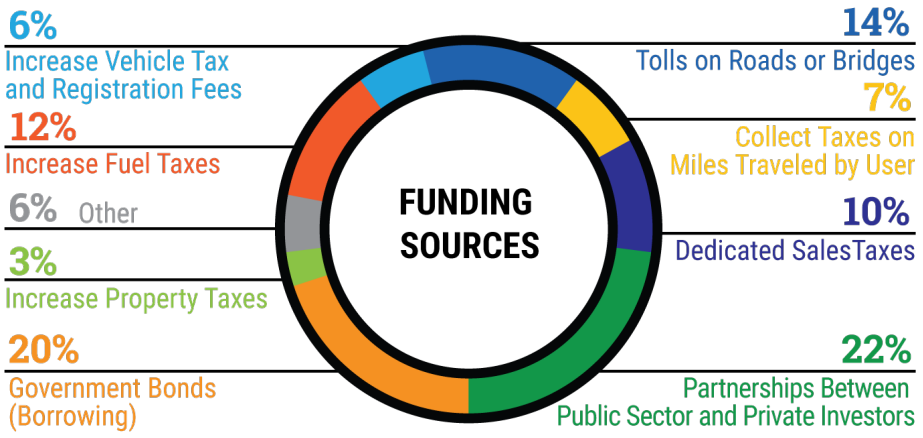
What are Your Top Priorities for Road Improvements in Kentucky?



What are Your Top Priorities for Improvements to Other Types of Transportation in Kentucky?



Which of the Following Options Would You Most Support as Funding Sources for Transportation Improvements?



Forces of Change

A force of change is a dynamic influence that transitions a body from a state of rest to one of motion. In consideration of the future operation and development of a transportation system, these forces can include shifts in social structure, technology, politics, economics, and the environment. Kentucky's transportation system is similarly affected by these forces of change, and the LRSTP has considered specific drivers which exist within these forces of change.

When examining the effect of these forces of change upon Kentucky's multimodal transportation system, the geographic setting of the state is an important factor. Kentucky is located within 500 miles of most major industrial, cultural, and economic centers in the central and eastern United States. It is also positioned along the nation's major highway, rail, aviation, and marine routes.

The combination of central location and accessibility to major multimodal transportation routes has made Kentucky a crossroads state. Six major interstate highways (I-24, I-64, I-65, I-69, I-71, and I-75) and one major interstate spur highway (I-165) run through the state, along with additional miles of fully controlled access parkways distributed throughout. Access to the Mississippi, Ohio, Tug Fork River, and Big Sandy Rivers and to an extensive system of major and short-line railroads provides convenient movement of freight. Additionally, the major airports of Lexington, Louisville, and Northern Kentucky/Cincinnati contribute to the movement of passengers and air cargo and is supplemented by a broad system of general aviation airports across the state.

Looking toward 2045, two major factors, climate change and emerging technology, are worthy of special consideration because of their disruptive natures regarding the development and operation of the state's multimodal transportation system. Drastic shifts in global climate patterns are having long-term adverse impacts on the built environment as severe weather events, ranging from powerful storms with damaging winds and torrential flooding rains to severe droughts and excessive heat, can damage the physical infrastructure of the system. On the positive side of disruption is the rapid advent of technological changes to the transportation fleet with the emergence of electric-powered vehicles and increasing vehicle self-autonomy. An additional effect from emerging technology upon transportation is the increasing number of workers and students telecommuting from their homes as opposed to physically commuting to their workplace or school. The respective impacts to transportation in Kentucky of both climate change and emerging technology have been further explored in the following sections of the LRSTP.

CLIMATE CHANGE

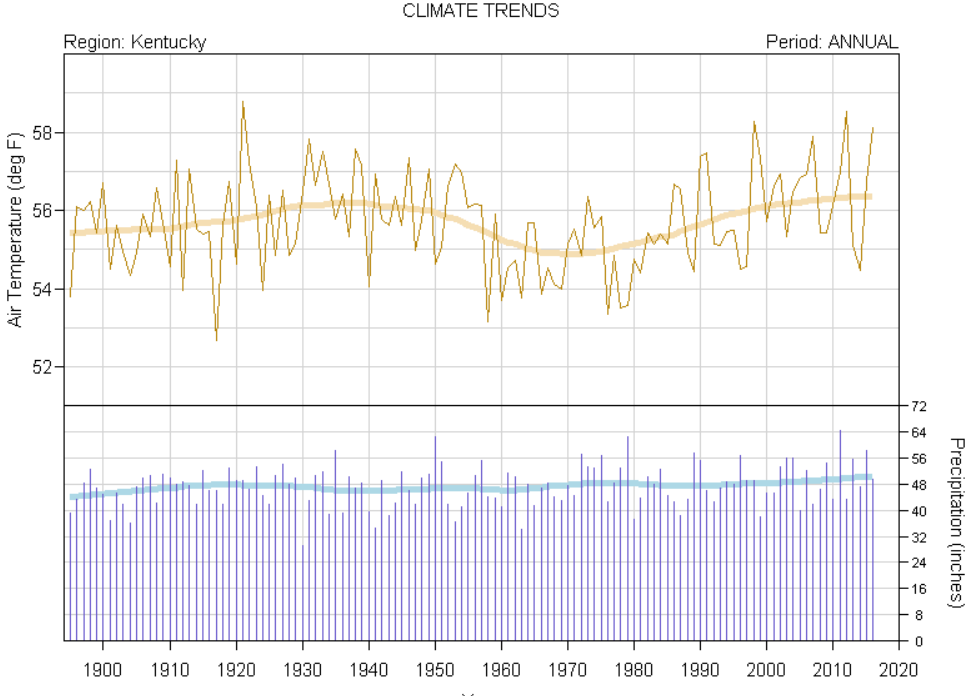
Human-caused increases in greenhouse gases have been the major influencing factor on global climate change over the past 140 years. Energy production and consumption, specifically the burning of fossil fuels, are the largest sources of greenhouse gas emissions in the world.

Both ecosystems and human infrastructure around the world face risks from climate change. Increased temperatures, extreme weather events and sea level rise can have wide-ranging and long-term consequences.

Kentucky's climate is changing quickly. The Bluegrass State is the **NINTH MOST THREATENED STATE** in the country by long-term climate change impacts, according to a recent study by SafeHome.org, based on data from the Kentucky Climate Center. Kentuckians have experienced significant recent natural disasters such as the tornadoes in Western Kentucky in 2021 and the devastating flooding in Eastern Kentucky in 2020 and 2022.

Three of the five wettest years on record in the state have been in the last decade, and the summer of 2020 saw the most rain of any two-month period on record going back to 1895. More rain can boost crops, but in many parts of Kentucky rain now comes in unhelpful torrents. In both the eastern mountains and urban areas, excessive rain has contributed to severe and frequent flooding.

Kentucky Climate Trends: 1895 through 2016 (Kentucky Climate Center, 2021)



CLIMATE IMPACTS IN KENTUCKY

Kentucky's transportation system needs to remain resilient against natural hazards to maintain an effective means of moving goods and providing emergency routes to citizens. Closing major thoroughfares due to natural hazards in Kentucky not only affects the immediate area and its residents but could affect the logistics routes of major manufacturers across the country.

Myclimate.org identified the following potential impacts:

- The state will see an increase in extreme precipitation and heat in the future.
- The western part of the state will see a more dramatic increase in days with extreme heat.
- The central and eastern parts of the state will see a more dramatic increase in extreme precipitation events.
- The eastern part of the state is more prone to rockfalls and landslides.
- The central part of the state is abundant with sinkholes and karst landscape.
- Flooding is an issue throughout most of the state.
- There are seismic zones on both the eastern and western border of the state.

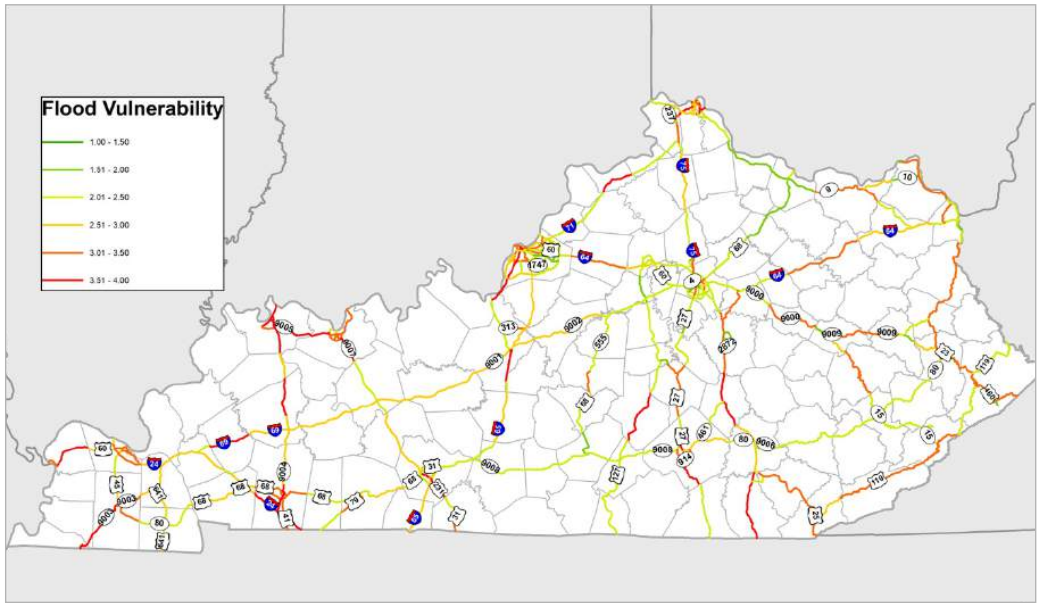
Environmental Hazards

The Kentucky Transportation Center (KTC) aided KYTC in identifying assets that are most vulnerable to natural hazards. In 2016, KYTC administered a federally-funded natural hazard vulnerability assessment of NHS routes. NHS assets, including highway segments, bridges, and culverts, were evaluated for risk against earthquakes, floods, landslides, and sinkholes using available data. Each of the 12 KYTC Districts individually contributed to the identification of the most critical extreme weather and natural hazards in their District and helped to develop mitigation strategies for the highest priority risks.

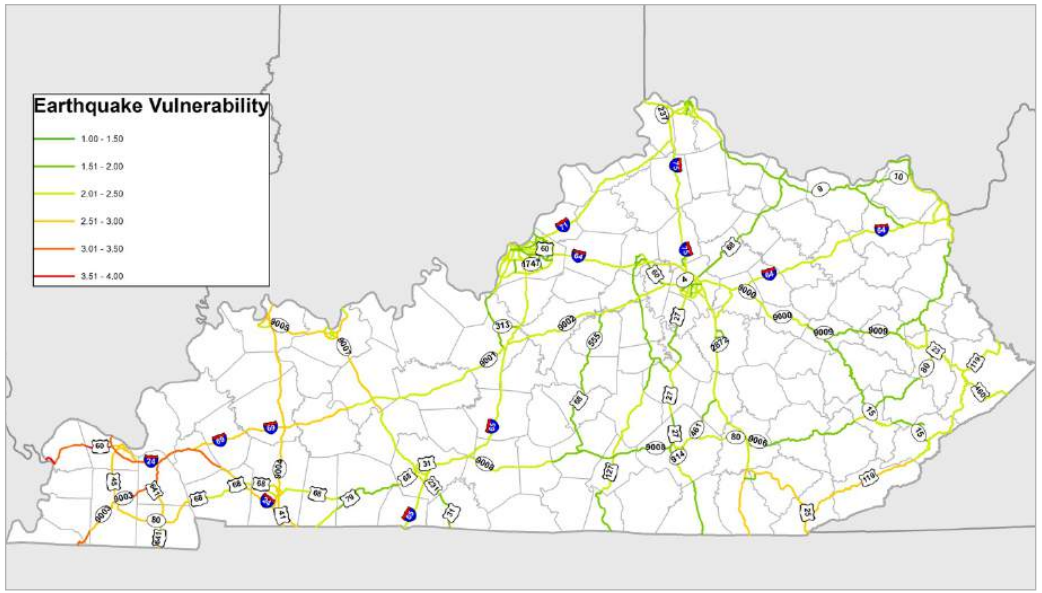
Kentucky has over 90,000 miles of streams within the state, making it prone to flooding during any season. KYTC works with the USACE and the Environmental Protection Cabinet for necessary permits, public protection, and environmental justice actions. The most frequent types of flooding in Kentucky are river floods and flash floods. A river flood occurs when water levels overtake riverbanks due to the accumulation of precipitation in stream channels. Flash floods occur because of a heavy amount of rainfall in a brief period resulting in rapidly increasing water levels that flow through stream channels, urban streets, or mountain valleys. Flash flooding can occur anywhere in the Commonwealth, but it is particularly an issue in eastern Kentucky, where steep topography directs water into the streams and valleys.

FOR ADDITIONAL INFORMATION:
See Appendix H: Climate Change

Flood Vulnerability of Kentucky's NHS (KTC, 2018)



Earthquake Vulnerability of Kentucky's NHS (KTC, 2018)



RESILIENCY IMPROVEMENT PLAN (RIP)

Extreme weather events have become more frequent and costly in recent years. These events damage assets, increase mitigation and maintenance costs, and further strain already-stretched transportation budgets. Models indicate extreme weather events will continue to occur with increased frequency as Kentucky moves toward a warmer and wetter climate.

The goal of the Kentucky Resilience Improvement Plan is to identify transportation vulnerabilities to extreme weather and natural hazards and develop a plan to guide activities and investments toward improving system resiliency. Transportation Resilience Improvement Plans are not a federal requirement for transportation agencies. However, agencies are encouraged to develop a plan in accordance with 23 U.S.C. Section 176(e) to address surface transportation system resilience to current and future weather events and natural disasters. Agencies that have developed an eligible plan qualify for a lower non-federal match from the FHWA PROTECT Formula Program.

The Kentucky Resilience Improvement Plan reflects KYTC's efforts to identify vulnerabilities, develop risk-based strategies, and schedule and prioritize improvements. The Plan serves as the baseline for a resiliency planning program within the agency. The Plan includes:

- Coordination with agency planning efforts
- Historic impact summary
- Probability assessment of future weather and natural disaster impacts
- Risk based assessment of vulnerable assets
- Resiliency strategies

KYTC applies a systemic approach to resiliency planning that considers the risks to the system across geographic regions. Strategies in place include:

- Optimizing asphalt mix designs to provide increase friction in high precipitation
- Application of preservation strategies to provide more permeability for asphalt pavements
- Inclusion of resiliency factors in asset management prioritization
- Consideration of redundancy for project prioritization

PLANNING GOALS AND OBJECTIVES TO MITIGATE CLIMATE CHANGE

The following planning goals and objectives reflect similar ones found in the planning documents of the Metropolitan Planning Organizations across Kentucky.

Encourage innovative design and development that is sensitive to the environment, its constraints, and the general surrounding natural conditions.

Promote energy efficiency and conservation on a community-wide basis.

Protect, enhance, and restore our living environment including the population, landscape, air, soil, water, and irreplaceable natural and scenic resources which we use in our community.

Preserve the environmental integrity of the natural, cultural, and physical resources.

Protect natural beauty in order to maintain and improve as a destination and place of residence.

Minimize the risk of loss of life, injury, damage to property, and economic and social dislocations resulting from flood hazards.

Ensure a proper relationship between significant natural streams/creeks and urban development by protecting and preserving these natural features and the area to maximize the benefits conferred on our community by its natural setting including natural barriers, slopes, and topography.

Provide and enhance the quality of natural and human environmental resources, heritage, agricultural resources, and recreational opportunities.

DESIGNATED PROJECT GROUPS

As part of Kentucky's required State Transportation Improvement Program (STIP), two groups of STIP projects related to climate change, are 1) Air Quality, and 2) Bicycle, Pedestrian, and Transportation Alternative Programs. Both of these groups help improve the resiliency and reliability of the transportation system.

Air Quality

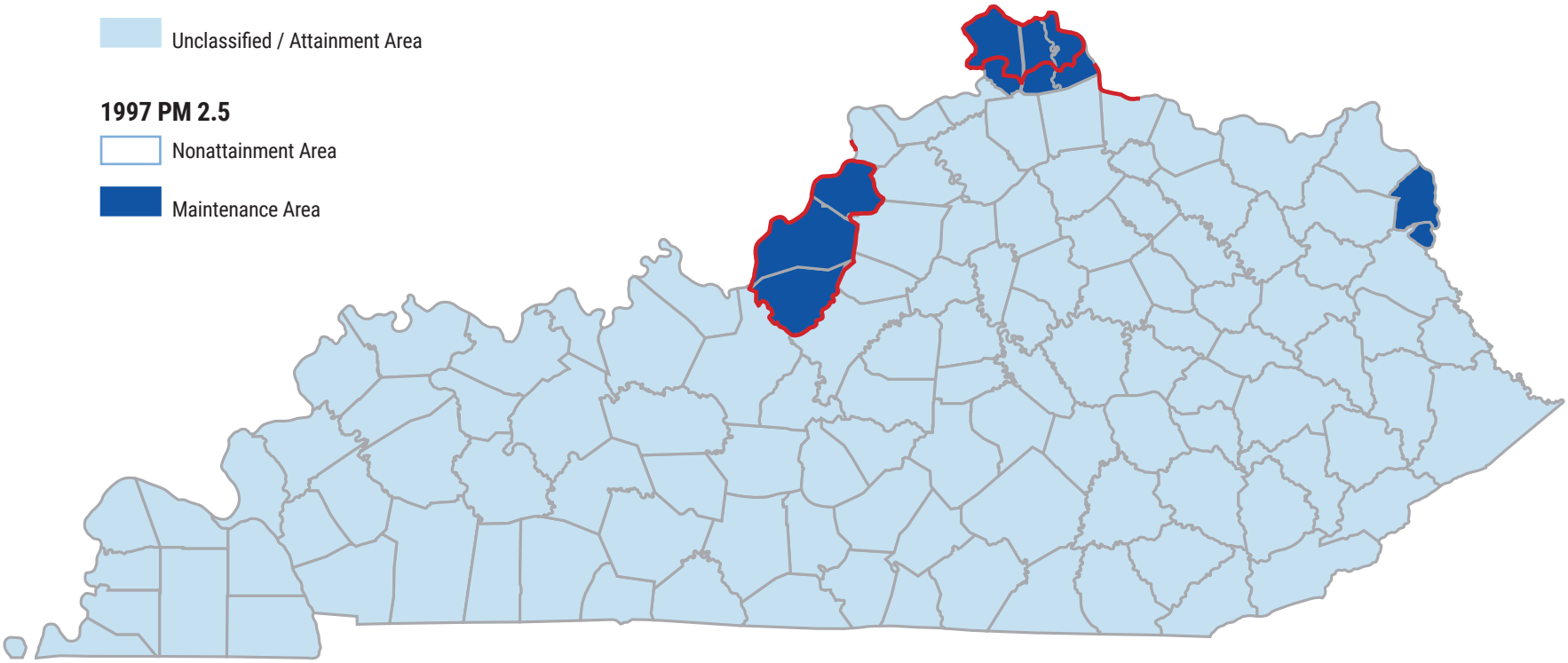
Air quality improvement projects consist of the congestion mitigation projects to help reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas).

Bicycle, Pedestrian, and Transportation Alternative Program

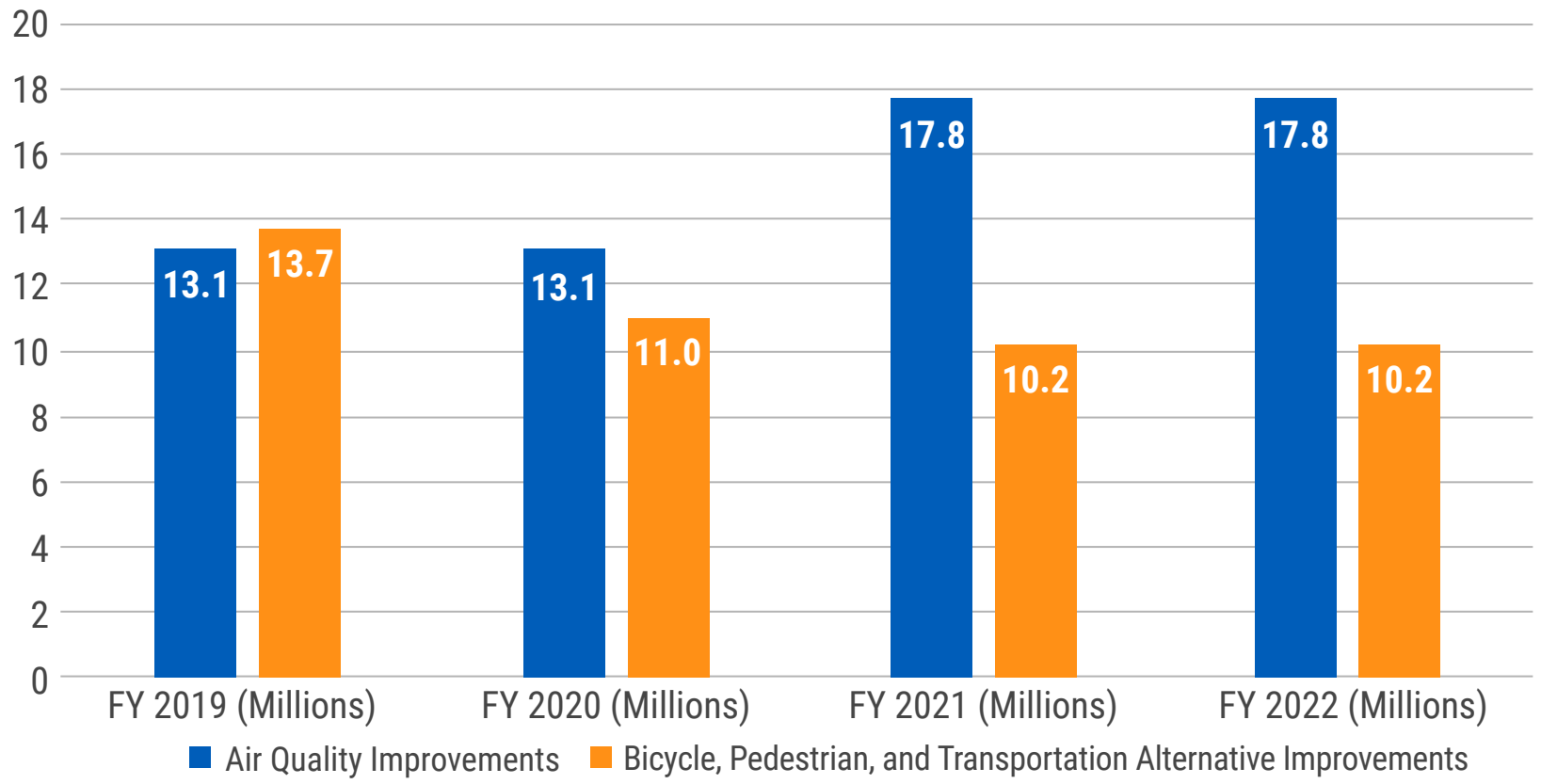
Bicycle, Pedestrian, and Transportation Alternative Program (TAP) improvement projects consist of the construction/reconstruction of bicycle and pedestrian facilities, recreational trails, safe routes to school, community improvements such as historic preservation, and vegetation management. Also included is environmental mitigation related to stormwater and habitat connectivity.

In 2017, the transportation sector made up 29% of U.S. greenhouse gas emissions. Reducing emissions in the transportation sector is one way to mitigate climate change. Bicycling is a zero-emissions form of transportation; riding a bike saves 150 grams or 5.3 ounces of carbon dioxide per kilometer (about 0.6 miles) traveled when compared to driving a car.

Air Quality Nonattainment and Maintenance Areas (EPA, 2021)



Annual Funding on Grouped Projects



CONNECTED/AUTONOMOUS VEHICLES

Connected and autonomous vehicles (C/AVs) are a trending topic for the future of transportation and represent the next revolution in transportation. C/AVs promise to improve safety by minimizing the human driver error and supporting a movement to zero deaths. Mobility is improved through automation or connected automation by providing access to transportation for all, regardless of abilities. It improves traffic flow by minimizing human perception and decision time, limiting non-recurring congestion, and reducing headways.

Rapid evolution of emerging technologies has increased the number of states looking to address the potential impacts of C/AVs on the transportation system. Common issues arising in C/AV-related legislation are safety, public acceptance, progression of automated technology, infrastructure needs and costs, licensing requirements, regulatory regimes for autonomous vehicle related liability changes, and platooning.

Personally-owned C/AVs could travel

40%MORE
MILES IN 2050

CHALLENGES

- Costs
- Safety
- Privacy
- Legal and regulatory issues
- Cyber security

OPPORTUNITIES

- Crash reductions
- Reduced headways
- Enabling trip planning
- Increasing capacity of current infrastructure through synchronized traffic flows
- Improved transportation access for the young, elderly, and disabled
- Reducing freight transportation costs
- Improving productivity by freeing up driving/ commuting time

Importance/Impact to KY's Economy

While Kentucky legislators discussed the issue of C/AV's, there have not been many laws enacted to protect drivers in the event of a crash. In 2018, however, the state did enact a law to regulate truck platooning. Reviewing Kentucky Revised Statutes (KRS) and Kentucky Administrative Regulations (KAR), it is apparent there are areas in which future changes may be needed related to licensing, registration, cell phone usage, and traffic enforcement. C/AVs that can drive themselves and communicate with one another are likely to increase vehicle miles traveled and reduce people's willingness to use public transit, according to a new study from the University of California.

C/AVs have the potential to **INCREASE THE SAFETY** of vehicle travel, reduce congestion and emissions, and make transportation **more efficient.**

FOR ADDITIONAL INFORMATION:
See Appendix I: Emerging Technology

ALTERNATIVE FUELS TECHNOLOGY AND INFRASTRUCTURE

At the end of 2021, two million electric vehicles (EVs) were in the United States, making up 0.5% of all light-duty vehicles -- approximately double the number in 2018. At the same time, in Kentucky, about 6,000 EVs made up 0.2% of the registered light-duty vehicles -- nearly triple the number in 2018. Of the 6,000 EVs in Kentucky, 3,700 (62%) were battery electric vehicles (BEVs) and the remaining 2,300 (38%) were plug-in hybrid electric vehicles (PHEVs). Annual EV sales in Kentucky have increased substantially from 0.5% in 2018 to 1.6% in 2021. The 2022 first quarter EV sales increased even further to 2.4%.* It is expected the EV market share will continue to grow as barriers to EV adoption are addressed.

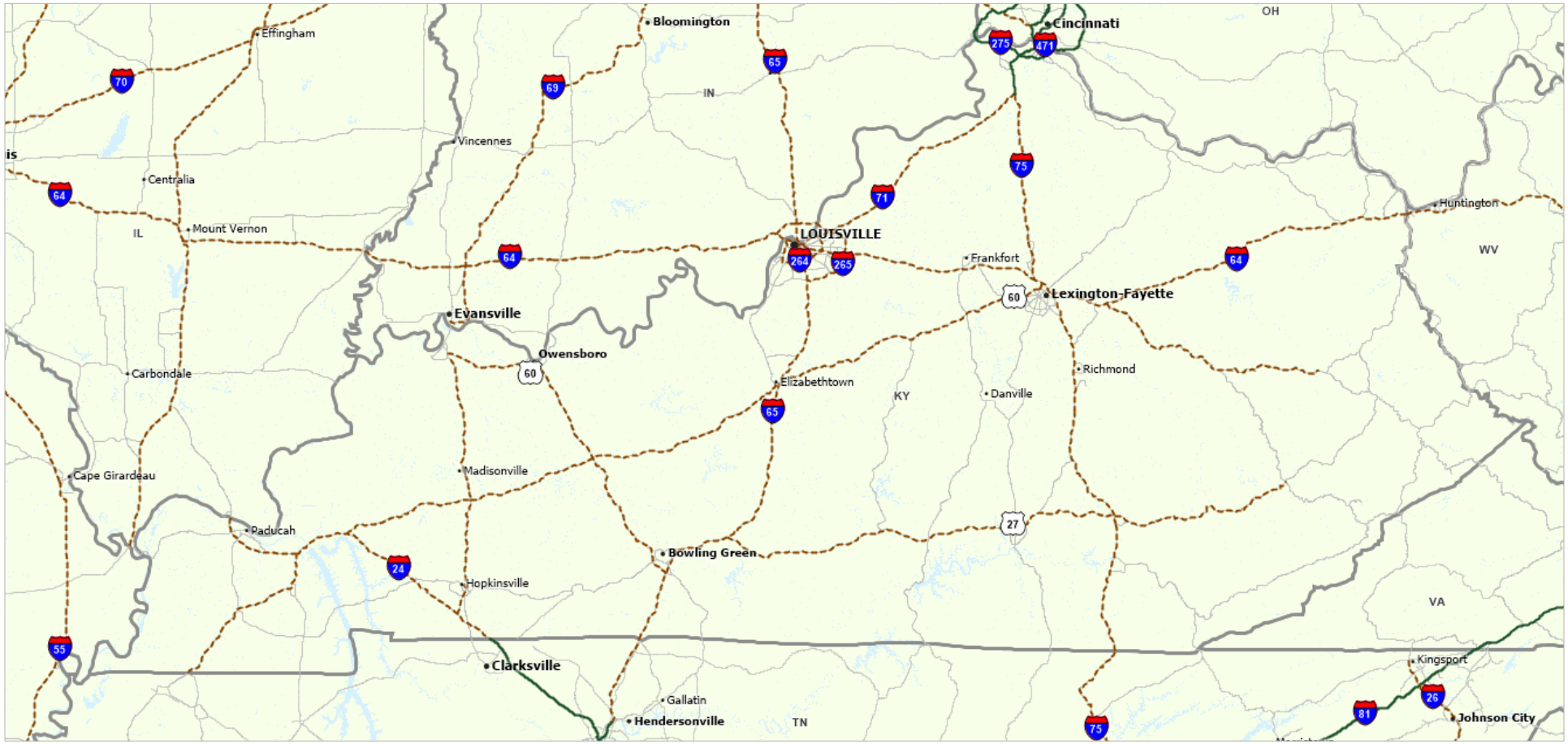
For example, EV technology continues to improve, increasing vehicle range and reducing EV costs relative to comparable vehicle options. Customers are becoming more familiar with EVs and many more models are on the market than in prior years. Based on recent research, one 2022 projection showed EV sales in Kentucky exceeding 30% by 2030.Private companies and public agencies are also investing billions in new EV infrastructure. For example, the IIJA/BIL included $7.5 billion in new funding specifically to install charging infrastructure across the country. Much of this funding is designated to build DC fast-charging (DCFC) stations along designated Alternative Fuel Corridors (AFCs). The AFC are shown in the figure on the next page.

In Kentucky, while all interstates and parkways have been designated as alternative fuel corridors for EVs, only I-64, I-65, and I-75 have been designated as alternative fuel corridors for hydrogen. Hydrogen is being encouraged by the freight industry. Kentucky has planned three public hydrogen refueling stations as part of their AFC plan for Bowling Green, Louisville, and Georgetown.

Kentucky is also looking at other charging needs on other high priority EV corridors. Kentucky recently submitted a required EV Infrastructure Deployment Plan to FHWA, which will be updated in the future as infrastructure is installed and the industry matures. While most EV charging occurs at home or work, a major need still exists for long-distance and community-based public charging in Kentucky. As of August 2022, nine public 24-hour DCFC stations with a total of 21 charging ports were present in Kentucky and approximately 142 public 24-hour Level 2 charging stations with 282 ports.** (Private charging stations or those restricted by time or to customers were excluded). With current private and public investments, this network is expected to increase substantially in the next few years.

*International Energy Agency, 2022 and Alliance for Automotive Innovation, 2022
**US Department of Energy, Alternative Fuels Data Center, 2022.

Alternative Fuel Corridors



Source: https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/maps/

Importance to Kentucky's Economy

EVs are expected to be a major driver for Kentucky's economy in the years to come. $7.8 billion in new EV battery manufacturing investment is underway to change the manufacturing industry in Kentucky and make the state the battery production capital of the U.S. This is expected to translate into spin-off development, investment, and EV market sector growth across the state. Kentucky is positioned to play a major role in this industry transformation.

Other Alternative Fuels

In addition to EVs, other new vehicle technologies and alternative fuels are being developed or are in limited use to include compressed natural gas (CNG), propane, and hydrogen. Currently, one public CNG station and 19 public propane stations are present in the state, with no public hydrogen fueling stations.

ALTERNATIVE FUELING STATIONS
Including Public and Private Stations in Kentucky

Biodiesel (B20 and above)	3
Electric (charging outlets)	303
Ethanol (E85)	71
Hydrogen	0
Natural Gas	10
Propane	19

In Kentucky, there are

303 electric charging outlets AVAILABLE for electric vehicle users

Nationally, there are

2.9 alternative fueling stations & 9.7 electric charging outlets

per 10K registered vehicles

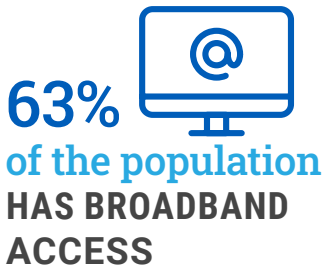
Strategies and Programs

- **Transit Authority of River City (TARC)**
  TARC's new ZeroBus is a fast-charging, all-electric bus that produces zero emissions. Use of electric transit vehicles will help reduce exposure to air pollutant in disadvantaged neighborhoods.

- **Hybrid Horsepower for Kentucky Schools**
  The Kentucky Clean Fuels Coalition and partners replaced 156 aging diesel school buses across Kentucky with new hybrid-electric school buses with an average of 35% greater fuel efficiency. Federal and state funding of approximately $28 million provided the incremental cost of the hybrid system to Kentucky school districts ordering new buses through the Hybrid Horsepower for Kentucky Schools project. The project has collectively saved almost 200,000 gallons of fuel and saved school districts over $700,000. These fuel savings are expected to continue over the 14-year life span of the vehicles.

BROADBAND

Kentucky has a total of 74 internet providers. As of July 2021, the average global internet connectivity speed was 58.27 Mbps, while average mobile upload speed was recorded at 12.35 Mbps. Amongst the states in the U.S., Kentucky ranks 33rd with a median download speed of 33.66 Mbps. As part of his Better Kentucky Plan, Governor Andy Beshear aims to expand internet access to unserved communities across the state. The bills passed at the end of the 2021 legislative session direct American Rescue Plan Act of 2021, or ARPA, funds to boost the state's economy by building new schools, delivering clean drinking water, and expanding access to broadband.



Broadband Summary

The superior technology to deliver internet and network services is optical fiber that carries a communications signal from an operator's equipment all the way to a home, business, or enterprise. This technology has been found to be more robust and reliable than older technologies. Though relatively new, running fiber to homes (fiber-to-the-home) is a fast-growing method of providing much greater bandwidth and speeds to consumers and businesses, for more robust video, internet, and voice services. Connecting homes, business, and any endpoints (including cellular towers or sites) directly to fiber optic cable enables enormous improvements in what bandwidth devices are capable of delivering. Current fiber optic technology can provide two-way transmission speeds, upload and download, of over a gigabit per second.

The COVID-19 pandemic accentuated the need for all Kentuckians to have access to high-speed, reliable internet access to stay informed and connected to school, work, family, church, health care, and other critical services. As more jobs transitioned to telework and classrooms moved to online learning, households across Kentucky became increasingly reliant on enhanced internet capacity dependent technology to not only download data, but also to upload and share information, particularly when two or more platforms were simultaneously online.

- Under House Bill 320 and House Bill 382, a bipartisan agreement signed into law by Governor Beshear, Kentucky's Broadband Deployment Fund includes $300 million in state funds earmarked to address the connectivity needs of unserved and underserved communities across the Commonwealth. Combined with at least 50% required matching federal investments, a minimum of $600 million will support broadband expansion in Kentucky, creating more than 10,000 direct and indirect jobs.

STRATEGIES AND PROGRAMS

KentuckyWired – Kentucky Communications Network Authority (KCNA)

KentuckyWired is a state-run project constructing over 3,000 miles of high-speed, high-capacity fiber optic cable in every county in Kentucky.

Broadband Map

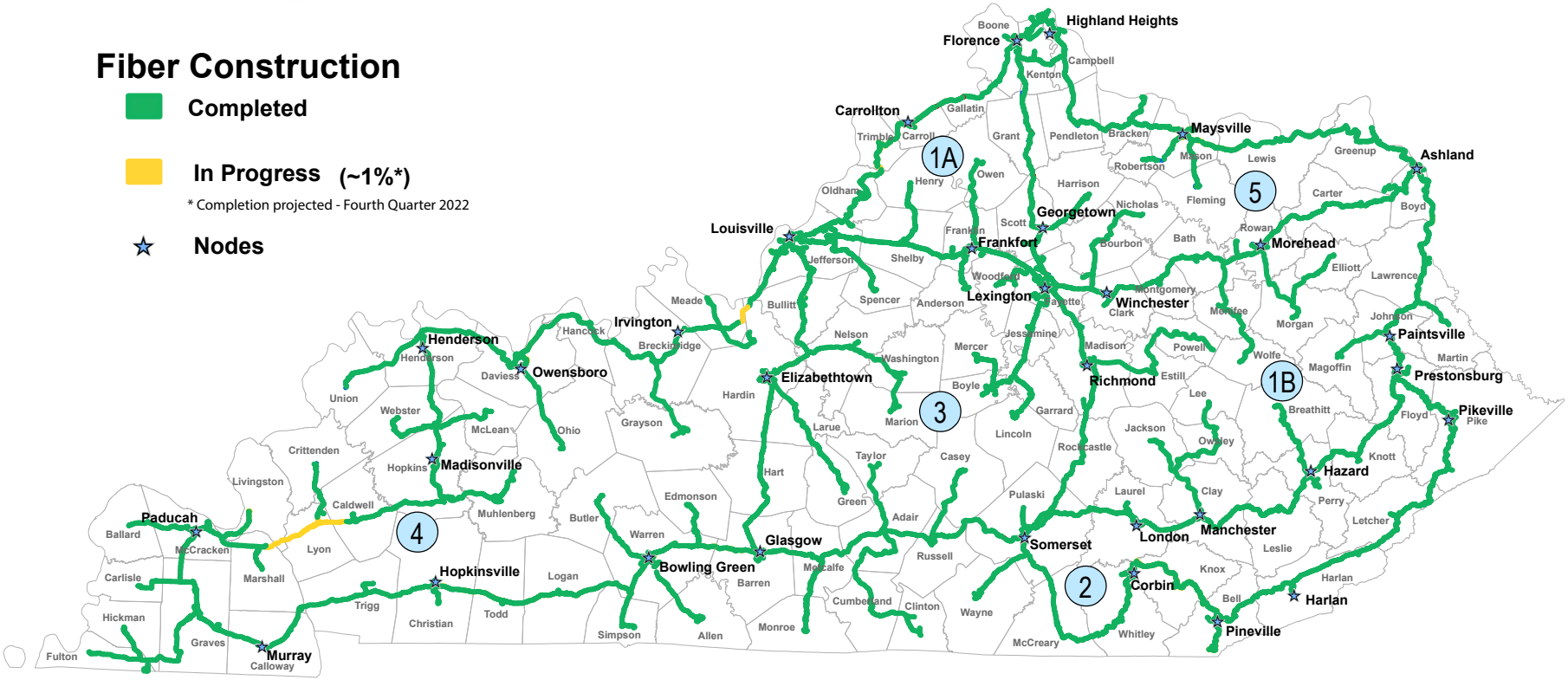
KCNA Kentuckywired

Fiber Construction

- Completed
- In Progress (~1%*)

* Completion projected - Fourth Quarter 2022

- Nodes



Source: https://kentuckywired.ky.gov/cfr/Pages/maps.aspx

Summary of Transportation Needs

The state's multimodal transportation system includes highways, bicycle and pedestrian facilities, public transit, aviation, rail, and waterways. Most of these modes are governed by different agencies both within the Commonwealth and at the federal level. This leads to challenges in coordinating a balanced transportation system, particularly in light of anticipated forces of change such as climate disruptions and emerging technology. The state highway system is managed through KYTC's Department of Highways. A summary of highway needs follows on the next few pages. The sections below discuss other modal needs.

Active Transportation

While KYTC is responsible for active transportation on state facilities, many of the new bicycle and sidewalk projects to date have been as a result of new or widened roadway projects or resurfacing projects. Active transportation needs refer to the spending required to create new sidewalks or bring sidewalks up to ADA standards, to add bike lanes or multi-use paths, and to add to the state's trail system. Bike and pedestrian facilities need to be incorporated into highway projects to reduce travel demand, support communities as people age in place, and to support changing land-use patterns that will result in additional residential or commercial growth.

Transit

The Office of Transportation Delivery assists transit agencies with implementing public transit grants and coordinating human service transportation. The level of funding provided by the state for operational and capital expenses is very low compared to other states. Higher state funding would allow equipping of more transit agencies with the tools and equipment to provide better transit service statewide.

Aviation

The Kentucky Department of Aviation (KDA) supports airports in the state by providing engineering and funding assistance, as well as zoning reviews. Critical issues for aviation funding involve caps on avgas taxes and the increase in more fuel efficient or electric planes, both of which reduce revenues. KDA proposes changes to the jet fuel tax cap in the future to support airport maintenance, pavement maintenance, and improvement projects. In addition, the creation of an aviation improvement fund would allow airports to reach industry standards.

Rail

Rail system needs are covered by private companies in Kentucky. No dedicated state funds exist for either freight or passenger rail development projects, including the need for Amtrak station upgrades. The development of a rail fund to address passenger rail upgrades, and freight rail improvements, along with rail safety and security, would allow rail companies to maintain industry standards.

Waterways

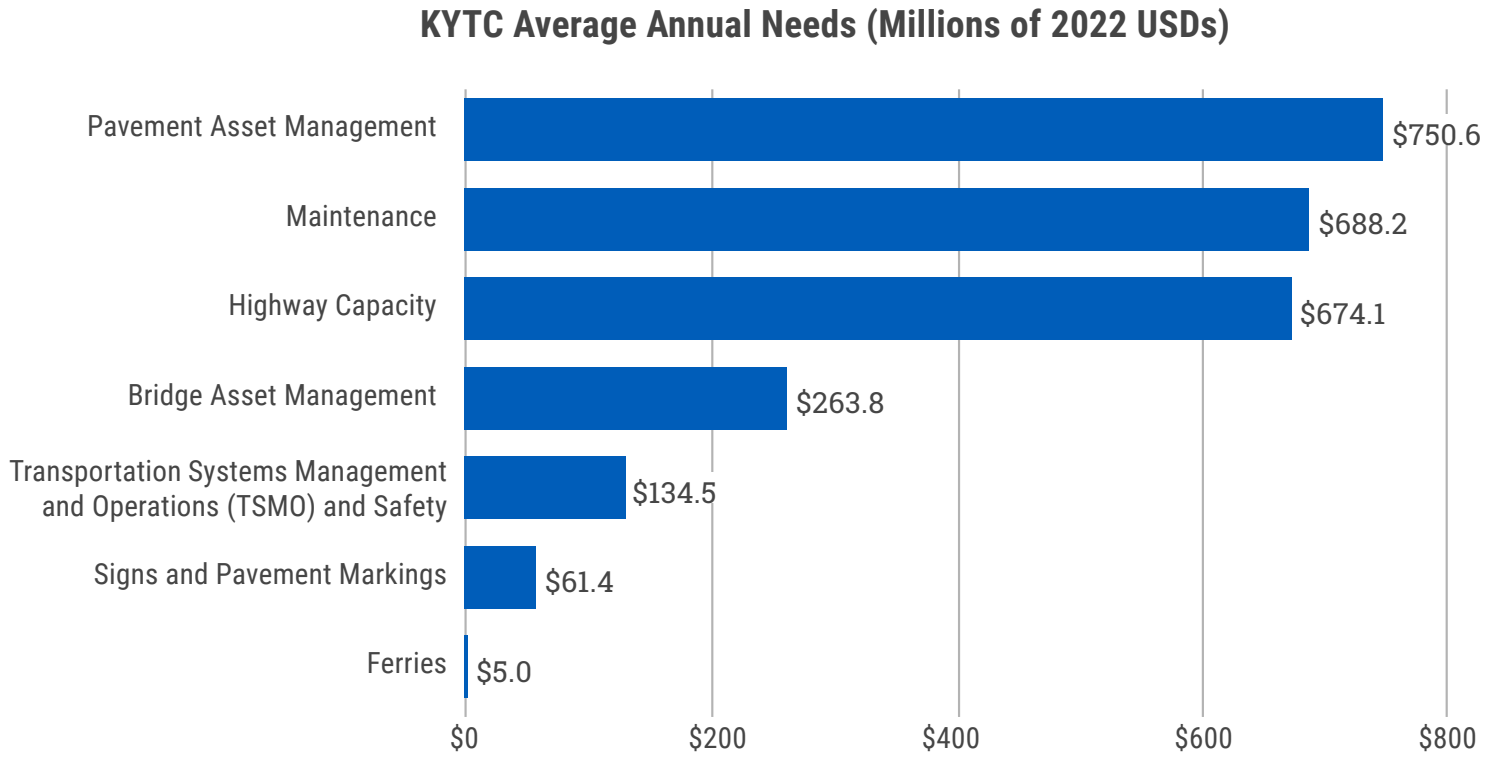
The Kentucky Water Transportation Advisory Board was established to advise legislators and KYTC on water transportation issues. KYTC assists with the administration of the board, and since 2013, the Kentucky Transportation Cabinet budget included $500,000 in revenue for riverport improvement through a grant program that requires an equal match of funds for projects for a total investment of $1 million. This is significantly less than the estimated $222 million preservation, modernization and expansion needs identified in a Riverport Study for the Board.

Forces of Change

In addition to the modal needs above, addressing the needs brought about by the forces of change on the multimodal transportation system requires significant planning and preparation by KYTC. For climate change, additional efforts should be made to improve preparation, shelters, and emergency response in relation to damaging weather events. Also, construction congestion mitigation projects and active transportation projects have both been identified as ways to help improve air quality. Looking at emerging technologies and alternative fuels, KYTC's Division of Planning is currently completing an Electric Vehicle Infrastructure Deployment Plan which will address infrastructure needs required for EV usage. Similar studies and/or additional committee tasks for C/AV are needed to prepare for a future with both autonomous and connected vehicles. Finally, as construction projects are developed, opportunities may exist for improving broadband access in the Commonwealth.

Highway Needs

Defining KYTC's long-term spending needs for different programmatic areas allows for needs to be compared with expected revenue to identify potential gaps. Needs analysis can also reveal actions to improve these programmatic areas. KYTC estimated its 24-year spending needs from 2022 to 2045 for programmatic areas for which adequate data was available for the calculations, and these programmatic areas comprise most of KYTC's spending. KYTC's needs between 2022 and 2045 total $61.86 billion in 2022 U.S. dollars (USDs), which equates to an average of $2.58 billion per year. The largest needs categories are pavement asset management (29.1% of needs), followed by highway maintenance (26.7%), highway capacity (26.2%), and bridge asset management (10.2%). The figure below shows KYTC's average annual needs by programmatic area.

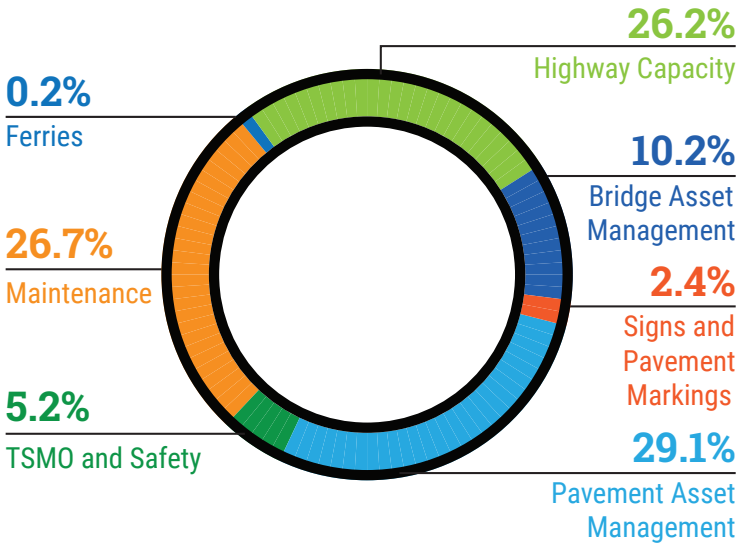


Note: TSMO includes both safety and intelligent transportation systems (ITS).

Analytical methods were customized for each programmatic area and included such techniques as modeling asset condition, modeling traffic, incorporating needs from existing plans or previous analysis, analyzing and extrapolating historical spending, and applying unit costs to known needs. All dollar amounts are in constant 2022 USDs.

The table and figure to the right break down KYTC's needs, and the following paragraphs for each programmatic area summarize the methods and needs for that specific area. The following paragraphs summarize the programmatic areas, the overall results, and the analytical methodologies.

Share of Modal Needs by Programmatic Area



Total 24-Year Modal Needs

Programmatic Areas	Average Annual Needs
Pavement Asset Management	
Pavement - Non-Rural Secondary System	$637.5 million
Pavement - Rural Secondary System	$113.1 million
Bridge Asset Management	$263.8 million
Highway Capacity	$674.1 million
Maintenance	$688.2 million
TSMO & Safety	$134.5 million
Signs and Pavement Markings	$61.4 million
Ferries	$5.0 million
TOTAL	$2.6 billion

Pavement Asset Management

Pavement asset management keeps the state-owned roadway system's pavement in a state of good repair. Pavement asset management spending needs for the state-owned system are $18.01 billion (of which $2.71 billion is for the Rural Secondary system and $15.30 billion is for the state-owned non-Rural Secondary system). This equates to annual needs of $750.62 million (of which $113.11 million is for Rural Secondary system and $637.51 million is for the state-owned non-Rural Secondary system). Needs for the non-Rural Secondary System are based on forecasted pavement condition where needs equal the minimum spending needed to achieve a long-term target of at least 92% of lane-miles being in good or fair condition. Needs for the rural secondary system are derived by extrapolating historical spending.

Bridge Asset Management

Bridge asset management needs refer to the spending required to preserve state-owned bridges and meet the state's performance targets. Bridge asset management needs total $6.33 billion, which equates to an average of $263.81 million per year. Bridge needs are derived from analysis of models produced by KYTC's Bridge Management System (BMS).

Highway Capacity

Adding capacity to its roadway network is one of the approaches that KYTC can follow to address current or expected problems in traffic flow. To meet the anticipated congestion problems currently identified in Kentucky through 2045, the total highway capacity needs are $16.18 billion (an annual average of $674.10 million). Highway capacity needs are derived from a combination of travel demand model analysis and analysis of the Kentucky Statewide Corridor Plan known as *Linking Kentucky*.

FOR ADDITIONAL INFORMATION:
See Appendices J, K, L, M, N, O, P

Maintenance

Highway maintenance includes such activities as pothole repair, mowing, guardrail repair, snow and ice clearing, and rest area maintenance. KYTC's highway maintenance needs total $16.52 billion (an annual average of $688.21 million). Maintenance needs were primarily derived by extrapolating historical spending with adjustments to account for the fact that historical spending has not kept pace with cost increases and for needs that have not been met by historical funding.

Transportation System Management and Operations (TSMO)

TSMO refers to operational improvements to the highway system that can improve safety and restore performance before extra capacity is needed. TSMO includes safety and intelligent transportation systems (ITS). KYTC's safety needs total $2.50 billion (an annual average of $104.31 million), and ITS needs total $723.98 million (an annual average of $30.17 million). KYTC's safety needs are estimated by extrapolating historical spending or obligated fund amounts for engineering and behavioral countermeasures and making an adjustment for the inadequacy of historical spending to address all safety needs. ITS needs are primarily derived from analysis and extrapolation of historical spending along with adjustments to account for cost increases and needs associated with new traffic signals.

Signs and Pavement Marking

Signs and pavement markings provide essential information to drivers. KYTC's needs for signs and pavement markings are $1.47 billion (an annual average of $61.43 million). Sixty-eight percent of the need is for pavement markings, and the remaining 32% is for signs. Sign and pavement marking needs were primarily derived by extrapolating historical spending for both in-house and contract costs, and adding in unfunded needs. Pavement marking needs were also adjusted to account for extra costs due to changes in striping width and savings due to additional use of thermoplastics.

Ferries

Ferry needs include Kentucky's seven state-funded ferries (Augusta, Cave-in-Rock, Dorena-Hickman, Reeds, Rochester, Turkey Neck Bend, and Valley View). Spending needs for ferryboat operations in Kentucky total $121.10 million. These needs range from $3.38 million in 2025 to $5.64 million in 2045. The needs are greatest for Cave-in-Rock ferry, which contributes 35% of the overall spending needs, following by Turkey Neck Bend ferry, with 28%, and the Valley View and Augusta ferries, both with 11%.

KYTC will not be able to address all the identified needs in the 2045 LRSTP within the current funding framework but will always do the best with the dollars made available through state and federal funding sources.

SECTION

3

Data-Driven Approach Toward 2045

Vision, Goals & Objectives, and Guiding Principles

As defined by the Federal Highway Administration (FHWA), whether for a corridor, a region, or an entire state, a transportation plan is a prioritized, but fluid framework of possible actions or policies and their estimated use of resources that can be undertaken to address identified transportation needs. The unifying foundation of a transportation plan includes the vision, goals and objectives, and guiding principles which define the desired outcomes resulting from the implementation of the plan recommendations. The LRSTP is not a project-oriented transportation plan. Rather, it is a policy document, establishing broad goals, guiding principles, and strategic actions to work toward the vision for Kentucky's multimodal transportation system over the next two decades.

The plan's vision is usually expressed as a succinct statement of what the system is desired to be by a future point in time. The vision is the desired ideal of the future multimodal transportation system and can be considered as the description of the future condition that is reached through a series of actions. Goal setting is like using a road map which can help to navigate to that future condition.

> **"The journey is the safest when the roadmap is the clearest."**
>
> –Secretary Jim Gray

Objectives clarify the goals. Guiding principles define key considerations to be incorporated in the decision-making process and the delivery of improvements or strategies that support the achievement of the plan's vision. Strategies are the specific steps that can be taken to reach each of the goals and achieve the vision. These strategies are defined in the LRSTP Implementation Plan and are focused upon resource allocation or new or revised policies.

The 2022-2045 LRSTP provides a basis for meeting the vision for Kentucky's multimodal transportation system by clearly identifying goals and objectives, guiding principles, and implementable strategies which support the achievement of that shared vision so that we can "**GET THERE TOGETHER**". The LRSTP is considered a "living document" to be adjusted as future conditions warrant.

LRSTP Vision, Goals, and Guiding Principles

The development of the LRSTP began in the fall of 2021, as Kentucky was emerging from the disruptions created by the COVID-19 pandemic and heightened socio-political tensions. The 2020 US Census results provided the identification of major shifts within the demographics of Kentucky's population. In November 2021, U.S. Congress passed the Bipartisan Infrastructure Law (BIL) to address the investment need in the nation's infrastructure and has provided a funding framework for the coming years. These challenges and opportunities have been fully considered within the development of the LRSTP, especially within the development of the vision, goals, and guiding principles.

The vision, goals, and guiding principles were drafted for the 2022-2045 LRSTP from the input gathered through discussions with KYTC leadership, multimodal stakeholders, and from over 8,300 participants from across the state involved in the Kentucky Statewide Transportation Survey during the last three months of 2021.

The LRSTP Vision is an overarching statement describing the desired multimodal transportation system to be delivered regardless of the challenges or opportunities within the possible futures or scenarios.

The 2022-2045 LRSTP Vision is for a viable, reliable, and resilient multimodal transportation system to provide access and mobility for all users for the safe movement of people and goods.

National Performance Goals

Safety
To achieve a significant reduction in traffic fatalities and serious injuries on all public roads

Infrastructure Condition
To maintain the highway infrastructure asset system in a state of good repair

Congestion Reduction
To achieve a significant reduction in congestion on the National Highway System (NHS)

System Reliability
To improve the efficiency of the surface transportation system

Freight Movement & Economic Vitality
To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development

Environmental Sustainability
To enhance the performance of the transportation system while protecting and enhancing the natural environment

Reduced Project Delivery Delays
To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

To achieve that expressed vision, a set of five goals was derived from the collected input and were aligned with the seven national performance goals of: Safety, Infrastructure Condition, Congestion Reduction, System Reliability, Freight Movement and Economic Vitality, Environmental Sustainability, and Reduced Project Delivery Delays.

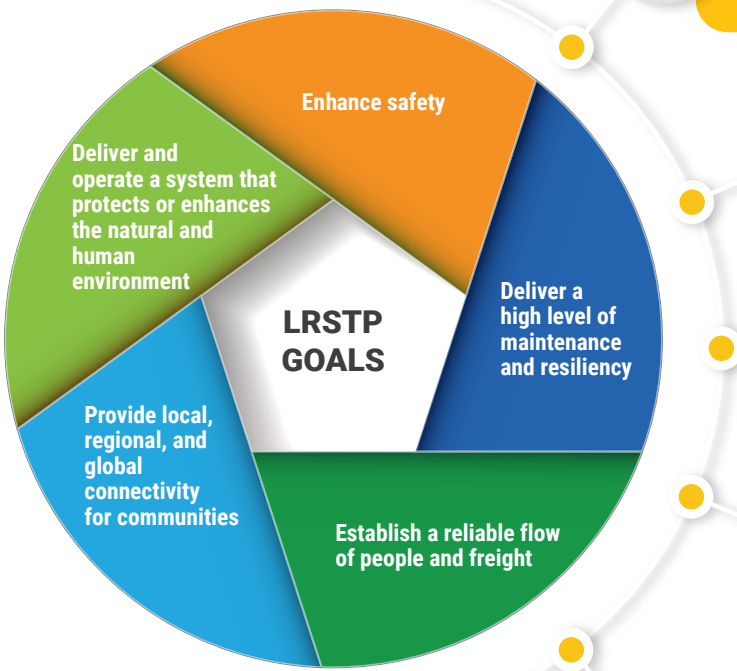
The five interconnected LRSTP Goals which support the delivery of the LRSTP Vision for the Commonwealth of Kentucky are:

- Enhance safety
- Deliver a high level of maintenance and resiliency
- Establish a reliable flow of people and freight
- Provide local, regional, and global connectivity for communities
- Deliver and operate a system that protects or enhances the natural and human environment

Each of the five LRSTP Goals have specific objectives which have been developed to clarify the desired outcomes of each goal. The following page shows the LRSTP Goals, their associated LRSTP Objectives, and the specific National Performance Goals to which the LRSTP Goals are aligned.

LRSTP Goals	Obj #	LRSTP Objectives	National Performance Goal Alignment
Enhance Safety	S1	Reduce the number of crashes	• Safety - To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
	S2	Reduce the amount of disruption to traffic flow resulting from crashes	
	S3	Reduce the amount of conflict between motor vehicles, pedestrians, and bicyclists	
Deliver a high level of maintenance and resiliency	M1	Improve pavement and bridge conditions for the existing system	• Infrastructure Condition - To maintain the highway infrastructure asset system in a state of good repair
	M2	Protect transportation infrastructure from extreme weather events	
	M3	Provide a level of redundancy to the system	
	M4	Maintain the right of way to create a manageable and unobstructed views	
Establish a reliable flow of people and freight	R1	Reduce travel time delays created by congestion	• Congestion Reduction - To achieve a significant reduction in congestion on the National Highway System • System Reliability - To improve the efficiency of the surface transportation system • Reduced Project Delivery Delays - To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices
	R2	Deliver construction and maintenance projects in a manner to reduce delays or disruptions	
	R3	Facilitate the cooperation in the development and operations for all modes which creates seamless trips for people and goods	
Provide local, regional, and global connectivity for communities	C1	Support a multimodal transportation system which provides connections for people and goods to reach their destinations in a timely manner	• Freight Movement and Economic Vitality - To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development • Reduced Project Delivery Delays - To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices
	C2	Reduce the amount of hours of travel for people and goods	
	C3	Provide travel options across physical and financial capabilities of system users	
Deliver and operate a system that protects or enhances the natural and human environment	E1	Reduce emissions	• Environmental Sustainability - To enhance the performance of the transportation system while protecting and enhancing the natural environment
	E2	Avoid, minimize, or mitigate environmental impacts	
	E3	Coordinate land use and transportation decisions	

No matter which LRSTP Goal is being addressed, the Guiding Principles provide the process framework to deliver improvements or policies supporting the achievement of all five LRSTP Goals. The following five LRSTP Guiding Principles reflect KYTC's vision and were developed through stakeholder and public input:



Quality of Life

Create a clean and efficient system that promotes healthy and fully engaged lifestyles while protecting the natural and human environment

Equity

Seek fairness in mobility and accessibility to meet the needs of all community members

Adaptability/Sustainability

Develop and operate a system that can adjust to the potentially disruptive forces of advances in technology, funding challenges, or human-made and natural disasters

Seamlessness

Integrate connectivity across all modes to provide reliable trip choices for people and freight

Economic Vitality

Deliver and operate a system that improves the ability of the state to provide employment and market opportunities

Although the LRSTP is not a project-based plan, this document establises policies and strategies which informs the project prioritization and delivery processes. KYTC uses a data-driven planning and project prioritization tool titled Strategic Highway Investment Formula for Tomorrow (SHIFT) to accomplish this process.

Strategic Highway Investment Formula for Tomorrow (SHIFT)

Kentucky uses a process called SHIFT to prioritize transportation projects. SHIFT allows KYTC to utilize a balanced approach to addressing the projects in Kentucky's over-programmed highway plan. These projects seek to be data-driven, objective, and collaborative.

Kentucky currently has approximately ten times more project needs identified than revenue to address those projects. For projects that may be eligible for federal funding, the state must supply a match of typically 10 to 20 percent. Prior to 2020 the required state match was provided from using earned credits on dollars invested decades ago in the state's parkway (toll) system. These earned credits have been deplenished creating a wider gap in addressing transportation needs in the Commonwealth and a stronger need for prioritization.

The data-driven process now used to prioritize and program federal and state funded highway improvement projects involves a mix of quantitative and qualitative criteria linked closely to federal performance measures as discussed in Section 3. This process allows KYTC highway district offices (HDOs), Area Development Districts (ADDs) and Metropolitan Planning Organizations (MPOs) to provide a list of projects for their jurisdictions that can then be scored and ranked by KYTC.

The Five Components Used to Score and Rank Projects Include:

The SHIFT process requires that a project be sponsored by either KYTC, an ADD, or a MPO and the number of sponsorships is determined based on number of counties, population, and lane miles.

KYTC allows a variety of project types to be considered in the SHIFT process as shown below.

Project types:

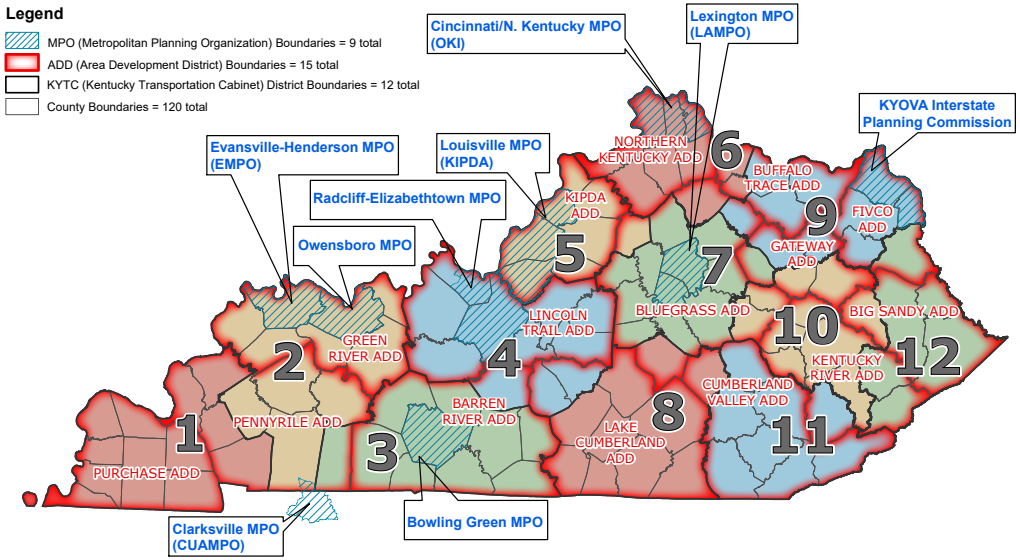
- Safety improvements
- Road widening
- Reconstruction
- New routes
- Interchanges

The SHIFT process does not include Rural and Municipal Aid, maintenance, and federally-dedicated projects such as MPO and bicyclist or pedestrian projects.

Once KYTC receives project scorings using criteria in the figures below from the Highway Districts, ADDs, and MPOs, the next step of the process is to select projects for priority funding. Approximately one-third of the projects will be elevated to this next step. Those projects not elevated may be considered in future year SHIFT phases. Selected projects may be boosted by local transportation leaders. This is a process when the project score is adjusted based on a set number of boosting points allowed for each District, ADD, or MPO to spread across projects.

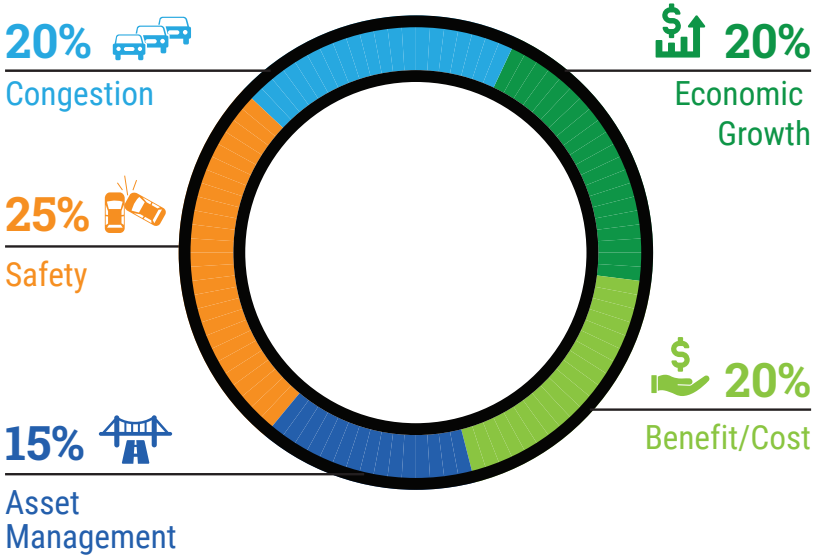
KYTC then develops the full projects list for the six-year Recommended Highway Plan. The Recommended Highway Plan is presented by the Governor to the General Assembly every two years on the even numbered calendar year. From January to April, the General Assembly considers the projects listed and will enact a new Highway Plan.

ADD, MPO and KYTC highway district boundaries



Proposed Statewide Funding Formula

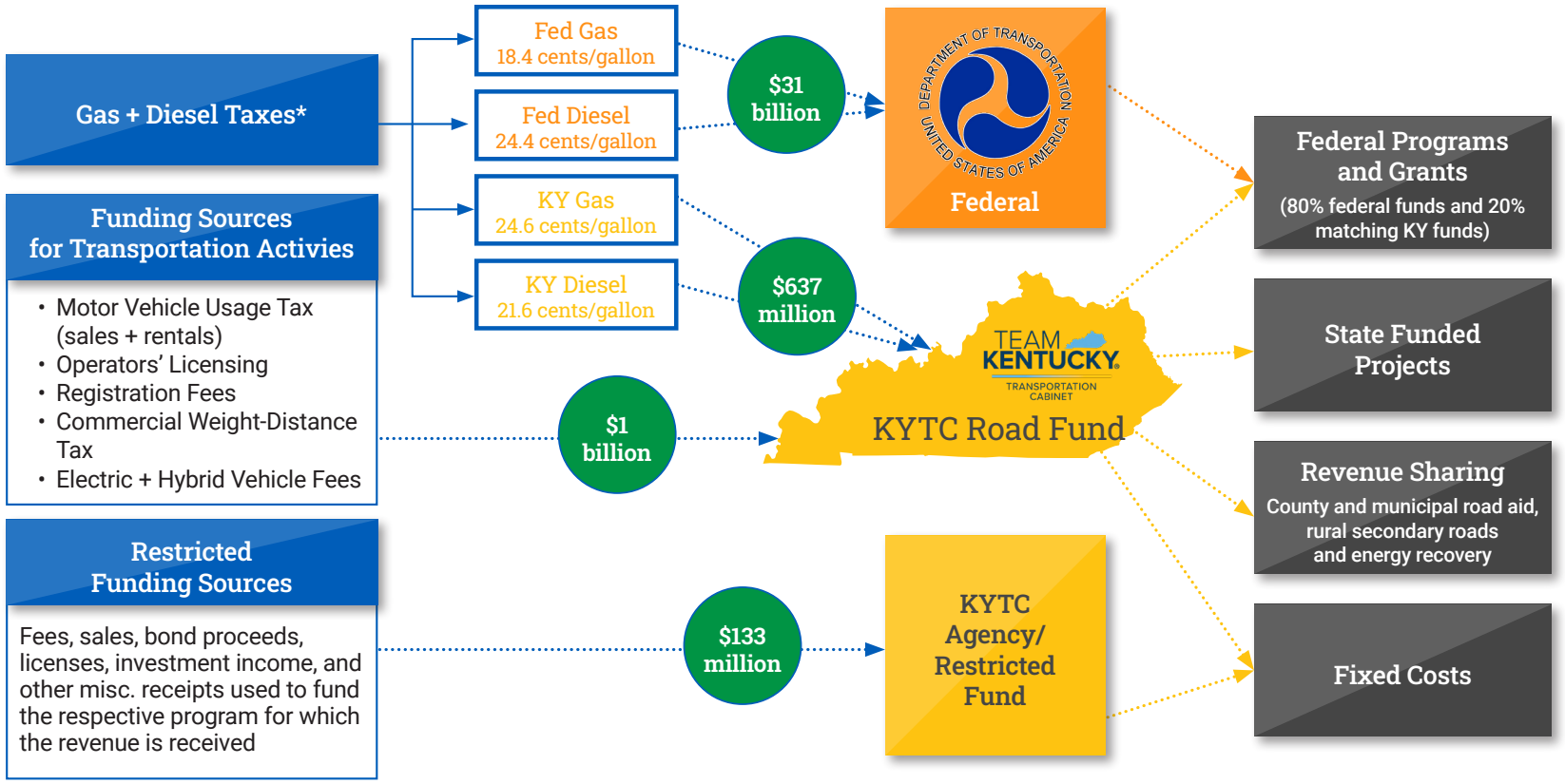
Priority	Score
Improve Safety	25%
Reduce Congestion	20%
Fuel Economic Growth	20%
Spend Tax Dollars Wisely (Benefit/Cost)	20%
Preserve Infrastructure (Asset Management)	15%
TOTAL	**100%**



Revenue Forecast

REVENUE SOURCES AND FLOW

The funds used to pay for the transportation improvements that are identified and prioritized in the SHIFT process are collected through three major sources of revenue: fuel taxes, fees, and taxes from transportation activities, and specifically assigned restricted revenues. The following figure illustrates the 2022 revenue sources and the flow of those funds through federal and state governments. Next, it identifies how the funds are used in paying for both state and federally funded transportation projects and programs, providing revenue sharing with local governments for their transportation improvements, and covering fixed costs such as debt payments and operational costs of KYTC. The revenue sources and the flow of funds were the framework for the development of a 2022-2045 revenue forecast model.



* There is a ceiling and floor for fuel tax amount

Federal gas and diesel tax: https://www.fhwa.dot.gov/policyinformation/statistics/2020/fe101a.cfm • KYgas and diesel tax: https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=49908

2020 - 2021 Road Fund revenue: https://transportation.ky.gov/BudgetFiscalManagement/Documents/2021%20KYTC%20Financial%20Report%20to%20Management.pdf

2020 - 2021 Restricted/Agency Fund revenue: https://transportation.ky.gov/BudgetFiscalManagement/Documents/2021%20KYTC%20Financial%20Report%20to%20Management.pdf

FEDERAL REVENUE SOURCES

The federal government levies taxes on the sale of fuels, tires for commercial trucks, truck and trailer sales, and on the use of heavy trucks above 55,000 pounds. Proceeds are deposited in the federal Highway Trust Fund (HTF), from which the federal highway programs are funded. KYTC anticipates $731.6 million in federal highway funding FY 2022, rising gradually to $745.4 million in FY 2026 in 2022 constant dollars.

On November 15, 2021, President Joe Biden signed the $1.2 trillion Bipartisan Infrastructure Law (BIL). This is a historic amount of total federal funding as the previous surface transportation bill – Fixing America's Surface Transportation (FAST) Act – authorized $226.3 billion in federal funding for FY 2016 through FY 2020. Due to uncertainty around the long-term federal transportation revenue levels, the model assumes annual federal highway funding will revert to more traditional federal funding levels. This means that KYTC can expect to receive $14 billion in federal highway funds between 2022 and 2045.

STATE SOURCES OF REVENUE

Road Fund Revenue Sources

The Road Fund total revenue estimates from 2022 – 2026 were drawn from KYTC's Transportation Asset Management Program forecast. The Road Fund projections for 2027 through 2045 were modeled based on input sources to the Road Fund including interest earnings, general fund transfers, Motor Vehicle Operator's License fees, Commercial Weight-Distance taxes, Motor Vehicle Usage tax, Registration fees, electric and hybrid vehicle fees, and Kentucky Motor Fuel taxes. Based on this assumption, KYTC is projected to receive $23.2 billion in 2022 constant dollars.

Electric and Hybrid Fees

Based on the new electric and hybrid vehicle fees enacted through the Kentucky Revised Statues House Bill 83, the annual registration fee for electric and hybrid vehicles is $120 and $60, respectively. Based on the new law, 50% of the funds are provided to KYTC and the revenue forecast model estimates this fee will generate $284.5 million (2022 constant dollars) over the next 24 years.

Even though Kentucky is now collecting annual fees on electric and hybrid vehicles, it is not enough to keep up with the loss of VMT that is taxable. In 2021, there were nearly 5,000 electric vehicles and 5,500 hybrid vehicles registered in the Kentucky and that represented less than 1% of the registered automobile fleet. Based on the future assumptions of growth of the electric vehicle fleet, this will change dramatically as there will be nearly 593,000 electric vehicles and 594,000 hybrid vehicles in Kentucky by 2045 and combined this will represent 60.6% of the registered automobile fleet. This equates to revenues decreasing $1.5 billion (2022 constant dollars) over 24 years or $62.5 million (2022 constant dollars) annually but when accounting for the new electric and hybrid fees collected over 24 years, revenues would decrease $1.2 billion or $50 million annually (2022 constant dollars).

Restricted Funds Sources

Restricted funds are received from fees, sales, bond proceeds, licenses, investment income and other miscellaneous receipts. Restricted funds are used to fund the respective program for which the revenue is received. The forecast assumes that the ratio of restricted/total Road Fund revenue will remain at the average of 2017 to 2022 (9.7% from 2023 – 2045). Based on this assumption, KYTC is projected to receive a total of $3.1 billion in 2022 constant dollars between 2022 and 2045.

REVENUE FORECAST ASSUMPTIONS

As part of the LRSTP process, a revenue forecast model for 2022-2045 was built based on the aforementioned revenue sources as currently allowed under state and federal laws. The model incorporated the drop in federal revenue in 2027 due to the end of the BIL higher funding levels and reverting to more traditional federal funding levels. Also considered in the revenue forecast model was that the Federal Fund Debt service ends in 2028 and the Road Fund Debt service ends in 2043 and the forecast did not project any new debt service. To project future transportation revenues for transportation in Kentucky the following assumptions were used:

Percent of new passenger and commercial vehicle sales that are electric increases from 1% in 2021 by 1 percentage point each year between 2022 and 2025, and then 3 percentage points each year between 2026 and 2045. This assumes 65% of new passenger car sales and commercial vehicles sales will be electric in 2045.

The percentage of VMT that generates fuel tax revenue is projected to decrease from 97% in 2022 to 59% by 2045.

Fuel economy of new passenger vehicles and light trucks is 25.8 mpg in 2021 and increases by 0.1 mpg each year to 28.3 mpg in 2045.

Fuel economy of new CMVs is 9.88 mpg in 2021 and increases by 0.0383 mpg each year to 10.83 in 2045.

Percent annual growth in passenger vehicle VMT is the same as forecasted Kentucky population growth (0.36% annually).

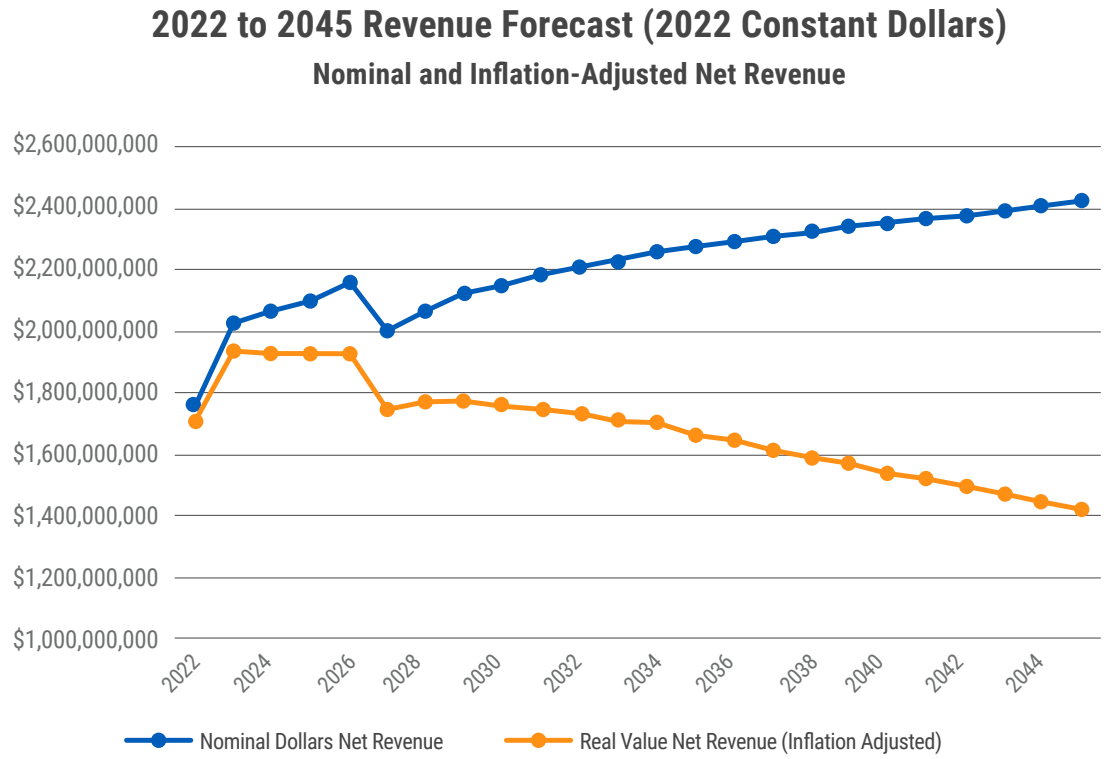
1.92% annual growth in commercial vehicle VMT.

Assuming annual inflation averaging 2.5%, the purchasing power of fuel tax revenue generated per VMT will decrease by 24.1% by 2045 compared to 2020.

Percent annual growth in passenger vehicle registrations is the same as forecasted Kentucky population growth (0.36% annually).

1.90% annual growth in commercial vehicle registrations.

As shown in the graphic on this page, there is an increasing gap from 2022 to 2045 between the revenue growth and the loss of buying power due to the assumptions of inflation rates of 6% in 2022, 3% in 2023 and 2024 and 2% between 2025 and 2045. Over the 24-year time period, inflation erodes a total of $12.8 billion or 24.1% of the revenue forecast. Of this amount, 35 percent, or $14.0 billion will come from federal formula apportionments and 65 percent, or $26.3 billion will come from state Road Fund Revenue sources and the state Restricted Fund.



FUNDING GAP

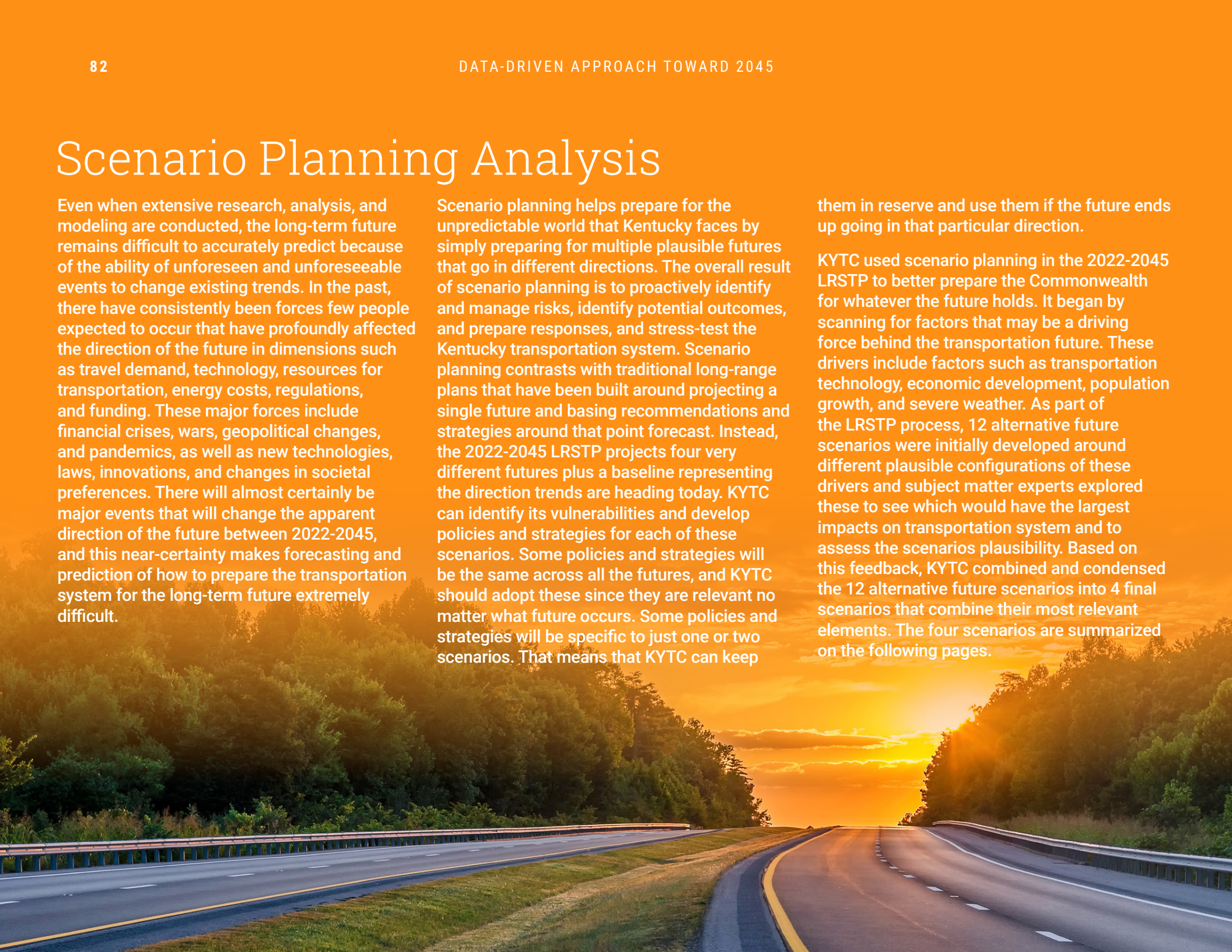
Like many states, Kentucky does not have adequate budget to address the $61.6 billion (2022 constant dollars) of KYTC needs identified in the 2022-2045 LRSTP. Under current federal laws, the majority of the revenue is generated from excise taxes on motor fuel that go into the HTF. Under current state laws, the Road Fund receives about 45% of its revenue from excise taxes on motor fuels. Based on the projected $40.3 billion (2022 constant dollars) of state and federal revenues, KYTC has a funding gap of $21.5 billion, which averages $895 million a year.

Scenario Planning Analysis

Even when extensive research, analysis, and modeling are conducted, the long-term future remains difficult to accurately predict because of the ability of unforeseen and unforeseeable events to change existing trends. In the past, there have consistently been forces few people expected to occur that have profoundly affected the direction of the future in dimensions such as travel demand, technology, resources for transportation, energy costs, regulations, and funding. These major forces include financial crises, wars, geopolitical changes, and pandemics, as well as new technologies, laws, innovations, and changes in societal preferences. There will almost certainly be major events that will change the apparent direction of the future between 2022-2045, and this near-certainty makes forecasting and prediction of how to prepare the transportation system for the long-term future extremely difficult.

Scenario planning helps prepare for the unpredictable world that Kentucky faces by simply preparing for multiple plausible futures that go in different directions. The overall result of scenario planning is to proactively identify and manage risks, identify potential outcomes, and prepare responses, and stress-test the Kentucky transportation system. Scenario planning contrasts with traditional long-range plans that have been built around projecting a single future and basing recommendations and strategies around that point forecast. Instead, the 2022-2045 LRSTP projects four very different futures plus a baseline representing the direction trends are heading today. KYTC can identify its vulnerabilities and develop policies and strategies for each of these scenarios. Some policies and strategies will be the same across all the futures, and KYTC should adopt these since they are relevant no matter what future occurs. Some policies and strategies will be specific to just one or two scenarios. That means that KYTC can keep them in reserve and use them if the future ends up going in that particular direction.

KYTC used scenario planning in the 2022-2045 LRSTP to better prepare the Commonwealth for whatever the future holds. It began by scanning for factors that may be a driving force behind the transportation future. These drivers include factors such as transportation technology, economic development, population growth, and severe weather. As part of the LRSTP process, 12 alternative future scenarios were initially developed around different plausible configurations of these drivers and subject matter experts explored these to see which would have the largest impacts on transportation system and to assess the scenarios plausibility. Based on this feedback, KYTC combined and condensed the 12 alternative future scenarios into 4 final scenarios that combine their most relevant elements. The four scenarios are summarized on the following pages.



Survival Modes

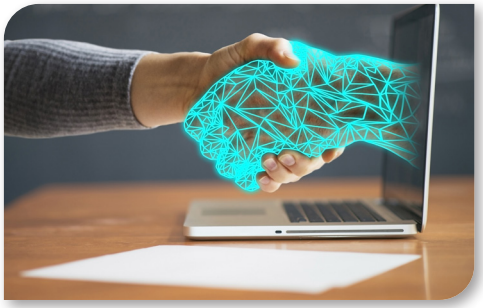
Survival Modes is a difficult future where several negative trends converge to reduce funding for transportation and make life harder for transportation system users. Severe weather is more frequent, with disruptions to the transportation system. Additionally, the prospect of armed conflicts makes transportation spending take a back seat to international relations and military priorities. Energy prices, including fuel and electricity, are much higher and are not fully compensated with new technology. The economy and population grow slowly.

Live, Work, Local

Live, Work, Local is a future in which moderate growth and technological change accompany shortening travel patterns and changing mode choices that require KYTC to examine how, where, and what kind of transportation infrastructure and services it provides. An emphasis on living and working locally with short commutes and opportunities close by has become more prevalent throughout the state and has been most realizable in towns and cities.

Global Market Growth

Global Market Growth is a high-growth scenario with fast adoption of new transportation technologies. In this scenario, Kentucky is one of the leading global freight hubs with a freight ecosystem composed of freight movement, logistics management, engineering, and manufacturing among other industries. Fast economic growth and growth of freight hubs in Kentucky put new demands on the transportation system across modes.



Tech Innovations

Tech Innovations is a future in which technology changes not only how people travel, but also where and how they live. Tech Innovations sees people spreading around the state and into exurban and rural areas facilitated by telework, telemedicine, and electronic commerce. Fast adoption of transportation technology means that people can travel farther more conveniently, increasing trip lengths and shifting heavy travel outside of metro regions. Productivity increases rapidly as more and better technology is embedded into nearly every part of life. The world has gotten smaller.

Main Scenario Characteristics

Survival Modes

- More severe weather
- Expensive energy
- Slow technology change
- Low economic growth
- Stable population growth
- Much less transportation revenue

Live, Work, Local

- Much more tourism
- Much higher population and employment density
- Steady technological changes
- Stable economic and population growth

Global Market Growth

- Very fast economic growth
- Fast population growth
- Higher population and employment density
- Fast technology adoption
- More transportation revenue with a bit less federal funding

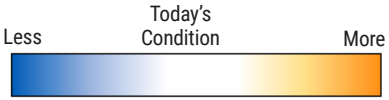
Tech Innovations

- Much more technology with very fast adoption of transportation technology
- Fast economic and population growth
- Much lower density
- More transportation revenue

These four scenarios are the basis for KYTC's scenario planning workshop that occurred in April 2022. At the scenario planning workshop, KYTC convened subject matter experts and stakeholders with knowledge about different parts of the multimodal transportation system throughout the Commonwealth. The workshop participants provided meaningful feedback on how each scenario would or should affect the transportation system, investment strategies, policies, and KYTC's internal processes and structures. Workshop participants also explored impacts to how transportation projects should be prioritized for each scenario through its SHIFT process. Finally, participants worked together in small groups to allocate the transportation revenue that are expected to be raised under each scenario (accounting for differences in economic growth, vehicle usage, and vehicle fuel types) in programmatic investment areas to achieve necessary transportation performance, which required trade-offs to prioritize the portions of the multimodal transportation system that are most essential under each scenario. The programmatic investment areas included pavement and bridge asset management, highway capacity, maintenance, signs and pavement markings, TSMO, safety, active transportation (bike and pedestrian movement), public transit, and ferries.

The following table summarizes the configuration of drivers within each scenario as well as the ways in which these configurations could shape transportation demand, performance, quality of life, and other impacts of considerations.

		Survival Modes	Live, Work, Local	Global Market Growth	Tech Innovations
Drivers	Severe Weather				
	Transportation Technology				
	Other Technology (Communication, AI, Quantum Computing)				
	Economic Growth				
	Tourism				
	Federal Funding				
	Population Growth				
	Energy Cost				
	Population & Employment Density				
Impacts and Considerations	Highway Safety				
	Transportation Equity				
	Quality of Life				
	State of Good Repair/Infrastructure Condition				
	System Reliability				
	Highway Congestion				
	Demand for Freight Movement				
	Environmental Sustainability				
	Housing Affordability				
	Cybersecurity Threats				
	Senior Population*				
	Demand for Truck Parking				
	Demand for Bike/Pedestrian Transportation				
	Demand for Transit				
	Demand for Single-Occupancy Vehicle Movement				
	Demand for Intercity Rail and Bus				



*Senior population is the share of the state population that is age 65 and higher.

The feedback from the workshop participants helped identify risks that KYTC should watch out for in the future and outlined how KYTC leadership should respond when the future starts trending in one of these directions. The responses take the form of policies, investments, business changes, partnerships, changes to hiring, and other factors that are featured in the Plan of Action on page 85. Additionally, there were several common investment decision themes the participants identified among the four scenarios.

The four scenarios considered

- **Moderate increase in investment in system preservation**
  Underinvestment in preserving the existing system is costly in terms of money and system performance. In scenarios with lower revenue forecasts, the participants kept system preservation spending as a high priority relative to other programmatic areas. However, in scenarios with higher revenue forecasts, participants did not increase preservation spending and instead prioritized spending in other programmatic areas.

- **Restrained investment in the capacity of the highway system**
  Participants were skeptical of the state's ability or need to build its way out of congestion. Even in scenarios with much more travel activity than today, it is possible that new technologies may expand capacity and these strategies may be more effective in accommodating increased demand than adding lanes or new roads.

- **Expectation of improved safety due to advancing technology**
  There is an expectation that new technologies will make vehicles safer by avoiding crashes or protecting occupants better in crashes, and that new technologies may allow KYTC to stretch its safety budget.

- **Growing investment in active transportation**
  Even though active transportation budgets remain a very small fraction of budgets of larger programmatic areas like asset preservation and maintenance, participants allocated a moderate to high spending amount by historical standards to active transportation. In some scenarios this investment is due to more demand for bicyclist and pedestrian infrastructure, and in other scenarios the decision flowed from the ability to make a large improvement in a mode's safety and mobility with a relatively small spending amount.

FOR ADDITIONAL INFORMATION:
See Appendix S: Scenario Planning

Plan of Action

Information gleaned from various existing plans, the scenario planning analysis, and developed modal reports were all considered through the lens of the LRSTP Vision, Goals, Objectives, and Guiding Principles to determine the general strategies of the 2022-2045 LRSTP Plan of Action. (See page 72 for the table of Goals and Objectives.)

The scenario planning process involved considering various alternative futures, the impacts on transportation in Kentucky, and how Kentucky's transportation system and agencies may need to adapt to respond to the future changes. The scenario workshops were conducted with a variety of stakeholders, and participants were not required to consider the current transportation policy, planning, or programming in Kentucky nor were they limited to only considering KYTC and its assets. The idea was to gather input for use in development of policy-level recommendations that would inform development of specific implementation actions for KYTC. The following subsections summarize the themes that emerged from the scenario planning workshop breakout groups.

1 Network Vulnerabilities

- **Revenue**
  Most breakout groups perceive funding instability as a threat to fulfilling KYTC's mission. This threat was perceived to be most severe in scenarios when revenue projection was low and when spending needs were high.
- **Technology**
  Most breakout groups discussed technological vulnerabilities that could be categorized as either 'protecting technology from harm', such as cyber security and C/AV hacking, or 'adequate investment to support new technologies,' including the need for EV charging infrastructure and safeguarding against potentially obsolete technologies.
- **Changing Nature of Demand for Transportation**
  All breakout groups expressed concern about not being able to keep up with the changes in transportation demand, although the ways in which transportation demand is expected to change varied across the scenarios. The Survival Modes and Live, Work, Local breakout groups were concerned about potentially not having enough public transportation services to meet demand, such as the lack of a non-motorized local road network that can meet the demand for local, short-distance movement. The Tech Innovations breakout group worried about the speed with which KYTC could build and maintain a spatially dispersed transportation network to meet spatially dispersed demand. Lastly, the Global Market Growth breakout group anticipated problems in having the adequate infrastructure to support new passenger and freight technologies.

- **Preservation**
  Most breakout groups identified asset management and preservation as a priority. Identified asset management and preservation strategies included using durable and resilient materials and methods for infrastructure construction, preserving existing roadway and non-motorized infrastructure, and pursuing opportunities to research and deploy advanced materials and construction techniques to extend facilities' useful life.

- **Partnerships**
  Most breakout groups emphasized partnerships, particularly those related to revenue since KYTC can leverage public-private partnerships to make up for revenue deficiencies. Local partnerships were suggested to address the increased transportation demand that results from population concentration in cities and non-state-owned infrastructure supporting an increasing share of movement. Additionally, partnerships present an avenue to address rising investment needs brought on by rapid growth and to capitalize on technological opportunities.

- **Technology**
  In high-tech scenarios, breakout groups supported making large investments in new technologies that help transition to new types of vehicles (e.g., C/AVs), build new communication infrastructure (e.g., broadband), and upgrade Traffic Management Centers (TMCs) to handle new data and management/operations issues that may arise with fleet transition.

- **Freight**
  In high-growth scenarios, breakout groups supported investment to support freight and logistics. Examples of freight investments included freight ports and other intermodal centers where shipments can transition from long-haul automated vehicles to short-distance and last-mile vehicles, especially if automation is less prevalent on local roads than in more predictable highway environments.

- **Complete Streets**
  In scenarios with high reliance on non-automotive transportation, breakout groups suggested investing in transit and, pedestrian and bicycle infrastructure, particularly in the form of Complete Streets where feasible.

- **Revenue**
  All breakout groups noted the importance of replacing lost revenue and having the flexibility to adjust taxes and spend revenue where it is needed most based on the scenario conditions. However, some of the changes required to raise revenue or increase flexibility in allocating funding among programmatic areas depend on decisions made by the Kentucky General Assembly. One common concern was how to develop new revenue streams that are more stable in the face of increasing overall fleet efficiency. One way to address this challenge could be to partner with local or private entities on technology-based projects that would shift funding responsibilities from KYTC, create new revenue sources for congestion and capacity, and would allow limited available funds to be focused on other needs.

- **Planning**
  Most breakout groups saw a need for follow-up planning to address key issues or needs that the scenarios raised. Examples of follow-up planning strategies included completing state and regional bike and pedestrian plans (thereby producing projects and expanding modal networks to meet rising demand), enhancing policy connections between statewide transportation planning and local government planning and zoning, TSMO, and leveraging transportation data for TMCs. Additionally, the Survival Modes breakout group highlighted the importance of thinking ahead to promote resiliency in infrastructure design.

- **Programs and Projects**
  The Survival Modes breakout group supported allocating more funding to non-Single Occupancy Vehicle (SOV) modes and less funding to highway expansion in response to the scenario's low population growth and limited economic opportunities for individuals. The Global Market Growth breakout group focused more on accelerating project development so that projects are completed faster and can address system needs sooner.

- **Skills**
  Most breakout groups discussed the need for KYTC to hire subject matter experts with the right skills, although the particular skills needed vary based on the scenario's prominent traits. The Survival Modes breakout group noted skill needs focused on safety, security, and emergency response, including having adequate staff to meet documentation requirements for federal reimbursements for disasters and emergencies. The Global Market Growth and Tech Innovations breakout groups both noted the need to have staff with subject matter expertise in transportation system technologies, data science skills, and flexibility to adapt to technological changes. All groups recognized that attracting employees with the right skills may require KYTC to offer market-rate salaries, which could only be done via action by the Kentucky General Assembly.

- **Change in Focus**
  Several breakout groups highlighted a need to change KYTC's focus. The Live, Work, Local scenario suggested increasing the focus on multimodal transportation, while the Tech Innovations scenario requires more of a TSMO focus due to transportation technology adoption (e.g., C/AVs, truck platooning).

- **Structural Changes**
  Most breakout groups discussed the possibility of making changes to KYTC's organizational structure in order to respond to scenario-specific challenges. In the Survival Modes scenario, the world is especially unpredictable, making KYTC subject to many potential threats, so the breakout group proposed developing an office for each mode to track threats or assigning 'megatrends' staff either as a standalone office or located within the Division of Planning. In the Tech Innovations scenario, large cybersecurity threats are expected to arise, and the breakout group suggested an increased collaboration between the Office of Information Technology (OIT) and TMCs. The focus is on local decision-making and decentralization in the Live, Work, Local scenario, and as a result, the breakout group recommended allotting more resources to localities and giving more funding flexibility for the District offices.

- **Local Input**
  In scenarios with a local focus, breakout groups called for continued local input via community meetings and suggested working with local governments to obtain consistent plans and data sources.
- **Change in Projects Included**
  Most breakout groups encouraged expanding the types of projects included in SHIFT to include separate prioritization schemes for TSMO projects, transit and non-motorized transportation projects, and other non-highway projects related to aerial drones, waterways, and rail.
- **Changes in Criteria Weights**
  While there is not complete agreement on how to weight criteria, some trends stand out. For instance, most breakout groups recommended giving more weight to asset management. The Survival Modes and Global Market Growth groups agreed on giving more weight to congestion and safety but disagreed on how to weight the benefit-cost ratio, with the former recommending reducing the weight and the latter recommending that it be weighted more heavily. Lastly, the Tech Innovations breakout group called for less safety weight due to greater adoption of in-vehicle safety-enhancing technology.

FOR ADDITIONAL INFORMATION:
See Appendix T: Plan of Action

The outlined common themes led to Plan of Action recommendations. The following subsections describe the Plan of Action's recommendations grouped into four categories: Funding and Revenue, Programming and Project Decision-Making, KYTC Organizational Structure, and Standards and Processes. These recommendations together help advance the Commonwealth toward meeting the LRSTP goals and objectives. (See page 72 for the table of Goals and Objectives.)

FUNDING AND REVENUE

Declining or falling transportation revenue threatens KYTC's ability to fulfill its mission, particularly when spending needs are high due to population and economic growth, needs to invest in new technologies or capabilities, aging infrastructure, increases in severe weather, or other factors that require greater spending to preserve or expand the multimodal transportation system. Beyond the adequacy of funds is the question of whether 'colors of money' prevent available funds from being used where they are needed most. This section summarizes recommendations for heading off threats to the adequacy of transportation revenue or spending adaptability.

RECOMMENDATION 1

Continue to provide information to elected leaders about revenue trends and needs

OBJECTIVES

Has potential to meet all LRSTP objectives but is reliant on General Assembly decisions.

Increasing vehicle fuel efficiency and prevalence of electric vehicles is expected to diminish transportation revenue available for preserving, managing, and expanding the multimodal transportation system. Decisions affecting most of Kentucky's transportation revenue ultimately rest with the Kentucky General Assembly and the U.S. Congress. KYTC can provide information to elected decision-makers about the trends facing revenue for the Kentucky transportation system and outcomes of potential legislative solutions that they might consider, including tax structure adjustments. KYTC should work with the General Assembly to provide the data and information necessary to inform these decisions including the historical revenue figures, revenue forecasts, and transportation needs because changes required to increase gas tax or vehicle fee revenue, or to increase flexibility in allocating funding among programmatic areas depend on decisions made by the Kentucky General Assembly. KYTC can coordinate with the Kentucky General Assembly to improve flexibility in gas tax rates and other potential transportation revenue sources.

RECOMMENDATION 2

Flexibly spend where the needs are greatest

OBJECTIVES

Has the potential to meet all LRSTP objectives but is dependent upon the investment focus and availability of funding.

The revenue-constrained environment is nearly certain to continue making KYTC's spending needs surpass its available revenue, which will continue to require the agency to prioritize its needs within and across modes and programmatic areas. KYTC should continue to use data-driven decision-making to spend revenue where it is needed most based on changing conditions.

FUNDING AND REVENUE

RECOMMENDATION 3

Establish public-private partnerships

OBJECTIVES

S1: Reduce the number of crashes

S2: Reduce the amount of disruption to traffic flow resulting from crashes

M1: Improve pavement and bridge conditions for the existing system

M3: Provide a level of redundancy to the system

M4: Maintain the right of way to create an attractive and unobstructed view

R1: Reduce travel time delays created by congestion

R2: Deliver construction and maintenance projects in a manner to reduce delays or disruptions

R3: Facilitate the cooperation in the development and operations for all modes which creates seamless trips for people and goods

C1: Support a multimodal transportation system which provides connections for people and goods to reach their destinations in a timely manner

Partnerships present an avenue to address rising investment needs brought on by growth, aging infrastructure, or technological changes by leveraging private capital. Public-private partnerships may also capitalize on technological opportunities. KYTC should leverage public-private partnerships on technology-based projects that would shift funding responsibilities from KYTC, create new revenue sources for congestion and operational improvements, and allow limited available funds to be focused on other needs. Additionally, KYTC should strengthen customer relationships with the rail industry through communication, cooperation, and information exchange. KYTC could also establish an advisory committee to facilitate freight representation and participation by the private sector in the state and MPO planning processes.

FUNDING AND REVENUE

RECOMMENDATION 4

Explore local partnerships

OBJECTIVES

R3: Facilitate the cooperation in the development and operations for all modes which creates seamless trips for people and goods

C1: Support a multimodal transportation system which provides connections for people and goods to reach their destinations in a timely manner

C2: Reduce the amount of hours of travel for people and goods

C3: Provide travel options across physical and financial capabilities of system users

E1: Reduce emissions

E2: Avoid, minimize, or mitigate environmental impacts

E3: Coordinate land use and transportation decisions

Local infrastructure supports a large share of transportation movement. KYTC should explore local partnerships to address the increased transportation demand from population growth and in some cases population concentration in towns and cities. Local partnerships are an opportunity to not only improve transportation coordination, but also the connection between local land use and KYTC's transportation planning to increase synergy. These partnerships can be facilitated by holding community meetings and working with local governments around data sharing and the consistency of plans between localities and the state government. KYTC should continue developing a methodology to better inform local officials and add transparency to the project selection process on a statewide basis. Additionally, KYTC can support local agencies by developing educational programs for local officials.

PROGRAMMING AND PROJECT DECISION-MAKING

KYTC's development, prioritization, and implementation of projects shapes the state's transportation system. The sections below present recommendations affecting KYTC's project pipeline and other investment venues.

RECOMMENDATION 5

Continue to invest in promising emerging technologies

OBJECTIVES

S1: Reduce the number of crashes

S2: Reduce the amount of disruption to traffic flow resulting from crashes

M1: Improve pavement and bridge conditions for the existing system

R1: Reduce travel time delays created by congestion

R3: Facilitate the cooperation in the development and operations for all modes which creates seamless trips for people and goods

C3: Provide travel options across physical and financial capabilities of system users

E1: Reduce emissions

E2: Avoid, minimize, or mitigate environmental impacts

KYTC should invest in the emerging technologies that promise the greatest long-term usage while also being aware of and coordinating efforts with local, federal, and private organizations that may also be investing in these technologies to maximize their investments' complementarity. Investments in emerging technologies could include EV charging infrastructure, connected infrastructure for vehicle-to-infrastructure connections (V2I), broadband or fiber-optic infrastructure, TSMO, Active Traffic Demand Management (ATDM), TMC upgrades, and intelligent transportation systems (ITS). Even while investing in emerging technologies, KYTC should be cognizant of the speed at which technology changes and the risk of locking into technologies or standards that may be surpassed and never achieve widespread adoption. The risk of even emerging technologies becoming obsolete is especially strong where there are competing standards or technologies serving similar purposes, such as has existed for connected infrastructure communication standards (e.g., 5G vs dedicated short-range communication) and vehicle energy sources (e.g., battery-powered electric vs fuel cell). In technological investment, KYTC should also consider the risks that bad actors can pose to the investments, meaning that KYTC should in parallel develop robust cybersecurity safeguards to protect systems and connected infrastructure from unauthorized access or disruption that can come from hacking, and work to harden publicly and privately owned transportation infrastructure such as connected infrastructure against cybersecurity threats like hacking and ransomware attacks.

PROGRAMMING AND PROJECT DECISION-MAKING

RECOMMENDATION 6

Continue to invest in freight and support logistics

OBJECTIVES

S3: Reduce the amount of conflict between motor vehicles, pedestrians, and bicyclists

R1: Reduce travel time delays created by congestion

R3: Facilitate the cooperation in the development and operations for all modes which creates seamless trips for people and goods

C1: Support a multimodal transportation system which provides connections for people and goods to reach their destinations in a timely manner

C2: Reduce the amount of hours of travel for people and goods

E1: Reduce emissions

E2: Avoid, minimize, or mitigate environmental impacts

In all futures, freight movement is expected to grow. Investing in improvements that support freight movement on critical freight corridors at intermodal connections can make the transportation system function more smoothly by addressing congestion, travel time reliability, and safety issues, and can also support the state's economic development. There are many potential ways in which KYTC can invest in freight across modes and support logistics. Locks and dams facilitate freight movement on Kentucky's navigable rivers and allow for container-on-barge shipments, including in areas where railroads do not provide adequate access. Preserving the aging lock and dam system supports waterborne freight movement. Similarly, new transportation technologies such as automation may change how freight moves. For example, if carriers can adopt truck automation most completely or quickly in more predictable highway environments than less predictable local roads, then there could be a need for freight ports and other intermodal centers where shipments can transition from long-haul automated vehicles to short-distance and last-mile vehicles. Finally, identifying and closing first and last-mile gaps near manufacturing or multimodal centers can also improve freight connectivity.

PROGRAMMING AND PROJECT DECISION-MAKING

RECOMMENDATION 7

Continue to update the SHIFT process in line with future developments

OBJECTIVES

Reliant on updates to SHIFT.
Has the potential to support all LRSTP objectives but is dependent upon SHIFT updates.

The environment that SHIFT prioritizes projects for is changing over the medium and long terms as new data sources become available, new modeling techniques are developed, and the state's transportation system priorities change. Although it is impossible to know exactly what the future holds, it is likely that the changes in the environment within which SHIFT operates will be large enough to merit updates to the process. KYTC should track new sources of transportation data and new measurement and modeling techniques and consider adopting them into the SHIFT scoring process if they provide advantages over current practice. KYTC may also consider expanding the categories of projects included in SHIFT, adding new criteria, and/or adjusting criteria weights to match the Commonwealth's transportation priorities more closely. For instance, the project categories could be expanded to include TSMO projects, transit and non-motorized transportation projects, and other non-highway projects related to aerial drones, waterways, and rail. Second, the project criteria weights could be adjusted on a more regular basis to reflect changing conditions and Commonwealth priorities more accurately. For instance, scenario planning revealed that asset management is likely to become more important in several different futures and may merit additional weight in the SHIFT process.

PROGRAMMING AND PROJECT DECISION-MAKING

RECOMMENDATION 8

Expand focus of projects

OBJECTIVES

S2: Reduce the amount of disruption to traffic flow resulting from crashes

S3: Reduce the amount of conflict between motor vehicles, pedestrians, and bicyclists

M3: Provide a level of redundancy to the system

R3: Facilitate the cooperation in the development and operations for all modes which creates seamless trips for people and goods

C1: Support a multimodal transportation system which provides connections for people and goods to reach their destinations in a timely manner

C2: Reduce the amount of hours of travel for people and goods

C3: Provide travel options across physical and financial capabilities of system users

E1: Reduce emissions

E2: Avoid, minimize, or mitigate environmental impacts

KYTC can benefit from expanding the focus of its prioritization program to include multimodal and non-automotive transportation projects as well as highway operational improvements. Across all project types, KYTC can continue to track trends and risks through asset management and promote resiliency in infrastructure design.

RECOMMENDATION 9

Continue to support local match

OBJECTIVES

S3: Reduce the amount of conflict between motor vehicles, pedestrians, and bicyclists

C2: Reduce the amount of hours of travel for people and goods

C3: Provide travel options across physical and financial capabilities of system users

E1: Reduce emissions

E2: Avoid, minimize, or mitigate environmental impacts

In Kentucky, there are currently some federal funds that are being left on the table due to the lack of a non-federal match required, notably for some local transit projects. To the extent KYTC can support the local match requirement for relevant federal programs, KYTC may help to enable small local governments and transit agencies in Kentucky to access additional funds.

KYTC ORGANIZATIONAL STRUCTURE

KYTC's organizational structure includes the roles that it hires for, the responsibilities and capabilities that different teams or groups have, and their relationships to one another and to the Commonwealth's elected and appointed leaders. The sections below address recommendations for KYTC's organizational structure that better prepare the agency for the future.

RECOMMENDATION 10

Continue to hire and retain subject matter experts with appropriate expertise and skillsets, even when not traditional DOT functions

OBJECTIVES

Has the potential to support all LRSTP objectives but is dependent upon skills of staff

KYTC should remain vigilant to changes in the transportation system and proactively employ and retain staff with strong subject matter expertise and the skills that allow it to respond better to these changes. For instance, the proliferation of new transportation data and the expected adoption of new transportation technologies may make data and analytical skills related to transportation systems technologies and data science more important than they are today. By contrast, if severe weather events become more frequent or intense, KYTC would need to acquire extra skills or staff with strong safety, security, and emergency response skills, including having adequate staff to meet documentation requirements for federal reimbursements for disasters and emergencies. Some of these skills may be acquired through contracts in addition to employment. Attracting and retaining competitive staff may require KYTC to offer market-rate salaries which may differ from state wage rates that it is authorized to offer and would require the approval of the Kentucky General Assembly to change.

RECOMMENDATION 11

Consider structural changes where helpful to respond to new trends

OBJECTIVES

M2: Protect transportation infrastructure from extreme weather events

R2: Deliver construction and maintenance projects in a manner to reduce delays or disruptions

R3: Facilitate the cooperation in the development and operations for all modes which creates seamless trips for people and goods

Implementing changes to KYTC's organizational structure can help the agency respond to changing needs and new challenges. For instance, some possible structural changes could include developing a division for each mode to track system performance and risks or assigning 'megatrends' staff either to a standalone office or located within the Division of Planning, both of which would help KYTC to stay abreast of changes affecting its ability to fulfill its mission. There may also be opportunities to fulfill a function better by using a merger to create helpful synergies. Some futures may also require reviewing the division of responsibilities between KYTC Central Office and District Offices to determine if those should change over time to address trends.

KYTC ORGANIZATIONAL STRUCTURE

RECOMMENDATION 12

Provide training opportunities

OBJECTIVES

Has the potential to support all LRSTP objectives but is dependent upon training opportunities offered

KYTC can offer training opportunities on project funding and appropriation in order to ensure that ADD planners are aware of the location and limitations of relevant transportation data. KYTC should continue developing an orientation packet for new Regional Transportation Committee members and additional standard processes such as establishing reporting standards and setting participation expectations.

RECOMMENDATION 13

Continue and expand data sharing and technical assistance

OBJECTIVES

Has the potential to support all LRSTP objectives but is dependent upon data used and technical assistance provided.

Many portions of the multimodal transportation system are owned, maintained, and managed by other entities besides KYTC. While KYTC has limited ability to directly advance the Commonwealth's transportation vision for these portions of the system, it can have indirect influence by several means, including sharing data with and providing technical assistance to the non-state public and private entities responsible for these parts of the system. The 2015 *Kentucky Statewide Rail Plan* correctly highlighted that abandoned rail lines are one of the potential areas of influence. For instance, KYTC can provide technical guidance and assistance during abandonments related to rail banking and other topics.

STANDARDS AND PROCESSES

KYTC's standards and processes guide the execution of its work. The sections below provide recommendations related to KYTC's standards and processes.

RECOMMENDATION 14

Develop follow-up planning procedures

OBJECTIVES

Has the potential to support all LRSTP objectives but is reliant on the subject matter and scope of follow up plans

Developing plans that follow up on and delve into identified needs can help KYTC address key issues, discover emerging needs, and produce additional project ideas. Examples of follow-up planning strategies include completing state and regional bike and pedestrian plans, expanding mode networks according to demand, enhancing policy connections between statewide transportation planning and local government land use regulation and zoning, planning TSMO investments to improve reliability and operation of the system, and updating freight and modal plans to inform decision-making. KYTC should also leverage transportation data for better operations management and decision-making. This can be accomplished by implementing and refining performance measures to track implementation progress.

RECOMMENDATION 15

Focus on asset management and preservation

OBJECTIVES

M1: Improve pavement and bridge conditions for the existing system

M2: Protect transportation infrastructure from extreme weather events

Asset management and preservation strategies may include using durable and resilient materials and methods for infrastructure construction; preserving existing roadway and non-motorized infrastructure; improvement to bridge, pavement, and other asset condition data and management systems; and pursuing opportunities to research and deploy advanced materials and construction techniques to extend facilities' useful life. The results of the scenario planning workshop revealed that asset management is likely to gain importance in the future, requiring a continued and expanding KYTC focus on it.

RECOMMENDATION 16

Implement complete streets standards

OBJECTIVES

S1: Reduce the number of crashes

S3: Reduce the amount of conflict between motor vehicles, pedestrians, and bicyclists

The new Statewide Bicycle and Pedestrian Plan and the KYTC Complete Streets Policy support these recommendations.

STANDARDS AND PROCESSES

RECOMMENDATION 17

Foster inter-agency and inter-state collaboration

OBJECTIVES

C1: Support a multimodal transportation system which provides connections for people and goods to reach their destinations in a timely manner

C2: Reduce the amount of hours of travel for people and goods

E1: Reduce emissions

E2: Avoid, minimize, or mitigate environmental impacts

E3: Coordinate land use and transportation decision

Collaboration and partnerships allow KYTC to promote the Commonwealth's transportation vision beyond the system that it owns and manages. Since KYTC does not own the entire multimodal transportation system, it will need partnerships to realize its vision. Some of the potential partnerships and areas for collaboration are with:

- The Kentucky Cabinet for Economic Development (KCED) related to the identification of needs and impacts of businesses that are recruited to Kentucky
- The Division of Commercial Vehicle Enforcement (Kentucky State Police) related to truck routes, truck parking, and Weigh in Motion (WIM) technology
- Support for multi-state coordination of infrastructure improvements through federal grant opportunities
- The Department of Parks and the Department of Local Government around the Rails to Trails program

RECOMMENDATION 18

Focus on project delivery

OBJECTIVES

R2: Deliver construction and maintenance projects in a manner to reduce delays or disruptions

KYTC should aim to accelerate project development so that projects are completed faster and can address system needs sooner. KYTC can evaluate and modify its procurement process to improve the efficiency of the project delivery process and pursue innovative contracting methods and revenue streams for projects involving federal funds.

As the Plan of Action recommendations were developed, there was a great deal of discussion on potential risks and 'what if' situations. To recognize these potential risks and show how the recommendations from the LRSTP Plan of Action can help Kentucky plan accordingly, the following Plan of Action Decision Matrix was created.

Plan of Action Decision Matrix

If this happens...	Be prepared for...	By taking these actions
If severe weather events become more frequent and / or disruptive	RISK: Disruption to transportation network and operations RISK: Unexpected costs to replace damaged or destroyed assets	RECOMMENDATION 10: Hire and retain staff with appropriate expertise and skillsets, even when not traditional DOT functions RECOMMENDATION 15: Focus on asset management and preservation
If there are more cybersecurity threats	RISK: Hacking and associated disruption of connected infrastructure, assets, and systems RISK: Theft of data by hackers, including sensitive data such as customer payment information related to tolls	RECOMMENDATION 8: Expand focus of projects RECOMMENDATION 10: Hire and retain staff with appropriate expertise and skillsets, even when not traditional DOT functions
If economic hardship and/or rising costs reduce Kentuckians' average transportation budgets	RISK: Less access to opportunities that Kentuckians enjoy via the transportation network	RECOMMENDATION 8: Expand focus of projects RECOMMENDATION 9: Support local match RECOMMENDATION 16: Implement complete streets standards
If population growth slows and the average age of Kentucky residents rises	RISK: The share of Kentuckians who cannot drive increases, resulting in a loss of access to goods, services, and opportunities OPPORTUNITY: Less growth in congestion than would occur with faster growth, allowing focusing investment elsewhere	RECOMMENDATION 2: Flexibly spend where the needs are greatest RECOMMENDATION 5: Invest in promising emerging technologies RECOMMENDATION 7: Continue to update the SHIFT process in line with future developments RECOMMENDATION 8: Expand focus of projects RECOMMENDATION 9: Support local match RECOMMENDATION 16: Implement complete streets standards

Plan of Action Decision Matrix

If this happens...	Be prepared for...	By taking these actions
If population and employment cluster more closely together in towns and cities	RISK: More congestion within these towns and cities OPPORTUNITY: More accessibility without major infrastructure growth	RECOMMENDATION 7: Continue to update the SHIFT process in line with future developments RECOMMENDATION 8: Expand focus of projects RECOMMENDATION 9: Support local match RECOMMENDATION 4: Explore local partnerships RECOMMENDATION 14: Develop follow-up planning procedures
If population and employment density decrease and become more evenly distributed within and among regions	RISK: Need to build and maintain a larger transportation network to serve Kentuckians and economic activity OPPORTUNITY: More even distribution of opportunities across Kentucky regions, creating opportunities in areas that currently have fewer opportunities	RECOMMENDATION 7: Continue to update the SHIFT process in line with future developments RECOMMENDATION 11: Consider structural changes where helpful to respond to new trends RECOMMENDATION 14: Develop follow-up planning procedures
If funding decreases due to falling VMT, rising fuel efficiency, smaller tax base, or other reasons	RISK: Inadequate revenue to preserve the transportation system and meet the other elements of KYTC's mission	RECOMMENDATION 1: Provide information to elected leaders about revenue trends and needs RECOMMENDATION 2: Flexibly spend where the needs are greatest RECOMMENDATION 3: Establish public-private partnerships RECOMMENDATION 4: Explore local partnerships
If transportation energy sources, communication standards for connected infrastructure, or other infrastructure-related technologies continue to change rapidly and do not stabilize around one or more dominant technologies	RISK: Obsolescence of energy infrastructure (such as around vehicle electrification) into which KYTC has invested if standards change or another energy source (e.g., fuel cell) displaces the current front-runner RISK: Partial obsolescence of investment into connected infrastructure if communication standards change (e.g., such as between 5G and dedicated short-range communication [DSRC])	RECOMMENDATION 5: Invest in promising emerging technologies

Plan of Action Decision Matrix

If this happens...	Be prepared for...	By taking these actions
If electric vehicles largely displace internal combustion engine (ICE) vehicles	RISK: Decrease in revenue available for transportation RISK: Gaps in the vehicle charging or energy distribution networks RISK: Difficulty in the electrical grid accommodating new demand for vehicle charging	RECOMMENDATION 1: Provide information to elected leaders about revenue trends and needs RECOMMENDATION 2: Flexibly spend where the needs are greatest
If freight traffic increases significantly	RISK: Additional congestion or less reliable movement on freight corridors or on local roads RISK: Potential for conflicts between commercial and non-commercial vehicles RISK: New needs for truck parking on freight corridors OPPORTUNITY: Economic development opportunities related to logistics and freight services	RECOMMENDATION 3: Establish public-private partnerships RECOMMENDATION 6: Invest in freight and support logistics RECOMMENDATION 7: Continue to update the SHIFT process in line with future developments RECOMMENDATION 17: Foster inter-agency and inter-state collaboration
If vehicle automation or other technologies cause trips to become longer and more numerous (resulting in more VMT), change the times of day during which travel occurs, or otherwise change traffic patterns	RISK: Additional congestion and less reliable movement RISK: Congestion on roads that are not currently congested RISK: Faster asset deterioration than expected under the influence of heavier use OPPORTUNITY: Benefit to Kentuckians from realizing previously unrealized demand for transportation OPPORTUNITY: Changes in trips' time of day, allowing demand to be spread over time and resulting in less congestion than would otherwise occur	RECOMMENDATION 7: Continue to update the SHIFT process in line with future developments

Plan of Action Decision Matrix

If this happens...	Be prepared for...	By taking these actions
New transportation technologies are further developed and adopted, or unforeseen transportation technologies emerge	RISK: Need for changes in many aspects of KYTC's operations due to new technologies in ways that are not initially clear RISK: Automated vehicles and related technologies (e.g., truck platooning) require updates to infrastructure to be able to 'read the road' or interact with non-automated vehicles, bicyclists, pedestrians, and other roadway users RISK: Conflicts between automated vehicles and other roadway users, particularly vulnerable users RISK: Need for updates to infrastructure (e.g., signs) OPPORTUNITY: Potential to better meet Kentuckians' transportation needs through new technologies	RECOMMENDATION 5: Invest in promising emerging technologies RECOMMENDATION 6: Invest in freight and support logistics RECOMMENDATION 10: Hire and retain staff with appropriate expertise and skillsets, even when not traditional DOT functions RECOMMENDATION 11: Consider structural changes where helpful to respond to new trends RECOMMENDATION 14: Develop follow-up planning procedures
If there are shortages of labor or materials	RISK: Delays to construction projects or maintenance work	RECOMMENDATION 12: Provide training opportunities RECOMMENDATION 18: Focus on project delivery
If labor and materials cost more than KYTC can pay for legal or financial reasons	RISK: Insufficient staff in KYTC with necessary skills	RECOMMENDATION 7: Continue to update the SHIFT process in line with future developments
If adoption of automated vehicles, connected vehicles, and other transportation infrastructure increase the amount of data that is generated	RISK: Potential for data to be stolen via hacking OPPORTUNITY: Use of additional data for operations management, project prioritization, and planning	RECOMMENDATION 3: Establish public-private partnerships RECOMMENDATION 4: Explore local partnerships RECOMMENDATION 10: Hire and retain staff with appropriate expertise and skillsets, even when not traditional DOT functions RECOMMENDATION 11: Consider structural changes where helpful to respond to new trends RECOMMENDATION 13: Continue and expand data sharing and technical assistance

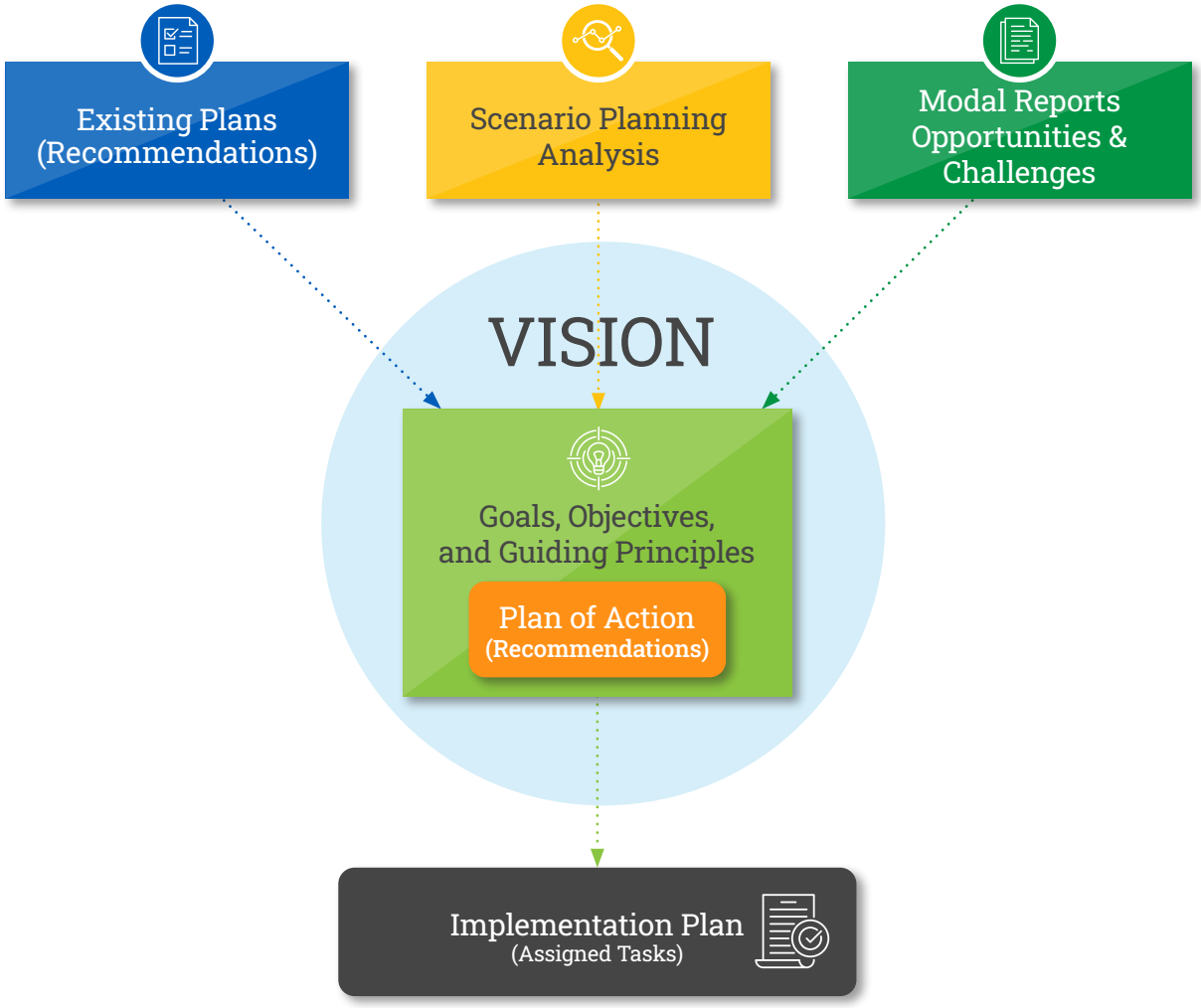
SECTION

4

Implementation Plan

Summary of LRSTP Preparation

The information gleaned from various existing plans, the scenario planning analysis, and developed modal reports were all considered through the lens of the LRSTP Vision, Goals, Objectives, and Guiding Principles to determine the general strategies of the Plan of Action. The 2022-2045 LRSTP Plan of Action includes recommendations on policies, policy changes, investment strategies, new programs, changes to program structure, and organizational changes to help KYTC better prepare for the impacts of the alternative futures on the transportation system. The eighteen Plan of Action recommendations were grouped into four categories: Funding and Revenue, Programming and Project Decision-Making, KYTC Organizational Structure, and Standards and Processes. The sets of assigned tasks of the LRSTP Implementation Plan were developed to support the Plan of Action recommendations and grouped according to the four Plan of Action categories.



Proposed Tasks and Assigned Responsibilities

In the following tables, the specific Implementation Plan tasks are grouped by the four Plan of Action categories of Funding and Revenue, Programming and Project Decision-Making, KYTC Organizational Structure, and Standards and Processes. Additionally, the assigned responsibility for accomplishing each task has been identified. **The responsible parties include Kentucky's leadership, including the Governor and Legislature, along with various multimodal agencies and industry representatives.** However, the majority of the actions for the success of each task lies with KYTC and its various departments, offices, divisions, and districts. To help outline the hierarchy of KYTC, the KYTC organizational structure is included in Appendix U.

Plan of Action Category	Task #	Implementation Plan Tasks	Assigned Responsibility
 **Funding and Revenue**	1a	Examine the implications of decreasing revenues based on the revenue forecast. Monitor changes in gas tax revenue over time and evaluate impacts to investments on an annual basis.	This is a shared responsibility of KYTC Secretary's Office, State Highway Engineer's Office, Division of Planning, and Division of Program Management
	1b	Identify possible alternatives to thecurrent sources of transportation funding (to fill gap identified by decreasing revenue in Task 1a). Document the findings in an internal KYTC white paper.	This is a shared responsibility of KYTC Secretary's Office, State Highway Engineer's Office, Division of Planning, and Division of Program Management
	2	Engage with the Executive Branch of State Government to: • Identify additional potential dedicated and sustainable transportation funding opportunities to reach the proper allocation of revenues that will address the state's transportation needs. • Consider legislative changes that could capture transportation-related costs created from redevelopment or new development (impact fees, special taxation districts, etc.). • Consider funding possibilities that would permit the use of Road Funds for matching federal funds or providing financial assistance to the non-highway transportation modes. • Diversify sources more that provide funding to the Road Fund.	KYTC Secretary's Office supported by State Highway Engineer's Office, Division of Program Management, Division of Planning, and Department of Vehicle Regulation
	3	Collaborate with the owners of infrastructure of other modes to apply for discretionary grant funding for freight improvement projects such as port or rail connection improvements or truck parking facilities.	KYTC Division of Planning with support from Division of Program Management and and Department of Rural & Municipal Aid's Division of Local Programs
	4	Coordinate with federal and state emergency management agencies (FEMA and KYEM) around emergency preparedness and recovery of available emergency funds. • Work with the University of Kentucky's and USGS's predictive models to establish projects.	KYTC Secretary's Office, State Highway Engineer's Office, and Office of Highway Safety coordinate with KYEM and FEMA
	5	Increase the funds for aviation received into the Jet A fuel tax fund whether by increasing the tax cap and/or adjusting for inflation.	KY Legislature with advocacy from KYTC Department of Aviation

Plan of Action Category	Task #	Implementation Plan Tasks	Assigned Responsibility
 **Programming and Project Decision-Making**	1	Continue to improve the pre-SHIFT process, including the following: • Evaluate incorporating a process that accesses projects projects for environmental impacts and preliminary alignment. • Consider the inclusion of a separate transit project section/process. • Consider the inclusion of a separate active transportation project section/process for pedestrians and bicyclists. • Consider the inclusion of a separate TSMO project section/process. • Evaluate weight of reliability relative to recurring congestion. • Examine possible alignment alignment of the economic impacts, freight, safety, benefit/cost, and asset management criteria. • Study inflationary pressure upon the benefit/cost ratio for projects. • Consider weight or benefit on equity for environmental justice populations or disadvantaged areas.	KYTC Secretary's Office, State Highway Engineer's Office, and Division of Planning
	2	Consider these investments strategies: • Consider resiliency and vulnerability in seeking investment in more reliable transportation solutions to serve areas of historical disasters more effectively. • Provide continued investment in ITS to address human-made or natural disruptions to the transportation system. • Evaluate investments in projects that increase accessibility at a lower cost such as transit or active transportation. • Evaluate project opportunities that focus on intercity accessibility such as intercity bus or passenger rail. • Create an equity index or heat map to assist with decision making by using socio-economic, accessibility, and environmental data. • Invest in multimodal freight infrastructure including riverports, rail, pipelines, and airports to help with movement of freight goods.	This is a shared responsibility of Secretary's Office, State Highway Engineer's Office, Division of Planning, and Division of Program Management in the creation of the Recommended Highway Plan, then the Governor and KY Legislature in approving.
	3	Incorporate emerging technologies such as electric vehicles and connected/autonomous vehicles into the planning, project development, and operations processes including the development of a C/AV strategic plan. • Support corridors for electric vehicle charging infrastructure investment as identified in NEVI funding program. • Evaluate needs for infrastructure that can accommodate connected and automated vehicles and platooning and include in a C/AV plan or new transportation technology plan. This may address recommendations around communication infrastructure, dedicated lanes for truck platooning, signs, striping, regulations for mixed (automated and non-automated) fleet, infrastructure for aerial drones, and minimum engineering standards.	State Highway Engineer's Office, Division of Highway Design, Division of Planning, Office of Highway Safety, and HSIP within Division of Traffic Operations
	4	For aviation, consider the use of Virtower ground system to gather aviation data to help airports seek funding.	Department of Aviation

Plan of Action Category	Task #	Implementation Plan Tasks	Assigned Responsibility
 **KYTC Organizational Structure**	1	As part of KYTC Performance Management: • Conduct the research necessary before KYTC commits to a single infrastructure technology until it is clear which will become dominant. • Monitor historical and forecasted trends to assist KYTC in determining a meaningful direction to address the challenges and opportunities of the impacts of those trends. • Evaluate the organizational capabilities to support emerging transportation technologies and shifts in the socio-political and economic landscapes.	KYTC Secretary's Office and State Highway Engineer's Office
	2	Evaluate decision-making responsibilities for KYTC Central Office and Highway District Offices in an effort to more effectively balance prioritization efforts between statewide and regional transportation needs.	KYTC Secretary's Office and State Highway Engineer's Office
	3	Explore the possibility of creating personal service contracts with individuals who could work directly with and for KYTC.	KYTC Secretary's Office, State Highway Engineer's Office, and Division of Professional Services
	4	Continue to promote the development of a data management framework to allow real-time data integration from multiple data sources (historical KYTC data, automobiles, transit vehicles, trucks, mobile devices, infrastructure) and communication channels (fiber optics, Wi-Fi, 5G, digital short-range communications [DSRC], and other radio communications).	KYTC Secretary's Office and State Highway Engineer's Office
	5	Evaluate organizational capabilities to support emerging transportation technologies including the level of cybersecurity and emergency response expertise. Based upon this evaluation, consider changes within KYTC to make cybersecurity and emergency response more prominent.	Commonwealth Office of Technology would have to work with KYTC for cybersecurity: Emergency response is within KYTC Dept of Highways (Office of Highway Safety, Division of Maintenance, and Highway District Offices)

Plan of Action Category	Task #	Implementation Plan Tasks	Assigned Responsibility
Standards and Processes	1	Provide research and data analysis to the Legislative and Executive Branches of State Government to encourage the development of deterrent laws related to cybersecurity and connected/autonomous vehicles.	Commonwealth Office of Technology would have to work with KYTC for cybersecurity: C/AV is within KYTC Department of Highways
	2	Incorporate the roll-out of emerging vehicular technologies (EV, C/AV, etc.) into the planning, design, delivery, and maintenance of the system that allows flexibility in adapting the system with minimal additional expense if technologies change.	KYTC Secretary's Office and State Highway Engineer's Office
	3	Adjust the design process and the investment in materials to promote durability in all transportation assets, including pavement, bridges, and transit vehicles.	KYTC Secretary's Office and State Highway Engineer's Office
	4	Improve and update cost estimating tools across the spectrum, from forecasting economic trends to preparing individual project cost estimates and schedules.	Various Divisions within the Dept of Highways (Planning, Design, Structural Design, Construction Procurement, Construction, Maintenance, etc.) as well as the Depts of Aviation and Rural & Municipal Aid
	5	Continue to pursue opportunities related to proactively reducing the impact of utility relocations on project schedules and costs.	KYTC Divisions of Planning, Design, and Right of Way, Utilities and Rails
	6	Develop collaborative agreements with local governments and the private sector for data-sharing.	KYTC Division of Planning with support from Department of Rural & Municipal Aid's Division of Local Programs
	7	Institute policies and legislation on the testing and operation of C/AVs in Kentucky, in particular to transit, C/AV freight, and truck platooning.	KY Legislature with advocating from KYTC and transportation industry reps
	8	Encourage the MPOs to start with a shared dataset, the KYTC road network for example, and use consistent naming conventions across the MPOs.	Led by KYTC Division of Planning
	9	Create a unique identifier for each project that is used across all GIS data and other published reports. More consistent data structure would enable more efficient analysis among the various data sources.	Led by KYTC Division of Planning and Division of Program Management
	10	Develop a policy connection between land use planning agencies and KYTC to address the cause-and-effect relationships between transportation, land use, and environmental outcomes.	KYTC Secretary's Office, State Highway Engineer's Office, Division of Planning, and reps of planning agencies

SECTION

5

Conclusion

LET'S GET THERE TOGETHER KY!

KY Motto: United We Stand, Divided We Fall.

As Kentucky enters the third decade of the 21st century, Kentuckians are faced with major challenges but also with incredible opportunities affecting their daily lives in monumental ways. The state's multimodal transportation system plays a vital role in the quality of life of those who live in or travel through our Commonwealth. The purpose of the Kentucky 2022-2045 LRSTP is to develop a road map through these challenges and opportunities and lead the state toward the vision of a viable, reliable, and resilient multimodal transportation system to provide access and mobility for all modes; highways, freight, rail, waterways, active transportation (bicyclists-pedestrians), aviation, and transit for the safe movement of people and goods.

The LRSTP has been the result of a comprehensive and collaborative process that began with the analysis of the existing conditions, trends, and needs of Kentucky's multimodal transportation system. Understanding that the future is unknown, the LRSTP process examined the challenges and opportunities confronting the system through four possible futures or scenarios. This scenario planning analysis, along with the review of the system's existing conditions, trends, and individual modal transportation plans provided input for the development of the 2022-2045 LRSTP Plan of Action. To help KYTC prepare for the impacts of the possible futures on the transportation system, the Plan of Action includes recommendations on network vulnerabilities, investment strategies, policies and policy changes, internal business processes, and the SHIFT process for project prioritization.

In support of the recommendations, tasks were developed and refined in the LRSTP Implementation Plan by grouping into four categories: Funding and Revenue, Programming and Project Decision-Making, KYTC Organizational Structure, and Standards and Processes. Over the coming years, KYTC will work to implement these assigned tasks to achieve the LRSTP Goals, within the framework of the LRSTP Guiding Principles, and ultimately strive to meet the desired vision of the state's multimodal transportation system.

However, transportation systems can only function effectively when adequate investment is made to continuously develop, maintain, and operate the system. The sustainability of transportation funding is of utmost concern. Efficient use of all resources is necessary to support the critical publicly owned elements of the transportation system, but there also is the need for inclusion of new resources. Understanding that it does not control nor fund all modes of Kentucky's transportation system, KYTC will continue to cultivate close working partnerships with other agencies and private sector owners of other components such as rail, aviation, and waterways.

Significant effort was made by all involved in the development of this plan, including essential input from the public. The Kentucky 2022-2045 LRSTP ultimately serves as guidance for statewide organizations, policymakers, and local communities to understand the initiatives, priorities, and tasks required to lead Kentucky's present transportation system into the future. United efforts of KYTC, the Kentucky General Assembly, local governments, stakeholders, and the citizens are necessary to set the steps into motion to accomplish the vision for us to...

GET THERE TOGETHER.

SECTION

6

Resources: Acronyms

AADT	Annual Average Daily Traffic
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACP	Asphaltic Concrete Pavement
ACS	American Community Survey
ADA	Americans with Disabilities Act of 1990, as Amended
ADD	Area Development District
ADT	Average Daily Traffic
AIP	Airport Improvement Program
APMS	Airport Pavement Management System
APTA	American Public Transportation Association
ARPA	American Rescue Plan Act
ARBTA	American Road & Transportation Builders Association
ASOS	Automated Surface Observing System
ATDM	Active Traffic Demand Management
AV	Autonomous Vehicle
AVGAS	Aviation Gasoline
AVL	Automatic Vehicle Location
AWOS	Automated Weather Observing System
BEB	Battery Electric Buses
BIL	Bipartisan Infrastructure Law
BMS	KYTC's Bridge Management System
BNSF	Burlington Northern Santa Fe Railway
BRT	Bus Rapid Transit
BTS	Bureau of Transportation Statistics
CAA	Clean Air Act
CARES	Coronavirus Aid, Relief and Economic Security Act
C/AV	Connected and Autonomous Vehicles
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CRFC	Critical Rural Freight Corridor
CHP	Combined Heat and Power
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CRRSAA	Coronavirus Response and Relief Supplemental Appropriations Act
COVID-19	Coronavirus Disease 2019

CPI	Consumer Price Index
CSXT	CSX Transportation
CUFC	Critical Urban Freight Corridor
CVO	Commercial Vehicle Operations
CVG	Cincinnati/Northern Kentucky International Airport
CWS	Carload Waybill Sample
CY	Calendar Year
DMS	Dynamic Message Sign
DNA	Data Needs Analysis
DOE	Department of Energy
DOT	Department of Transportation
DSRC	Dedicated Short-Range Communication
DVMT	Daily Vehicle Miles Traveled
EAS	Essential Air Service
EIA	Energy Information Administration
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
EPAD	Energy Project Assessment Districts
ETC	Electronic Toll Collection
EV	Electric Vehicle
FAA	Federal Aviation Administration
FAF	Freight Analysis Framework
FARS	Fatality Reporting System
FAST	Fixing America's Surface Transportation Act
FE01	KYTC Roadway Maintenance Funding Source
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM/LM	First-Mile/Last-Mile
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GA	General Aviation
GDP	Gross Domestic Product
GECHS	Governor's Executive Committee on Highway Safety
GIS	Geographic Information System
GTFS	General Transit Feed Specification

HCO_3	Bicarbonate
HEV	Hybrid Electric Vehicle
HMVMT	Hundred Million Vehicle Miles of Travel
HPMS	Highway Performance Monitoring System
HPV	High Productivity Vehicle
HSIP	Highway Safety Improvement Program
HSP	Highway Safety Plan
HTF	Highway Trust Fund
HSTD	Human Services Transportation Delivery
IIJA	Infrastructure Investment and Jobs Act
IRI	International Roughness Index
ITS	Intelligent Transportation Systems
IVI	Intelligent Vehicle Initiatives
JPO	Joint Program Office
KCC	Kentucky Conservation Committee
KIPDA	Kentuckiana Regional Planning and Development Agency
KOHS	Kentucky Office of Highway Safety
KRS	Kentucky Revised Statutes
KCFC	Kentucky Clean Fuels Coalition
KCNA	Kentucky Communications Network Authority
KFP	Kentucky Freight Plan
KREDA	Kentucky Rural Economic Development Act
KTC	Kentucky Transportation Center at the University of Kentucky
KYTC	Kentucky Transportation Cabinet
LEXTRAN	Lexington Public Transportation Authority
LRSTP	Long-Range Statewide Transportation Plan
LRT	Light Rail Transit
MaaS	Mobility-as-a-Service
MAP-21	Moving Ahead for Progress in the 21st Century Act
MIS	Major Investment Study
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
MWRRI	Midwest Regional Rail Initiative
MUTCD	Manual on Uniform Traffic Control Devices
NAAQS	National Ambient Air Quality Standards

NBI	National Bridge Inventory
NEVI	National Electric Vehicle Infrastructure
NHFP	National Highway Freight Plan
NEPA	National Environmental Policy Act of 1969
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NHS	National Highway System
NHTSA	National Highway Traffic Safety Administration
OBFM	KYTC's Office of Budget and Fiscal Management
OEM	Original Equipment Manufacturer
OFA	(Runway) Object Free Area
OKI	Ohio-Kentucky-Indiana Regional Council of Governments
OMS	KYTC's Operations Management System
OTD	Office of Transportation Delivery
PACE	Property Assessed Clean Energy
PAPI	Precision Approach Path Indicator
PCC	Portland Cement Concrete
PCI	Pavement Condition Index
PHEV	Plug-In Hybrid Electric Vehicle
PHFS	Primary Highway Freight System
PM2.5	Fine Particulate Matter
PMS	KYTC's Pavement Management Information System
PPE	Personal Protective Equipment
PSR	Pavement Sustainability Ratio
PUC	Public Utilities Commissions
REIL	Runway End Indicator Lights
RFID	Radio Frequency Identification Device
RLC	Red Light Camera
RM	Ramp Meter
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RTMC	Regional Traffic Management Center
SAE	Society of Automotive Engineers
SASP	Statewide Aviation System Plan
SB	Senate Bill
SDF	Louisville Muhammad Ali International Airport

SHIFT	Strategic Highway Investment Formula for Tomorrow
SHSP	Strategic Highway Safety Plan
SPAN	State Physical Activity and Nutrition
STB	Surface Transportation Board
STIP	Statewide Transportation Improvement Program
SOTS	State of the System
SUV	Sport Utility Vehicle
T2	Transportation Tomorrow
TAM	Transit Asset Management
TAMP	Transportation Asset Management Plan
TANK	Transit Authority of Northern Kentucky
TARC	Transit Authority of River City
TEU	Twenty-Foot Equivalent
TIP	Transportation Improvement Program
TIS	Traveler Information System
TNC	Transportation Network Company
TOD	Transit-Oriented Development
TSC	Traffic Signal Coordination
TSMO	Transportation Systems Management and Operations
TSP	Transit Signal Priority
TVA	Tennessee Valley Authority
UAV	Unmanned Aerial Vehicles
UNL	Unidentified Needs List
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USBR	United States Bike Route
USD	U.S. Dollars
USDOT	United States Department of Transportation
V2I	Vehicle to Vehicle
V2X	Vehicle to Everything
V/C	Volume to Capacity (Ratio)
VAST	Vulnerability Assessment Scoring Tool
VMT	Vehicle Miles of Travel
VPD	Vehicles per Day
WHO	World Health Organization

SECTION

6

Resources: Glossary

ACCRUING NEEDS
Those modal needs that are warranted at a future date due to capacity, services, or repair requirements.

ACTIVE TRAFFIC DEMAND MANAGEMENT (ATDM)
The proactive and dynamic management, control, and influence of travel demand, traffic demand, and traffic flow of transportation facilities.

ACTIVE TRANSPORTATION
Any non-motorized mode of transportation, including bicycling, walking, or wheeling.

ADEQUACY RATING
A numerical score from 0 to 100 evaluating the current condition of a roadway segment based on congestion, safety, and pavement condition.

AIR CARGO
Airlines dedicated to the transport of cargo. Some cargo airlines are divisions or subsidiaries of larger passenger airlines.

AIR CARRIER
The commercial system of air transportation comprising large certificated air carriers, small certificated air carriers, commuter air carriers, on-demand air taxis, supplemental air carriers, and air travel clubs.

ALTERNATIVE FUEL CORRIDORS
The U.S. Department of Transportation has designated national plug–in electric vehicle charging and hydrogen, propane, and natural gas fueling corridors to improve alternative fuel vehicle mobility.

ATTENUATORS
An electronic device that reduces the power of a radio or audio signal.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
An organization of state Departments of Transportation.

AMERICANS WITH DISABILITIES ACT (ADA)
A civil rights statute that prohibits discrimination against people who have disabilities in employment, transportation, communications, access to government services, and other public accommodations. Compliance with ADA requires that KYTC make all reasonable modifications to policies and programs to ensure that people with disabilities have an equal opportunity to enjoy all programs, services, and activities.

ANNUAL AVERAGE DAILY TRAFFIC (AADT)
Average daily traffic on a roadway link for all days of the week during a period of one year, expressed in vehicles per day (vpd).

APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM (ADHS)
An administrative designation of a highway system in the Appalachian Regional Commission (ARC) region of Kentucky.

APPALACHIAN REGIONAL COMMISSION (ARC)
A regional economic development agency that represents a partnership of federal, state, and local government. Established by an act of Congress in 1965, ARC is composed of the governors of the 13 Appalachian states and a federal co-chair, who is appointed by the president. Local participation is provided through multi-county local development districts.

APRON
The hard-surfaced or paved area around a hangar and defined area on an airport or heliport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking.

AREA DEVELOPMENT DISTRICT (ADD)
Kentucky's counties are grouped into 15 regions known as Area Development Districts (ADDs). The ADDs contract annually with KYTC to facilitate a Public and Local Officials Transportation Committee. The primary objective is to obtain information identifying proposed regional needs for use in conjunction with the UNL and prioritized every two years, which is then provided as input to the Kentucky Transportation Cabinet's Biennial Highway Plan.

ASSET
The physical infrastructure of a transportation network, such as streets, pavements, bridges, buses, streetcars, traffic signals, streetlights, etc.

ASSET MANAGEMENT
Defined by FHWA as a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the life-cycle of the assets at minimum practicable cost.

AT-GRADE
Typically referring to railroad or other crossings where the road and railroad intersect on the same level or grade.

AUTONOMOUS VEHICLE (AV)
A driverless vehicle that can operate itself and perform necessary functions without any human intervention through the ability to sense its surroundings.

AVERAGE DAILY TRAFFIC (ADT)
The total traffic volume during a given period of time, range from 2 days to 364 consecutive days, divided by number of days in that time period, and expressed in vpd (vehicles per day.)

BARGE
The cargo-carrying vehicle that inland water carriers primarily use. Basic barges have open tops, but there are covered barges for both dry and liquid cargoes.

BASELINE REVENUE PROJECTION
Forecast of existing state and federal transportation funding, with expressed assumptions for inflation, deflation, or continuity.

BICYCLE FACILITY
A street or path which in some manner is specifically designated and/or designed for the use of bicycles or for shared use by bicycles and other transportation modes.

BIKE LANE
A marked space for bicyclists on the street. This excludes locations with shared-lane (sharrow) markings.

BIPARTISAN IINFRASTRUCTURE LAW (BIL)
A United States federal statute enacted by the 117th United States Congress and signed into law by President Joe Biden on November 15, 2021.

BRIDGE DECK
The roadway or walkway surface of a bridge.

BRIDGE REPLACEMENT AND REHABILITATION
A funding category for Federal Highway Trust Funds to be used for replacing and rehabilitating bridges. These funds may be used, within certain limits, on locally maintained as well as state-maintained bridges.

CAPACITY
Physical facilities, personnel, and process available to meet the product of service needs of the customers. Capacity generally refers to maximum output of transportation network or facility.

CENTERLINE MILES
Represent the total length of a road from its beginning point to its end point. The number of the lanes on that road are ignored when calculating centerline mileage.

CLASS I RAILROAD
Classification of rail carriers having annual operating revenues of $447,621,226 (current dollars) or more.

CLASS II RAILROAD
Classification of rail carriers having annual operating revenues less than $447,621,226 but more than $35,809,698 (current dollars).

CLASS III RAILROAD
Classification of rail carriers having annual operating revenues of $35,809,698 (current dollars) or less.

CLEAN AIR ACT (CAA)
The CAA was amended in 1990 (often referred to as the Clean Air Act Amendment) and imposes more stringent requirements for State Implementation Plans to improve air quality. The Environmental Protection Agency published the Transportation Conformity Rule in the Federal Register on November 24, 1994 (40 CFR 51). This rule established the criteria and procedures for determining that transportation plans, programs, and projects, which are approved in 23 United States Code or the Federal Transit Act, conform to the state or federal air quality implementation plans.

CODE OF FEDERAL REGULATIONS (CFR)
The codification of the general and permanent regulations published in the Federal Register by the executive departments and agencies of the federal government of the United States.

COMMERCIAL SERVICE AIRPORT
Defined by the Federal Aviation Administration as a publicly owned airport that receives scheduled passenger service and has at least 2,500 passenger boardings each calendar year.

COMPLETE STREET
A street designed and operated to enable safe use and support mobility for all users. Those include people of all ages and abilities, regardless of whether they are traveling as drivers, pedestrians, bicyclists, public transit riders, or via any other means of transportation.

CONGESTION MANAGEMENT
A way of harnessing the market to reduce the waste associated with traffic congestion. Congestion management works by shifting some rush hour highway travel to other transportation modes or to off-peak periods, taking advantage of the fact that most rush hour drivers on a typical urban highway are not commuters.

CONGESTION MITIGATION AIR QUALITY (CMAQ)
A categorical Federal-aid funding program created with the ISTEA. This program directs funding to projects that contribute to meeting National air quality standards. CMAQ funds generally may not be used for projects that result in the construction of new capacity available to SOVs (single-occupant vehicles).

CONNECTED AND AUTONOMOUS VEHICLE (C/AV)
Connected vehicles use various communication technologies to exchange information with other cars on the road. Autonomous, or "self-driving" vehicles operate without direct driver input to control the steering, acceleration, and braking and are designed so that the driver is not expected to constantly monitor the roadway while operating in self-driving mode.

CONNECTED STREET GRID
An interconnected web of streets that provides a more direct path of travel to public transit and final destinations, Glossary 74 and the ensuant shorter travel distances favor nonmotorized modes.

CONNECTED VEHICLES (CV)
Technologies that allow vehicles to communicate with other vehicles and the outside world around them through the internet.

CONSTANT DOLLAR
An adjusted value of currencies to compare dollar values from one period to another.

CONTROLLED ACCESS FACILITY
A roadway where the spacing and design of driveways, medians, median openings, traffic signals and intersections are strictly regulated by consideration of such factors as traffic volume, number of lanes and adjacent land use.

CORRIDOR ACCESS MANAGEMENT
The design, application, and control of entry and exit points along a roadway to improve safety for all modes, facilitate walking and biking, and reduce trip delay and congestion.

DAILY VEHICLE MILES TRAVELED (DVMT)
Calculated by adding up all the daily miles driven by all the cars and trucks on all the roadways in a region.

DATA NEEDS ANALYSIS (DNA)
Studies on projects that have had no previous planning activity or a study prior to the Design phase. The purpose of DNA studies is to better define the scope of the project, identify environmental concerns early in the process and determine if the funds allocated in the Highway Plan are adequate for the project.

DEMAND-RESPONSE
Descriptive term for a service type, usually considered paratransit, in which a user can access transportation service that can be variably routed and timed to meet changing needs on an as-needed basis.

DYNAMIC MESSAGE SIGNS
Large, electronic signs that overhang or appear along major highways. The signs are typically used to display information about traffic conditions, travel times, construction, and road incidents.

E-COMMERCE
Commercial transactions conducted electronically on the Internet.

ENERGY INFORMATION ADMINISTRATION (EIA)
Official energy statistics from the U.S. government.

ENDANGERED SPECIES
Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man.

EQUITY
Equity in transportation seeks fairness in mobility and accessibility to meet the needs of all community members. A central goal of transportation is to facilitate social and economic opportunities by providing equitable levels of access to affordable and reliable transportation options based on the needs of the populations being served, particularly populations that are traditionally underserved.

ESSENTIAL AIR SERVICE (EAS)
A program enacted by the U.S. government that maintains commercial air service in small communities affected by the Airline Deregulation Act of 1978. Without EAS, residents of small communities would have to spend many hours to access a larger, "hub" airport for travel, medical care, and other services.

FATALITY RATE
The number of fatalities per 100 million vehicle miles traveled.

FATALITY REPORTING SYSTEM (FARS)
A census of motor vehicle traffic crashes that result in a fatality to a vehicle occupant or nonmotorist within 30 days of the crash.

FEDERAL AVIATION ADMINISTRATION (FAA)
U.S. Department of Transportation agency responsible for aviation policy and administration.

FEDERAL HIGHWAY ADMINISTRATION (FHWA)
U.S. Department of Transportation agency responsible for administering the federal highway aid program to individual states, and helping to plan, develop and coordinate construction of federally funded highway projects.

FEDERAL HIGHWAY TRUST FUND
Dedicated federal fund specifically for transportation projects based primarily on motor fuel tax that was first created in 1956.

FEDERAL INTERSTATE MAINTENANCE FUNDS
An Interstate Maintenance (IM) program that provides funding for resurfacing, restoring, rehabilitating, and reconstructing (4R) most routes on the Interstate System.

FEDERAL RAILROAD ADMINISTRATION (FRA)
U.S. Department of Transportation agency that creates and enforces rail safety regulations, administers rail funding, and researches rail improvement strategies and technologies.

FEDERAL TRANSIT ADMINISTRATION (FTA)
U.S. Department of Transportation agency that provides financial and planning assistance to help plan, build and operate rail, bus, and paratransit systems. The agency also assists in the development of local and regional traffic reduction programs.

FINANCIAL CONSTRAINT
A federal requirement that long-range transportation plans include only projects that have a reasonable expectation of being funded, based upon anticipated revenues. In other words, long-range transportation plans cannot be pie-in-the-sky wish lists of projects. They must reflect realistic assumptions about revenues that will likely be available looking forward at least 20 years. Financial constraint is often referred to as fiscal constraint as well.

FINE PARTICULATE MATTER (PM 2.5)
Particulate matter consists of airborne solid particles and liquid droplets. Particulate matter may be in the form of fly ash, soot, dust, fog, fumes, etc. These particles are classified as “coarse” if they are smaller than 10 microns, or “fine” if they are smaller than 2.5 microns. Coarse airborne particles are produced during grinding operations, or from the physical disturbance of dust by natural air turbulence processes, such as wind. Fine particles can be a by-product of fossil fuel combustion, such as diesel and bus engines. Fine particles can easily reach remote lung areas, and their presence in the lungs is linked to serious respiratory ailments such as asthma, chronic bronchitis and aggravated coughing. Exposure to these particles may aggravate other medical conditions such as heart disease and emphysema and may cause premature death. In the environment, particulate matter contributes to diminished visibility and particle deposition (soiling).

FISCAL YEAR
Defined as July 1 through June 30 of a given year for finance purposes by the Kentucky Transportation Cabinet. However, some agencies may choose to specifically designate their own “fiscal year.”

FIXED-ROUTE TRANSIT
Defined by the Federal Transit Administration as services provided on a repetitive, fixed schedule basis along a specific route with vehicles stopping to pick up and deliver passengers to specific locations; each fixed route trip serves the same origins and destinations.

FIXING AMERICA’S SURFACE TRANSPORTATION (FAST) ACT
The federal transportation reauthorization bill passed by the Obama Administration in 2015; authorized over $305 billion to fund surface transportation programs across fiscal years 2016 through 2020 for highway, highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail, and research, technology, and statistics programs. Geolocation the estimation of the physical location of an object such as a mobile phone or internet-connected device using geographic coordinates.

FREIGHT ANALYSIS FRAMEWORK (FAF)
A federal database that integrates data from a variety of sources to estimate commodity flows and related freight transportation activity among states, regions, and major international gateways.

FUNCTIONAL CLASS (SYSTEM CLASSIFICATION)
Functional classification groups streets and highways into classes or systems according to the character of service they are intended to provide. This classification recognizes that individual roads and streets do not serve travel independently. Rather, travel involves movement through a network of inter-related roads and streets. Because a highway network is limited and restrictive, the movement must be channeled through an efficient, hierarchical system of facilities that progress from a lower classification handling short, locally oriented trips to a higher classification as the trips become longer and connect regional and interregional traffic generators. The level of service provided by, and function performed by, each facility within this hierarchical system determines its functional classification. The classifications are as follows: Rural Principal Arterial, Rural Minor Arterial, Rural Collector Road, Rural Local Road, Urban Principal Arterial, Urban Minor Arterial, Urban Collector Street, and Urban Local Road.

FUNDING GAP
The difference between state and federal share of estimated modal needs (at defined "levels of service") and baseline revenue projection.

GENERAL AVIATION
That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of public convenience and necessity from the Civil Aeronautics Board and large aircraft commercial operators. The 92% of U.S. aircraft and more than 65% of U.S. flight hours flown by other than major and regional airlines or the military. Often misunderstood as only small, propeller-driven aircraft, even a large jet or a cargo plane operated under FAR Part 91 can be considered a general aviation aircraft.

GEOGRAPHIC INFORMATION SYSTEM (GIS)
A computer system used to visualize, question, analyze and interpret data to understand relationships, patterns and trends related to positions on Earth's surface.

GLOBAL POSITIONING SYSTEM (GPS)
A satellite-based navigation system.

GOKY.KY.GOV
Online travel information services provided by the Kentucky Transportation Cabinet regarding road closures, construction updates and crashes. It is provided to help motorists make better decisions about travel in Kentucky.

GOVERNORS HIGHWAY SAFETY ASSOCIATION (GHSA)
A non-profit organization based in Washington, DC that represents the state and territorial highway safety offices that implement programs to address behavioral highway safety issues, including the following: occupant protection, impaired driving, and speeding. GHSA provides leadership and advocacy for the states and territories to improve traffic safety, influence national policy, enhance program management, and promote best practices.

HIGH-SPEED RAIL
A type of rail transport that operates significantly faster than traditional rail traffic, using an integrated system of specialized rolling stock and dedicated tracks.

HIGHWAY INFORMATION SYSTEM (HIS)
Kentucky's HIS is a database containing information about highway system assets that is developed and maintained by the KYTC. Individual databases are maintained as layers that can be displayed individually or in combination for use in displaying information about the status of Kentucky's highway system.

HIGHWAY PERFORMANCE MONITORING SYSTEM (HPMS)
A database maintained by each state and provided annually to the FHWA to assess the use, condition, performance, and operational characteristics of the nation's highway infrastructure. HPMS is used to monitor vehicular travel to certify public mileage data, and to facilitate planning and policymaking at the national level.

HIGHWAY PLAN
The six-year work plan administered by KYTC that guides the scheduling and conducting of planning, engineering, environmental, right-of- way, utility and construction activities necessary to complete projects in a timely fashion.

HIGHWAY TRUST FUND (HTF)
Established by legislation in 1989 for the purpose of improving identified "primary transportation corridors" within the State and completing urban loops around major metropolitan areas.

INFRASTRUCTURE INVESTMENT AND JOBS ACT
The Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan IInfrastructure Law (BIL), is a United States federal statute enacted by the 117th United States Congress and signed into law by President Joe Biden on November 15, 2021.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)
A broad range of wireless and traditional communications-based information and electronic technologies that advance transportation safety and mobility through integration into transportation infrastructure and into vehicles.

INTERMODAL
The ability to connect, and the connections between, modes of transportation. The term "mode" is used to refer to a means of transportation, such as automobile, bus, train, ship, bicycle, and walking. Intermodal refers specifically to the connections between modes. Intermodal Connectors facilities that provide access to intermodal facilities. Intermodal terminal is a facility for the transfer of containers between railroad and truck.

INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT OF 1991 (ISTEA)
A federal five-year transportation funding act passed in 1991 which changed the approach to transportation funding programs. Through various measures, this act required a greater degree of intermodal coordination, regional, and statewide planning than was required under previous highway and transit funding measures.

INTERNATIONAL ROUGHNESS INDEX (IRI)
A scale for roughness based on the simulated response of a generic motor vehicle to road surface irregularities.

INTERSTATE HIGHWAY SYSYTEM
A continuous network of access-controlled highways in the contiguous 48 U.S. states that serve as part of the National Highway System.

LAND USE
The human use of land; a representation of economic and cultural activities (e.g., agricultural, residential, industrial, recreational, mining, etc.) that are practiced in a given place.

LAST MILE
Figure of speech describing movement of goods from a transportation hub to the final delivery destination.

LEADING PEDESTRIAN INTERVAL (LPI)
A crosswalk signal configured to give pedestrians a three to seven second head start when entering an intersection, with a corresponding green signal in the same direction of travel.

LEVEL OF SERVICE (LOS)
Qualitative measure of a road's operating conditions differentiated by mode, investment goal.

LIGHT RAIL
A streetcar-type vehicle operated on city streets, semi-exclusive rights-of-way, or exclusive rights-of-way. Service may be provided by step-entry vehicles or by level boarding.

LONG-RANGE STATEWIDE TRANSPORTATION PLAN (LRSTP)
A federally required long-range transportation plan for a minimum period of twenty years. The federal legislation requires that a plan be developed for at least a twenty-year period and must include funding information. The document is updated periodically and may include projects or just address state policy.

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)
The MUTCD defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is published by the Federal Highway Administration (FHWA) under 23 Code of Federal Regulations (CFR), Part 655, Subpart F. The MUTCD, which has been administered by the FHWA since 1971, is a compilation of national standards for all traffic control devices, including road markings, highway signs, and traffic signals.

METROPOLITAN PLANNING ORGANIZATION (MPO)
A regional planning organization designated as being responsible, together with the state, for conducting the continuing, cooperative, and comprehensive planning process for the Metropolitan Area as designated by the Federal Government (more than 50,000 people). This organization is responsible for the regional planning process for the metropolitan area as required by federal legislation under ISTEA, TEA-21, SAFETEA-LU and MAP-21.

METROPOLITAN TRANSPORTATION PLAN (MTP)
A Metropolitan Planning Organization's long range multimodal transportation plan that identifies how the metropolitan area will manage and operate the transportation system for a 20+- year planning horizon.

MILEAGE-BASED USER FEE (MBUF)
A user charge based on miles driven in a specific vehicle as opposed to the current excise tax on fuel consumed. Mobility the ease with which people or goods move from place to place.

MOBILITY AS A SERVICE (MAAS)
The integration of various forms of transport services into a single mobility service accessible on demand, such as public transport, ride-, car- or bike sharing, or taxi.

MODAL NEEDS
Estimate of the long-range capital and operating costs of infrastructure, services provided, and maintenance/repair for each transportation mode.

MODAL SPLIT
The percentage of travelers using a particular type of transportation or number of trips using that type.

MODE
The way in which passengers and/or goods can be transported; for example: vehicles, bicycles, buses, trains, or walking.

MOTOR VEHICLE EMISSION BUDGETS
The portion of the total allowable emissions defined in the submitted or approved control strategy implementation plan revision or maintenance plan for a certain date for the purpose of meeting reasonable further progress milestones or demonstrating attainment or maintenance of the National Ambient Air Quality Standards (NAAQS), for any criteria pollutant or its precursors, allocated to highway and transit vehicle use and emissions.

MOVING AHEAD FOR PROGRESS IN THE 21ST CENTURY ACT (MAP-21)
A federal regulation signed into law in 2012 to fund surface transportation programs at over $105 billion for fiscal years (FY) 2013 and 2014. MAP-21 is the first long-term highway authorization enacted since 2005. It is a milestone for the U.S. economy and the Nation's surface transportation program. By transforming the policy and programmatic framework for investments to guide the system's growth and development, MAP-21 creates a streamlined and performance-based surface transportation program and builds on many of the highway, transit, bike, and pedestrian programs and policies established in 1991.

MULTIMODAL
Involving several transportation modes.

MULTI-USE TRAIL
A paved or smooth gravel pathway for walking and/or bicycling that is separated from motor vehicle traffic yet still functions as a transportation facility. Multimodal transportation of freight using several modes.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)
An environmental law that promotes the enhancement of the environment and established the President's Council on Environmental Quality that was enacted in law on January 1, 1970.

NATIONAL ELECTRIC VEHICLE INFRASTRUCTURE (NEVI)
A formula program ("NEVI Formula") to provide funding to States to strategically deploy electric vehicle (EV) charging infrastructure and to establish an interconnected network to facilitate data collection, access, and reliability.

NATIONAL HIGHWAY FREIGHT NETWORK (NHFN)
Mandated by the Fixing America's Surface Transportation Act (FAST Act) to strategically direct federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system and includes the Primary Highway Freight System (PHFS) plus remaining Interstates not on the PHFS.

NATIONAL HIGHWAY SYSTEM (NHS)
A federally-designated highway system that consists of roadways important to the nation's economy, defense, and mobility. The subsystems of the NHS include Interstates, Principal Arterials, Strategic Highway Network (STRAHNET), Strategic Highway Network Connectors, Intermodal Connectors.

NATIONAL TRANSIT DATABASE (NTD)
A federal reporting program for transit agencies receiving Federal Transit Administration funding and it serves as a primary repository for all transit related data and statistics.

NATIONAL TRUCK NETWORK (NTN)
In compliance with the Surface Transportation Assistance Act of 1982 (STAA) and DOT Appropriations Act of 1983 and KRS 189.222, Kentucky has established a network of highways on which motor vehicles with increased dimensions (STAA vehicles) may operate. This network includes state-maintained highways five (5) driving miles from the designated system and fifteen (15) miles from an interstate or parkway exit for the purpose of attaining reasonable access to terminals, facilities for food, fuel, repairs, or rest. The allowed access is reduced to one (1) driving mile from the designated system on public use highways which are not state maintained.

NEW MADRID FAULT LINE
An active fault line located in southeastern Missouri, northeastern Arkansas, western Tennessee, western Kentucky and southern Illinois.

NON-MOTORIZED TRANSPORTATION
To travel by means other than a motorized vehicle including by foot, bicycle, or horse.

OZONE
Ozone is a colorless gas with a sweet odor. Ozone is not a direct emission from transportation sources. It is a secondary pollutant formed when VOCs and NOx combine in the presence of sunlight. Ozone is associated with smog or haze conditions. Although the ozone in the upper atmosphere protects us from harmful ultraviolet rays, ground-level ozone produces an unhealthy environment in which to live. Ozone is created by human and natural sources.

PARATRANSIT
A comparable transportation service required by the American Disabilities Act (ADA) for individuals with disabilities who are unable to use fixed route transportation systems. (49CFR37) (APTA1) This service consists of a variety of smaller, often flexibly scheduled-and-routed transportation services using low-capacity vehicles, such as vans, to operate within normal urban transit corridors or rural areas. These services usually serve the needs of persons that standard mass-transit services would serve with difficulty, or not at all. Often, the patrons include the elderly and persons with disabilities.

PAVEMENT MANAGEMENT SYSTEM (PMS)
One of the management systems required under ISTEA but made optional under TEA-21. Kentucky has continued to maintain a PMS and uses performance measures in this system to identify high priority roadways for resurfacing and to assist in determining the resurfacing cycle.

PEAK PERIOD
The time of heaviest use, usually during the morning and evening commute periods ("rush hours").

PER CAPITA INCOME (PCI)
A measure of income derived by dividing the total income for a particular group by the total population. Personal income measures and statistics for counties, states, regions, and the U.S. are released by the U.S. Bureau of Economic Analysis.

PERFORMANCE BASED PLANNING AND PROGRAMMING (PBPP)
A system-level, knowledge-driven process that builds upon the concept of "performance management". PBPP refers to the application of performance management within the planning and programming process of transportation agencies to achieve desired performance outcomes for the multimodal transportation system. This includes a range of activist and products undertaken by a transportation agency together with other agencies, stakeholders, and public as part of a 3 C (cooperative, continuing, and comprehensive) process.

PERFORMANCE MANAGEMENT
A strategic approach that uses data to support decisions which help to achieve the desired outcomes. Those desired outcomes support the overall aims of a transportation plan: the goals and the vision.

PERFORMANCE MEASURES
Operational characteristics, physical conditions, or other appropriate parameters used as a benchmark to evaluate the adequacy of transportation facilities and estimate needed improvements. Such metrics can be used to track results and can serve as a basis for comparing progress against a target or other objective.

PERFORMANCE TARGETS
A quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period.

POVERTY LEVEL
The minimum level of money income adequate for families of different sizes, in keeping with American consumption patterns. These levels are determined annually by the U.S. government based on an index originated by the U.S. Social Security Administration and released biennially by the U.S. Census Bureau for states and counties.

PRIVATE USE AIRPORT
An airport that is accessible to private users only and not open to the public.

PROJECT DELIVERY
The process that takes a project concept from the planning and programming stage, through the design process (including environmental, utility, railroad, and right-of-way clearances, as required), to the completion of a constructed project.

PROJECT DEVELOPMENT
The development and implementation of a project and its progress through a number of phases (or stages).

PROTECTED BICYCLE LANE
Bicycle lanes that have physical separation between motor vehicle travel and the bicycle lane. This can be a row of parked cars, a concrete curb, or flex posts and wheel stops.

PUBLIC INVOLVEMENT PROCESS (PIP)
The Public Involvement Process (PIP) provides a framework to the public involvement process regarding statewide planning related activities. The plan identifies federal and state requirements; goals, objectives, and policies; planning activities which require public involvement and the process(es) involved when providing the public with full access to and notice of planning activities.

PUBLIC USE AIRPORT
An airport that is open to the general public and can be owned publicly or privately.

PUBLIC-PRIVATE PARTNERSHIP (P3)
A contractual agreement between a public entity and a private entity (or another public entity) in which the public entity transfers the responsibility for engineering, construction, operation, financing, and/or maintenance (or any combination) of a transportation project or facility to the private sector for a defined period of time.

REGIONAL RAILROAD
See Class II railroad.

RELIABILITY
Refers to the degree of travel time certainty and predictability on the transportation system.

RESILIENCY
The ability to adapt to, recover from, and respond to—and bounce back quickly from threats to physical infrastructure and operations and threats of cybersecurity, terrorism, and all hazards.

RURAL SECONDARY PROGRAM
The Rural Secondary (RS) Program is funded by 22.2% of the motor fuels tax revenue. These funds are used for the construction, reconstruction and maintenance of secondary and rural roads in each county. Allocation of RS funds is determined using the Fifths Formula. The Transportation Cabinet is responsible for expending all Rural Secondary Program funds. Safe, Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) - The federal transportation reauthorization legislation, enacted August 10, 2005, as Public Law 109-59. SAFETEA-LU authorizes the Federal surface transportation programs for highways, highway safety, and transit for the 5-year period 2005-2009 and continued many of the provisions of TEA-21, but also further emphasized and elevated the importance of safety and security, further coordination of statewide planning with the metropolitan areas, consultation with local elected officials, and continued public involvement.

SHORT LINE RAILROAD
See Class III railroad.

SMALL URBAN AREAS (SUA)
Areas of population greater than 5,000 but less than 49,999 qualify as small urban according to FHWA definitions.

STATE IMPLEMENTATION PLAN (SIP)
A plan mandated by the Clean Air Act that contains procedures to monitor, control, maintain, and enforce compliance with the National Ambient Air Quality Standards (NAAQS). This plan must be considered in the transportation planning process.

STATE PRIMARY SYSTEM
Under KRS 177.020 the State Primary Road System classifies state-maintained roadways by the type of service and function they provide. The (603 KAR 3:030) legislation designates the following classes, State Primary System, State Secondary System, Rural Secondary System, Supplemental Roads. State Road Fund - Dedicated state fund specifically for transportation projects based primarily on motor fuel tax.

STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)
This program was required under ISTEA, and continued under TEA-21, SAFETEA-LU and MAP-21. The STIP is a capital improvement program for all federally funded state surface transportation (highway, bus and rail) projects which are anticipated for a specified period. The STIP is a subset of the Six-Year Highway Plan and the Statewide Transportation Plan and includes projects for a four-year period. This staged, multi-year, statewide, intermodal program of transportation projects is consistent with the statewide transportation plan and planning processes as well as metropolitan plans, TIPs, and processes. The STIP must also be financially balanced.

STRATEGIC HIGHWAY SAFETY PLAN (SHSP)
A collaborative plan developed by KYTC to harmonize the highway safety goals and strategies among these agencies; the plan is required by FHWA and includes projects funded by the Highway Safety Improvement Program (HSIP).

TELECOMMUTING
Communicating electronically (by telephone, computer, fax, etc.) with an office, either from home or from another site, instead of traveling to it physically.

TRAFFIC MANAGEMENT CENTER (TMC)
The hub of most freeway management systems where data about the freeway are collected and processed, fused with other operational and control data, synthesized to produce “information”, and distributed to stakeholders such as the media, other agencies, and the traveling public; see also Regional Traffic Management Center (RTMC).

TRANSPORTATION ALTERNATIVES PROGRAM (TAP)
A program administered by the U.S. Federal Highway Administration (FHWA) which helps states fund a variety of activities related to improving transportation assets, including on- and off-road pedestrian and bicycle facilities, environmental mitigation, and creating or improving recreational trails projects.

TRANSPORTATION ASSET MANAGEMENT PLAN (TAMP)
The risk-based plan, required by MAP-21 and developed for the National Highway System (NHS), that uses performance-based budgeting to improve or preserve the condition of the assets and the performance of the NHS.

TRANSPORTATION DEMAND MANAGEMENT (TDM)
A general term for strategies that result in more efficient use of transportation resources. These strategies include education, incentives, and disincentives to reduce the need for vehicle trips (e.g., telework, compressed work weeks, walking, bicycling), the distance of trips (e.g., shop close to home, home delivery); and to shift to higher-occupancy modes like transit and other forms of ridesharing.

TRANSPORTATION EQUITY ACT FOR THE 21ST CENTURY
1998 (TEA-21) – A federal transportation legislation passed in June of 1998 which continued many of the provisions of ISTEA, but also further emphasized the coordination of statewide planning with the metropolitan areas, consultation with local elected officials, and continued public involvement.

TRANSPORTATION IMPROVEMENT PROGRAM (TIP)
A document prepared by a metropolitan planning organization that lists projects to be funded with FHWA/FTA funds for the next one to three-year period. This document identifies the projects for inclusion into the STIP. This document must be financially constrained and must be a direct subset of the area's Long-Range Transportation Plan.

TRANSPORTATION INFRASTRUCTURE
Built installations such as streets, sidewalks, railroads, transit facilities, trails, bridges, and tunnels.

TRANSPORTATION MANAGEMENT AREA (TMA)
Is an urbanized areas (UZAs) with populations greater than 200,000 as determined by the 2010 Census as hereby designated by the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA) in compliance with the agencies' authorizing statutes, 23 U.S.C. 134, and 49 U.S.C. 5303. This action supersedes the agencies' designations of TMAs made in the Federal Register on July 8, 2002, at 67 FR 45173. There are now four TMAs in Kentucky: Louisville, Lexington, Cincinnati/Northern Kentucky, and Evansville/Henderson. The five non-TMA MPOs are as follows: Ashland, Bowling Green, Clarksville, Owensboro, and Radcliff-Elizabethtown.

TRANSPORTATION PERFORMANCE MANAGEMENT (TPM)
A strategic approach that uses system information to make investment and policy decisions to achieve national performance goals.

TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO)
A way to address reliability, mobility, and congestion by implementing various strategies that utilize existing infrastructure; rather than just expanding capacity.

TRAVEL TIME RELIABILITY
Measurement of unexpected delay; the consistency or dependability in travel times, as measured from day-to-day and/or across different times of the day.

UNITED STATES ARMY CORPS OF ENGINEERS (USACE)
A federal agency under the United States Department of Defense and a major Army command made up of some 36,500 civilian and military personnel, making it one of the world's largest public engineering, design, and construction management agencies. Although generally associated with dams, canals and flood protection in the United States, USACE is involved in a wide range of public works throughout the world. The Corps of Engineers provides outdoor recreation opportunities to the public, and provides 24% of U.S. hydropower capacity. Their mission is to "Deliver vital public and military engineering services; partnering in peace and war to strengthen our Nation's security, energize the economy and reduce risks from disasters."

UNITED STATES DEPARTMENT OF TRANSPORTATION (USDOT)
A federal cabinet department of the United States government that was created in 1966 and is governed by the United States Secretary of Transportation. This agency is concerned with transportation and institutes and coordinates national transportation programs. Its mission is to "Serve the United States by ensuring a fast, safe, efficient, accessible, and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today and into the future."

URBAN AREA
Areas of population greater than 5,000 can qualify as urban as defined by the U.S. Census Bureau. (23 U.S.C. 101(a)(33)) An urban area boundary, which encircles the urbanized area in a region, is developed by states in cooperation with local officials.

VEHICLE MILES TRAVELED (VMT)
A measure of the level of travel activity in an area. The figure is generally found by multiplying the average length of trip by the total number of trips, based on actual traffic counts.

VEHICLE TO EVERYTHING (V2X)
The passing of information from a vehicle to any entity that may affect the vehicle, and vice versa.

VEHICLE TO INFRASTRUCTURE (V2I)
A communications model that allows vehicles to share information with components of a highway system; examples of components include radio frequency identification device (RFID) readers, cameras, traffic lights, and streetlights.

VEHICLE-MILES TRAVELED (VMT)
Unit for measuring vehicle travel distances; number of miles traveled nationally by vehicles for a period of one year.

WATER TRANSPORTATION ADVISORY BOARD (WTAB)
A board established under KRS through Kentucky legislation as an advisory body to the executive and legislative branches of government on matters pertaining to water transportation.


Indianapolis
Cincinnati
Frankfort
Lexington
Evansville
Louisville
KENTUCKY
Ohio
40
65
GET THERE TOGETHER.

KENTUCKY 2022-2045

LONG-RANGE STATEWIDE TRANSPORTATION PLAN

GetThereTogetherKY.org