



Transportation 2050

Lawrence-Douglas County
Metropolitan Transportation Plan

Funding Note: This report was funded in part through grant[s] from the Federal Highway Administration [and Federal Transit Administration], U.S. Department of Transportation. The views and opinions of the authors [or agency] expressed herein do not necessarily state or reflect those of the U. S. Department of Transportation.

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Transportation 2050

Metropolitan Transportation Plan
Lawrence - Douglas County

Approved on March 16, 2023 by MPO Policy Board



Adopted by:

Lawrence / Douglas County MPO Policy Board

March 16, 2023

Resolution 2023-01

Received by:

Lawrence Transportation Commission

March 6, 2023

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Lawrence / Douglas County Metropolitan Planning Commission

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Douglas County Board of County Commissioners

Date TBD

Resolution #

Lawrence City Commission

Date TBD

Ordinance #

Amendments and Administrative Revisions

Amendment 1

October 19, 2023

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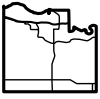


What we heard:

“The ability to move safely should not change from city to city. Current traffic infrastructure encourages speeding with super wide and straight lanes. There is no traffic calming or directing infrastructure that makes big “highway-like” roads such as Iowa Street or 6th Street safe...”



Chapter 1 Overview



Populations of Douglas County

Total Douglas County:	118,785
Lawrence:	97,384
Eudora:	6,408
Baldwin City:	4,677
Lecompton:	588

Source: 2020 American Community Survey (5-year Estimates)



What is a Metropolitan Planning Organization (MPO)?

A Metropolitan Planning Organization (MPO) is defined as a federally funded transportation policy-making organization that represent local, state, and national interests.

Source: Federal Transit Administration

1. Overview

A. Introduction

Transportation 2050 (T2050) is the blueprint for our future transportation system; it is a vision for a healthy, safe, and efficient transportation system which adequately serves the metropolitan region that includes Lawrence, Eudora, Baldwin City, Lecompton and all remaining unincorporated areas of Douglas County into the future.

The plan identifies future transportation needs, investments, and improvement strategies for all forms of transportation (automobile, public transit, bicycle, pedestrian, etc.) necessary to meet the transportation needs of the region through 2050. Financial resources available to implement T2050 have also been identified to ensure the plan is financially realistic, and that projects selected for implementation can reasonably be afforded.

Since 2013, the Lawrence and Douglas County Commissions formally acknowledged the latest Metropolitan Planning Organization (MPO) approved Metropolitan Transportation Plan (MTP) as the transportation chapter of the Lawrence-Douglas County Comprehensive Plan. This means that T2050 serves as the transportation chapter in the [Plan 2040 Comprehensive Plan for Unincorporated Douglas County & The City of Lawrence](#).

B. What is the Lawrence - Douglas County Metropolitan Planning Organization (MPO)?

MPOs provide a comprehensive, cooperative, and continuous transportation planning process for urbanized areas with a population of 50,000 or greater. The MPO serves all of Douglas County including all the municipalities in the County - Baldwin City, Eudora, Lawrence, and Lecompton - because transportation issues don't stop at city limits.

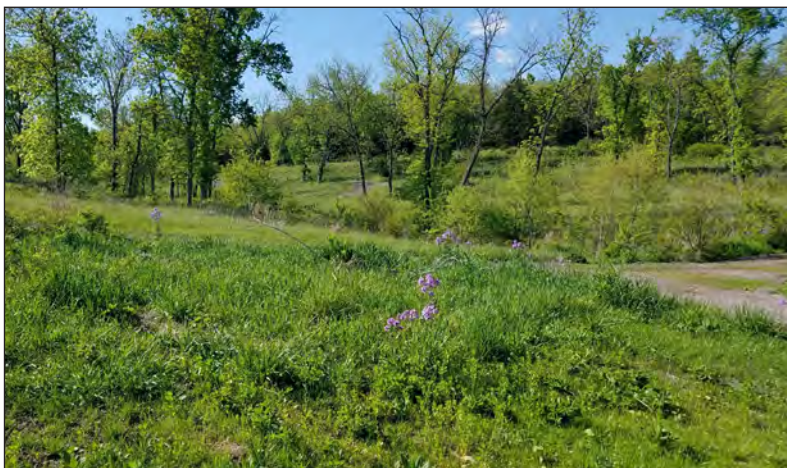
The MPO brings together residents, local governments, state, federal departments of transportation, and other interested persons and organizations in order to create policy and develop plans that reflect our vision for transportation.

C. MPO Area

The Lawrence-Douglas County Metropolitan Planning Area (MPA) includes the census defined urbanized area and unincorporated areas in Douglas County which are expected to become urbanized during the next 20 years. This MPA boundary includes the Urban Area Boundary (UAB) as defined by the Lawrence - Douglas County MPO. In addition to the MPA and UAB, the urban area, through the land use planning efforts, is embodied in the Plan 2040 Comprehensive Plan for Unincorporated Douglas County & The City of Lawrence. The locally defined urbanized growth areas (UGA) are subject to change as local conditions warrant. In addition, the MPA takes into account other statutory boundaries as defined by the U.S. Census Bureau.

Lawrence is the largest urban place and area, but the county has three other cities: Baldwin City, Eudora, and Lecompton. Baldwin City and Eudora also meet the U.S. Census Bureau definition of an Urban Area (which categorizes Urbanized Area (UZA) of at least 2,000 housing units or at least 5,000 people) while Lecompton does not meet these requirements. Baldwin City, Eudora, and Lecompton are all located along important transportation routes including state highways and/or bridges over the Kansas River. The rural areas of Douglas County have been sparsely populated historically and today.

T2050 addresses transportation issues and needs throughout Douglas County. However, the primary emphasis is on the urbanized area including and immediately surrounding the City of Lawrence. Figure 1.1 identifies the various planning areas and boundaries affecting the development of T2050.



What is a Metropolitan Planning Area (MPA)?

A Metropolitan Planning Area is the census defined urbanized area plus contiguous areas that are expected to become urbanized in 20 years.

Source: U.S. Census



What is an Urbanized Area (UZA)?

An Urbanized Area is a city with a population of at least 5,000 people 50,000 people or 2,000 housing units.

Source: U.S. Census

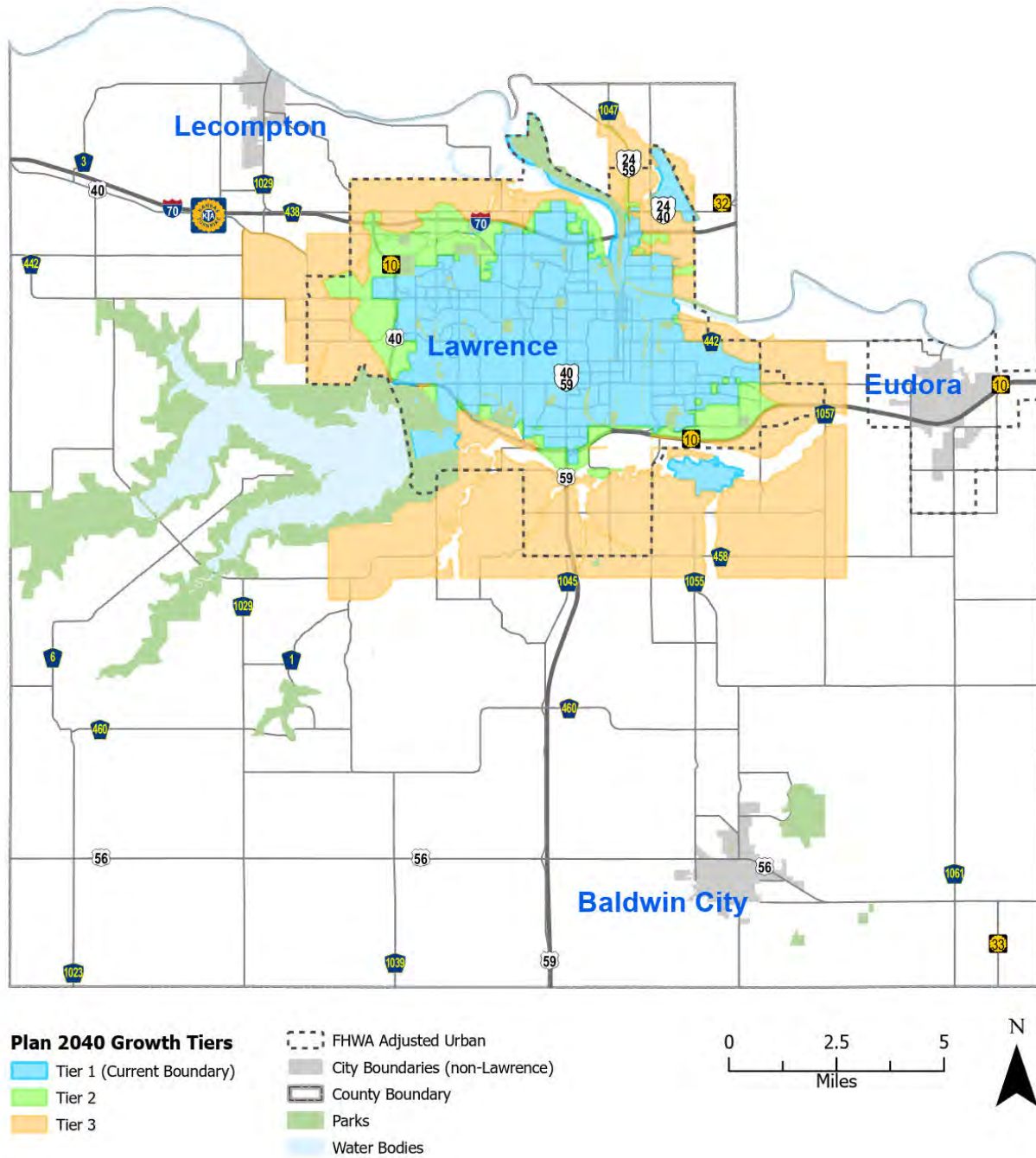


What is an Urbanized Growth Area (UGA)?

An area surrounding an existing urbanized area in which future development is anticipated.

Source: Plan 2040

Figure 1.1: Douglas County Planning Area Boundaries

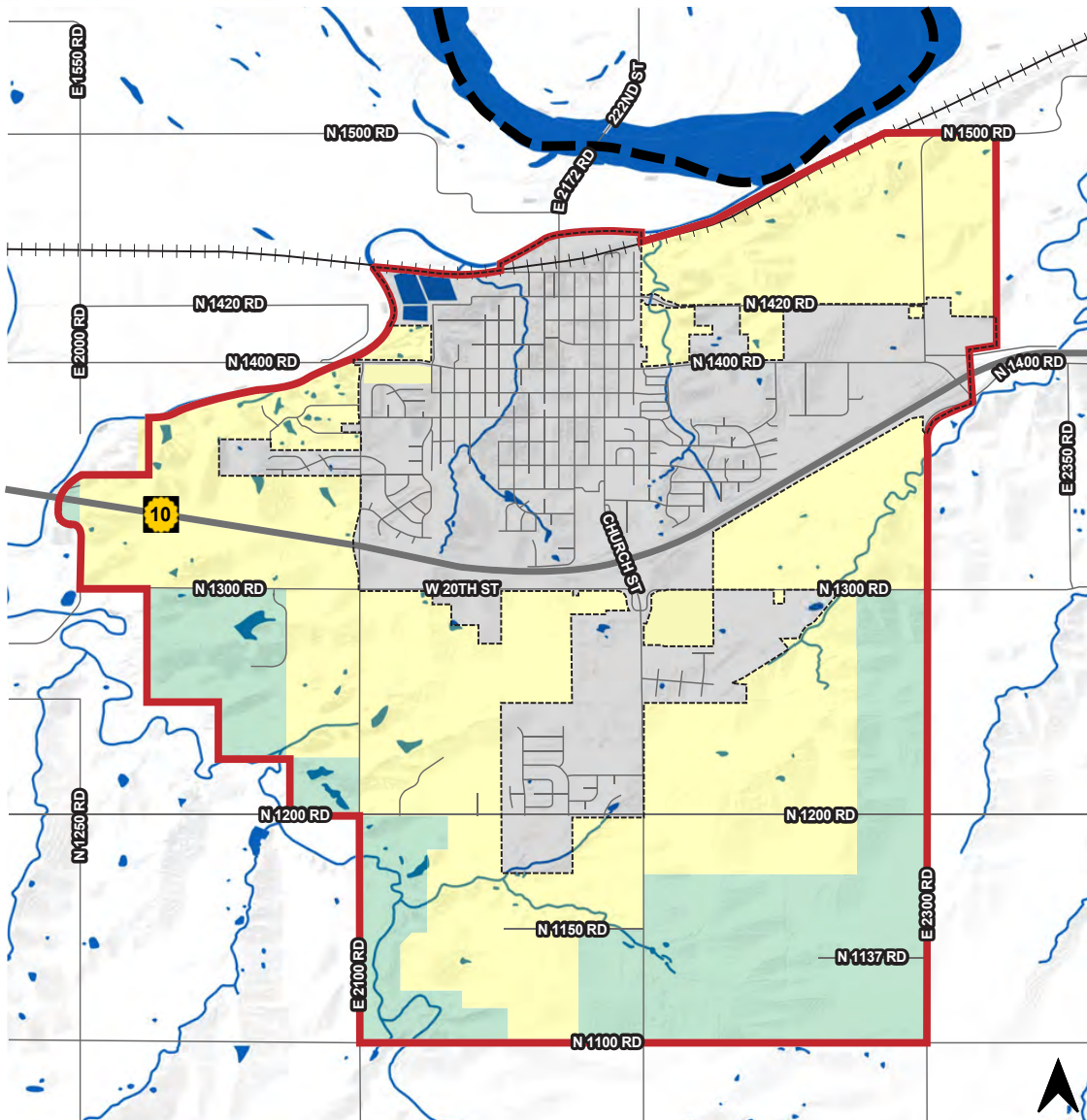


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 Source: Plan 2040 and 2013 FHWA Adjusted Boundaries
 Produced: Lawrence-Douglas County MPO

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Figure 1.2: Eudora Planning Area Boundaries



Legend

- | | |
|---------------|--------------|
| Tier 1 | Railroad |
| Tier 2 | Street |
| Urban Reserve | Highway |
| UGA Limit | City Limit |
| | County Limit |

0 0.25 0.5 0.75 1 mi

Date Exported: 12/19/2022
 Source: City of Eudora Comprehensive Plan 2040

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How does the MPO incorporate the FAST ACT?

The T2050 Plan addresses these Planning Factors by incorporating these into T2050's Goals and Objectives, and throughout the text of the Plan.



D. Legislative Requirements

In 2022, President Biden signed into law the [Infrastructure Investment and Jobs Act](#) (IIJA) also commonly known as the Bipartisan Infrastructure Law (BIL). This provides a comprehensive framework for transportation investment decisions for metropolitan areas. The transportation planning process must consider projects and strategies that address the following factors identified in the IIJA:

1. [Planning Factors](#)

1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
2. Increase the safety of the transportation system for motorized and non-motorized users;
3. Increase the security of the transportation system for motorized and non-motorized users;
4. Increase accessibility and mobility of people and freight;
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
7. Promote efficient system management and operation;
8. Emphasize the preservation of the existing transportation system;
9. Improve the resiliency and reliability of the transportation system and reduce or mitigate storm water impacts of surface transportation; and
10. Enhance travel and tourism.

Additionally US DOT has identified [planning emphasis areas](#): tackling the climate crisis, equity and [Justice40](#) in transportation planning, Complete Streets, virtual public involvement, Federal Land Management Agency (FLMA) Coordination, Planning and Environment Linkages (PEL) and data sharing in transportation planning.

2. [Environmental Justice \(EJ\)](#)

EJ provisions (Executive Order 12898) require agencies to take steps to identify and address disproportionately high and adverse impacts on minority and/or low-income populations through the development and implementation of T2050. Title VI of the 1964 Civil Rights Act requires that no person be excluded from participation in, denied benefits of, or be subjected to discrimination by any federal aid activity. An EJ profile review is found in [Chapter 2](#). Whenever possible data is delineated by EJ and non EJ area throughout [Chapter 2](#). [Chapter 7](#) includes a fuller EJ analysis.

E. **National and Community Identified Issues**

The planning process considered both national and community identified issues that impact transportation. National issues are noted in the sidebar. Many community issues were brought forth for consideration during the T2050 public involvement process including:

- Providing transportation choices (transit riding, biking, walking, and driving) that are comfortable for all ages, abilities, and all residents regardless of socioeconomic status.
- Enhancing transit service and amenities.
- Improving safety infrastructure for bicyclist and pedestrians.
- Improving travel times using intelligent transportation systems (ITS).
- Providing access and options for commuters within Lawrence, Douglas County, and other destinations.
- Planning for the efficient movement of freight.
- Utilizing environmental sensitive design when developing projects.
- Reducing reliance on fossil fuels.

These national trends and community identified issues guided plan development.



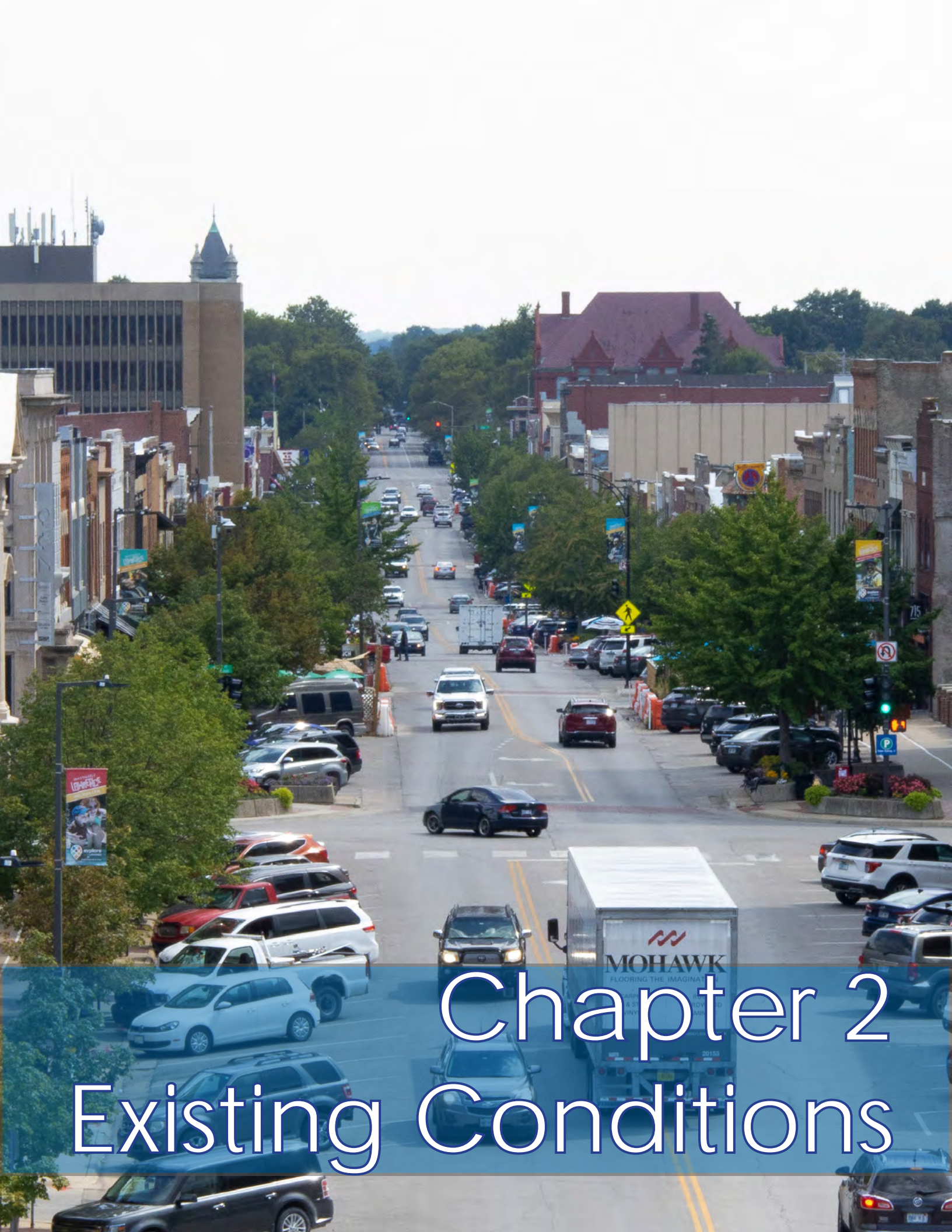
National Issues

- Fuel availability and price
- Alternative fuels and fuel efficiency
- Climate Change and air pollution
- Development of autonomous vehicles/self-driving cars
- Transportation needs for the aging population
- Safety and Transportation Equity for vulnerable users



What we heard:

"I would like to walk or cycle but the infrastructure is poor and prioritizes cars over people. I want protected bicycle lanes separated from traffic and pedestrian only areas/improved sidewalks."



Chapter 2

Existing Conditions



2. Existing Conditions

To assess transportation needs and develop this long range transportation plan, the following existing conditions have been assessed: existing and future projected land use, the natural environment, geographic and socioeconomic characteristics, and the existing multimodal transportation system. This chapter describes the relationship between these factors and overarching transportation planning considerations.

A. Land Use

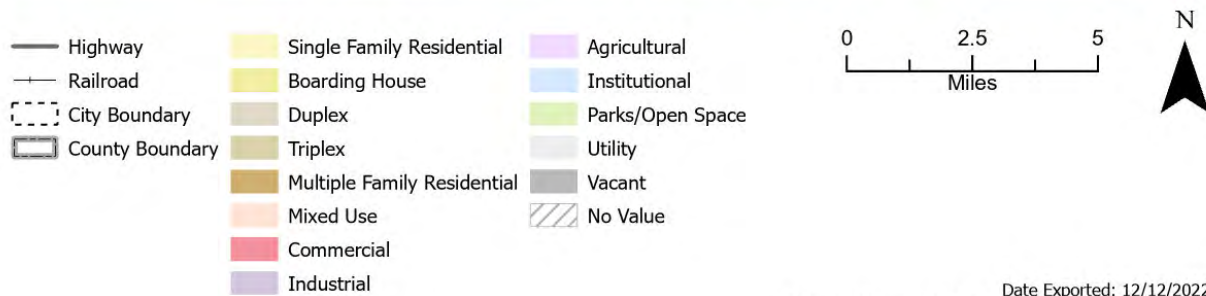
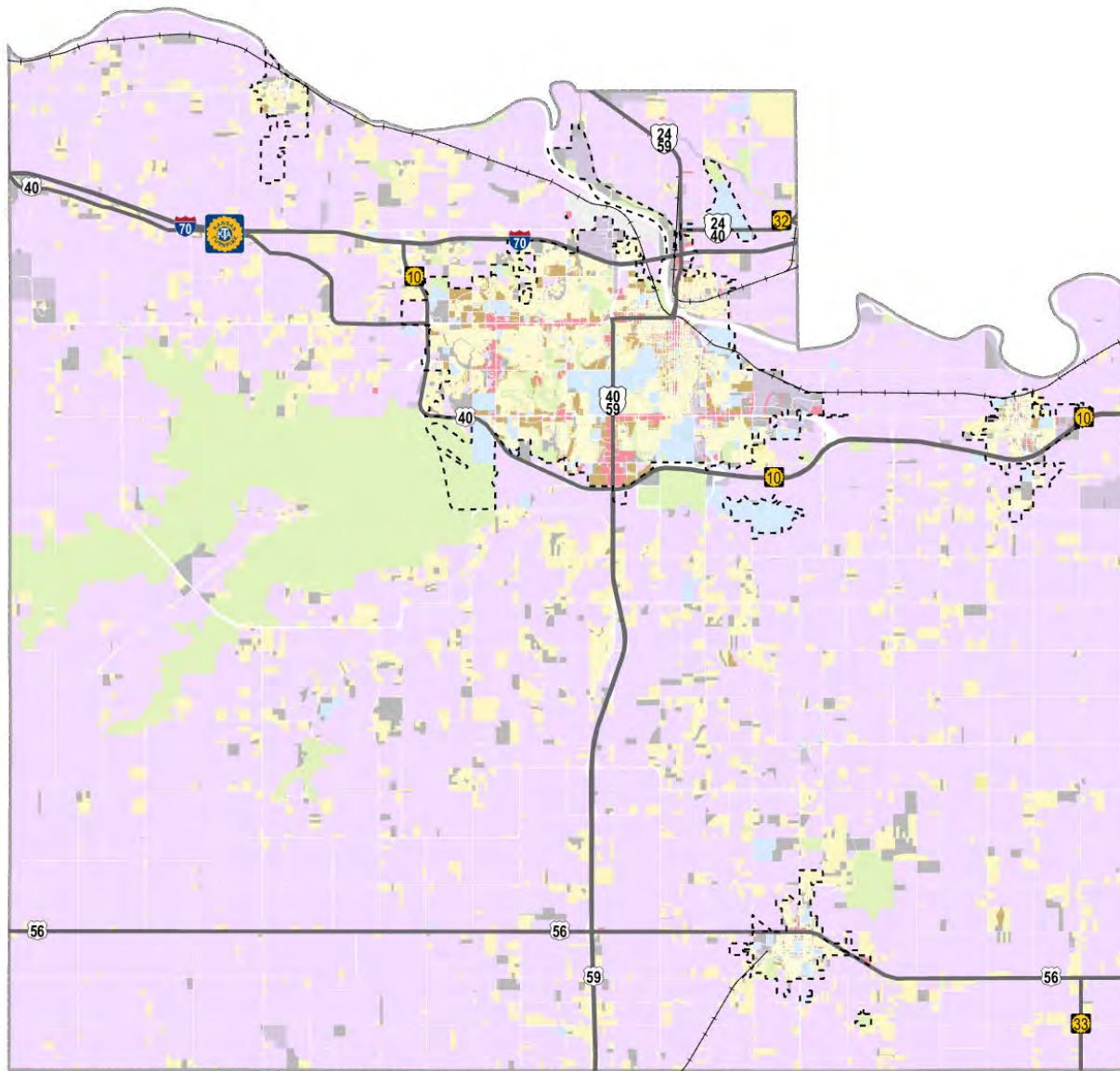
The land uses and development patterns that make up a region provide insight into the community's economic health, environmental awareness, and transportation requirements. With regard to planning and providing for transportation facilities and services, activities that occur in each of the various land uses across Lawrence and the County form the basis of travel demand through the trips they generate. The transportation system provides the means through which this demand is met, and as such is the mechanism through which commerce flows and personal mobility occurs. Expanded or new transportation facilities and services, accompanied with other types of expanded or new infrastructure, allow a community to grow into new areas as development occurs. Land use and transportation are inextricably linked. Existing land uses in the Douglas County, Lawrence, and Eudora are illustrated on Figures 2.1-2.3. As the figures suggest, the Lawrence city limits delineate the apparent boundary between the wider variety of land uses found within the city and the lower density residential and agricultural uses found in the unincorporated areas of Douglas County.



Source: City of Eudora



Figure 2.1: Douglas County Existing Land Uses

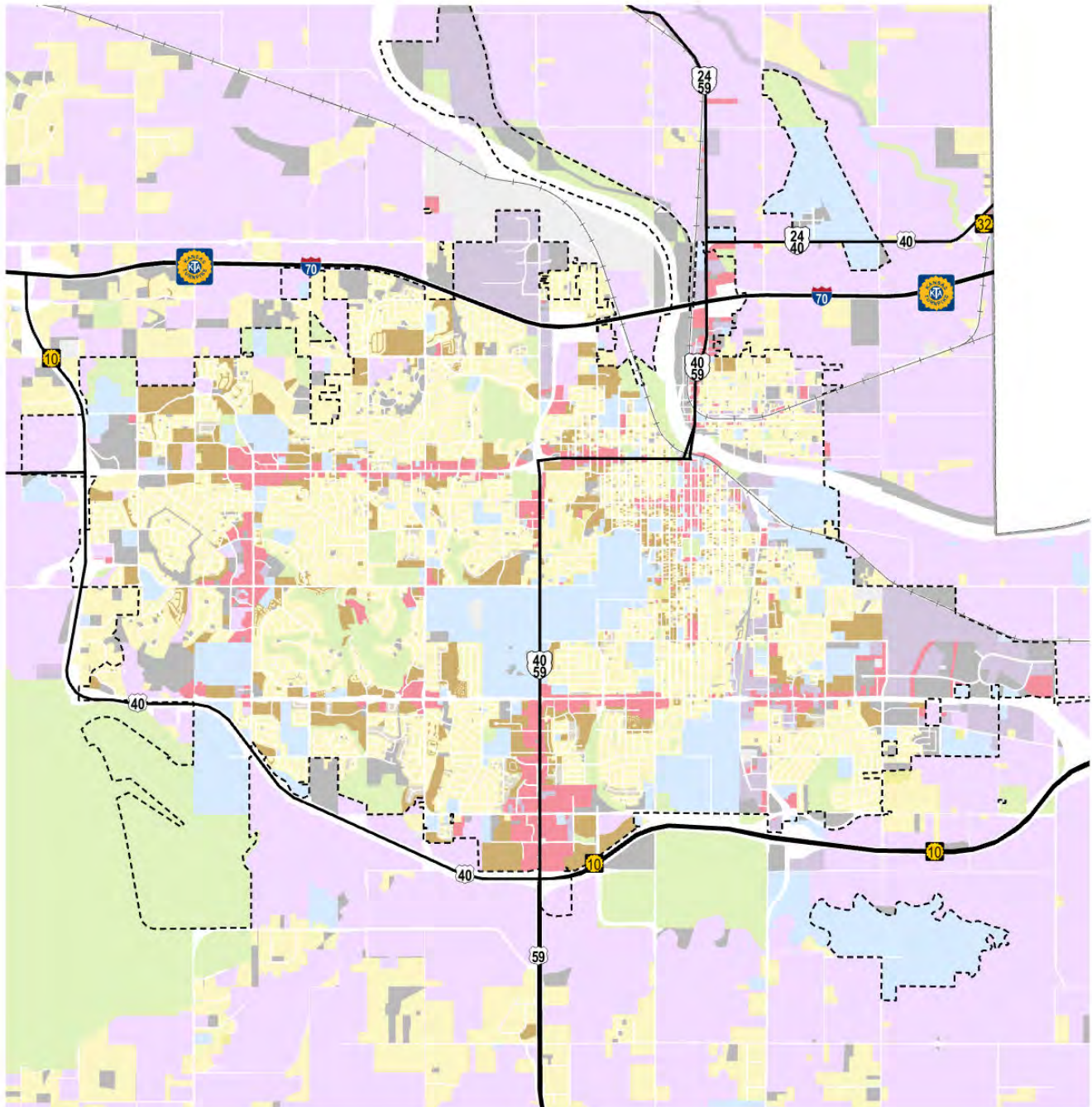


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Figure 2.2: Lawrence Existing Land Uses



- | | | |
|---------------------|-----------------------------|------------------|
| — Highway | Single Family Residential | Industrial |
| — Railroad | Boarding House | Agricultural |
| - - - City Boundary | Duplex | Institutional |
| ▭ County Boundary | Triplex | Parks/Open Space |
| | Multiple Family Residential | Utility |
| | Mixed Use | Vacant |
| | Commercial | ▨ No Value |

0 0.8 1.5
Miles

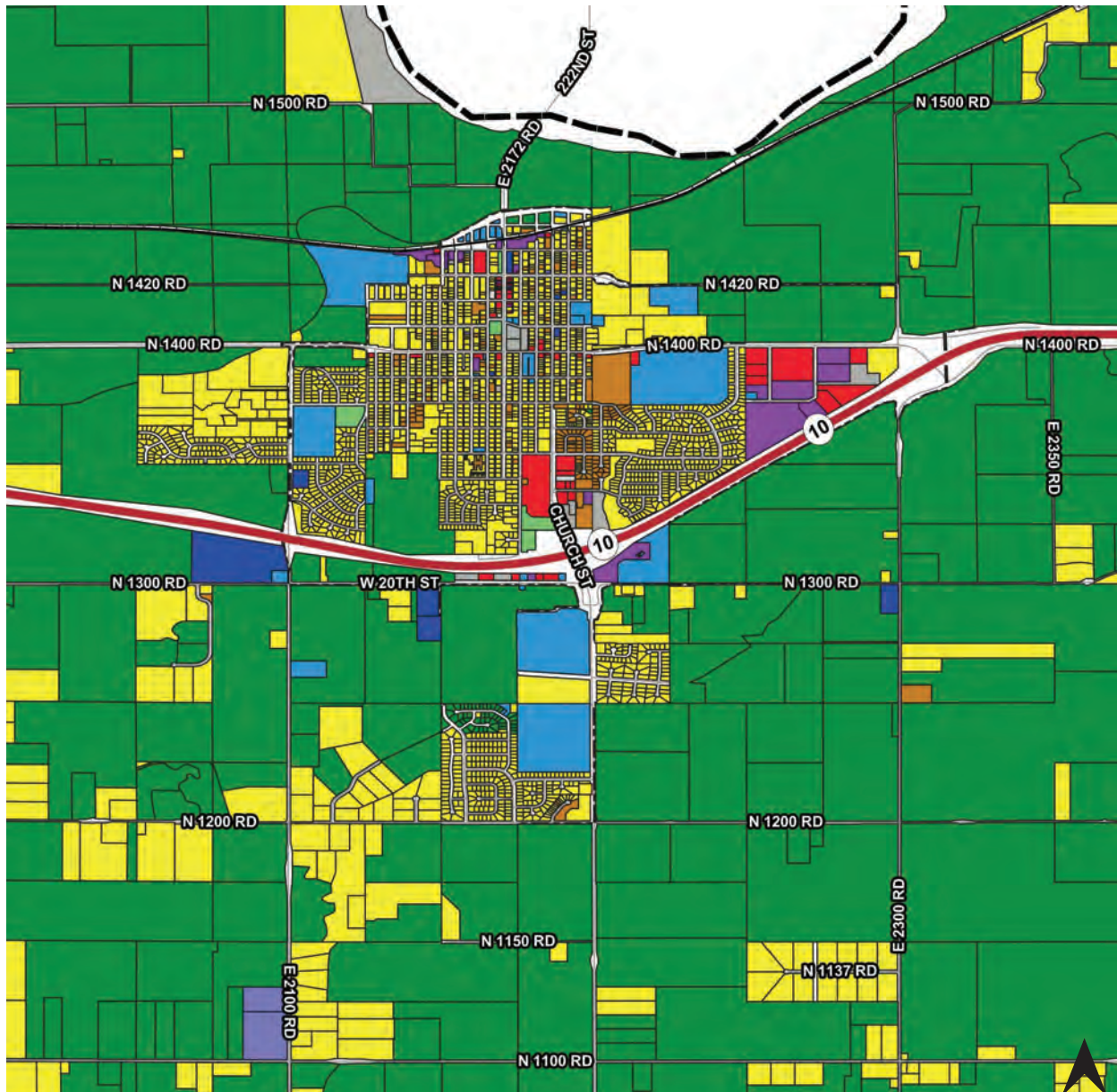
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Figure 2.3: Eudora Existing Land Uses



Legend

- Highway
- Road
- Railroad
- County
- City Limits

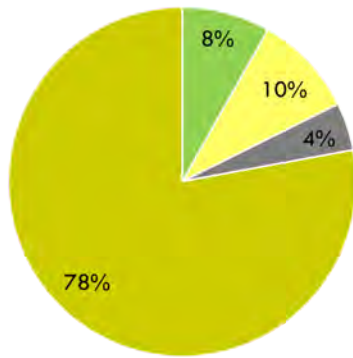
- Existing Land Use
- Single-family Residential
 - Multi-family/Mobile Homes
 - Commercial
 - Industrial
 - Institutional

- Transportation
- Gathering/Assembly
- Leisure
- Natural Resources
- Vacant/Unclassified

0 0.25 0.5 0.75 1 mi

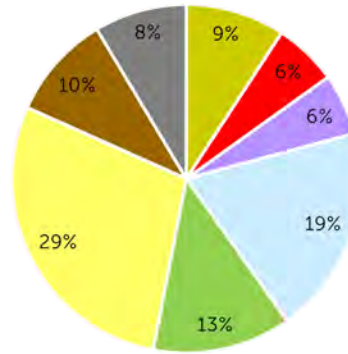


Figure 2.4: Unincorporated Douglas County Land Use Composition



- Agricultural
- Industrial
- Parks/Open Space
- Multiple Family Residential

Figure 2.5: Lawrence Land Use Composition



- Commercial
- Institutional
- Single Family Residential
- Vacant/Other

Source: Lawrence-Douglas County Metropolitan Planning Office (2021)



Performance Measures

21 - Density of Urban Area (people/square mile)

Low-density land use increases motor vehicle use and reduces the viability of other modes of travel. Therefore, transportation costs are reduced by promoting density.

	2019	2020	2021
Eudora	1,903	1,916	2,149
Lawrence	2,817	2,720	2,732

Source: Lawrence-Douglas County GIS (2022)

22 - Average Cost of Transportation per Household

Gas costs are only a fraction of total driving costs. Car maintenance and use combine for the true cost of car ownership.

Median Household Income: \$61,020
 15% of Income for Transportation = \$9,153

	Total Annual Transportation Costs	Annual Transportation Costs % Over Affordable
Lawrence	\$12,900	141%
Eudora	\$15,059	165%
Baldwin City	\$15,232	166%
Lecompton	\$16,868	184%
Douglas County	\$13,725	150%

Transportation costs are considered affordable if they are 15% or less of household income; This calculation used gas priced at \$3.80 and Regional Typical Household Characteristics.

Source: <https://htaindex.cnt.org/total-driving-costs>

Educational campuses are a major land use within the City of Lawrence including the 1,000 acre University of Kansas (KU) campus and the 293 acre Haskell Indian Nations University campus. KU's central location impacts the transportation network within Lawrence. Baker University is located in Baldwin City.

1. University of Kansas

The KU campus impedes east/west movement, as 15th Street does not connect through campus. Major events like KU basketball, football, and graduations lead to a large influx of traffic throughout Lawrence and around campus, which the transportation network must accommodate.

The [2014-2024 University of Kansas Campus Master Plan](#) sets out the vision for the KU campus. KU is in the beginning stages of developing its next Campus Master Plan, which should be completed in 2023.

KU was awarded a bronze level [Bicycle Friendly University](#) designation in 2016 by the American League of Bicyclists. Feedback from the League recommended KU adopt a [Complete Streets](#) or Bicycle Accommodation policy, expanding the bicycle network, increase high quality bicycle parking at popular destination, develop a comprehensive bicycle education program with a public safety awareness campaign, provide bicycle registration with campus police, host bicycle-themed events, and implement the bicycle master plan.



University Statistics

The University of Kansas - Lawrence Campus

Enrollment	23,958
Employment	10,689
Land Area	1,000 Acres

Haskell Indian Nations University

Enrollment	701
Employment	250
Land Area	293 Acres

Baker University - Baldwin City Campus

Enrollment	882
Employment	500
Land Area	56 Acres

Source: University of Kansas, Haskell Indian Nations University, Baker University Economic Development Corporation of Lawrence & Douglas County and Lawrence-Douglas County Planning Office





Historic Places in Douglas County

Currently 755 properties are designated or contributing properties in the National Register of Historic Places or in the Register of Historic Kansas Places in Douglas County.

Information on these properties may be found in the [Kansas Historic Resources Inventory](#).



The KU Bicycle Plan was completed in 2016. The plan is designed to address the following goals:

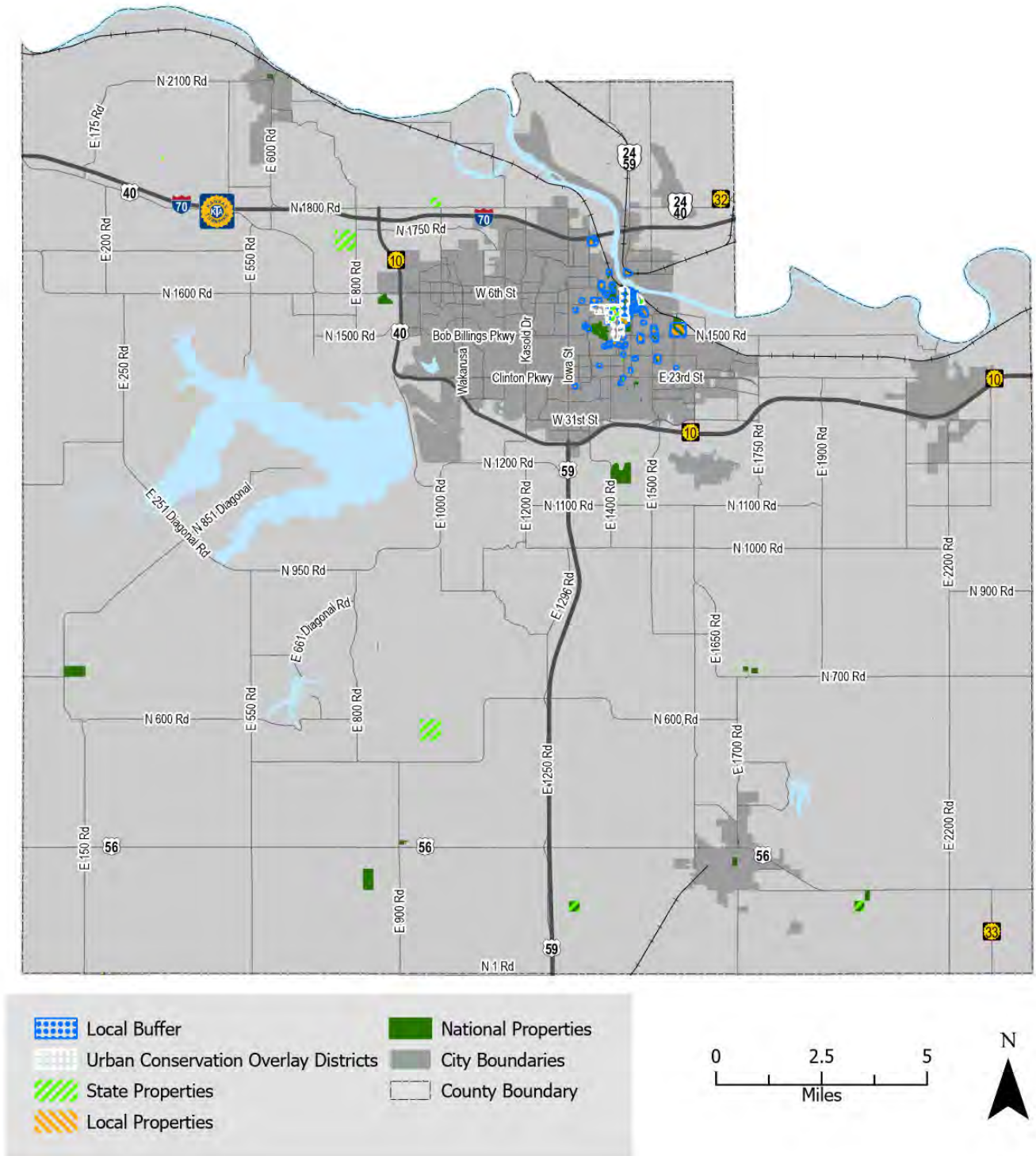
- Enhance the bikeway network linking residential, academic, and recreational destinations on campus and in the community
- Promote a safe, healthy campus environment
- Increase the percentage of bicycle and pedestrian users on campus through the implementation of new policies, programs, and infrastructure
- Improve coordination with the City of Lawrence and create seamless transitions between university and city bicycle infrastructure and routes
- Create movement uphill by identifying policy, program, and infrastructure solutions that encourage people to overcome the real and perceived barrier of steep routes to campus.

B. Historic and Environmental Characteristics

Lawrence and Douglas County strive to balance the needs of a vibrant economy, an equitable society, and a healthy environment. There are important cultural and environmental aspects that enrich the vibrancy of Douglas County and define the urban form. These include historic resources and in the City of Lawrence context areas to protect the environment of the historic properties (Figure 2.6). Over 7,200 properties have been surveyed in Douglas County to document historic resources. The properties include buildings, sites, structures, and objects. Buildings include: houses, barns, theaters, gas stations, and warehouses. Sites include: designed landscapes (parks and gardens) and locations of important events (cemeteries and battlefields). Structures include bridges and dams and objects include fountains, brick sidewalks, and brick streets.

Floodplains, wetlands, and other environmentally [sensitive areas](#) should be reviewed as a part of project development. Figure 2.7 displays the environmentally sensitive areas. Due to the Wakarusa and Kansas Rivers there are several flood plain areas. As part of the Kansas Department of Agriculture Division of Water Resources statewide floodplain mapping initiative, the Lower Kansas Custom Watershed is in the process of being remapped.

Figure 2.6: Historic Environs

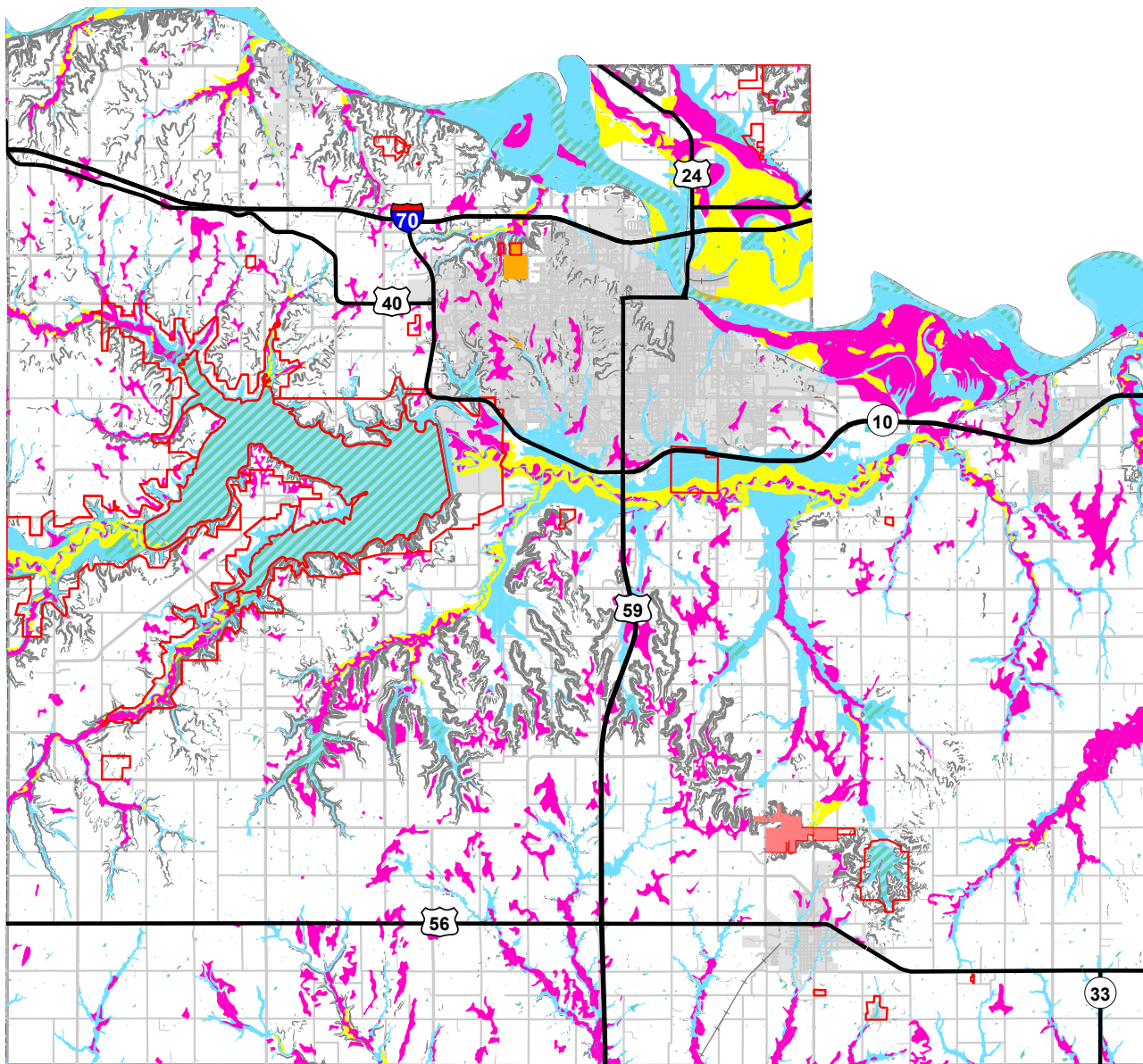


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Figure 2.7: Floodplains, Wetlands, and Other Environmentally Sensitive Areas



- | | |
|-------------------------------|---------------|
| Baldwin Woods Forest Preserve | Highway |
| Protected Areas | Railroads |
| Water Bodies | City Limits |
| Wetlands | County Limits |
| 100 Year Flood Plain | |
| Class 1 | |
| Class 2 | |
| Conservation Easement | |
| Slope 15%+ | |

0 2.5 5 Miles



Date Exported: 1/19/2022
 Source: Kansas Alliance For Wetlands And Streams
 Research Team and FEMA Flood Maps 2015
 Produced: Lawrence-Douglas County MPO

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As part of this process, Douglas County has identified locations for further study throughout the county where heavy rains have caused instances of road flooding, bridge infrastructure impacts, and property damage. Once updated, these maps will help identify areas where additional infrastructure improvements may be needed.

There are two categories of soils delineated: Class 1: Soils in this class are best suited for cultivated crops, pasture, range, woodland, and wildlife. They are deep, generally well drained, easily worked, and less prone to erosion. Class 2: They require careful management to prevent deterioration or to improve air and water relations when cultivated. The limitations are few and the necessary management is easy to apply. The soils may be used for cultivated crops, pasture, range, woodland, or wildlife food and cover. A conservation easement is a legally binding agreement limiting allowable actions to protect the property’s ecological or open-space values. It can be executed in many forms with a variety of permissions and restrictions.

The Kansas Department of Wildlife, Parks, and Tourism identifies Threatened and Endangered Species for each Kansas County (Table 2.1). The Douglas County list includes 7 endangered species and 10 threatened species on the State list and 5 endangered, 1 threatened, and 2 candidate species on the Federal list.

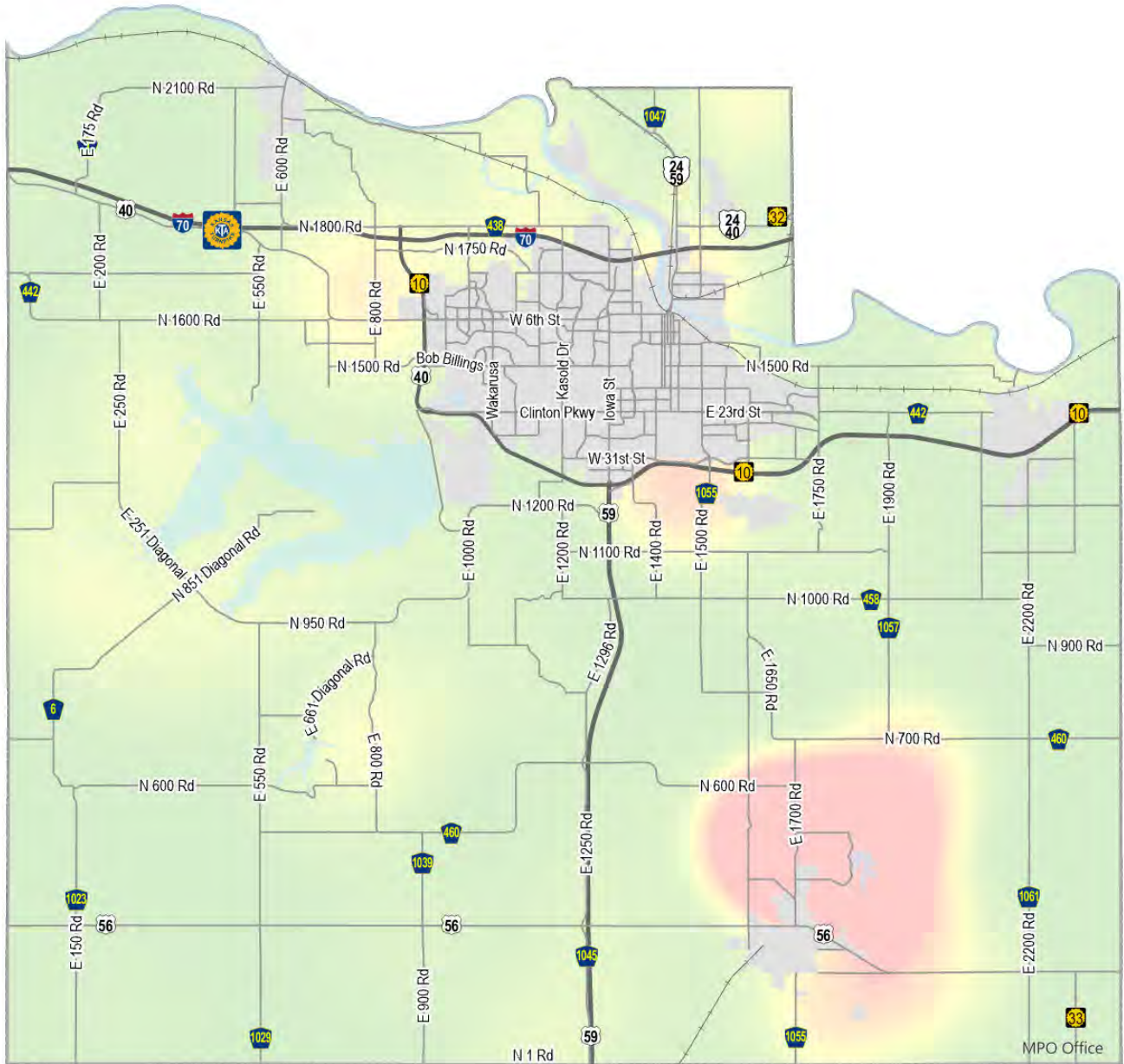


Table 2.1: Douglas County Threatened and Endangered Species

Name	State	Federal	Critical Habitat
Mucket Mussel	Endangered	N/A	Yes
Sturgeon Chub	Threatened	Candidate	Yes
Shoal Chub	Threatened	N/A	Yes
Plains Minnow	Threatened	N/A	Yes
Flathead Chub	Threatened	N/A	Yes
Silver Chub	Endangered	N/A	Yes
Least Tern	Endangered	Endangered	Yes
Piping Plover	Threatened	Threatened	Yes
Pallid Sturgeon	Endangered	Endangered	No
Sicklefin Chub	Endangered	Candidate	No
Western Silvery Minnow	Threatened	N/A	No
Topeka Shiner	Threatened	Endangered	No
Hornyhead Chub	Threatened	N/A	No
Whooping Crane	Endangered	Endangered	No
Snowy Plover	Threatened	N/A	No
Eastern Spotted Skunk	Threatened	N/A	No
American Burying Beetle	Endangered	Endangered	No

Source: Kansas Department of Wildlife, Parks and Tourism (2022)

Figure 2.8: Threatened and Endangered Species Heat Map



Threatened and Endangered Species
 High Intensity
 Low Intensity

Railroads
 Water Bodies
 City Limits
 County Limits
 Freeways
 Major roads

0 2.5 5 Miles



Date Exported: 12/27/2022
 Source: Kansas Alliance For Wetlands And
 Streams Research Team and Plan 2040
 Produced: Lawrence-Douglas County MPO

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Furthermore, 8 species have critical habitat, while 9 do not. Transportation projects need to mitigate impact on threatened and endangered species.

Sensitive lands are part of the natural environment that provide habitat for wildlife, endangered ecosystems, or present unique settings that are rare in Douglas County. By protecting these designated spaces we can protect natural habitats, provide recreation areas, help minimize development impacts in sensitive areas, and maintain economic and quality of life benefits.



Air pollution has a profound impact on the environment and leads to water and soil contamination, community health impacts, and contributes to adding greenhouse gases to the environment. The Environmental Protection Agency (EPA) sets National Ambient Air Quality Standards (NAAQS) for six classes of pollutants, which are monitored by the Kansas Department of Health and Environment (KDHE). While there is no KDHE air quality monitor in the County, the monitor in Leavenworth acts as the county's proxy.

Douglas County is currently in attainment for National Ambient Air Quality Standards. Ground level ozone (O₃) levels are one area of potential concern for the region based on data from the Kansas City region. While ozone levels there have trended downward over the last 20 years, the EPA standards have also become more stringent. The current standard is 70 parts per billion (ppb) with a violation occurring when the three-year average is 71 ppb or higher. Data reported by MARC in figure 2.9 shows the Kansas City region has been in attainment in recent years by a small margin.



Sensitive Lands

Sensitive Lands are part of the natural environment that provide habitat for wildlife, endangered ecosystems, or present unique settings that are rare in Douglas County. By protecting these designated spaces we can protect natural habitats, provide recreation areas, and help minimize development impacts in sensitive areas. Sensitive lands include:

- Endangered Species Habitats
- Floodway and Floodplain
- High Quality Agricultural Soils
- Native Prairies
- Rural Woodlands and Urban Forests
- Steep Slopes
- Wetlands and Stream Corridors

Source: Plan 2040



Performance Measure

24 - Percentage of Sensitive Lands

Douglas County Sensitive Lands Allocated to Rights-of-Way

4.8%

Source: Lawrence GIS (2021)



National Ambient Air Quality Standards

The EPA sets National Ambient Air Quality Standards for pollutants considered harmful to public health and environment:

- Carbon Monoxide
- Lead
- Nitrogen Dioxide
- Ozone
- Particle Pollution
- Sulfur Dioxide

Source: Environmental Protection Agency



Air Quality Forecasts

[SkyCast](#) is a forecast for air quality in the Kansas City region. If ground-level ozone levels are expected to reach unhealthy levels, the MARC Air Quality Program will release an Ozone Alert containing advice for protective measures and actions that reduce pollution. Factors that impact air quality are upwind air quality and a variety of weather conditions like temperature, cloud cover, wind speed and direction, and ceiling height.

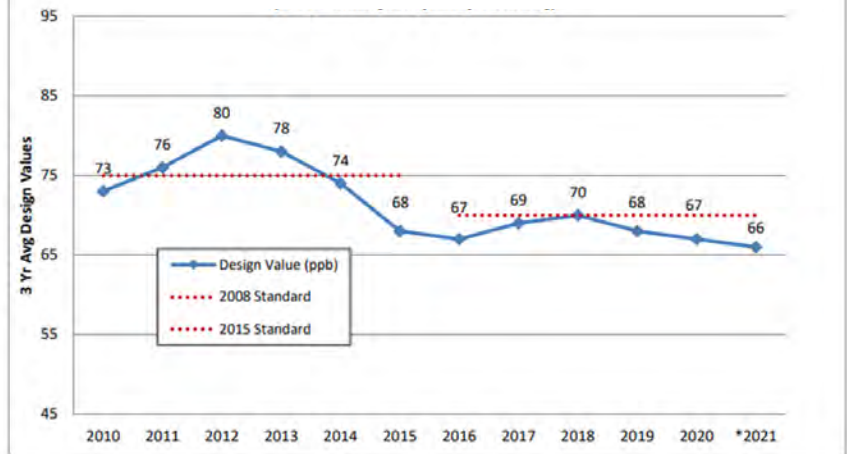


What is a Traffic Analysis Zone (TAZ)?

A traffic analysis zone is a geographic area used in planning models. Zones are constructed using Census block group information, population projections and they are tied to the transportation network. They provide a way to assign trips (origins and destinations) to a spatial area in the model.

The design of a sustainable multimodal transportation system can foster and encourage healthy lifestyle options. Transportation projects should work to minimize adverse social, economic, and environmental impacts created by the transportation system.

Figure 2.9: Mid-America Regional Council Ozone Reporting 2010-2021*



*2021 data not quality assured

C. Socioeconomic Characteristics

1. Population Profile

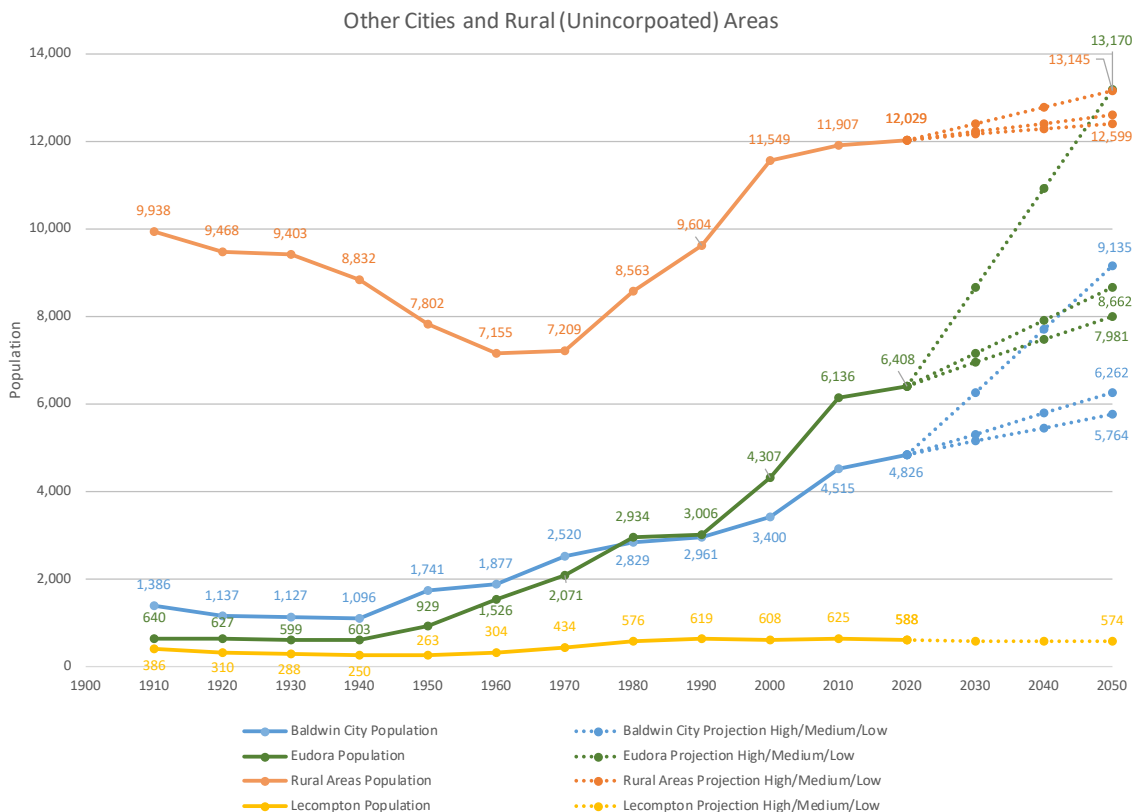
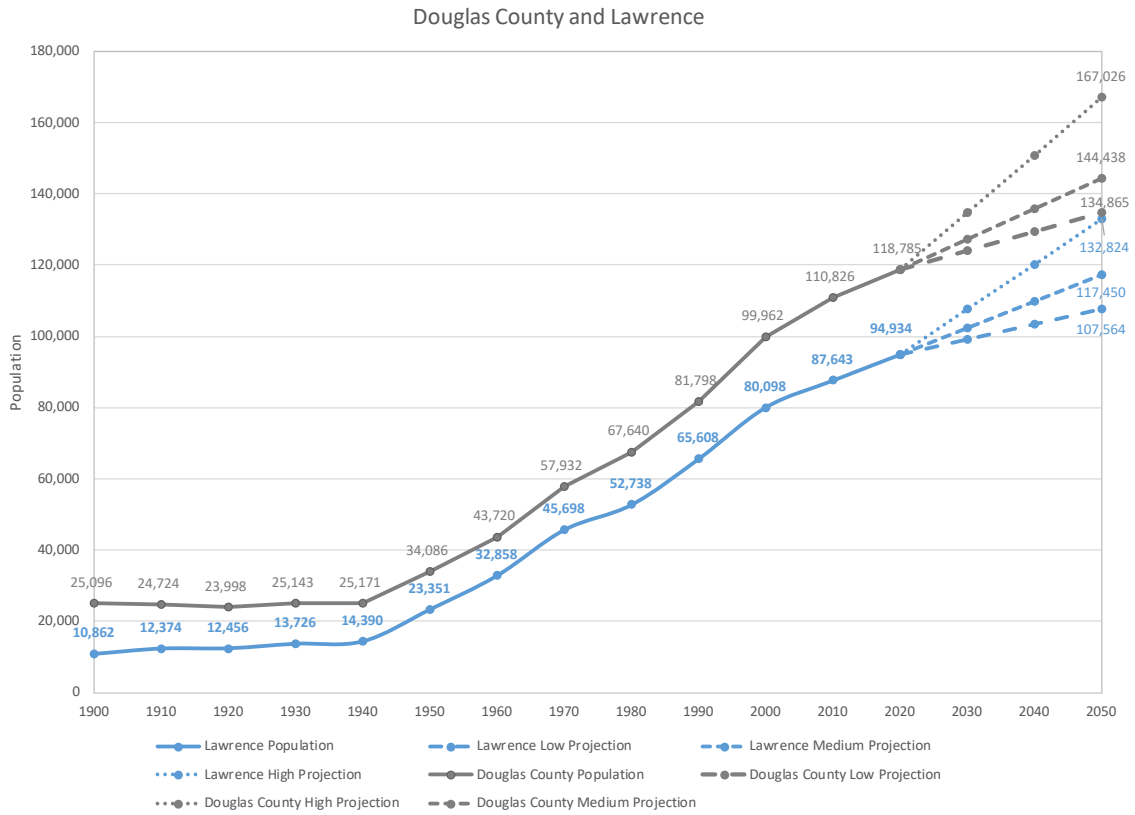
Since 1970, the City of Lawrence has historically made up roughly 80% of the total population for all of Douglas County, unincorporated parts of Douglas County have made up 11%, Eudora has made up 6%, Baldwin City has made up 4% and Lecompton has made up 1% of the total population. As shown in Figure 2.10, the highest population growth (shown in green) has occurred in Eudora and western Lawrence, which is to be expected based on development patterns. Furthermore, Eudora became a second class city under Kansas Statutes in 2010 when their population rose above 5,000.

2. Population Forecasts

Population forecasts were developed using a spatial model. The model uses several factors including Traffic Analysis Zones (TAZ) from the Travel Demand Model, growth curves, building permits, life cycle changes (births, deaths, migration), future land use plans, servable areas (utilities, fire, police), and Plan 2040's defined Urban Growth Area Boundary. Based on the model, population

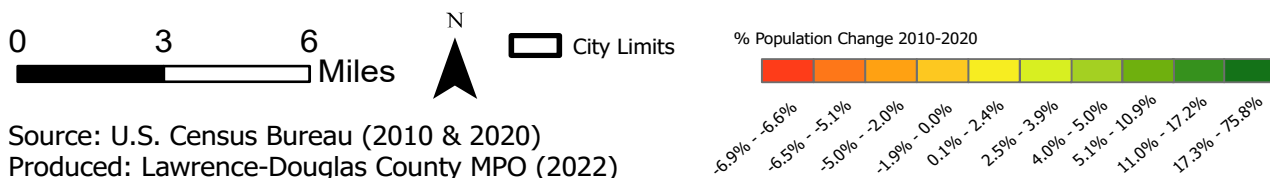
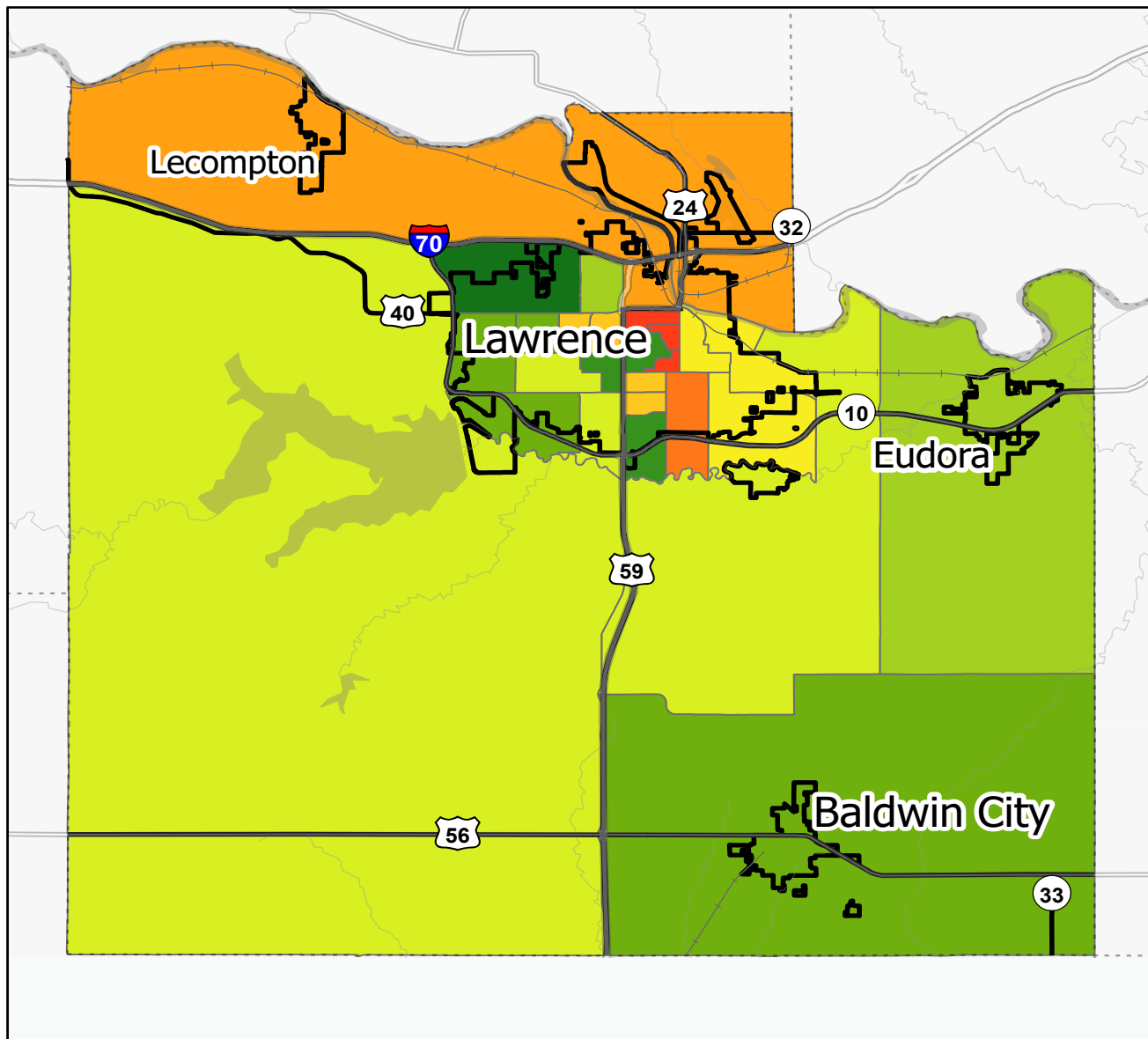
projections for 2030, 2040, and 2050 considering historic patterns up to 2020 were developed. Figure 2.10 displays the historic and population projections and Figure 2.11 shows population change from 2010-2020.

Figure 2.10: Historic and Population Forecasts



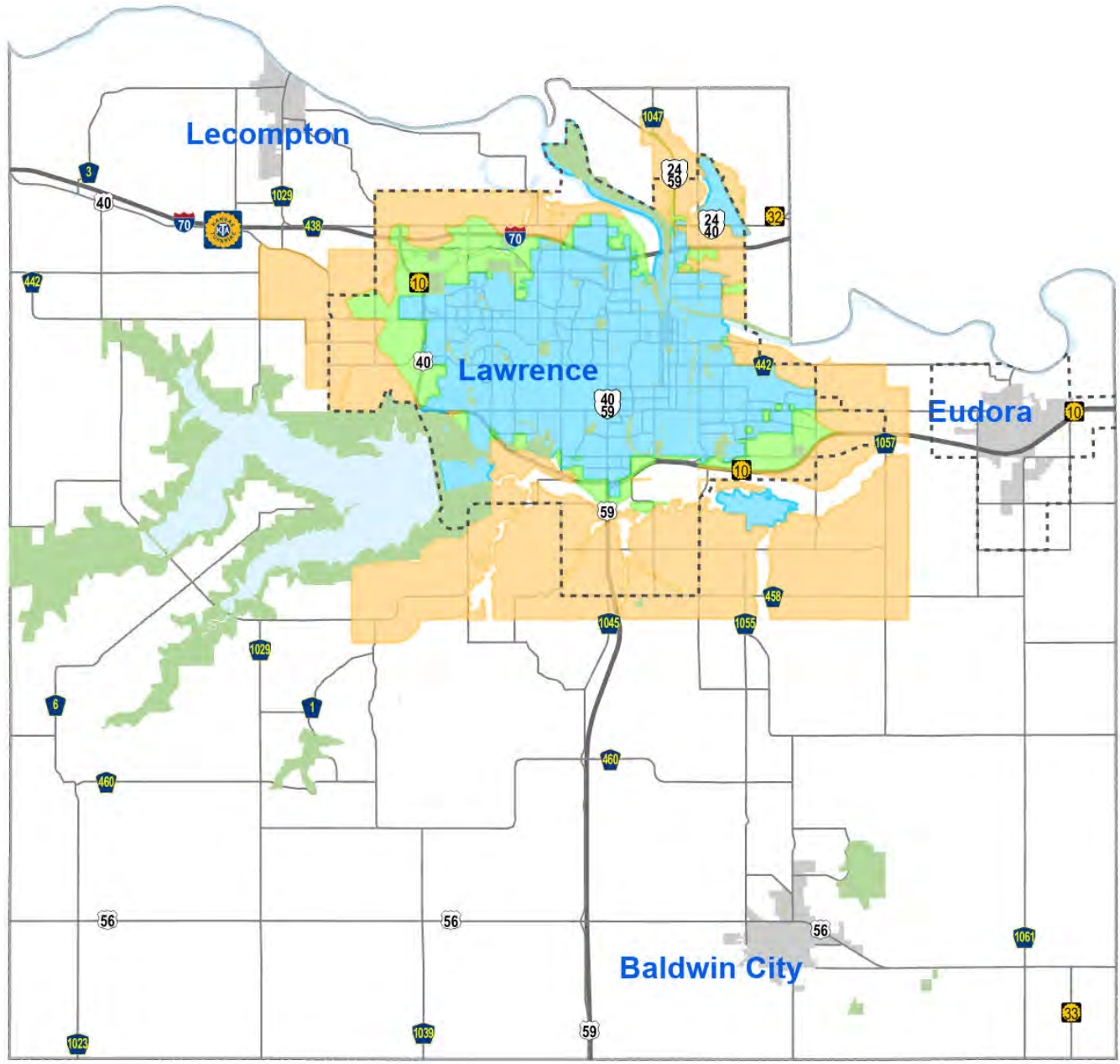
Source: U.S. Census Bureau and Lawrence Planning and Development Services (2022 projections)

Figure 2.11: Population Change (2010 to 2020)



Source: U.S. Census Bureau (2010 & 2020)
 Produced: Lawrence-Douglas County MPO (2022)

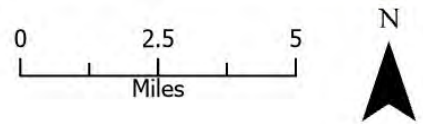
Figure 2.12: Plan 2050 Population Growth Tiers



Plan 2040 Growth Tiers

- Tier 1 (Current Boundary)
- Tier 2
- Tier 3

- FHWA Adjusted Urban
- City Boundaries (non-Lawrence)
- County Boundary
- Parks
- Water Bodies

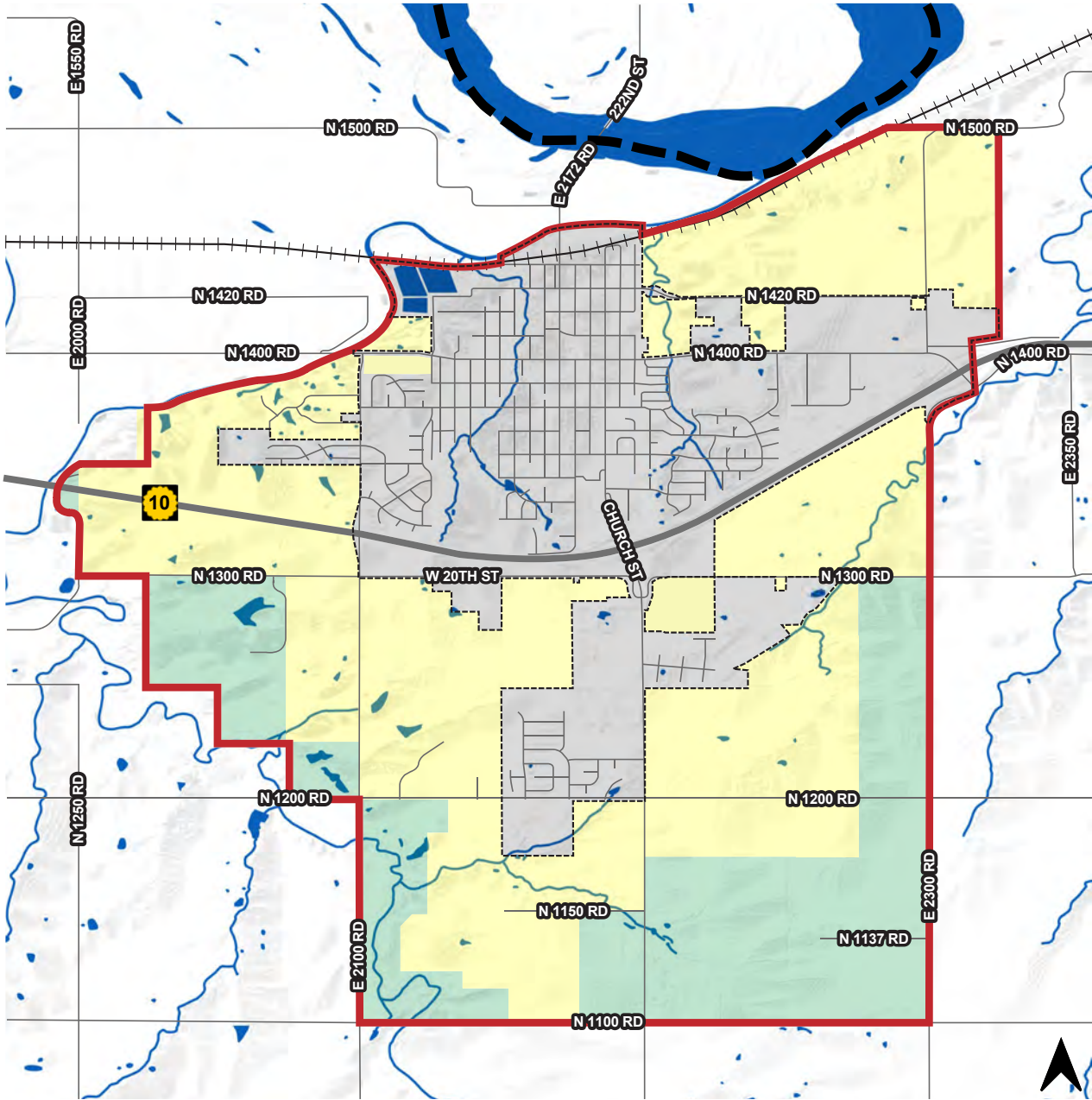


Date Exported: 1/6/2023
 Source: Plan 2040 and 2013 FHWA Adjusted Boundaries
 Produced: Lawrence-Douglas County MPO

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Figure 2.13: Eudora Comprehensive Plan Growth Tiers



Legend

- | | | | |
|---|---------------|---|--------------|
|  | Tier 1 |  | Railroad |
|  | Tier 2 |  | Street |
|  | Urban Reserve |  | Highway |
|  | UGA Limit |  | City Limit |
| | |  | County Limit |

0 0.25 0.5 0.75 1 mi



Figure 2.12 displays the Plan 2040 population growth tiers. Tier 1 is within the Lawrence city limits and is readily serviceable with utilities (water, sewer, storm water) with minor system enhancements. It is also serviceable by fire with current infrastructure. Tier 2 is within Lawrence’s [Urban Growth Area](#) and requires annexation. It is readily serviceable with utilities and minor system enhancements necessary for development. It is also serviceable by fire with current infrastructure. Tier 3 is the Future Lawrence Growth Area. It is located within Lawrence’s Urban Growth Area and requires annexation. Major utility system enhancements are necessary for development and requires investment in fire infrastructure and personnel. It is not expected to receive urban development by 2040.

Similar to Plan 2040, the Eudora Comprehensive Plan identifies growth tiers as shown in Figure 2.13. Tier 1 is prioritized for development at any time and is readily serviceable by utilities with minor system enhancements. Tier 2 is land to be annexed to accommodate demand and is readily serviceable by utilities with minor system enhancements or system expansion necessary for development. Urban Reserve is not designated to be annexed prior to 2040 and requires major utility system enhancements, expansions, or extensions.



3. Employment Profile

Educational institutions are the primary employers within Douglas County. The largest employer in the county is the University of Kansas, which has an impact on this transportation plan. Table 2.2 shows the largest employers within Douglas County.

Table 2.2: Largest Employers (250+ Employees)

Employer	Employees	% Change From 2017	Employer	Employees	% Change From 2017
The University of Kansas	10116	2%	Baker University	500	1%
Maximus	2100	n/a	SS&C Technologies	405	3%
Lawrence Public Schools	1800	0%	Douglas County	384	-12%
Lawrence Memorial Hospital	1450	10%	USA 800	300	n/a
City of Lawrence	1407	-3%	DCCCA	295	0%
Hallmark Cards, Inc.	900	71%	Allen Press	265	-4%
Amarr Entrematic	800	74%	Haskell Indian Nations University	250	0%
Berry Global	750	1%			

Source: Economic Development Corporation of Lawrence & Douglas County, City of Lawrence, USD 497



Environmental Justice (EJ)

Environmental Justice policy is defined in Executive Order 12898 that was signed by President Clinton on February 11, 1994.



What is a Travel Demand Model?

A travel demand model uses roadway networks, population and employment data to calculate expected demand for future roadway networks. The model outputs a map of the roadway network with forecasted traffic volumes for each segment.



What is an Environmental Justice (EJ) Zone?

Environmental Justice Zones are geographical areas identified within our community that represent a higher percentage of low/moderate income or high minority populations.

4. Employment Assumptions

Employment opportunities in Lawrence and Douglas County are diverse. Different types of businesses generate different types and amounts of travel. The employment data was updated for the Travel Demand Model based on the current best sources from the employment data was updated for the Travel Demand Model based on the current best sources from the Longitudinal Employer-Household Dynamics (LEHD)/LEHD Origin-Destination Employment Statistics (LODES) and local employment data. A map of forecasted employment by TAZ is shown in [Chapter 6](#).



Source: City of Eudora

D. Environmental Justice (EJ) Review Profile

The Environmental Protection Agency (EPA) defines [Environmental Justice](#) as the “fair treatment for people of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and policies.” EJ is a federal requirement that projects using federal funds be selected and distributed fairly to all people regardless of income or race and that all people have equal access to the benefits afforded by federally

To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.

To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

funded projects as well as equal access to the decision-making process for the selection of those federal projects. This concept is conveyed in the three Environmental Justice Principles shown on the previous page and are incorporated into plan development. The methodology the MPO used to define the target populations is detailed below. The MPO public participation process is detailed in [Chapter 3](#). The MPO analysis of EJ distribution, impacts, and process can be found in [Chapter 5](#).

1. Methodology

In response to EJ regulations the MPO defined target populations and thresholds to assess the impact of transportation planning.

a. Define Target Populations and Thresholds

Low-income and minority populations were identified in the MPO area. This is done by utilizing Census tracts and 2016-2020 American Community Survey (ACS) 5-year estimate data. Tracts are determined to meet the EJ threshold if they meet either of the criteria listed below.

Low/Moderate Household Income Population, by 2020 Census Tracts

The threshold for low/moderate household income was 50 percent or more of the population residing in households earning less than 80 percent of the area's median income. The City of Lawrence Community Development Division currently uses HUD identified areas within the community that have higher concentrations of low and moderate income residents. Community Development Block Grant (CDBG) funds are targeted toward low/moderate household income areas.

135% of the Mean Minority Population, by 2020 Census Tracts

The US Census Bureau collects demographic data for race and ethnicity. The majority race in this region is White/Caucasian and the other races, as well as those of Hispanic or Latino origin, collectively are considered as the minority group population for this EJ analysis.

Census Block Group data indicates 22.6% of Douglas County belongs to a minority population. A threshold



What is the American Community Survey (ACS)?

The American Community Survey is an on-going survey taking place of the old long-form Census. It includes basic demographics as well as detailed questions about population and housing characteristics.



Source: Adobe Stock



Demographics of Douglas County & Lawrence

Median Household Income

Douglas Co.	\$61,020
Lawrence	\$55,598

Housing Tenure

Douglas Co.	Own: 51% / Rent: 49%
Lawrence	Own: 45% / Rent: 55%

Persons in Poverty

Douglas Co.	11.8%
Lawrence	18.8%

Educational Attainment

High School graduate or higher	
Douglas Co.	95.5%
Lawrence	95.5%

Median Housing Value

Douglas Co.	\$212,000
Lawrence	\$204,800

Demographics of Douglas County & Lawrence (continued)

Race and Hispanic Origin

White alone	
Douglas Co.	83.4%
Lawrence	78.7%
Black/African American alone	
Douglas Co.	4.7%
Lawrence	5.1%
White alone	
Douglas Co.	83.4%
Lawrence	78.7%
Black/African American alone	
Douglas Co.	4.7%
Lawrence	5.1%
American Indian/Alaskan Native alone	
Douglas Co.	2.7%
Lawrence	2.4%
Asian alone	
Douglas Co.	5.0%
Lawrence	6.5%
Native Hawaiian/Other Pacific Islander alone	
Douglas Co.	0.1%
Lawrence	<0.1%
Two or more races:	
Douglas Co.	4.2%
Lawrence	6.0%
Hispanic or Latino	
Douglas Co.	6.5%
Lawrence	6.7%
White Alone, not Hispanic or Latino	
Douglas Co.	78.1%
Lawrence	75.0%

Source: U.S. Census Bureau 2016-2020 ACS 5-year estimates

of 135% of the county average is used to assess Block Groups with high concentrations of minority populations. 135% of 22.6% is 30.5%, meaning Block Groups that exceed 30.5% minority population are classified as EJ zones. The EJ zones are mapped in Figure 2.14. Approximately 42% of all Douglas County households are within EJ zones. EJ zones are mostly located within the City of Lawrence except for a sparsely populated area of unincorporated Douglas County just south of Lawrence that is included due to census boundaries.

E. Considering People with Transportation Disadvantage

Similar to Environmental Justice (EJ) review, evaluating transportation disadvantage provides a data driven approach to understanding distribution of transportation networks, services, and projects. Transportation disadvantage builds upon the approach of EJ but includes additional criteria. This data provides opportunities to create choices in where people live and how people travel for all residents, across age, race and ethnicity, economic means, and ability.

People who are transportation disadvantaged experience challenges achieving basic access to services, employment, and/or education. Not only do socio-demographic characteristics factor into being transportation disadvantaged, but also where people live and what travel options are available to them.

Methodology

An analysis was conducted for Transportation Disadvantaged Populations using several census data sets. These population characteristics include:

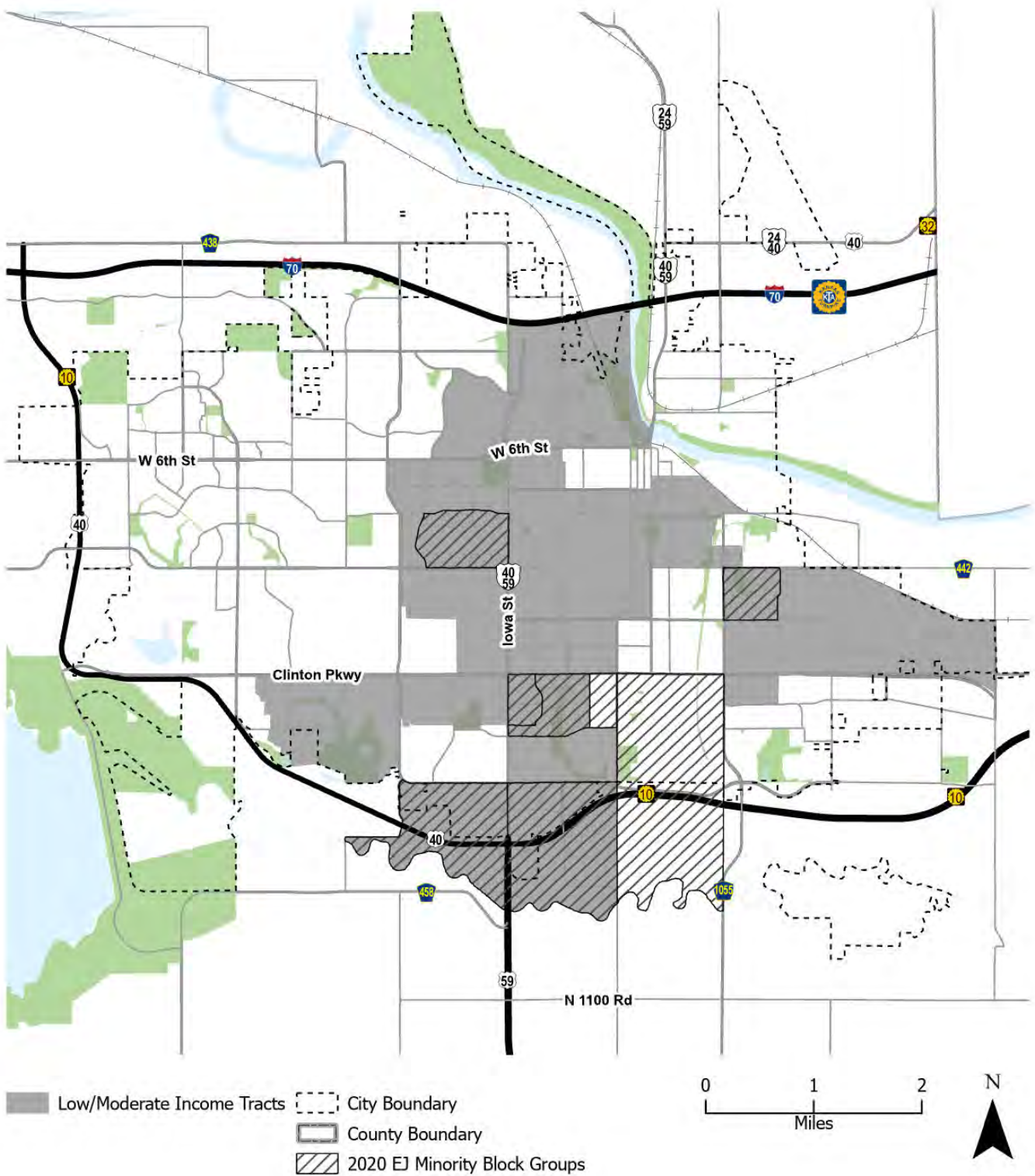
Low-moderate income households

People who have low-moderate income may not have the resources to own/maintain a personal vehicle, which on average costs \$6,060 – \$8,743 per year, and need to rely on public transit or others to provide rides. (AAA, 2019)

Minorities

There is a link between ethnicity and pedestrian deaths. Minority populations are less likely to own a vehicle and more likely to walk, bicycle and/or use public transportation, resulting in greater exposure to the dangers of the street. (Surface Transportation Policy Project, 2002)

Figure 2.14: Environmental Justice Zones



Date Exported: 12/12/2022

Source: 2018 ACS Data 5 year est. B02001 and CDBG 2019

Produced: Lawrence-Douglas County MPO

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Households with an individual with a mobility disability

There is a legacy of infrastructure and systems that do not accommodate people with impaired mobility, thus causing people to have to expend more energy, time, and money to access services. (Natural Resources Services – A Division of Redwood Community Action Agency, 2006)

People who have less than a high school education

Having less than a high school education is linked to a variety of negative health impacts, including limited employment prospects, low wages, and poverty. (Office of Disease Prevention and Health Promotion, 2020).

Single parent households

Single parent households typically earn significantly less than two parent households and children in single parent households are more likely to live in poverty. Further, 33% of single parent families in 2013 were “food insecure”. (The rise of single parent households, 2019).

Households without vehicles

When people do not have a personal vehicle they must walk, bicycle, use public transportation, or obtain a ride from others. This puts people in potential conflict with auto drivers unless the proper infrastructure is provided. In Douglas County, 6% of households have no vehicles.

Youth (under 18) and Senior citizens (65+)

One of the most significant non-driving populations are those who are too young to be licensed to drive. Even being old enough to obtain a driver’s license does not guarantee access to a vehicle, especially for youth from low-income families. Low-income children face an increased exposure to many risk factors since affordable housing is often located along high-speed, high-volume streets, in neighborhoods that lack parks, playgrounds and access to other safe places to play. The number of people over 65 is continually growing. Alternatives to driving are necessary for seniors as they lose the ability to drive due to either sight or mobility losses. (Natural Resources Services – A Division of Redwood Community Action Agency, 2006)

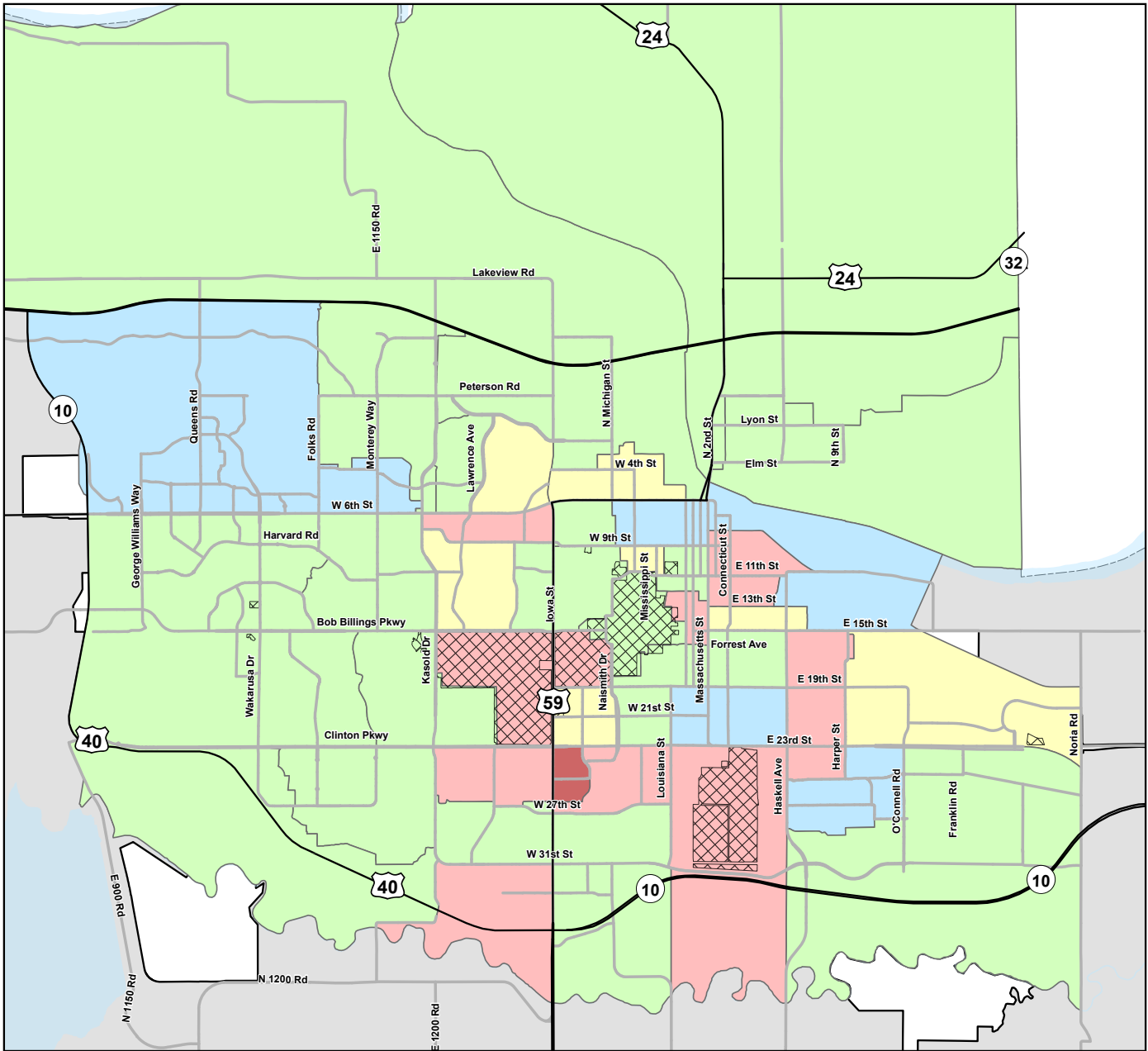
In Table 2.3 and Figure 2.15, the low-moderate income data is from the U.S. Department of Housing and Urban Development’s Community Development Block Grant (HUD’s CDBG) 2015

Table 2.3: Lawrence Transportation Disadvantaged Population Scoring Table

Topic	Lawrence Average	1 Point	2 Points	3 Points
Low-moderate CDBG income		51.0% to 62.4%	62.5% to 78.9%	Greater than 79.0%
Minority	14.7%	14.7% to 34.6%	34.7% to 54.6%	Greater than 54.7%
Households with an individual with a mobility disability	19.7%	19.7% to 39.6%	39.7% to 59.6%	Greater than 59.7%
Less than high school diploma	4.6%	4.6% to 24.5%	24.6% to 44.5%	Greater than 44.6%
Single parent household	32.0%	32.0% to 51.9%	52.0% to 71.9%	Greater than 72.0%
Households without vehicles	7.6%	7.6% to 27.5%	27.6% to 47.5%	Greater than 47.6%
Youth (under 18)	16.3%	16.3% to 36.2%	36.3% to 56.2%	Greater than 56.3%
Senior citizens (65+)	10.5%	10.5% to 30.4%	30.5% to 50.4%	Greater than 50.5%

Source: 2018 American Community Survey 5-year Estimates for all metrics except income and 2015 American Community Survey 5-year Estimates for CDBG Income. Points were assigned based on the percentage of each measure per block group. Then one point was assigned if the block group was equal to or 20 percent higher than the Lawrence average. Two points were attributed if the block group was 20 percent to 40 percent of the Lawrence average. And three points were assigned if the block group was greater than 40 percent higher than the Lawrence average. Low-moderate income data is the Community Development Block Grant (CDBG) identified low-moderate income areas. A block group is low-moderate income if the low-moderate income percentage for the block group is 51.0%. The 27 block groups that are considered low-moderate income were split into 3 groups of 9 and the highest percentage of low-moderate income were assigned three points, then two points, and lastly one point. The FFY21 TIP Transportation Disadvantaged Population was created using the county average, since the MPO is countywide. This analysis was developed for the sidewalk improvement area discussion in October 2020; therefore, it only uses the Lawrence average. Updated on 9/9/2021 to include 53 block groups.

Figure 2.15: Transportation Disadvantaged Zones



Transportation Disadvantaged Population scoring is comprised of US Census Bureau American Community Survey (ACS) data and Community Development Block Group (CDBG) income data. 2018 ACS data includes: people who have a disability, people who have less than a high school education, minorities, single parent households, zero vehicle households, and population under 18 and over 65. Higher points indicate a greater deviation from the regional average.

Transportation Disadvantaged Population Score

- ≤2
 - ≤6
 - ≤12
- ≤4
 - ≤9

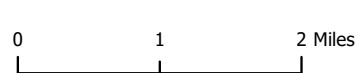
- Highways
- Major Roads

- University
- Water

- City Limits
- County Limits

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Date Exported: 9/10/2021
 Source: 2018 ACS 5-yr Est. for all except for income & 2015 ACS 5-yr Est. for HUD provided CDBG Income
 Produced: Lawrence-Douglas County MPO

American Community Survey 5-year Estimates, while the rest of the data is from the 2018 American Community Survey 5-year Estimates.

The Lawrence average was found for each topic except for income, which was not categorized based on a Lawrence average because income data is provided by the U.S. Department of Housing and Urban Department and has a specific Community Development Block Grant (CDBG) threshold (areas with at least 51% of income considered low-moderate income).

One point was assigned if the block group was equal to or 20 percent higher than the Lawrence average. Two points were attributed if the block group was 20 percent to 40 percent of the Lawrence average. And three points were assigned if the block group was greater than 40 percent higher than the Lawrence average. This is shown in the table.

As the income data didn't have a Lawrence average the 27 block groups were split into three groups to match the point thresholds. The group with the highest amount of low-moderate income people received three points.

Transportation Disadvantaged Population Scores which are higher correlates to additional scrutiny necessary to ensure these populations are not disproportionately affected.

Table 2.4: Infrastructure Inventory

	Sidewalk Network		Roadway Network			Bikeway Network			
	Sidewalk Miles	Curb Ramps	Roadway Miles	Percent Pavement 'Satisfactory' or Better Condition	Total Bridges	Bike Lanes	Bike Routes with Paved Shoulder	Shared Lane Markings	Shared Use Paths
Lawrence	598.	8,550	503.7	44.17%	47	29.4	0	11.3	41.2
Lawrence - EJ	258	3,945	236.6	40.27%	34	12.6	0	8.7	17.1
Lawrence - Non EJ	340.1	4,605	267.1	46.97%	15	16.9	0	2.6	24.1
Baldwin City	23.4	220	38.6	NA	2	0	0	0	1.4
Eudora	25.8	310	58.1	NA	0	0	0	0	3.6
Lecompton	1.5	8	10.1	NA	0	0	0	0	0.0
Unincorporated Douglas County	NA	NA	1,110.6	NA	260	1.3	42.1	0	0
Total	1,246.8	17,638	2,224.8	NA	358	60.2	42.1	22.6	87.4

Note: Bridges do not reflect ownership, rather the number of bridges within the jurisdiction/EJ Zone, which does not exactly match with the Lawrence city limits.

Updated datasets may not be comparable to data reported in T2040.

Source: Lawrence-Douglas County MPO (2022)

F. Multimodal Assets

This section presents the existing conditions of the various forms of transportation including non-motorized (bicycle and pedestrian), public transit, the roadway network, freight, intermodal, rail, and air. Furthermore, safety and security existing conditions are addressed.

Table 2.4 is an inventory of existing infrastructure within Lawrence, Baldwin City, Eudora, Lecompton, and unincorporated Douglas County. This data is shown as a summary, while the following sections provide more detail for each form of transportation. The Environmental Justice (EJ) zone is located primarily within the City of Lawrence. The sidewalk miles, curb ramps, roadway miles, average 2020 PCI, number of bridges, and various bikeway miles are split into EJ and non EJ areas.

1. Non-Motorized

Although current transportation planning focuses primarily on commercial and personal-use motor vehicles, incorporating alternative means of transportation, particularly bicycling and pedestrian traffic, has the potential to improve the region's transportation system for all users. The US DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations states, "Walking and bicycling foster safer, more livable, family-friendly communities; promote physical activity and health; and reduce vehicle emissions and fuel use." In this context, non-motorized transportation types are weighted equally against other transportation modes.

In 2011, the MPO adopted a Resolution in Support of Complete Streets Principles. The MPO committed to support and encourage the passage of a Complete Streets Policy by governments in Douglas County and incorporate multimodal transportation planning into all of its products, including this plan. The City of Lawrence adopted a Complete Streets Policy in 2012 and revised the policy in 2018 committing to use an interdisciplinary approach to incorporate the needs of all Users into the design, construction, and maintenance of transportation and land use projects that use public funds. This Complete Streets Policy establishes guiding principles



What does multimodal mean?

Multimodal describes all types or modes of transportation - including walking, biking, driving, or riding transit.



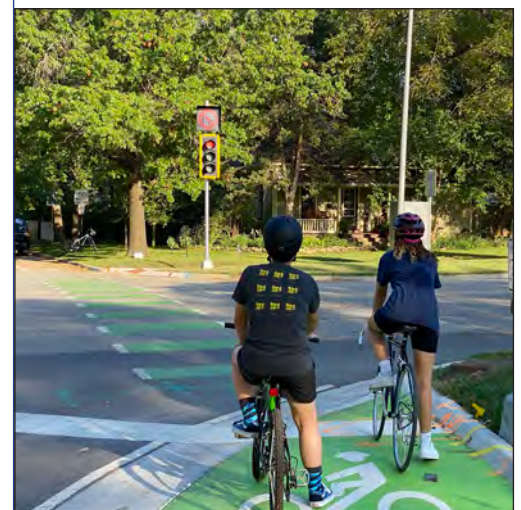
What are Complete Streets?

Complete Streets are designed for safe access for all users (pedestrians, bicyclists, motorists, and transit riders), ages, and abilities.

Source: Smart Growth America

Incorporating Complete Streets

The City of Lawrence uses a [checklist](#) to review projects for compliance with Complete Streets principles.





Bicycle Friendly Community

The Bicycle Friendly Communities Campaign is an awards program administered by the [League of American Bicyclists](#) that recognizes municipalities that actively support bicycling. A Bicycle-Friendly Community provides safe accommodation for cycling and encourages its residents to bicycle for transportation and recreation. The City of Lawrence has been recognized as a Bicycle Friendly Community at the Bronze level since 2000.

The City of Lawrence was re-designated at the Bronze level and the League of American Bicyclists provided [feedback and suggestions to further promote bicycling in Lawrence](#).



and practices to create an equitable, balanced, and effective transportation system that encourages walking, bicycling, and transit use, to improve health and reduce environmental impacts, while simultaneously promoting safety for all Users of Streets.

a. Bicycle & Pedestrian Mode Share

Bicycle and pedestrian counts help understand the average annual daily number of bicycle and pedestrian trips for locations counted across the community. These counts can be compared to KDOT's annual average daily vehicle traffic count numbers to calculate the travel percentage breakdown of trips by mode. This data paints a reasonable picture of the average annual trip counts for a variety of locations and on a variety of facility types. Detailed Count data can be found at on the [MPO website](#).

b. Bicycle

Existing Conditions

As a vital component of the entire transportation system in Lawrence and Douglas County, bicycles provide both essential commuter and recreational transportation. Lawrence was named a bronze level Bicycle Friendly Community (BFC) in 2000 by the League of American Bicyclists, this recognition was most recently renewed in 2020 through 2024, a symbol of Lawrence's commitment to providing bicycling opportunities.

As a recognized Bicycle Friendly Community, the City of Lawrence is working on enhancing existing facilities while planning for the future needs of people who bicycle in Lawrence.

The City of Lawrence's existing inventory of bicycle facilities includes:

- 29.4 miles of bicycle lanes, including 0.40 miles of buffered bicycle lanes
- 1.3 miles of bicycle boulevards
- 11.3 miles of shared lanes
- 41.2 miles of existing hard surface shared use paths
- 28 miles of off-road, natural surface paths, and



Performance Measure

26 - Reduce single occupancy motor vehicle trips

singletrack recreational trails, including the river levee trail and singletrack along the Kansas River.

2018

	Drove Alone	Carpooled	Bus	Walked	Biked	Taxicab, Motorcycle or Other
Lawrence	75.9%	8.9%	2.9%	6.3%	1.0%	1.1%
Baldwin City	78.5%	9.5%	0.0%	7.4%	0.3%	1.2%
Eudora	86.0%	9.9%	0.0%	0.0%	0.0%	0.0%
Lecompton	83.7%	12.7%	0.0%	0.7%	0.0%	1.1%
Douglas County	77.3%	9.0%	2.3%	5.5%	0.8%	1.0%

2019

	Drove Alone	Carpooled	Bus	Walked	Biked	Taxicab, Motorcycle or Other
Lawrence	76.3%	8.8%	2.5%	5.9%	1.1%	1.0%
Baldwin City	79.0%	7.9%	0.0%	11.6%	0.2%	0.0%
Eudora	86.8%	10.5%	0.0%	0.0%	0.0%	0.0%
Lecompton	85.8%	12.0%	0.0%	0.6%	0.0%	0.0%
Douglas County	77.7%	8.7%	2.1%	5.3%	0.9%	0.9%

2020

	Drove Alone	Carpooled	Bus	Walked	Biked	Taxicab, Motorcycle or Other
Lawrence	74.9	7.7	2.4	5.5	1.3	0.9
Baldwin City	78.6	6.0	0.0	14.4	0.3	0.0
Eudora	82.5	10.0	0.0	0.0	0.0	0.0
Lecompton	90.7	8.7	0.0	0.2	0.0	0.0
Douglas County	76.2	7.9	2.0	5.1	1.1	0.9

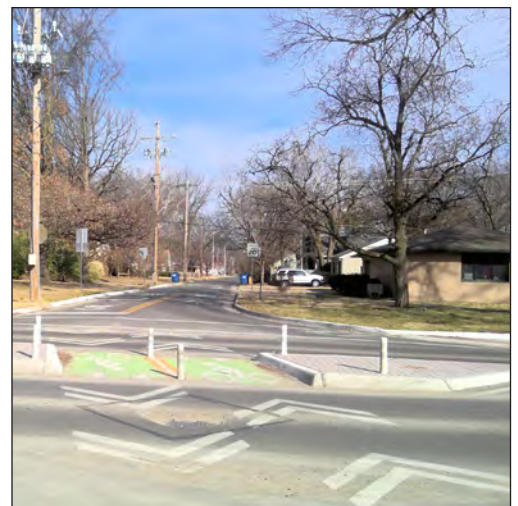
Source: U.S. Census Bureau Source: ACS 5-year estimates (S0801)



Elements that create a Bicycle Friendly Community

- Equity and Accessibility
- Education
- Engineering
- Evaluation
- Encouragement
- Ridership
- Crashes
- Facilities

Source: The League of American Bicyclists





Performance Measure

1 - Percentage of people who have access within a ¼ mile to the Level of Comfort 3 or below bikeway network

	Marked Shared Lane	Bike Boulevard	Bike Lane	Buffered Bike Lane	Protected Bike Lane	Shared Use Path	Total Bikeway Network Access
Lawrence	21%	4%	34%	4%	0%	56%	85%
EJ Zone	11%	2%	9%	0%	0%	27%	37%
Eudora	0%	0%	0%	0%	0%	41%	41%
Baldwin City	0%	0%	0%	0%	0%	23%	23%
Lecompton	0%	0%	0%	0%	0%	0%	0%
Unincorporated Douglas County	0%	0%	3%	0%	0%	11%	13%

Source: Lawrence-Douglas County MPO (2022)



Performance Measure

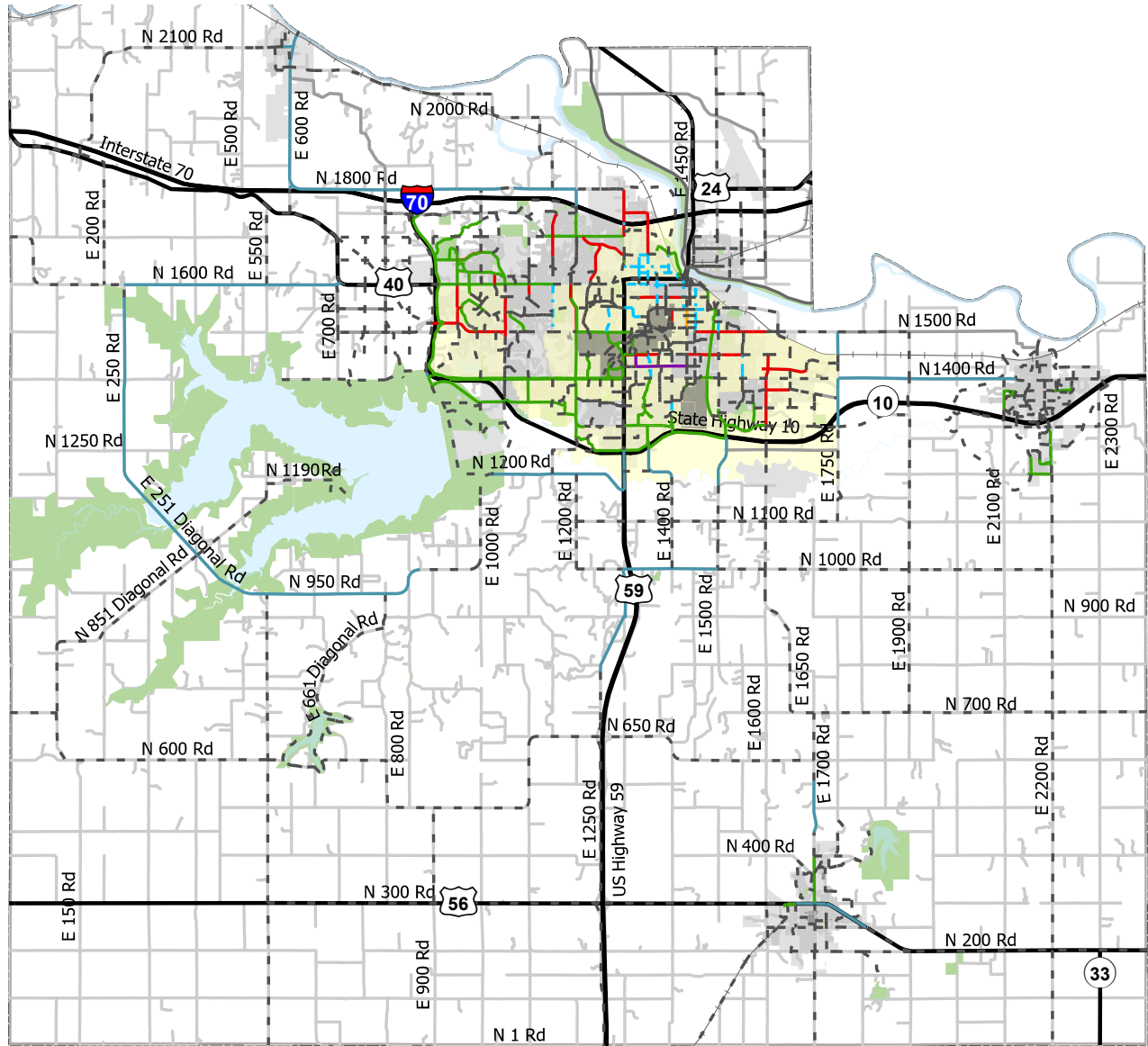
3 - Percentage of public streets with bikeway network

	Marked Shared Lane	Bike Boulevard	Bike Lane	Buffered Bike Lane	Protected Bike Lane	Shared Use Path	Total Bikeway Network Access
Lawrence	2.9%	0.3%	7.7%	4.8%	-	7.1%	36.6%
EJ Zone	5.5%	0.6%	6.7%	1.2%	-	6.2%	20.6%
Eudora	-	-	-	-	-	4.1%	4.1%
Baldwin City	-	-	-	-	-	3.5%	3.5%
Lecompton	-	-	-	-	-	-	-
Unincorporated Douglas County	-	-	-	-	-	0.6%	0.6%

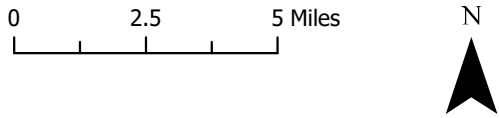
Note: EJ zone percentage includes only the EJ zone, not all of Lawrence

Source: Lawrence-Douglas County MPO (2022)

Figure 2.16: Lawrence-Douglas Countywide Bikeway System



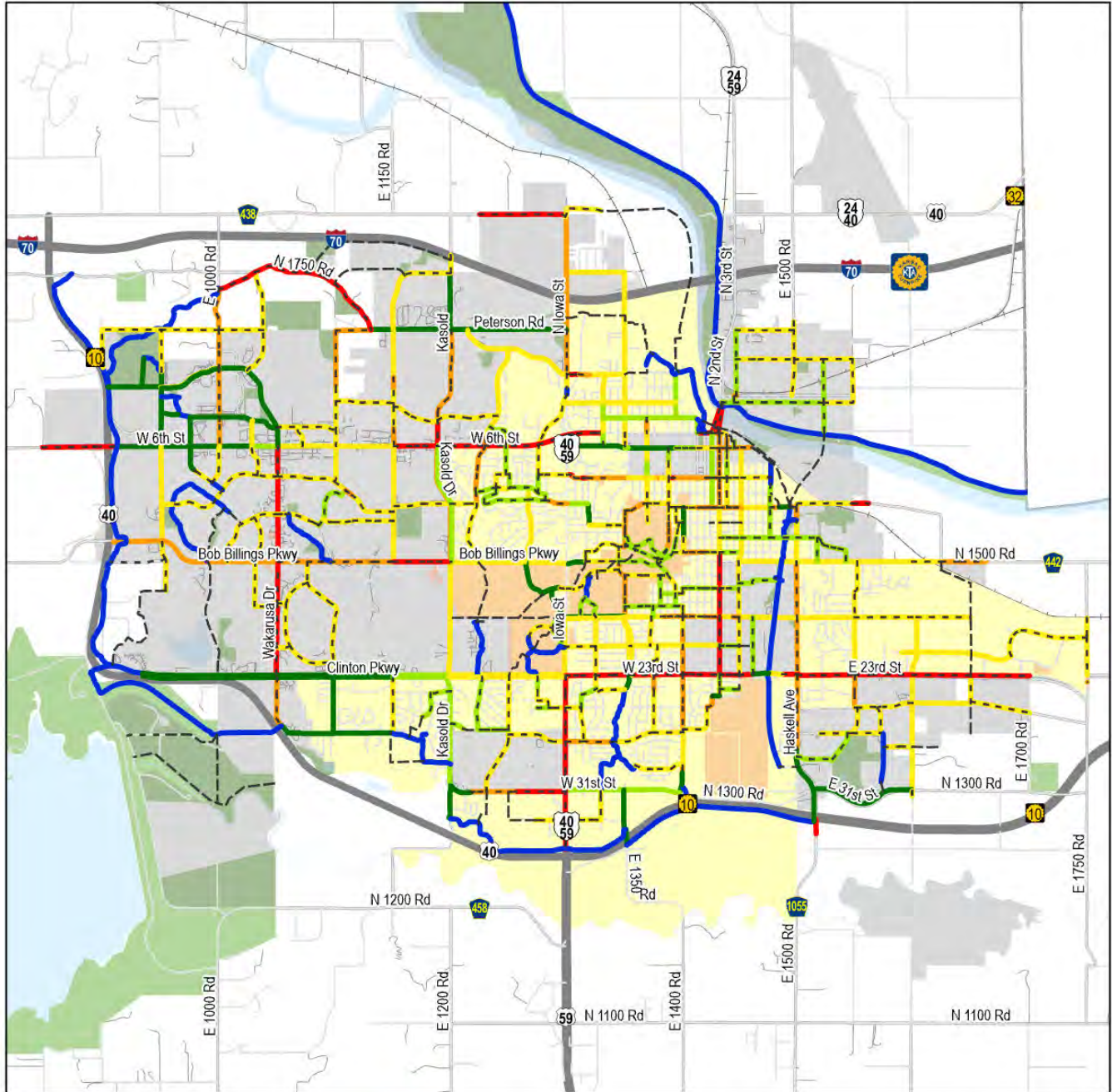
- | | |
|--------------------|----------------------------|
| Bike Boulevard | Railroad |
| Bike Lane | Street |
| Buffered Bike Lane | Parks |
| Gravel | Water Bodies |
| Marked Shared Lane | University |
| Shared Use Path | Environmental Justice Zone |
| Paved Shoulder | City Limits |
| Unpaved Trail | County Limits |
| Future Bikeway | |



Date Exported: 1/21/2022
 Source: Countywide Bikeway Plan (2021)
 and CDBG 2019
 Produced: Lawrence-Douglas County MPO

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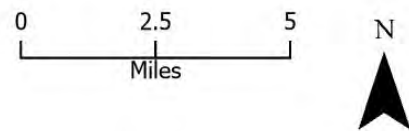
Figure 2.17: Lawrence Bikeway System Level of Comfort



Bike Level of Comfort 2021

- 0 - Most Comfortable
- 1
- 2
- 3
- 4
- 5 - Least Comfortable

- University
- City Boundaries
- County Boundaries
- Environmental Justice Zone



Date Exported: 12/13/2022
 Source: Countywide Bikeway Plan (2021)
 and CDBG 2019
 Produced: Lawrence-Douglas County MPO

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There are a number of existing challenges to bicycling within Lawrence-Douglas County.

Physical Barriers – Major streets can be physical challenges because they are difficult to cross and generally lack bicycle facilities. Topography also serves as a barrier.

Discontinuous Network – The existing bikeway network is discontinuous. Bikeways begin and end suddenly and often do not connect to other bikeways. A discontinuous network is often typical of new bikeway networks that are being implemented. This is particularly true of bikeways such as bicycle lanes and paths that may take significant time and money to complete. Communities that have streets arranged in grid patterns or have neighborhoods that have this pattern of streets will have an inherent advantage and more options in establishing easier connections for bicyclists.

Level of Comfort – The level of comfort for people bicycling varies based on the number of motor vehicles, the speed of the motor vehicles, and proximity of adjacent traffic. As seen in Figure 2.16, many existing routes in Lawrence have a low level of comfort (4 or 5), making them unusable for all but the most confident riders. Build out of the priority and secondary bicycle networks will provide a higher comfort experience for all.

Wayfinding Needed – The existing bikeway network does not indicate to users the direction or distance to different destinations. Wayfinding signs provide information about destinations, direction, and distance to help bicyclists determine the best routes to take to major destinations. Signs provide on-the-ground information that helps bicyclists understand and use the on-street and trail network without the use of a map.



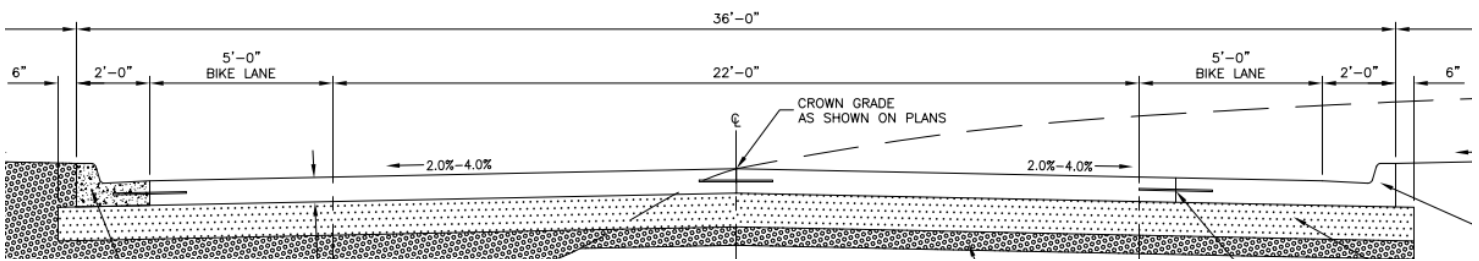
Bikeway Separation

Separation from traffic is a factor to bicycling level of comfort. Bikeway types fall within three levels of separation.

Major Separation - The most comfortable bikeway type is separated with a physical barrier between motor vehicles and bicycle riders. This is called Major Separation. Shared use paths, cycle tracks, and protected bicycle lanes are considered major separation.

Minor Separation - A stripe of paint provides less physical separation, but still provides a designated space for bicycle riders, this type of facility is called Minor Separation. Bike lanes and buffered bike lanes are considered minor separation. A bikeway separated by a physical barrier between motor vehicles and bicycle riders. Shared use paths, cycle tracks, and protected bike lanes are considered major separation.

Shared Streets -The lowest level of separation are called Shared Streets. On these facilities motor vehicles and bicycle riders commingle and share the street. There is not dedicated, exclusive space for bicycle riders. Bicycle Boulevards, streets with Shared Lane Markings, Advisory Bicycle Lanes, Paved Shoulders, and recreational gravel roads are shared streets



Typical Section - 36' Street (Collector)

Source: City of Lawrence Standard Details for Portland Cement Concrete Streets

Types of Bikeways

Conventional Bicycle Lane - a pavement marking that designates a portion of a street for the preferential or exclusive use of bicycles, noted with pavement markings.

Buffered Bicycle Lane essentially conventional bicycle lanes with the added benefit of a designated buffer space that creates further separation between the bicycle lane and the adjacent motor vehicle travel lane and/or parking lane.

Protected bike lanes - also called cycle tracks, are exclusive bicycle facilities which have features which establish physical separation between the bicycle lane and adjacent motor vehicle lanes. Protected bike lanes isolate bicycle traffic through the use of concrete barriers/raised medians, landscape buffers (trees and lawn), flex posts, planter boxes, bollards, or a variety of other measures.

Advisory bike lanes - a type of a shared roadway which provide space for biking on low-volume, low-speed streets that are too narrow for conventional bike lanes. A single motor vehicle lane is established, where drivers share the single lane with oncoming vehicles. When two vehicles meet they yield to bicycle riders before merging into the dashed bike lane

Street Cross-Sections – Streets with a 36 feet back of curb to back of curb street width allow for either two 11-foot travel lanes and two 5-foot bicycle lanes or two 12-foot travel lanes and two bicycle lanes that utilize the 1.5 foot gutter pan as part of the 5-foot bicycle lane. The second option is less desirable for bicyclists. However, streets that are heavily utilized by transit buses or other truck traffic should accommodate 12-foot travel lanes. Streets that are 34 feet back of curb to back of curb are the minimum width a street can be to be retrofit with bicycle lanes. In that case there are two 11-foot travel lanes and two bicycle lanes that utilize the 1.5 foot gutter pan as part of the 5-foot bicycle lane.

Safety – The safety of riding a bicycle on the road with cars close by is a major factor in travel mode choice decisions. The quantity of high speed, distracted, or unlawful driving exhibited by motorists, especially on major roads and during certain times of the day and year, can threaten the safety of bicyclists (and car drivers) becoming a prohibitive factor in citizens choosing bicycling as a viable means of transportation. Safety is of particular concern on streets without major separation. The personal safety of bicyclists (or perceived safety) is also a factor, particularly for children, elderly people (e.g., isolated areas depending on time of day). Personal security was also cited as an existing concern either as being real or a perceived threat in certain areas whether people ride on or off road

Share the Road Etiquette – Bicyclists on public roadways have rights and responsibilities as automobile drivers and are subject to laws and local ordinances to regulate their operation. Sometimes friction exists between these users of the roadway, as motorists and bicyclists do not know how to interact. When a road narrows or has a stop light or stop sign it is safer for a bicyclist to "Take the Lane" or cycle in the

middle of the lane. Motorists are better able to see bicyclists reducing the chance of sideswiping, right hooking, or left crossing the cyclist.

Existing Bicycle System - While the existing bicycle network is an opportunity, it is also a constraint to cycling in many areas. Many routes do not provide a direct, convenient, or safe means across busy streets. Some routes do not have sufficient signage. Other routes have conflicts with multiple users or they may not provide complete linkages to desired destinations.

Recent Efforts

Several studies have been recently completed.

- **Countywide Bike Plan** (2021) – The [Countywide Bikeway System Plan](#) details the existing and planned bikeway network for unincorporated Douglas County and the Cities of Eudora, Baldwin City, and Leocompton
- **Lawrence Bikes** (2019) - The [Lawrence Bikes](#) plan details the existing and planned bikeway network for the City of Lawrence.
- **Safe Routes to School** (2019 – Ongoing) – The [Lawrence Safe Routes to School](#) (SRTS) initiative is a collaborative effort between the Lawrence-Douglas County Health Department, Lawrence, Eudora, and Baldwin City Public Schools, the Cities of Lawrence, Eudora, and Baldwin City, and the Lawrence-Douglas County Metropolitan Planning Organization to improve the health and wellbeing of children by enabling and encouraging them to safely walk and bicycle to school. The SRTS program includes regular data collection regarding student travel patterns and parent concerns, identification of safe routes to school for all public elementary and middle schools in Lawrence, Eudora, and Baldwin City, supporting annual walk and bicycle to school celebrations, creating pedestrian and bicycle safety curriculum, and revising the school crossing policy.
- **Bike Share Feasibility Study** (2017) – The [Bike Share Feasibility Study](#) explored the feasibility of a bicycle share program in Lawrence and what a future program might look like. It found that a bicycle share program in Lawrence would be feasible. VeoRide bicycle share was launched in Lawrence in 2018 and in 2020 was transitioning towards e-scooters, With the COVID-19 pandemic VeoRide stopped the program and left Lawrence.

Types of Bikeways (cont.)

Bicycle Boulevard - or neighborhood greenway is a street with low motorized traffic volumes and speeds designated to provide priority to bicyclists and neighborhood motor vehicle traffic.

Shared Lane Marking - or sharrows are used on streets where bicyclists and motor vehicles share travel lanes. The sharrow helps position bicyclists and also provides a visual cue to motorists.

Shared-Use Path - an off-street bicycle and pedestrian facility, typically a 10 feet wide concrete path. Shared use paths are often located in an independent right-of-way such as in a park, stream valley greenway, along a utility corridor, or an abandoned railroad corridor.





View the [Walk Friendly Community Report Card](#).



Elements that create a Walk Friendly Community

- Community Data & Evaluation
- Planning & Policy
- Engineering & Design
- Education & Encouragement
- Law Enforcement

Source: Walk Friendly Communities

- **Multimodal Transportation Commission** (2017 - Ongoing) – The City of Lawrence Multimodal Transportation Commission serve as an advisory body to the City Commission to advice on transportation decisions to advance the health, safety, and welfare of all residents of the City of Lawrence through strong multimodal transportation planning
- **Bicycle Education** (2015 – Ongoing) – A four-school-pilot-program teaching the Lawrence Bicycle Education Safety Training (LBEST) as part of PE classes in USD 497 Lawrence Public Schools was conducted during the 2015-2016 school year. The program was implemented in all USD 497 elementary schools’ physical education curriculum in 2016-2017. Three bicycle fleets of 30 bicycles each were purchased using grant funds received by Lawrence-Douglas County Public Health. Maintenance for the bicycles is paid for by the school district. Approximately 1,650 fourth and fifth graders participate in the training annually. In four classes, students learn about proper helmet fit, rules of the road, bicycle safety checks, road hazards and how to safely navigate through an intersection. Some students learn how to ride a bicycle, while all learn safe riding. This program benefits all demographic groups and students thanks to the program being offered district-wide. A similar program is recommended for Baldwin City and Eudora in their respective Safe Routes to Schools plans.

c. Pedestrian

In 2017 and 2022 Lawrence was awarded a Silver Walk Friendly Community designation (i.e. third highest level of designation) from the University of North Carolina Highway Safety Research Center. The City received high marks for inter-agency coordination on the Safe Routes to School programs, the Complete Streets policy, and land use ordinances that are generally supportive of walking. Areas for improvement were also provided, which will provide the City of Lawrence direction to improve existing and future facilities.

Existing Conditions

An inventory of existing sidewalks and gaps along the pedestrian priority networks are shown in Figures 2.19 and

2.20. Existing inventory of pedestrian facilities (sidewalks and shared use paths) include 638 miles in Lawrence, 25 miles in Baldwin City, 29 miles in Eudora, and 1 mile in Lecompton (Table 2.4). Each community has a priority network and gaps identified for improved connectivity and access to resources. There are fewer miles of pedestrian facilities in the Environmental Justice zone (displayed in yellow) than in the non-Environmental Justice zone.

According to the Lawrence Municipal Services and Operations, completing the priority sidewalk network gaps (arterial streets, collector streets, Safe Routes to Schools routes and additional segments that improve access to bus stops, healthy food destinations, and parks) is estimated to cost \$54.4 million (plus design costs) to complete. At current funding levels this would take and over 150 years to accomplish. Completing the ADA Transition plan, which includes sidewalk replacement and repair and upgrading curb ramps, is estimated to cost an additional \$74.4 million. Figure 2.18 displays these estimated costs.



Performance Measure

2 - Percentage of public streets with sidewalks on at least one side

	Miles	%
Lawrence	306.3	78.4%
EJ Zone	120.9	76.0%
Eudora	18.1	42.2%
Baldwin City	12.9	41.5%

Lecompton 0.6 10.1%
 Source: Lawrence-Douglas County MPO (2022)

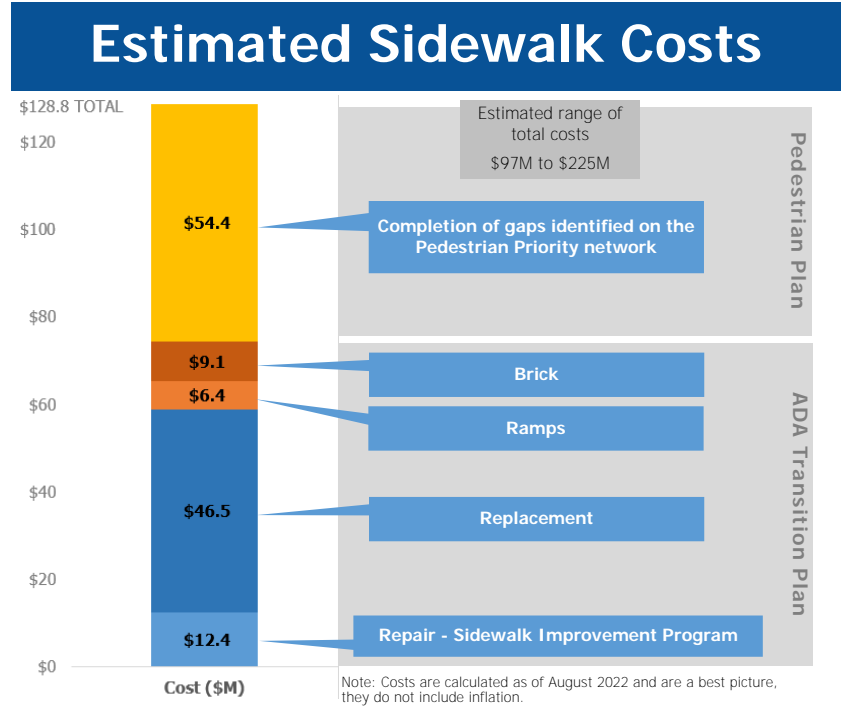


Priority Networks

Priority Networks are defined in Chapter 6 in [Figures 6.3](#) and [6.4](#).



Figure 2.18: Estimated Lawrence Sidewalk Costs

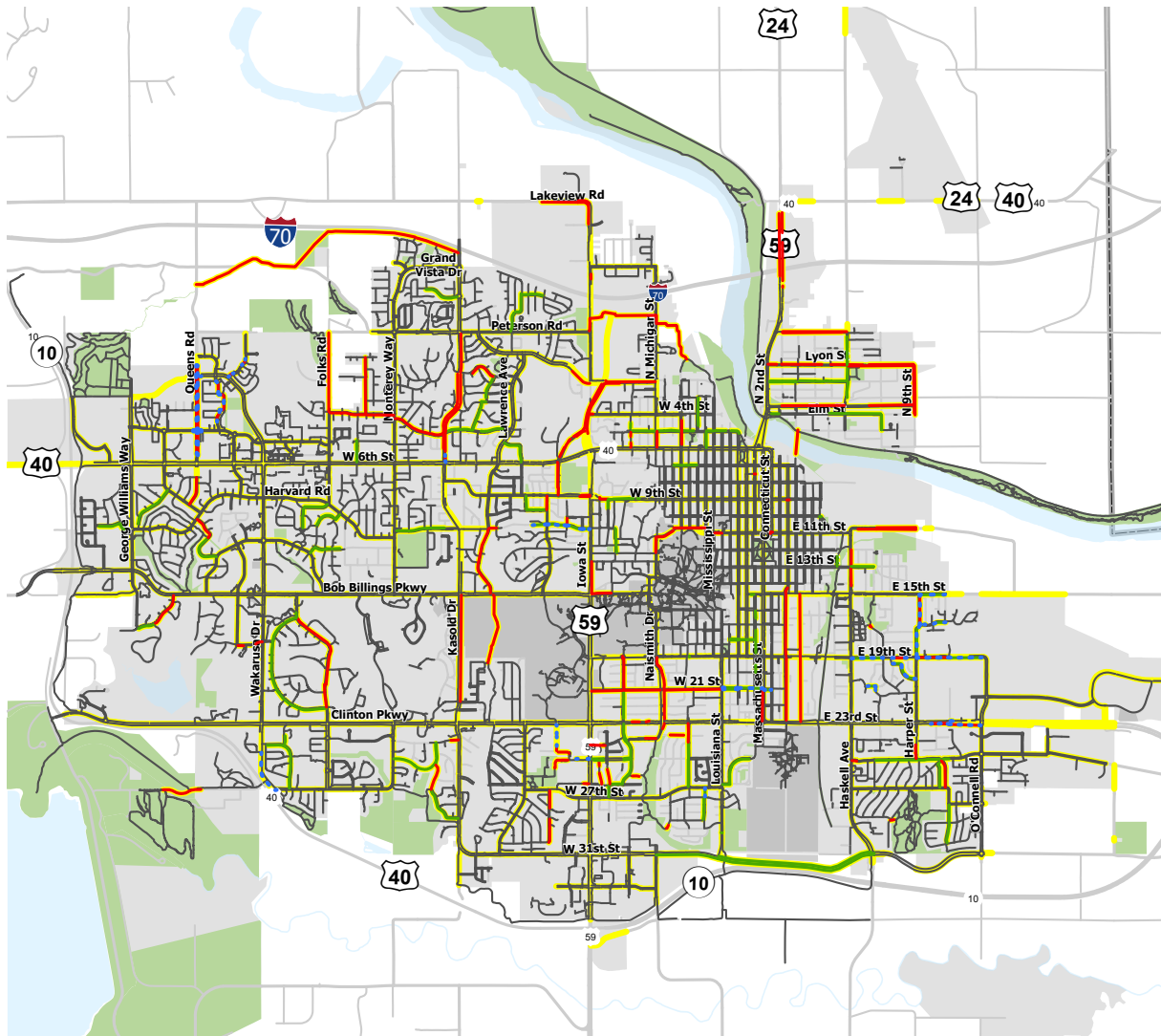


As shown in Figure 2.20, Eudora has missing sidewalks throughout the community. The only locations that have sidewalks are some of the core of town and on one side of the street in the newer curvilinear residential developments. Baldwin City has sidewalks in the historic downtown and around Baker University. Lecompton has few that exist and are along Woodson Avenue and Whitfield Street.

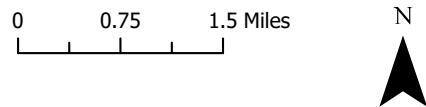
There are a number of existing challenges to pedestrian movement throughout Douglas County.

- Existing Sidewalk Network** – While the network of sidewalks is an opportunity, it is also a constraint to pedestrians in many areas. Many routes do not provide a direct, convenient, or safe means across busy streets. Gaps in the existing sidewalk network also create barriers for usage and create safety issues. Some routes do not have sufficient signage. Other routes have conflicts with multiple users or they may not provide complete linkages to desired destinations.

Figure 2.19: Lawrence Existing Sidewalk and Proposed Prioritized Pedestrian Projects



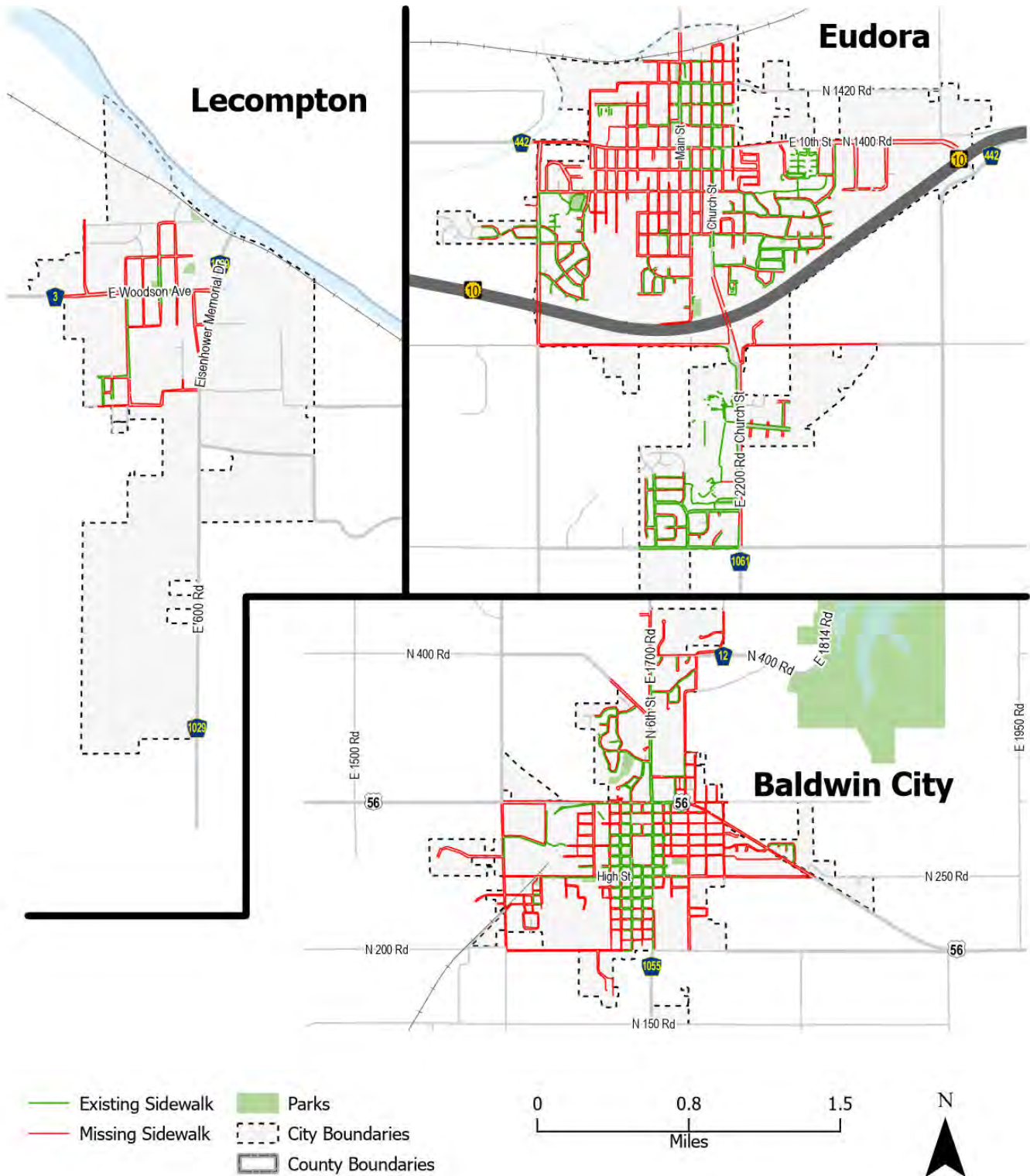
- Existing Sidewalk
- Pedestrian Priority Network
- Sidewalk Project Pending Development
- Arterial/Collector Streets Sidewalk or Shared Use Path Project
- Local Street Safe Routes to School, Transit, Food, Park Project
- Parks
- Water Bodies
- University
- City Limits
- County Limits



Date Exported: 5/2/2022
 Source: Lawrence Pedestrian Plan
 Produced: Lawrence-Douglas County MPO

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Figure 2.20: Baldwin City, Eudora, Lecompton Existing/Missing Sidewalk



Date Exported: 12/2/2022
 Source: Eudora, Baldwin City, Lecompton Plan 2021
 Produced: Lawrence-Douglas County MPO

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- **Street Crossing** – Street crossings may be the “Achilles Heel” of the pedestrian system. Street crossings place the pedestrian in the middle of the street and exposed to potential conflicts with automobiles. For an average pedestrian walking at 3 miles per hour (4.4 feet per second), it takes approximately 3 seconds to cross one 12 foot traffic lane. If bicycle lanes are present, an additional 2 seconds are needed. On-street parking on both sides of the street adds another 4 seconds. When determining the total time necessary for a walk signal phase, an additional 3 second cushion of safety is recommended. (Older adults, children, areas of high pedestrian density and mobility impaired pedestrians take longer to cross and may need approximately 50% more time to cross a street). The City of Lawrence is currently working on a Crossing Improvements Policy and Criteria to aid in implementing crossing improvements.
- **Design For Comfort** – The existing pedestrian experience varies based on the physical attributes of different locations which effect the comfort of people walking or using assistive devices. Higher comfort areas encourage more pedestrian activity while uncomfortable areas my lead to discomfort and intimidation. Comfortable areas address physical comfort with separation from motor vehicle traffic, shade trees, places to rest and “eyes on the street.” Amenities like landscaping, fountains and benches also create an attractive environment that is more comfortable.



Average Speeds of Pedestrian

Typical speed	1.2 m/s - (4.0 ft/s)
Older adults	0.9 m/s - (2.8 ft/s)
Cane or crutch	0.8 m/s - (2.62 ft/s)
Assistive walker	0.6 m/s - (2.07 ft/s)
Wheelchair	1.1 m/s - (3.55 ft/s)

Source: Federal Highway Administration



What attracts people to walk in certain areas?

Access & Linkages

- Continuity
- Proximity
- Connected
- Readable
- Walkable
- Convenient
- Accessible

Comfort & Image

- Safe
- Clean
- Green
- Walkable
- Sittable
- Spiritual
- Charming
- Attractive
- Historic

Sociability

- Diverse
- Stewardship
- Cooperative
- Neighborly
- Pride
- Friendly
- Interactive
- Welcoming

Uses & Activities

- Fun
- Active
- Vital
- Special
- Sustainable
- Real
- Useful
- Indigenous
- Celebratory

Source: Project for Public Spaces

Lawrence Pedestrian Plan



Recent Efforts

Several studies have been recently completed.

- **Lawrence Pedestrian Plan** (2022) - The [Lawrence Pedestrian Plan](#) develops a long-term vision for walkability in Lawrence, more specifically for the citywide sidewalk network. It identifies priority network gaps and identifies strategies to improve walkability establishes
- **Safe Routes to School** (2019 – Ongoing) – The [Lawrence Safe Routes to School](#) (SRTS) initiative is a collaborative effort between the Lawrence-Douglas County Health Department, Lawrence, Eudora, and Baldwin City Public Schools, the Cities of Lawrence, Eudora, and Baldwin City, and the Lawrence-Douglas County Metropolitan Planning Organization to improve the health and wellbeing of children by enabling and encouraging them to safely walk and bicycle to school. The SRTS program includes regular data collection regarding student travel patterns and parent concerns, identification of safe routes to school for all public elementary and middle schools in Lawrence, Eudora, and Baldwin City, supporting annual walk and bicycle to school celebrations, creating pedestrian and bicycle safety curriculum, and revising the school crossing policy.
- **Regional Pedestrian Plan** (2016, update underway) – The [Regional Pedestrian Plan](#) represents a vision of a more accessible and safer pedestrian environment in the region. It considers the many benefits of walking and identifies a diverse set of approaches encouraging more pedestrian activity. It also presents a toolbox of policy, program, and infrastructure ideas that cities in Douglas County can implement to improve the pedestrian environment. While there may be overlap, the needs of Lawrence, Eudora, Baldwin City and Lecompton vary in population, available funding, and local priorities; therefore, there are assessments and unique recommendations for each city within Douglas County.
- **Pedestrian Bicycle Issues Task Force Report** (2016) – The Lawrence City Commission created the Pedestrian-Bicycle Issues Task Force to develop built environment and programming recommendations to improve the city’s pedestrian and bicycle networks by 2030.

2. Transit

a. Existing Urban Public Transit Services

Two fixed route service providers, Lawrence Transit and KU on Wheels (KUOW), operate in the City of Lawrence (Figure 1). Lawrence Transit also provides a public complementary paratransit service (T Lift) to comply with the Americans with Disabilities Act (ADA) as well as a general public demand response service, Night Line, for overnight service. KU Transportation Services provides a similar paratransit service, JayLift, available to KU students, faculty and staff with a KU origin or destination, as well as SafeRide, available to KU students for a safe ride home at night.

The coordinated Lawrence Transit/KU on Wheels system provides nineteen routes varying from ten minute frequencies on the KU Campus to 60-minute service. In 2009 through extensive planning and coordination efforts, the Lawrence Transit and KU on Wheels systems created joint routing and scheduling, began using the same service provider, and present the two systems as one cohesive bus system to the general public through digital and printed materials. Following the 2021 Route Redesign Study, Lawrence Transit and KU on Wheels will implement two phases of route changes in response to new budget conditions, current ridership levels, and community interest in initiatives such as Sunday service. The first phase of new routes began operation in August, 2022.



Types of Transit Services

Fixed-Route Service - buses provide service on a repetitive, fixed-schedule along a prescribed route with vehicles stopping to pick up and deliver passengers at specific locations. Local examples of fixed route service include Lawrence Transit and KU on Wheels routes 1-53.

Commuter/Regional Service – a type of fixed route that provides transportation connecting one major urban area with another major urban area. Regional routes are typically long with few stops and act as a limited stop or express type of service. Local examples of commuter/regional service include the RideKC K-10 Connector.

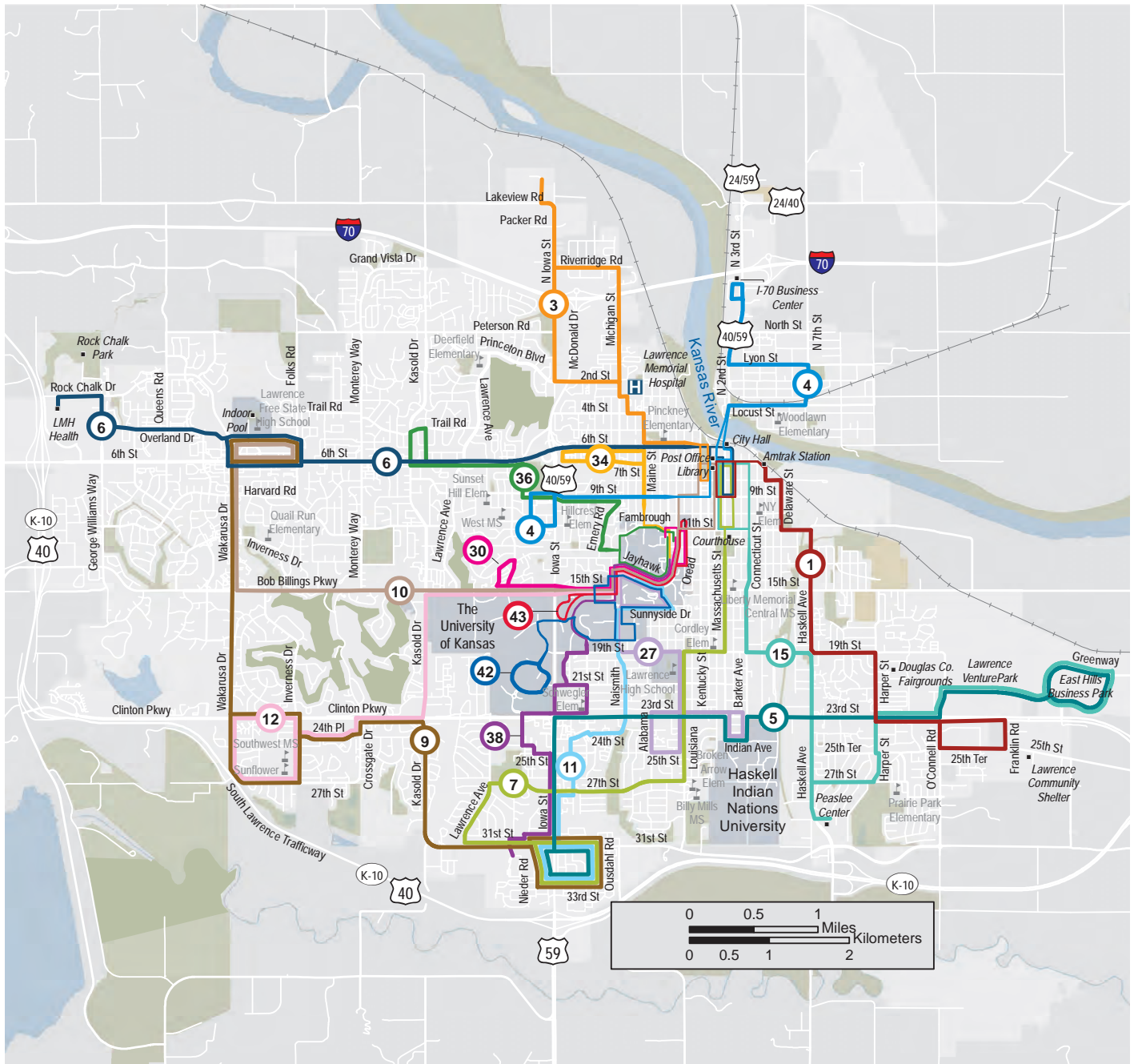
Paratransit - a transportation service required by the Americans with Disabilities Act for people with disabilities who are unable to use fixed-route transportation systems. These services can operate curb to curb or door to door. Local examples of paratransit service include T Lift, for the general public, and JayLift, limited to KU students, faculty, and staff.

Demand Response Service - does not operate over a fixed route but instead provides prearranged rides from origins-to-destinations. This includes T Lift and other paratransit services.

Microtransit – is a type of demand response service and functions as a shared ride service with transit vehicles and drivers. Individuals can request trips to and from locations using a smartphone app or dialing a phone number. Local examples of microtransit include Night Line and a planned Sunday service from Lawrence Transit for the general public, and KU's SafeRide program for students.

Flexible Service - is a nontraditional service that attempts to provide a hybrid between fixed route and paratransit services. "Flex" routes operate on a fixed route, but can deviate up to 1/4 to 3/4 mile to access other destinations. Flexible service can face challenges with providing consistent, timely service due to its flexible nature. There are no local examples of flexible service currently.

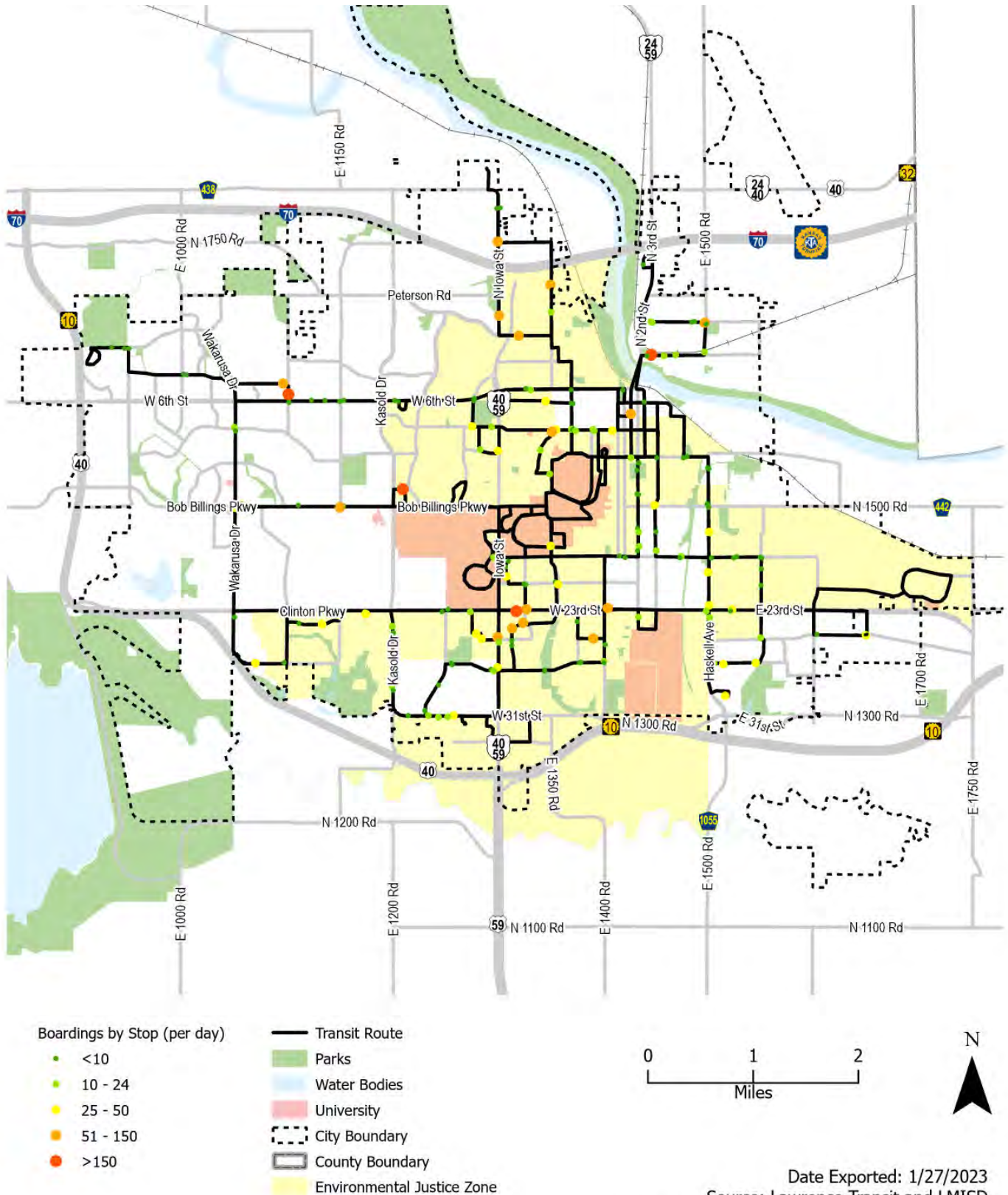
Figure 2.21: Lawrence Transit/KU on Wheels Transit (2022-2023 Routes)



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Figure 2.22: 2019 Daily Transit Boardings By Stop



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Bus Stop Art

Lawrence Transit has made a concerted effort to integrate art into bus stop improvements in recent years. These efforts have led to 17 glass bus shelters receiving vinyl artwork, and an additional 6 custom shelters constructed with wood and reclaimed rail infrastructure. Art at bus stops is functional, as it typically reduces vandalism, and it also leads to greater cultural connection between neighborhoods and otherwise neutral city infrastructure. These efforts can contribute positively to resident satisfaction with the amount of arts, diverse culture, and events in Lawrence.



Source: Lawrence Transit



Source: Lawrence Transit

b. Transit Amenities

Bus stops are often the first interaction that someone has with the bus system. Bus stops should be easy to find, accessible for all, comfortable to wait at, and contribute to an aesthetically pleasing streetscape. The basic standard for all bus stops is to include a bus stop sign and an accessible paved boarding area. Amenities such as benches, shelters, bicycle racks, and trashcans are added based on guidelines that take into account ridership, equity, and land use context. Current data regarding types of amenities at bus stops is shown in Table 2.5.

Lawrence Transit has recently updated its [Bus Stop Improvement Program Guidelines](#), which details community expectations, planning, prioritization, maintenance, and funding.

Lawrence Transit's Bus Stop Improvement Program includes efforts through multiple processes to improve bus stops on an ongoing basis. In a given year, bus stops may be improved through:

- Annual operational budget: \$150,000
- In coordination with the MSO Street Maintenance Program + Sidewalk Improvement Program
- In coordination with discrete MSO street or sidewalk projects
- In coordination with the ADA Transition Plan
- In coordination with private development
- As part of a competitive local, state, or federal grant award

Table 2.5: Current Data on Amenities at Bus Stops

Amenity	Number	Percent
ADA Boarding Pads	180	48%
Shelters	63	17%
Benches	54	14%
Bike Racks	24	6%
Total Stops	376	

Source: <https://lawrencetransit.org/projects/bus-stops/>

c. Community and Regional Transportation

In addition to Lawrence Transit and KU on Wheels (KUOW), there are several smaller agencies that provide specialized transportation/ paratransit services for transit dependent individuals in the region (as shown in Table 2.6). These demand-response transportation providers include: Bert Nash Community Mental Health Center, Cottonwood Inc., Senior Resource Center for Douglas County, Independence Inc., and the Lawrence-Douglas County Housing Authority. These agencies have other core missions, but provide needed specialized transport services to serve their clients. In some cases, these agencies may run transit service which is open to the general public. These vital agencies help to serve residents who live or require transportation outside the Lawrence Transit/KUOW coverage areas. The service provided by these small agencies is flexible [demand response service](#).

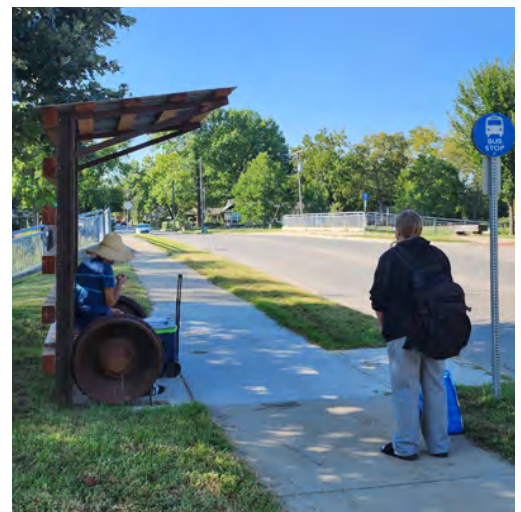
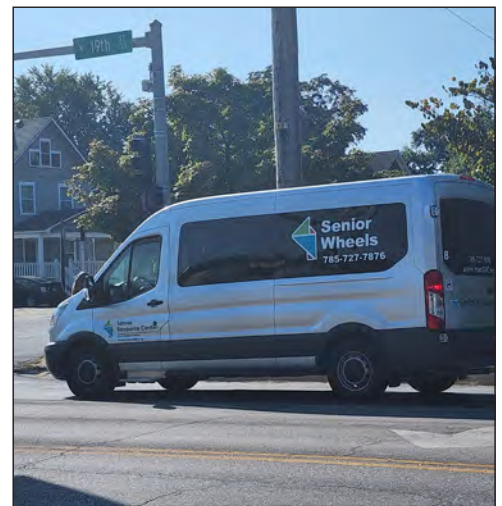
All of these transit providers combined provided approximately 1.3 million rides in 2021, down from 2.9 million rides in 2019, prior to the Covid-19 Pandemic (Table 2.7). Of these rides, each year, approximately 92% of the rides were on a fixed route.

The coordinated Lawrence Transit/KU on Wheels system provides nineteen routes varying from six minute frequencies on the KU Campus to 60 minute service. In the past few years Lawrence Transit has been transitioning appropriate routes to 30 minute or less frequency.

As the joint Lawrence Transit and KU On Wheels Mission Statement states, together these services form a network to “provide safe, convenient, affordable, reliable, and responsive transportation services to enhance the social, economic and environmental well-being of the community.” As shown in Table 2.5 each provider operates during a variety of hours, over various service areas, and for different Greyhound Bus Lines provides daily service from Lawrence using a stop at the Lawrence Public Library at 707 Vermont Street. From that location, passengers can board buses heading west to Topeka, east to Kansas City, south to Wichita, and to points beyond. Upon completion of the Lawrence Transit Central Station project, Greyhound will serve Lawrence from that location instead of Downtown. Downtown and Central Station will be connected with frequent fixed route service as part of Phase 2 of route redesign in 2023.

What is Peak Service?

Peak service refers to a greater level of fixed route service at higher-demand times, typically for 2-3 hours during morning (7-9AM) and afternoon (3-6PM) work commute times.



Ridership totals for each system provide a way to measure the volume of riders served by each transit service. Ridership from 2017-2021 is listed in Table 2.6 for each provider.

RideKC, in partnership with Johnson County also operates transit service in Douglas County. Its service is a longer distance commuter route (the K-10 Connector) into Douglas County with connections to college destinations in Johnson County. The KU campus in Lawrence and the Johnson County Community College and the KU Edwards campus are all connected by this JO service. The JO bus routes connect to the [fixed route service](#) in Lawrence at a few strategic locations like the KU Park & Ride facility.

Table 2.6: Transit Providers Operating Characteristics

Operator	*Fleet Size	Service Hours	Days of Service	Service Area	Clientele
Bert Nash CMHC	3	9 am - 7 pm	Monday - Saturday	Douglas County	Elderly, Disabled (Bert Nash Clients)
Cottonwood, Inc.	3 KDOT + 38 agency	7 am - 10 pm	Monday - Sunday	Douglas County	Disabled (Cottonwood, Inc. Clients)
Senior Resource Center for Douglas County	6	7 am - 3:40 pm	Monday - Friday	Douglas County	Elderly, Disabled
Independence, Inc.	6	8 am - 5 pm	Monday - Friday	Douglas County	Elderly, Disabled, General Public
RideKC: K-10 Connector***	5	6 am - 11:10 pm 6 am - 6:00 pm	Monday - Thursday Friday	Johnson and Douglas Counties (connecting the 2 KU campuses and JCCC)	General Public
KU on Wheels Fixed Route***	42	7 am - 10:30 pm	Monday - Friday	Lawrence city limits	General Public
KU on Wheels JayLift***	2	7 am - 6 pm	Monday - Friday	Lawrence city limits	**KU students, faculty, and staff
KU on Wheels SafeRide****	10	10:30 PM - 2:30 AM	Monday-Sunday	Lawrence city limits	KU students
Lawrence - Douglas County Housing Authority Babcock Bus	1	8 am - 4 pm	Monday - Thursday	Lawrence city limits	Elderly, Disabled, (Individuals receiving housing assistance)
Lawrence Transit Fixed Route	21	6 am - 8 pm	Monday - Saturday	Lawrence city limits	General Public
Lawrence Transit Nightline	6	8 pm - 6 am	Monday - Saturday	Lawrence city limits	General Public
Lawrence Transit T-Lift	19	6 am - 8 pm	Monday - Saturday	Lawrence city limits	**General Public
Lawrence Transit Sunday microtransit	5	8 am - 8 pm	Sunday	Lawrence city limits	General Public

* Fleet size is measured by the number of vehicles in maximum revenue hour service for most recent year data is available.

**Certification required.

*** Reduced service when class is not in session

****Operates when classes are in session, plus New Year's Eve and Independence Day. Thursday - Sunday service during summer session.

Source: Coordinated Public Transit and Human Services Transportation Plan (2016), Transit Providers (2022)

d. Performance Measures

Transit performance measures relate to T2050 goals, objectives, and strategies. Detailed information about each performance measure follows below.

On time performance,
On-demand wait time

On-time performance is measured by the percentage of time a bus arrives at time points no later than 5 minutes past the listed time in the public schedule. Lawrence Transit's fixed route service had an on-time performance of 83% during the first six months of 2022.

On demand wait time is not yet measured, but will be monitored as Sunday microtransit service begins.



Performance Measure

4 - Unlinked Passenger Trips per Vehicle Revenue Hour for demand response

Unlinked Passenger Trips is defined as the number of passengers who board public transportation vehicles. Passengers are counted each time they board transit vehicles, regardless of how many transfers they use to travel to their final destination.

Vehicle Revenue Hour is a term that describes the hours that transit vehicles are moving along a route providing passenger service.

	Demand Response		Avg. Psgr / Rev Hr
	Total Unlinked Passenger Trips	Total Vehicle Revenue Hours	
2017	82,341	39,989	2.06
2018	84,183	41,128	2.05
2019	82,233	39,394	2.09
2020	43,977	24,805	1.77
2021	57,960	24,693	2.35

Source: Lawrence Transit (2022)



Performance Measure

4 - Unlinked Passenger Trips per Vehicle Revenue Hour for fixed route service

	Fixed Route		Avg. Psgr / Rev Hr
	Total Unlinked Passenger Trips	Total Vehicle Revenue Hours	
2017	3,202,570	113,905	28.12
2018	2,884,370	115,021	25.08
2019	2,799,555	117,507	23.82
2020	1,049,204	105,402	9.95
2021	1,247,745	118,583	10.52

Source: Lawrence Transit and KU on Wheels (2022)



Source: Lawrence Transit

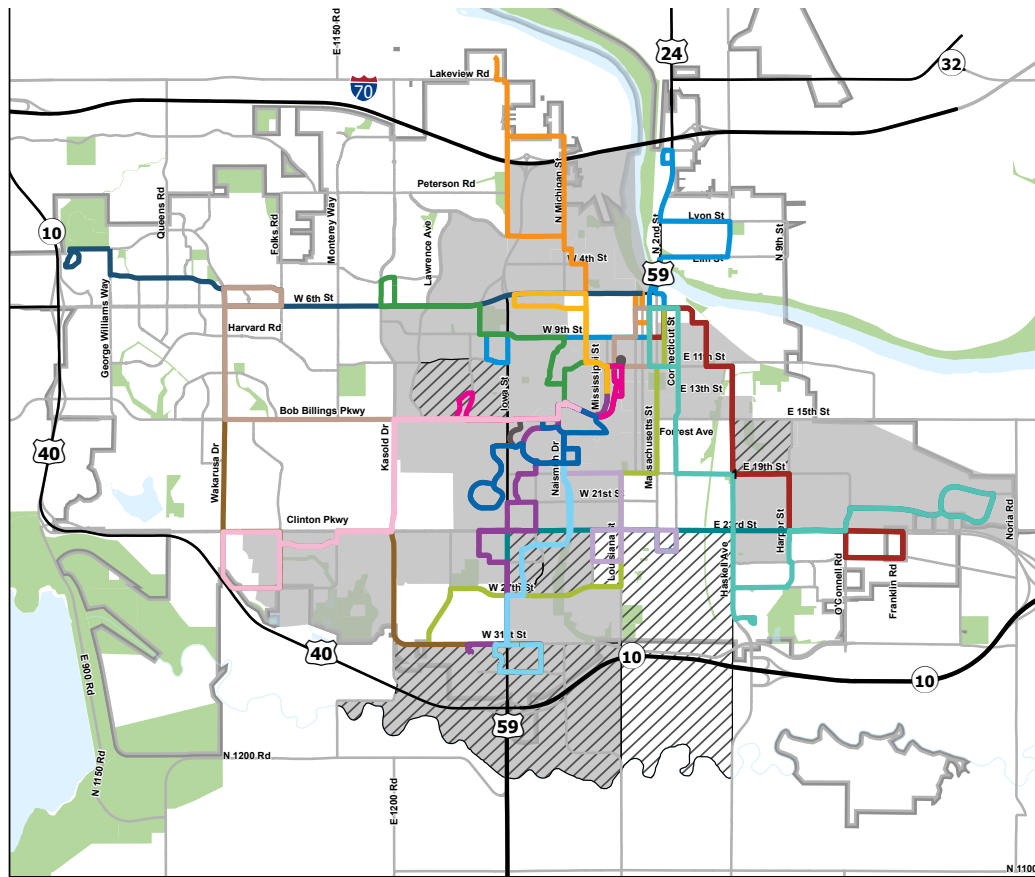


Performance Measure

5 - Percent of residential units in the Environmental Justice Zone within a quarter mile of a transit stop or on-demand transit zone

Lawrence Transit aims to intentionally provide as good or better transit access in Environmental Justice Zones as is available in areas outside of Environmental Justice (EJ) Zones. Access in this case means nearby walking distance to a location where one can be picked up on a typical weekday by a fixed route or on-demand bus. Based on the planned 2023-2024 Lawrence Transit bus routes, 88% of residential units within EJ zones will be within 1/4 mile of a bus stop compared to 76% of residential units within Lawrence overall.

Figure 2.23: Transit Routes and Environmental Justice Zones



Environmental Justice (EJ) zones are comprised of low to moderate income households (shown in gray) and/or minority households (indicated with diagonal lines) populations. These zones are updated utilizing income information from the US Housing & Urban Development (HUD) Department and race data from the US Census Bureau American Community Survey.

- Low-Moderate Income Block Groups
- Minority Block Groups
- 2022-2023 Transit Routes
- Parks
- Water
- City Limits

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Date Exported: 9/13/2022
Source: Lawrence Transit, 2016-2020 ACS 5-yr Est. & CDBG Income
Produced: Lawrence-Douglas County MPO



Performance Measure

16 - Percentage of revenue and non-revenue vehicles met or exceeded their Useful Life Benchmark (ULB)

Percentage of revenue and non-revenue vehicles met or exceeded their Useful Life Benchmark (ULB) / Percent of goals met for reliability of transit (On time performance, On-demand wait time, Percent of revenue vehicles meeting or exceeding their ULB)

Vehicle Revenue Hour is a term that describes the hours that transit vehicles are moving along a route providing passenger service.



Performance Measure

17 - Percentage of assets with a condition rating below 3 on the FTA Transit Economic Requirements Model (TERM) scale



There are no federally funded facilities.

Category	Class	ULB	KU on Wheels (15-YR ULB)	Lawrence Transit	Other Human Service Providers	% of Vehicles at or Exceeding ULB	L-DC MPO Target
Revenue Vehicles	Full-sized bus	14	11%	0%	-	11%	25%
	Cutaway bus	10	-	0%	100%	100%	25%
	Van	8	-	-	23%	23%	25%
	Minivan	8	-	-	-	-	25%

Note: Target is to meet or exceeded FTA Useful Life Benchmark (ULB). Targets set in the State TAM Plan are used for federal reporting. The L-DC MPO Target are for local planning purposes only.

Table 2.7: Transit Ridership in Douglas County

Operator	Annual Ridership				
	2017	2018	2019	2020	2021
Bert Nash CMHC	3,625	683	1,986	1,888	287
Cottonwood, Inc.	6,013	6,465	6,882	6,391	3,841
Independence, Inc.	5,278	6,351	6,836	5,680	6,766
KU on Wheels Fixed Route	2,029,057	1,754,650	1,691,502	525,045	666,178
KU on Wheels JayLift	3,713	3,859	2,409	1,085	832
KU on Wheels Safe Bus		6,414	2,243	621	
KU on Wheels Safe Ride		19,256	27,563	14,941	29,517
Lawrence - Douglas County Housing Authority Babcock Bus	1,416	2,431	403	1,450	969
Lawrence Transit Fixed Route	1,173,513	1,129,720	1,108,053	524,159	581,567
Lawrence Transit Demand Response	82,341	84,183	82,233	43,977	57,960
RideKC: K-10 Connector	98,936	99,494	95,260		
Senior Resource Center for Douglas County	5,861	5,842	5,345	4,617	4,559
Total	3,409,753	3,119,348	3,030,715	1,129,854	1,352,476

Source: Transit Providers and KDOT (2022)



Source: Lawrence Transit



e. Financial Need

The fixed route transit service in Lawrence is predicated on the amount of dedicated annual funding available. Approximately \$8 million is necessary to operate the current level of transit annually. Upcoming addition of Sunday service will not add revenue hours to the system, instead, hours from fixed route service will be reprogrammed for this use. Additional technology such as real-time information signs, onboard announcements, and other bus hardware and software is only able to be implemented through the award of competitive grants. Each of these systems typically require an annual cost for maintenance or software backend access.

Lawrence Transit will begin using Central Station in 2023, which will require additional annual funds of approximately \$200,000 for maintenance, technology, and security needs. Furthermore, transit vehicles have a useful life and need to be replaced on a set schedule. An estimated \$2-\$2.5 million is necessary each year to keep up with vehicle replacement, which places significant pressure on securing competitive grant awards for these capital purchases. The vehicle inventory is located in Appendix C: Transit Asset Management (TAM) and Fleet Inventory.

Additional financial considerations include:

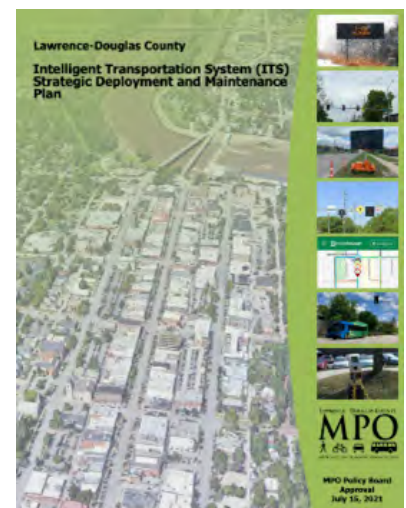
- Bus replacement with electric, how we think we can afford the capital, and if we think operating costs will go down
- Compare sales tax/formula funds increasing revenues to increasing ops cost due to inflation/planned increases
- Adding new tech/capital through competitive grants, impact on ongoing ops cost.
- Impact of fare free

With the expiration of the 10-year transit sales tax in 2028, voters may be asked to consider maintaining the same tax rate to keep service levels where they are, or increasing the tax rate to afford community-desired improvements such as more comfortable bus stop amenities, increased bus frequencies, and additional technology.

f. Upcoming and Recent Efforts

Several transit studies have been completed, and others will begin in the next 1-2 years.

- **Lawrence Transit Zero-Emission Transition Plan (Upcoming)**– Lawrence Transit was awarded competitive grant funds from the KDOT Access, Innovation, and Collaboration Program to conduct a \$150,000 study to understand how to feasibly move toward a zero-emission bus fleet. The scope of this plan will include planning for both charging and vehicle infrastructure, and funding for both capital and maintenance activities. This consultant-led planning work is estimated to begin in early 2023 and be completed in time to apply for 2024 FTA Low or No Emission grant funds.
- **Intercity Bus and Regional Route Study (Upcoming)**– KDOT is in the process of finalizing an RFP to update the 2014 I-70 Corridor Transit Feasibility Study. Lawrence Transit & KU on Wheels are prepared to engage when work begins on this plan update.
- **Route Redesign Study (2022)**– With the development of Central Station at Bob Billings & Crestline Drive, bus routes will be redesigned to better serve this new transfer center and the community at large. Route Redesign will go into effect in two phases, with Phase 1 in August 2022 and Phase 2 in early 2023. Phase 2 will include the introduction of Sunday microtransit service, as well as fare free service system-wide. See the [2022 Planned Route Redesign Summary](#) for more detail regarding each phase of route changes.
- **Annual Planned Route Changes (2020, 2021)**
The [2020](#) and [2021](#) planned route changes documents detail the proposed route changes, public engagement, and final planned route changes in response to community input on an annual basis.





**2016 COORDINATED
PUBLIC TRANSIT-HUMAN SERVICES
TRANSPORTATION PLAN**
FOR DOUGLAS COUNTY, KANSAS



July 21, 2016



- Lawrence-Douglas County Intelligent Transportation System (ITS) Strategic Deployment and Maintenance Plan (2021)** The Lawrence-Douglas County Metropolitan Planning Organization (MPO) Intelligent Transportation Systems (ITS) Plan details potential future application of technologies and communications to improve the multimodal transportation system in an area. ITS includes detection systems and cameras for monitoring traffic conditions on roadways, dynamic message signs to provide real time travel information, vehicle location systems to track transit and emergency services vehicles, and a host of other technological elements and agency coordination processes. Essentially it equals better travel through technology. The plan includes a number of future transit projects, some of which are planned to be implemented and have funding secured, with others that are planned for future study and/or identification of funding for implementation.
- Bus Transfer Location Analyses (2014, 2018)** The [2014](#) Lawrence Transit Center Locational Analysis was initiated to determine a candidate site, and conceptual costs, for a new transit center which would also serve as the major transfer hub for the city transit routes. This study first used a GIS process and various socio-economic and transit-related geographic parameters, to identify a general geographical area to focus the study's attention. Multiple sites within this geographical area were further examined for suitability as a transit center, based off of their general development constraints, impact on the transit route structure, and opportunities for synergy with existing or potential land use and ridership patterns. The [2018](#) Lawrence Bus Transfer Location Analysis built upon previous efforts to identify a location in Lawrence where a transit transfer location would be most beneficial to the city. The goal of the study was to identify a transit transfer facility location that would ultimately make the transit system more efficient allowing transit users to access the system connections in a centralized location. The purpose of the transit transfer location is to serve the coordinated City of Lawrence Transit System and KU on Wheels System.

- **Transit Comprehensive Operational Analysis (2017)** The [2017 Lawrence Transit Comprehensive Operational Analysis](#) identified the strengths and weaknesses of the 2016 system, and developed recommendations that could be used for improving service and meeting future system goals. For a publicly funded transit system, this means serving existing riders better, attracting new riders, and improving productivity to ensure that the system is a good steward of public funds. Additional topics covered in this document include recommendations on fares, governance, funding, public information/marketing, and paratransit service
- **TIGER Grant Application (2016) Coordinated Public Transit and Human Services Transportation Plan** This [2016 TIGER Grant application](#) sought to construct a new multimodal facility on the east half of the existing parking lot at Naismith Drive and W. 18th Street on the University of Kansas campus, in Lawrence, Kansas. The project was not selected for funding through the TIGER Grant application process, but represented an attempt to centrally locate a bus transfer facility for the coordinated City and University bus system.
- **Coordinated Public Transit and Human Services Transportation Plan (2016)** The [2016 Coordinated Public Transit and Human Services Transportation Plan](#) helps to aid in the continued communication and coordination of all transit providers throughout Douglas County. This plan was developed in coordination with representatives of public, private, and non-profit transportation and human service providers, as well as the public. The implementation of this plan will occur through Coordinated Transit District #1, a collaboration between providers in Shawnee, Douglas, Johnson, and Wyandotte counties, with participation from Mobility Managers in each of those service areas.
- **Fixed Route Transit & Pedestrian Accessibility Study (2014)** – The [2014 Fixed-Route Transit & Pedestrian Accessibility Study](#) identified obstacles transit riders face in accessing the fixed route system, locations where improvements can be made to the pedestrian environment, issues with streets/sidewalks that prevent people from accessing the fixed route system, and possible bus turnouts to make boarding and exiting more convenient and enhance traffic operations.
- **Commuter Park & Ride Study (2014)** – The [Commuter Park & Ride Study](#) identified potential park & ride locations in Lawrence, which were evaluated for highway access, connections to existing local transit service, proximity to major activity centers, residential, and employment areas, special event parking accommodation, land acquisition, and feasibility to accommodate amenities.
- **I-70 Corridor Transit Feasibility Study (2014)** – KDOT [studied the feasibility of providing transit service in the I-70 corridor](#) between downtown Kansas City, Missouri; Lawrence, Kansas; and Topeka, Kansas. The study found the largest commuter travel in the I-70 corridor is from residents of the Lawrence area to workplaces in downtown Topeka and Topeka residents to KU and other Lawrence employers. This level of movement would support regularly scheduled commuter transit service.

3. Roadway Network

A majority of residents within Douglas County and Lawrence travel to work in single occupancy motor vehicles (Performance Measure 25). As the community grows the transition to higher capacity travel modes will be a priority within the roadway network, as illustrated in Figure 2.24.



Performance Measure

25 - Percentage of single occupancy motor vehicles

Entity	2018	2019	2020
Lawrence	75.9%	76.3%	74.9%
Baldwin City	78.5%	79.0%	78.6%
Eudora	86.0%	86.8%	82.5%
Lecompton	83.7%	85.8%	90.7%
Douglas County	77.3%	77.7%	76.2%

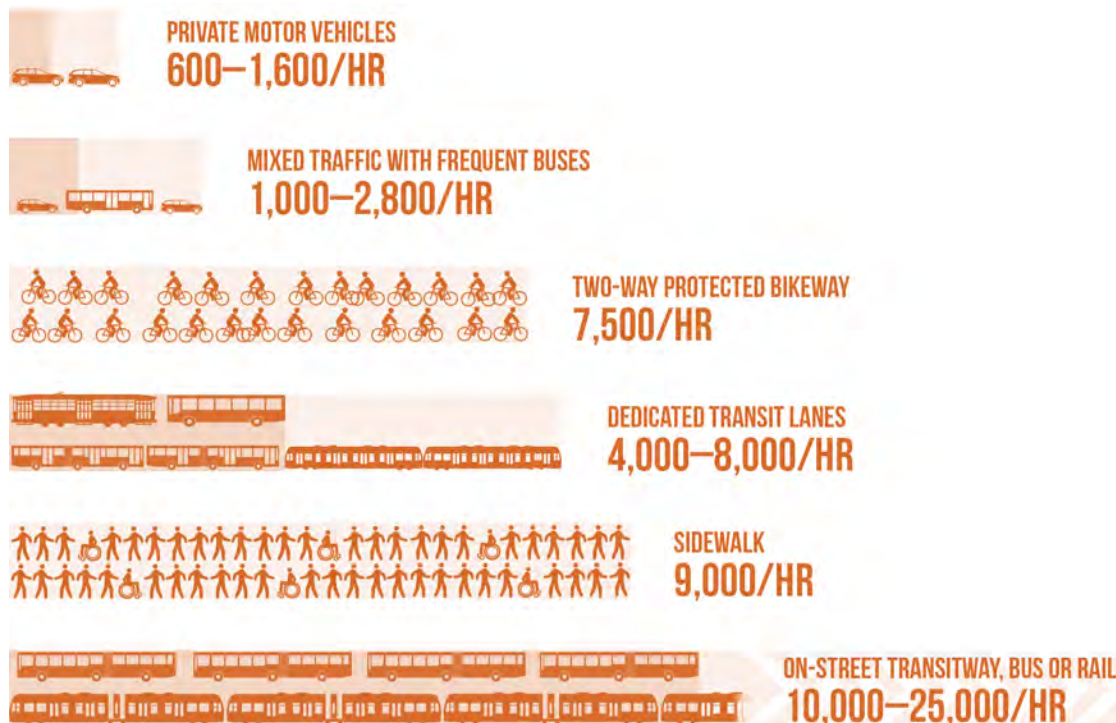
Source: ACS 5-year estimates (S0801)



What is a single occupancy vehicle?

A single occupancy motor vehicle means that only one person, the driver, is occupying an automobile.

Figure 2.24: Designing to Move People



Source: North American City Transportation Officials

a. Existing Conditions

The public roadway system in the region consists of approximately 1,366 functionally classified centerline miles of roads consisting primarily of two-lane minor arterials, collectors, and local roads. The principal arterial and higher class roadways comprise only a small percent of the mileage but represent most of the roads that have high traffic volumes and significant congestion problems. However, congestion along the region’s busiest roads is not the only issue facing the roadway network. In some other areas there is almost no congestion, but there are missing links in the network causing problems. Missing connections can create circuitous routings and longer than desired trip lengths, long wait times at un-signalized intersections, and other problems. At other uncongested places there are safety issues to consider related to the design or condition of the roadway and/or bridges along that route. Some congested locations may need improvements, but congestion is not the only (or in some locations not even an important) factor in recommending improvements. Other factors such as impacts to the built and natural environment, safety of all users, balancing the multimodal needs within the roadway and upfront and ongoing financial costs must be considered. Table 2.8 shows the overall totals of roadway centerline miles maintained by KDOT, Douglas County and city governments in the region. The table makes it obvious that Douglas County and the City of Lawrence are the



Table 2.8: Centerline Miles Maintained per Entity

Entity	Centerline Miles	Percentage
Army Corps of Engineers	8.4	0.6%
Baldwin City	30.2	2.1%
Douglas County	229.5	15.7%
Eudora	34.5	2.4%
Kansas Department of Transportation	123.7	8.5%
Kansas Department of Wildlife, Parks, and Tourism	8.5	0.6%
Kansas Turnpike Authority	49.8	3.4%
Lawrence	384.2	26.3%
Lecompton	6.7	0.5%
Townships	576.3	39.4%
University of Kansas	11.0	0.8%
Total	1,462.8	100.0%

Note: Douglas County maintains all bridges and all large culverts (opening greater than 25 sq. ft.) on Township roads
 Source: Douglas County & City of Lawrence (2017)



What is a center line mile?

A center line mile is a term used for one mile of a single roadway regardless of the number of lanes on the road.



Functional Classification

Interstates – roadways designated as interstate highways by the USDOT and KDOT.

Other Freeways and Expressways – limited access roads not designated as interstates that have a primary mobility function. These roads may have interchanges and some at-grade intersections.

Other Principal Arterials – major roads with a primary mobility function that are designed to move traffic across town, connect neighborhoods, and provide access to major activity centers in the region. These roads carry traffic to, from, and through the region. They are typically viewed as the major roads for the area, have some of the highest traffic volumes, serve longer trip lengths than other surface streets, and carry a high proportion of the area's traffic on a small percent of the road mileage.

Minor Arterials – roads having a primary mobility function that are designed to connect to and supplement the principal arterials while providing connections between neighborhoods and connections to some major activity centers. These roads may place more emphasis on land access than principal arterials. They may serve smaller cities and population centers not served by principal arterials.

two local governments that maintain most of the major roadway mileage in the region. However, that simple fact does not indicate the whole nature of the roadway system maintenance demands faced by those two entities nor does it present a picture of how the roadway maintenance demands on these two governments compare to other cities and counties around the state.

b. Functional Classification

The roadway network in Douglas County is composed of various types of roadways ranging from basic gravel roads to multi-lane freeways; the roads vary from congested urban arterials to sparsely used rural roads. For MPO purposes and this T2050 Plan the roadways in the region are classified as either urban area or rural area roads and then further divided into a number of functional classifications based on the role they serve in the network and how much mobility versus property access function they are planned to have (Figure 2.25). Figure 2.26 displays the Functional Classification Map for Douglas County. Table 2.9 shows the total mileage and percentage for each classification type. Brief descriptions of the roadway functional classifications used by the MPO are listed in the sidebar on this and the following page; more detailed descriptions of those terms including Federal Highway Administration (FHWA) definitions of them are found on the [FHWA website](#).

Figure 2.25: Roadway Function: Mobility and Access

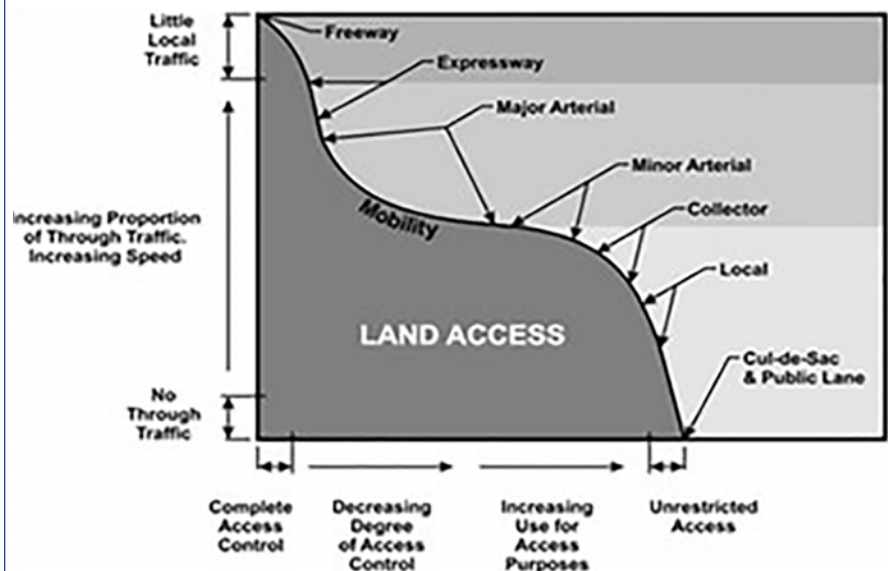



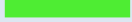








Table 2.9 Miles of Classified Roadways

Facility Type	Total Mileage	Percentage	Color
Interstate	17.3	1.3%	
Other Freeway & Expressway	33.4	2.4%	
Other Principal Arterial	22.8	1.7%	
Minor Arterial	97.8	7.2%	
Future Minor Arterial	-		
Major Collector	214.1	16.1%	
Future Major Collector	5.4		
Minor Collector	77.3	5.8%	
Future Minor Collector	2.4		
Local	895.6	65.6%	
Total	1,366.1	100.0%	

Source: 2021 MPO-KDOT-FHWA Roadway Functional Classification Map, MPO Approved 10-21-21

c. Other Roadway Classifications

Local governments may classify road segments differently than what is shown on the preceding MPO functional classification map. Those differences can relate to local practices or regulations. The two other classification maps used routinely by land use and transportation planners in the region are the Lawrence-Douglas County Major Thoroughfares Map and the Douglas County Access Management Map. The two locally produced maps (Major Thoroughfares and County Access Management Maps) provide useful planning information to help guide the development of the region’s roadway network and helps local officials avoid several problems that can develop if the future function and design needs for roadways are not accurately anticipated. The local road classification maps generally complement and supplement the information on the MPO-KDOT-FHWA Roadway Functional Classification Map Lawrence-Douglas County, Kansas (Functional Classification Map). However, in some cases the local made maps portray higher classifications for certain road segment than the Functional Classification Map does, and that is acceptable. Classification at a higher level often results from the local government concerns about access management or it can be the result of the difference between the regional MPO and local city/county viewpoints from which the different maps are drawn. For rural roads, the Functional Classification Map classifies roads based on their function on a regional or statewide basis, whereas the locally produced Access Management Map, for example, classifies roads based on their function on an intra-county basis.



Functional Classification (cont.)

Major Collectors – roads that have a relative balance between mobility and property access functions, bring traffic to higher class roads, connect to smaller activity centers, and serve important travel corridors in the region which are not served by higher class roads.

Minor Collectors – roads that have a balance between mobility and property access functions, supplement major collectors, bring traffic to higher class roads, and may provide connections to small local activity centers.

Local Roads – public roadways that have a primary purpose of property access and/or are not classified by the MPO. They provide the lowest level of mobility and are designed for short trips leading to nearby destinations in the same neighborhood or provide a connection from land uses to a higher class road. Longer through trips along these roads should be discouraged.



Federal Functional Classification & Major Thoroughfares

The Federal Functional Classification Map is a federally mandated map with certain requirements and is used on a state and national level. The Major Thoroughfares Map is used by Lawrence and Douglas County to balance land access and through movement of traffic for network level planning. Network planning ensures connectivity and access, as well as guides local decisions on corridor preservation, access management, and roadway design.



Map Classification

Lawrence Major Thoroughfares –

Used for development purposes to balance land access, through movement of traffic, for network level planning. The type of road classification determines the amount of required right-of-way, the location of access, and other developmental characteristics.

Federal Functional Classification –

A federally mandated map used on a state and national level. The functional classification of roadways defines the role each road plays in serving travel needs on a regional level. Federal legislation uses functional classification to determine eligibility for Federal funding.

Douglas County Access Management Road Classifications –

Used to increase the safety of the traveling public by reducing motor vehicle conflict points, extending the functional life of roadways, and preserving roadway corridors. The access management road classification determines minimum width of required right-of-way, the number and spacing of entrances allowed, and other developmental characteristics

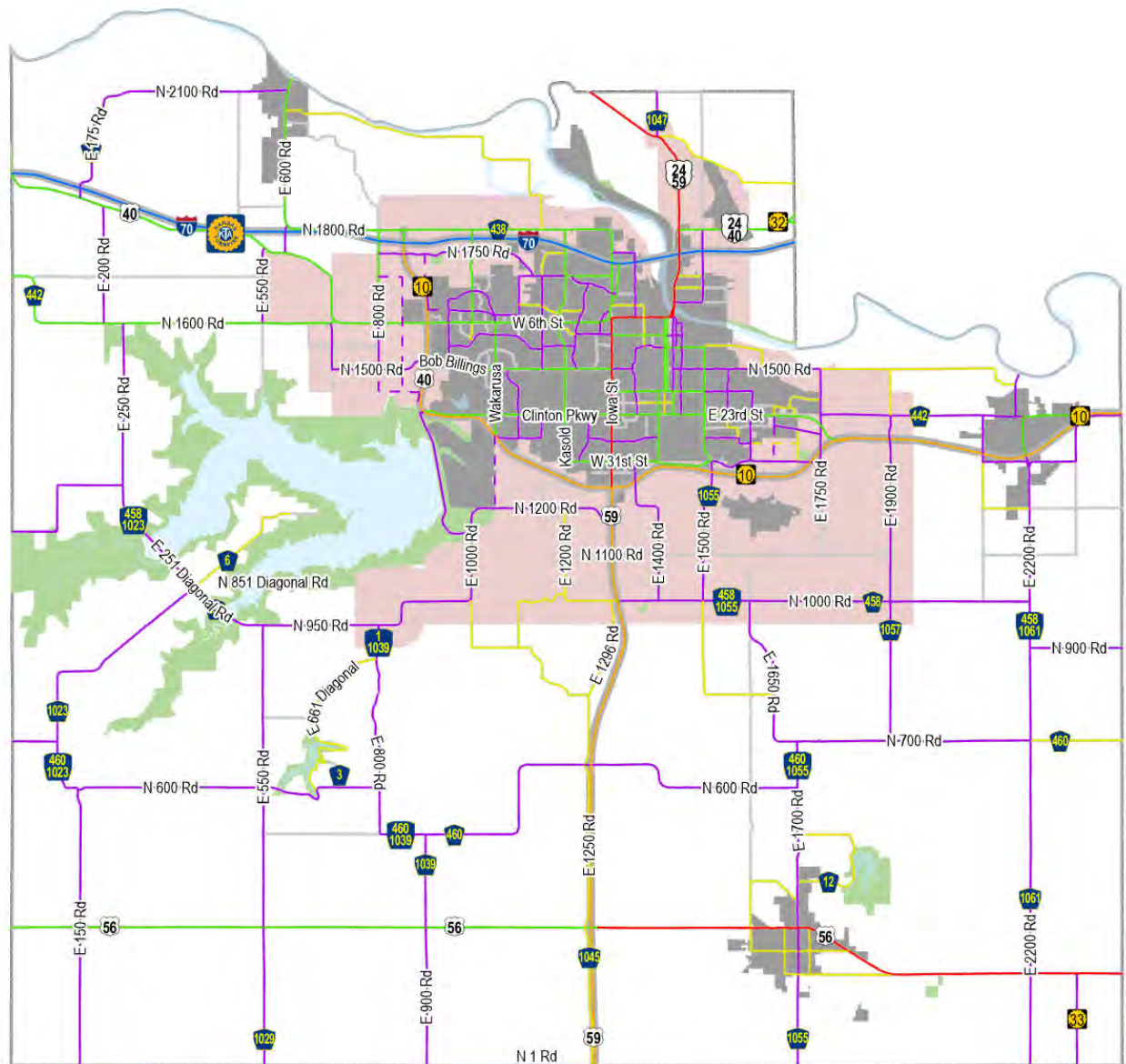
So, for example, a county road that may serve as a Major Collector on a regional or statewide basis may function as a Principal Arterial when considering only the Douglas County road network. In most cases the local maps have more classified road segments than the Functional Class Map and have higher classifications for some routes.

Lawrence-Douglas County Major Thoroughfares Map

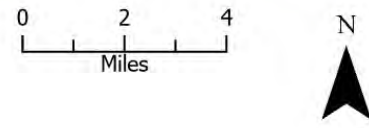
The Major Thoroughfares Map used by Lawrence and Douglas County land use planners is related to the MPO Functional Classification Map, but there are several differences. The thoroughfares map is created to address Kansas Statute No. 12-685 instead of the federal guidelines and regulations that the MPO uses to create the Functional Classification Map. This Kansas statute authorizes a city’s governing body to designate existing and proposed streets, boulevards, and avenues as “main traffic ways” whose primary function is the movement of traffic between activity areas within the city and between the city and surrounding areas. The roadway classifications shown on that map are used as the basis for guiding local decisions on corridor preservation, access management, and roadway design. That map is also referenced in Lawrence and Douglas County land use and development guides (zoning code, subdivision regulations, etc). The Major Thoroughfares Map, Figure 2.27 is the roadway classification map used for the Lawrence-Douglas County Comprehensive Plan and land use planning functions provided by the Lawrence-Douglas County Planning Department. The map is commonly referred to as the road classification map by Lawrence and Douglas County officials.



Figure 2.26: 2021 MPO-KDOT-FHWA Roadway Functional Classification Lawrence-Douglas County, Kansas



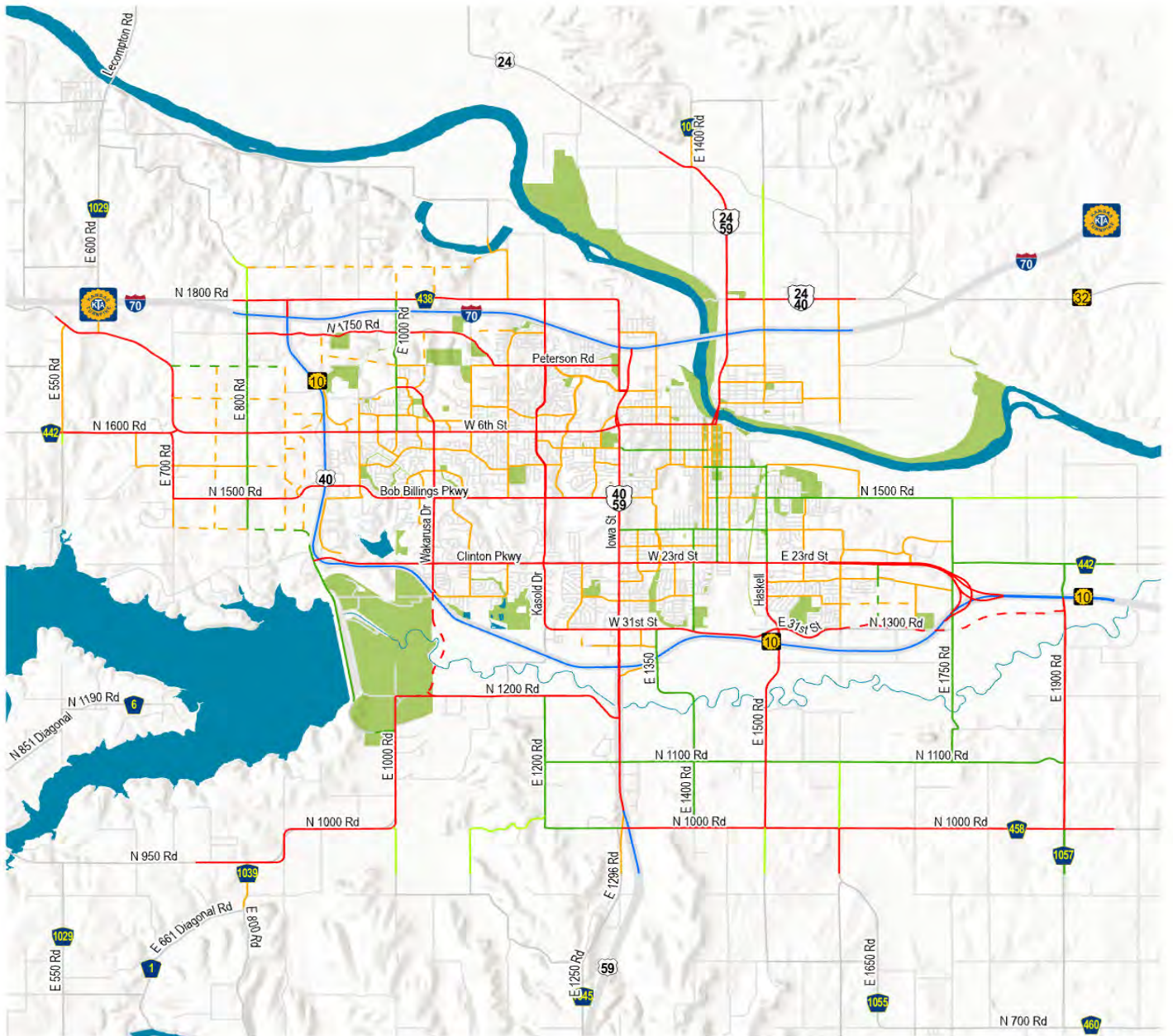
- Interstate
- Other Freeway & Expressway
- Other Principal Arterial
- Minor Arterial
- Major Collector
- - - Future Major Collector
- Minor Collector
- - - Future Minor Collector
- Lawrence Urbanized Area
- Parks
- Water Bodies
- City Boundary
- County Boundary



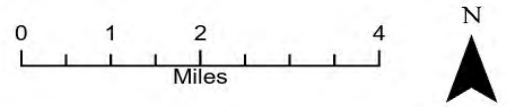
Date Exported: 12/5/2022
 Source: Federal Functional Classification (2021) and Plan 2040
 Produced: Lawrence-Douglas County MPO

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Figure 2.27: Lawrence-Douglas County Major Thoroughfares



- Collector/Rural Major Collector
- Freeway
- Minor Arterial
- Principal Arterial
- Rural Minor Collector
- Future Collector
- Future Minor Arterial
- Future Principal Arterial
- Water Bodies
- City Parks



Date Exported: 12/27/2022
 Source: Transportation 2050
 Produced: Lawrence-Douglas County MPO

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Douglas County Access Management Map

The other locally derived road class map used routinely by land use and transportation planners is the Douglas County Access Management Map. This map is used by land use planners and developers to determine access management type items like driveway spacing distances along rural area roads. In the unincorporated parts of Douglas County access management is particularly important for corridors that are likely to experience development or become urbanized in the foreseeable future. In 2006, Douglas County adopted access management standards for rural roads in which minimum frontage requirements increase as the functional classification of the road increases. That County action was taken to address the issue of strip development along county roads and to avoid problems caused by too many access points packed closely together along county routes.

Eudora, Baldwin City and Lecompton produce their own comprehensive plans and their own street classification maps in their planning documents. Those maps showing road classifications are typically coordinated with adjoining Douglas County road classifications.



View the [Eudora Future Street Network Map](#) in the Eudora Comprehensive Plan.

View the [Baldwin City Future Transportation Map](#) in the Baldwin City Comprehensive Plan.



d. Bridge Condition

In 2022, Douglas County was responsible for maintaining 158 bridges on county routes and township roads. (Figure 2.28). These bridge totals represent only bridges that are statutorily defined as openings of greater than 20 feet. As you drive around Douglas County it is clear that the drainage needs of the region dictate that roadways also include many drainage features that consist of smaller structures that convey water under the roads.

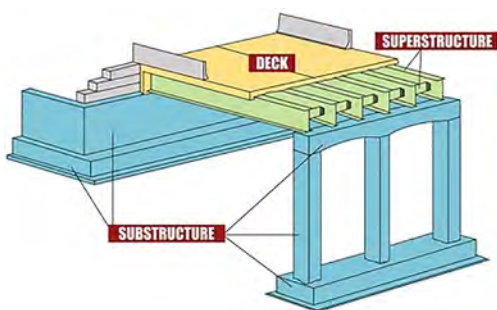
Those small structures typically are concrete culvert pipes or boxes. In 2022, Douglas County had over 1,000 culverts that they were responsible for maintaining on the County route system and township roads. By state law, the County is responsible for maintaining the bridges on both the County routes and Township roads, and the County is also responsible for maintaining Township road culverts that exceed 25 square feet of waterway opening area (e.g. a 5 foot x 5 foot box culvert). Townships are responsible for maintaining culverts on township roads that have smaller waterway openings.

Federal law requires bridges to be inspected at least once every 24 months or more frequently in certain circumstances. Inspections classify bridge condition as good, fair, or poor. A bridge is considered in good condition if the deck, superstructure, substructure, and culvert are rated at least 7 on a 0-to-9 scale. If any of these bridge elements is rated 5 or 6, a bridge is considered in fair condition. A bridge is considered structurally deficient and in poor condition if any element is rated 4 or less.

Functionally Obsolete is a classification previously used to describe a bridge that was structurally sufficient but no longer functionally adequate. The Federal Highway discontinued this classification in 2016 due to change in funding programs.



Bridge Components



For any bridges or culverts over a waterway, there is a condition component - channel. A bad channel can result in either structurally deficient or functionally obsolete designation. The primary consideration when evaluating and classifying structural deficiencies is the condition ratings of bridge components; specifically deck, superstructure, and substructure (see illustration in the sidebar).

Properly scheduled inspections help to identify unsafe conditions and if a bridge is determined to be unsafe, it is closed. Deficient bridges often remain open to traffic and have posted weight restrictions. These bridges are scheduled for rehabilitation or replacement to address deficiencies.

There are currently no structurally deficient bridges owned by the City of Lawrence, Douglas County, or KTA. There is one structurally deficient bridge owned by the KDOT. The KDOT bridge had a recent repair project to the deck which will likely result in an upgraded rating in the next inspection.



For more information about bridge condition in Douglas County see the [Kansas Local Infrastructure Planning \(KLIP\) Tool](#).



Performance Measure

14 - Percentage of NHS bridges by deck area classified as in Good condition

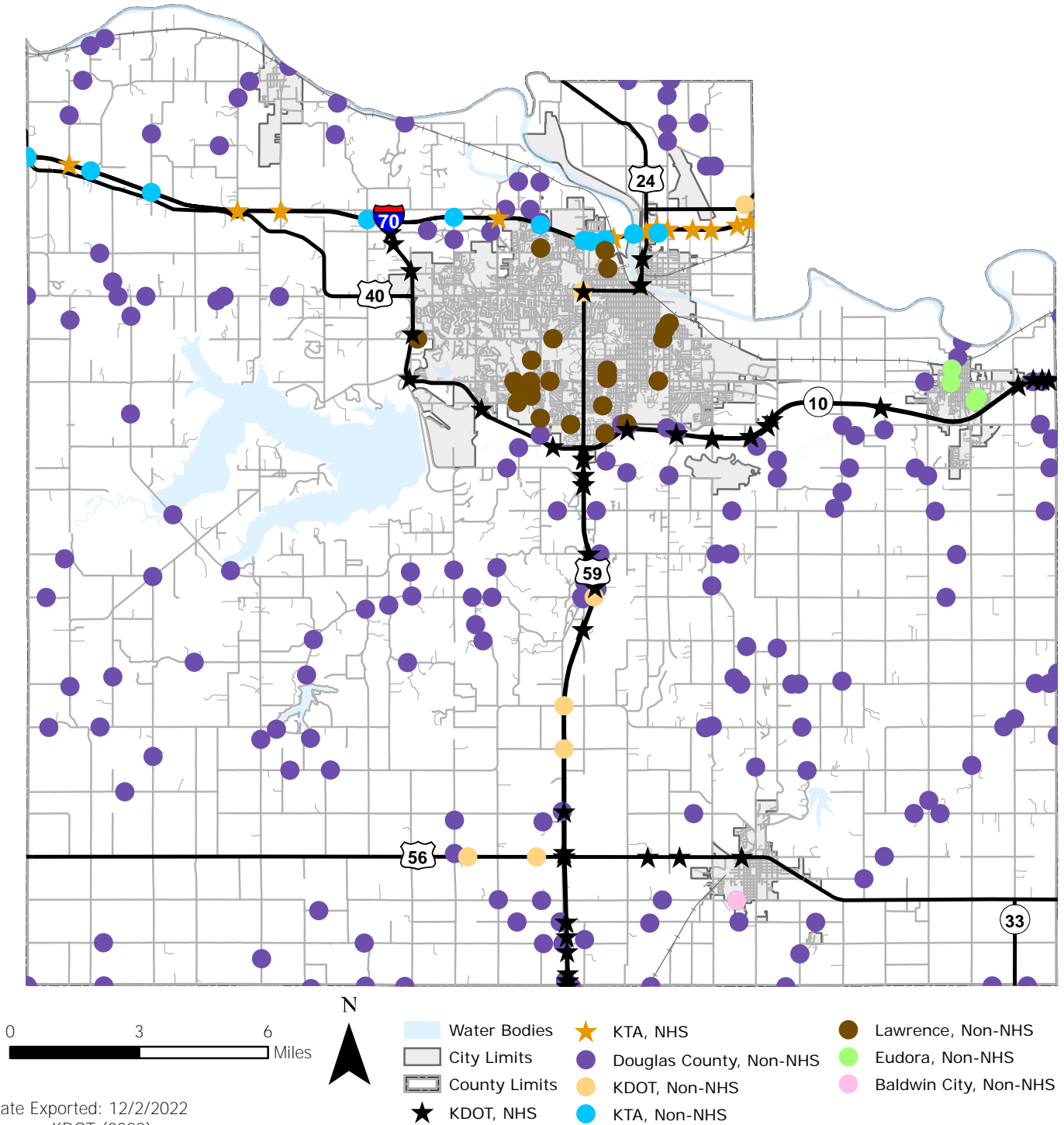
The federal government is moving towards evaluating bridges, utilizing a new metric that includes the deck, superstructure, and substructure. The rating is then weighted based on the deck area.

	2018	2019	2020	2021	2022
State Highway System	75%	71%	71%	70%	70%
KTA	99%	99%	99%	99%	99%
KDOT	85%	81%	86%	85%	85%
Total	92%	91%	92%	92%	92%

Source: KDOT (2022)



Figure 2.28: National Highway System (NHS) and Non-NHS Bridge



Date Exported: 12/2/2022
 Source: KDOT (2022)
 Produced: Lawrence-Douglas County MPO (2022)

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Performance Measure

14 - Percentage of NHS bridges by deck area classified as in Poor condition

	2018	2019	2020	2021	2022
State Highway System	2%	1%	2%	2%	3%
KTA	0%	0%	0%	0%	0%
KDOT	0%	0%	0%	3%	3%
Total	0%	0%	0%	1%	1%

Source: KDOT (2022)



Performance Measure

15 - Percentage of non-NHS bridges by deck area classified as in Good

	2018	2019	2020	2021	2022
State Highway System	74%	74%	75%	74%	73%
KTA	100%	100%	100%	100%	100%
KDOT	96%	94%	93%	93%	93%
County	80%	66%	72%	73%	72%
Lawrence/ Eudora	66%	69%	69%	72%	72%
Total	86%	78%	81%	81%	81%

Source: KDOT (2022)



Performance Measure

15 - Percentage of non-NHS bridges by deck area classified as in Poor

	2018	2019	2020	2021	2022
State Highway System	0%	1%	1%	1%	2%
KTA	0%	0%	0%	0%	0%
KDOT	0%	0%	0%	0%	0%
County	0%	0%	0%	0%	0%
Lawrence/ Eudora	0%	0%	0%	0%	0%
Total	0%	0%	0%	0%	0%

Source: KDOT (2022)



Source: Adobe Stock

e. Pavement Condition

Lawrence Municipal Services and Operations, Douglas County Public Works, City of Eudora, and KDOT regularly evaluate their pavement condition. Douglas County, and Eudora utilize a Pavement Condition Index (PCI) score based on visual inspection of the streets. Lawrence utilizes a PCI score based on data collected from a vehicle equipped with measuring and positioning equipment, a laser road imaging system, road surface profiler, and high-resolution cameras.

For Lawrence, software is utilized to calculate the PCI after engineering and quality control review of the collected pavement condition data is performed. The PCI is a numerical rating intended to reflect the overall impact of various distresses on pavement condition and is based on ASTM-D6433 standard testing methodology. The PCI is calculated by subtracting the total distress deductions from 100. The resulting PCI number falls within a rating scale range of 0 to 100. Douglas County also uses range of 0 to 100. Eudora’s scale is based on 0 to 10.

KDOT utilizes the International Roughness Index (IRI), cracking, rutting and faulting to rate its pavement according to FHWA Guidance on Transportation Performance Management Performance Measure Rule 2, or PM2. A van with a pavement profiling system collects real-time continuous highway speed measurements of longitudinal profile elevations, International Roughness Index (IRI), and faulting.

Table 2.10 Pavement Condition Scoring

Pavement Condition		
Jurisdiction	Score	Rating
Lawrence	>70	Satisfactory
	<70	Poor
Douglas County	>80	Good
	60-80	Fair
	<60	Poor
Eudora	>60	Good
	<60	Poor
KDOT	1	Good
	2	Fair
	3	Poor



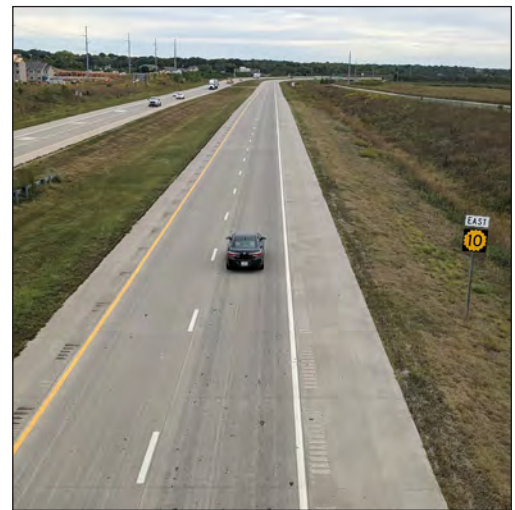
Pavement Condition Thresholds

	Good	Fair	Poor
IRI (inches/mile)	<95	95-170	>170
Rutting (inches)	<0.20	0.20-0.40	>0.40
Faulting (inches)	<0.10	0.10-0.15	>0.15
Cracking (%)	<5	5-20 (asphalt) 5-15 (JCP) 5-10 (CRCP)	>20 (asphalt) >15 (JCP) >10 (CRCP)

Values for IRI, Rutting, Faulting, and Cracking are categorized into three levels representing good, fair, and poor based on the Threshold Values in the figure (above) and Pavement type for the measurements summarized over 1/10th (nominal) mile pavement sections. Overall pavement condition is “good” if all three levels are “good”. If any two levels are “poor” then overall condition is poor”.

The end result for all of this is each pavement management section has a distress state that is created from the roughness, cracking, and rutting or faulting levels. Twenty-seven possible distress states from 111 to 333 are created from the roughness and distress data. By combining the distress state and pavement type, a performance level can be assigned to each segment.

Each entity determines what is considered “good” and “poor” pavement condition differently, with the scale used shown in Table 2.10.



Performance Measure

20 - Percentage of pavement of non-NHS major roads (collector and above) in Good and Poor condition (by City, County)

Lawrence	
PCI Rating	2020
Good (PCI > 70)	52.1%
Good Mileage	204.9
Poor Mileage (PCI < 70)	47.9%
	188.4

Source: Lawrence (2022)

Note: Lawrence changed how PCI data is collected beginning in 2020, making comparisons with past years invalid. 2020 is the most recent year PCI data was collected.

Douglas County					
PCI Rating	2016	2017	2019	2020	2021
Good (>= 80)	87.7%	87.4%	84.9%	84.9%	85.34%
Good Mileage	139.3	137.3	135.3	135.3	134.6
Poor (< 59.9)	0.0%	2.5%	0.0%	0.0%	0.0%
Poor Mileage	0.0	3.9	0.0	0.0	0.0

Source: Douglas County (2022)

Eudora			
PCI Rating	2016	2020	2021
Good (>= 6)	88.4%	93.9%	85%
Good Mileage			12.4
Poor (< 6)	11.6%	6.1%	15%
Poor Mileage			2.2

Source: Eudora (2022)



Performance Measure

18 - Percentage of pavements of the Interstate System in Good and Poor condition



	Good	Poor
2020	93.90%	0.00%
2021	94.60%	0.00%

Source: KDOT (2022)



Performance Measure

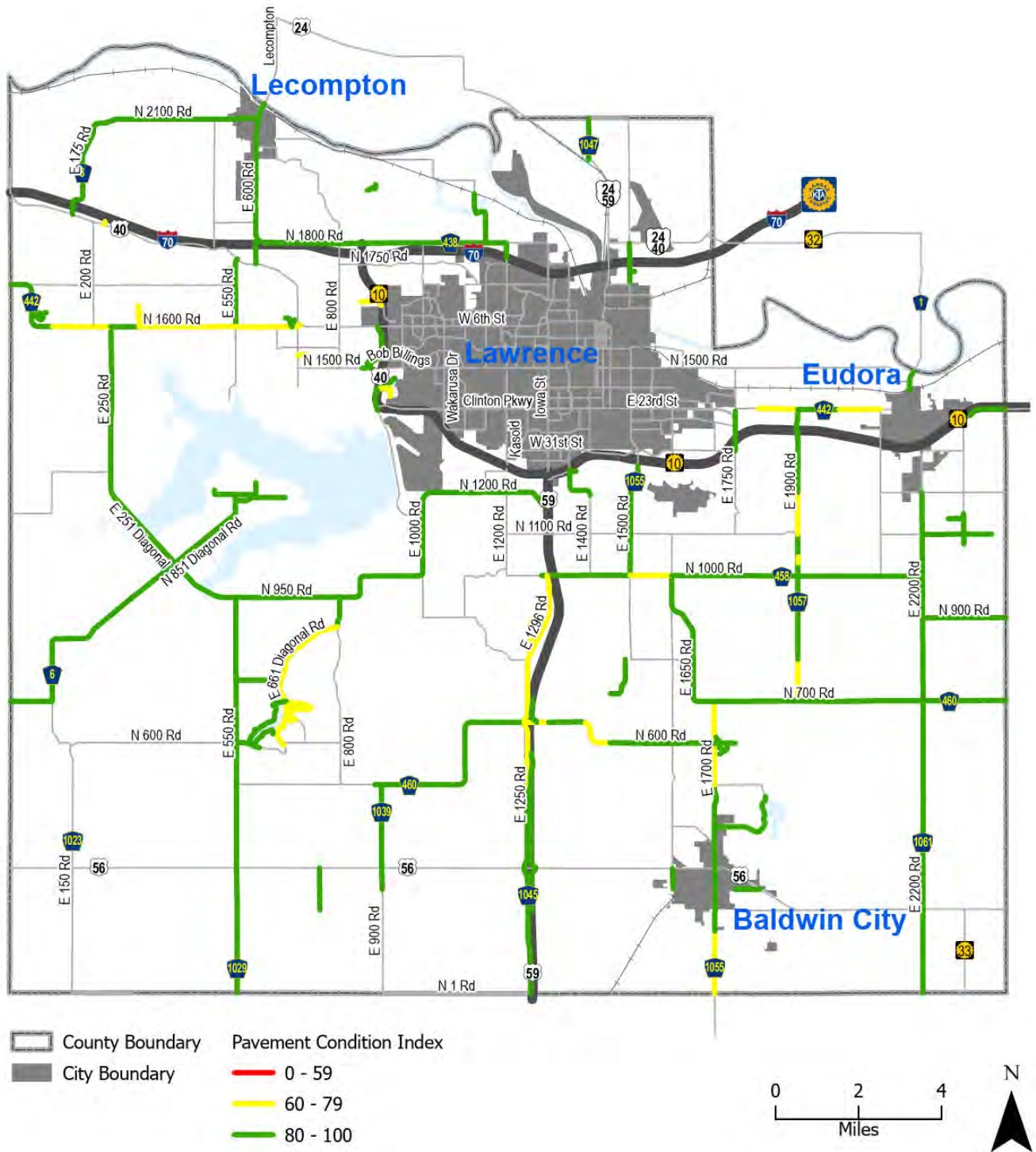
19 - Percentage of pavements of the non-Interstate NHS in Good and Poor condition



	Good	Poor
2020	60.60%	4.60%
2021	64.60%	4.20%

Source: KDOT (2022)

Figure 2.29: Douglas County Pavement Condition Map

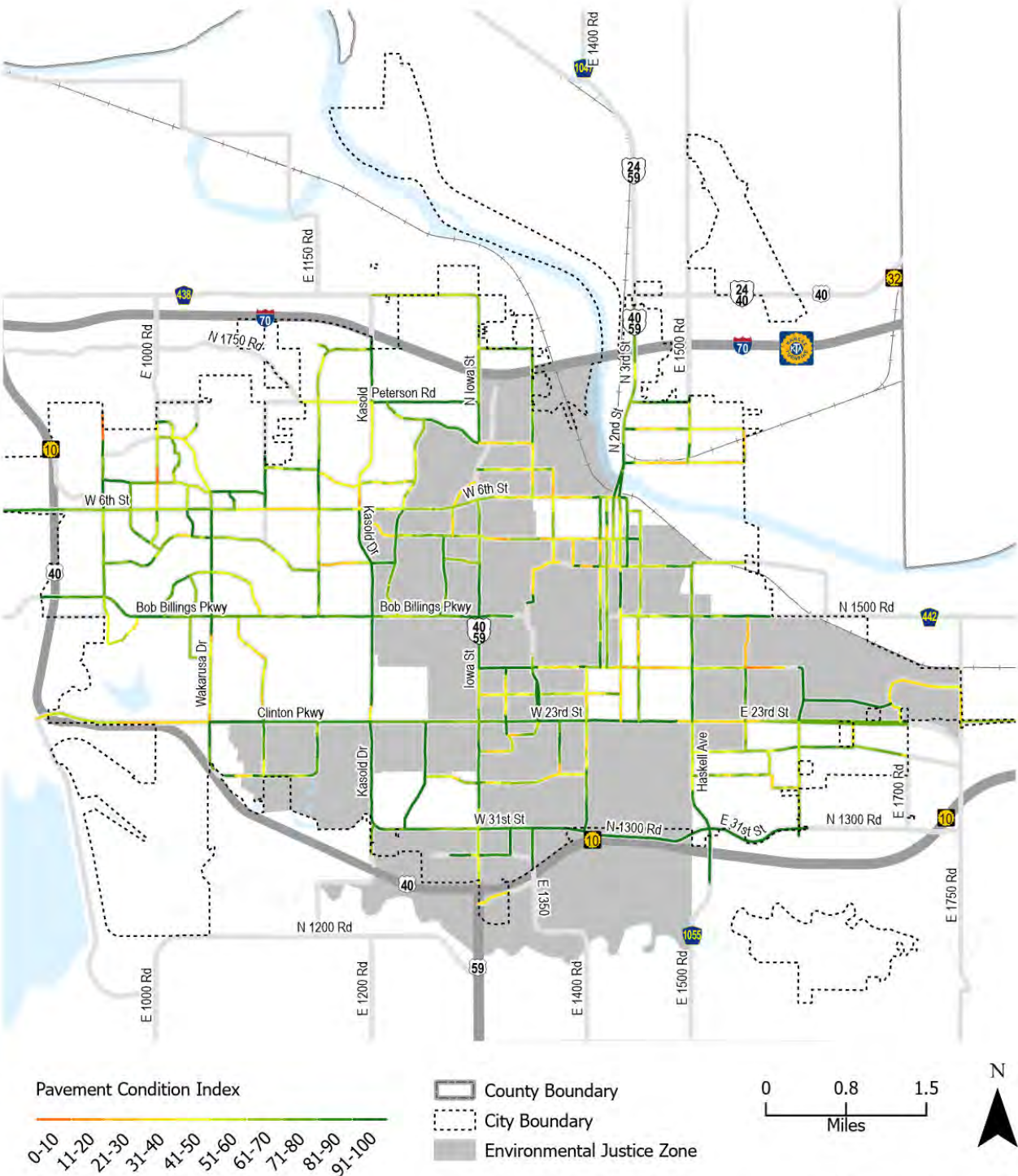


Date Exported: 1/11/2023
 Source: Douglas County and CDBG 2020
 Produced: Lawrence-Douglas County MPO

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Figure 2.30: Lawrence Pavement Condition Map



Date Exported: 1/27/2023
 Source: City of Lawrence Municipal Services & Operations Department and LMISD
 Produced: Lawrence-Douglas County MPO

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What are Intelligent Transportation Systems (ITS)?

ITS applies technology and communication systems to improve the multi-modal movement.

It includes traffic conditions detection systems and cameras, dynamic message signs providing real time travel information, agency coordination, and a host of other technologies improving the transportation infrastructure



f. Signalized Intersections

The City of Lawrence currently has 106 signalized intersections and 15 pedestrian/bicycle hybrid beacons throughout the City (Figure 2.31). There are 54 intersections along North 2nd-3rd Street, 6th Street, Iowa Street, Clinton Parkway, 23rd Street, 19th Street, Kasold Drive, and Wakarusa Drive that are part of an ITS system of coordinated signal corridors and are connected to the Traffic Operations Center via fiber optic cable. The remaining 52 signalized intersections are isolated and run in free mode.

These ITS efforts are designed to improve traffic flow, reduce delays, and reduce air pollutant emissions; the system will be expanded as funding becomes available. The [ITS Architecture](#) provides a framework for ITS implementation.

g. Commuting Patterns

The most recent ACS estimates on commuting flows from 2011-2015 indicate approximately 9,400 residents from outside Douglas County commuted into Douglas County each weekday for employment. Approximately 16,000 Douglas County residents commuted to areas outside the County, with the majority going to Johnson and Shawnee Counties in Kansas. Figures 2.32 and 2.33 illustrate commuter patterns within the area.



Performance Measure

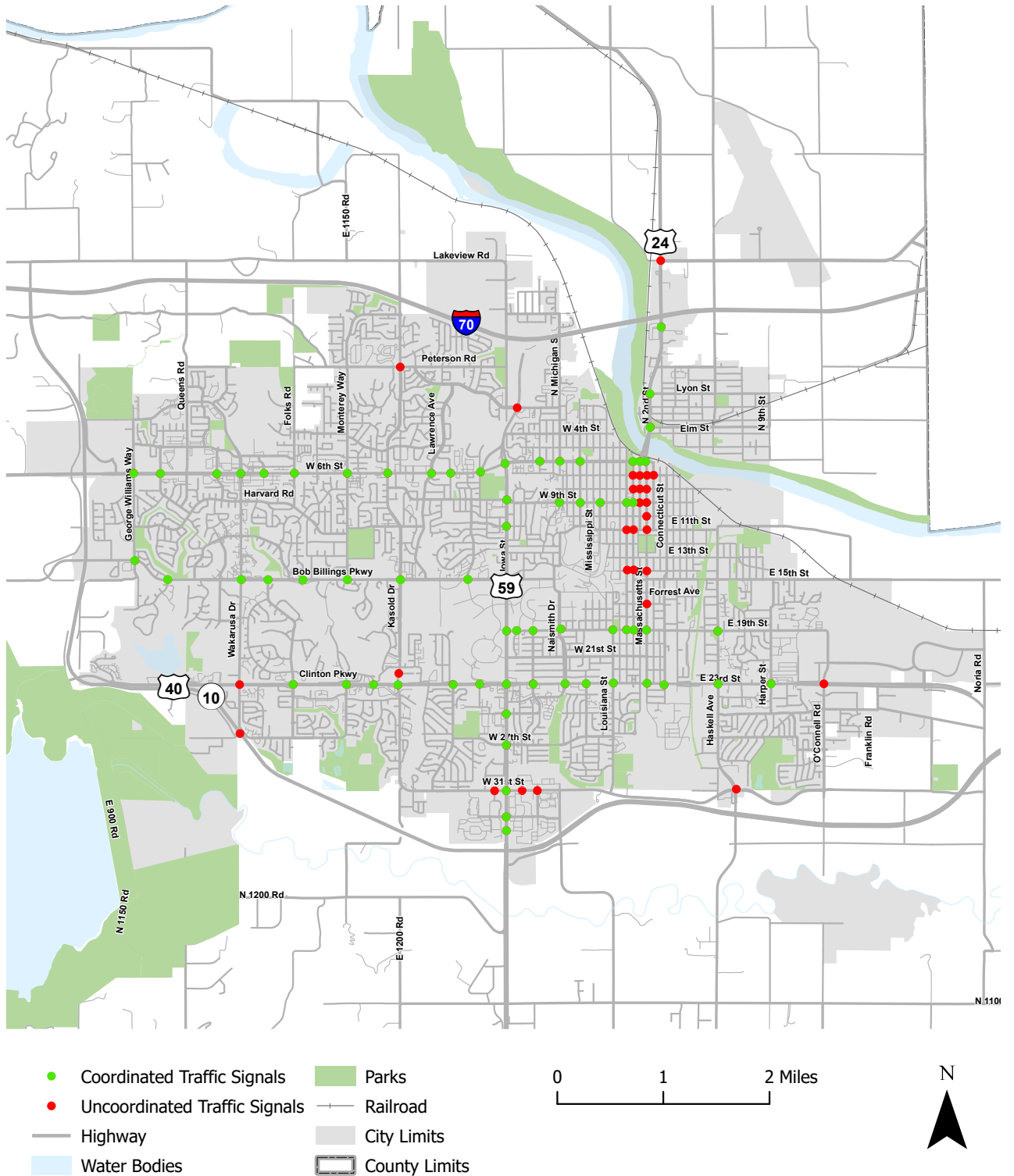
6 - Percent of the Person-Miles Traveled on the Interstate & Non-Interstate NHS That Are Reliable



	Interstate	Non-Interstate NHS
2020	100.00%	98.80%
2021	100.00%	99.50%

Source: NPMRDS (2022)

Figure 2.31: Lawrence Signalized Intersections



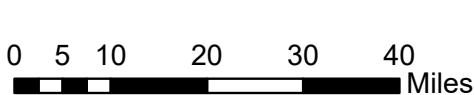
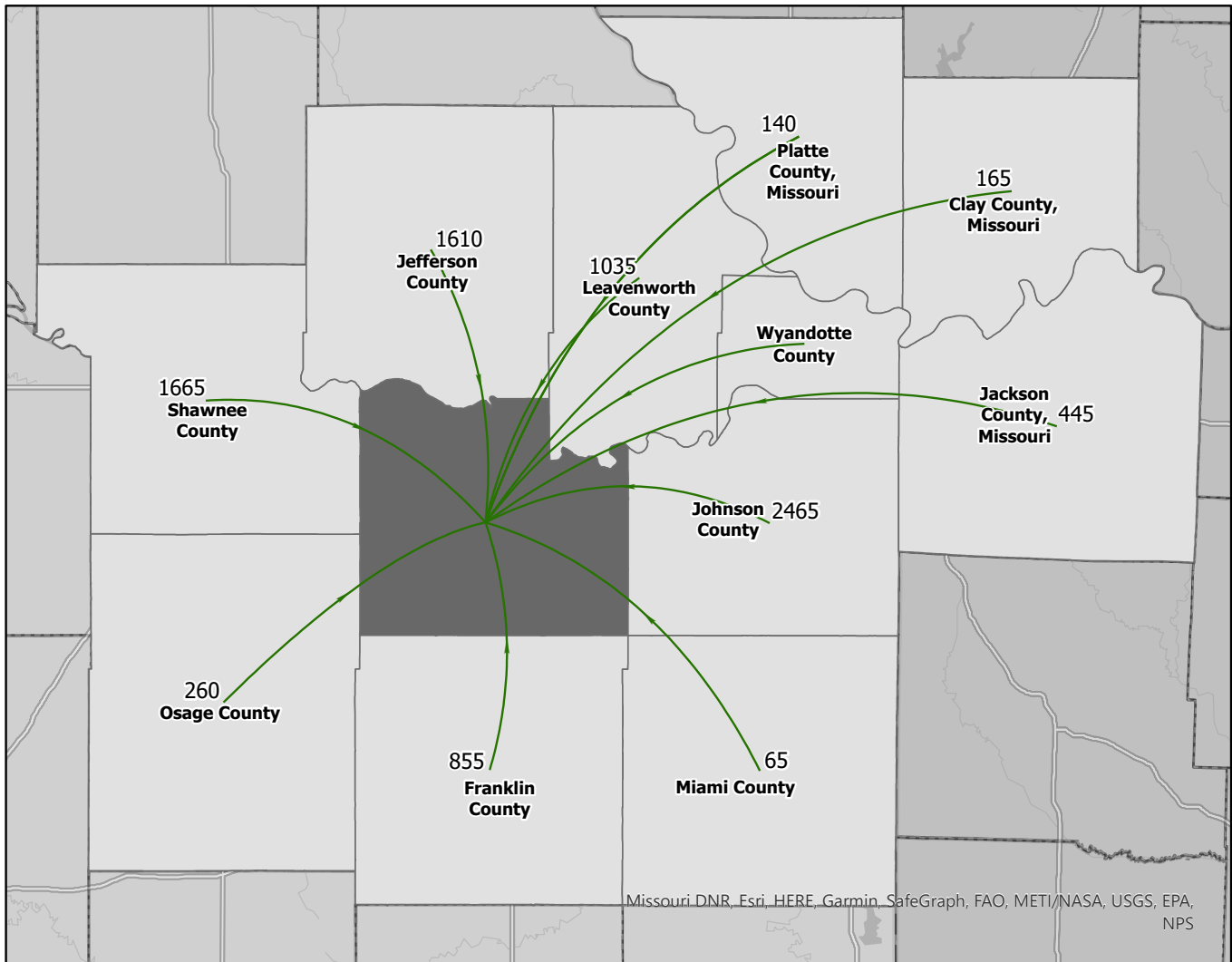
Date Exported: 9/15/2022
 Source: Lawrence Pedestrian Plan 2021
 Produced: Lawrence-Douglas County MPO

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Figure 2.32: Commuting Patterns - Inbound

Inbound Commuters



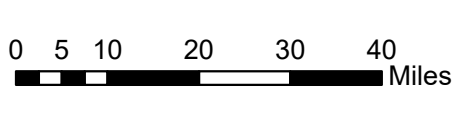
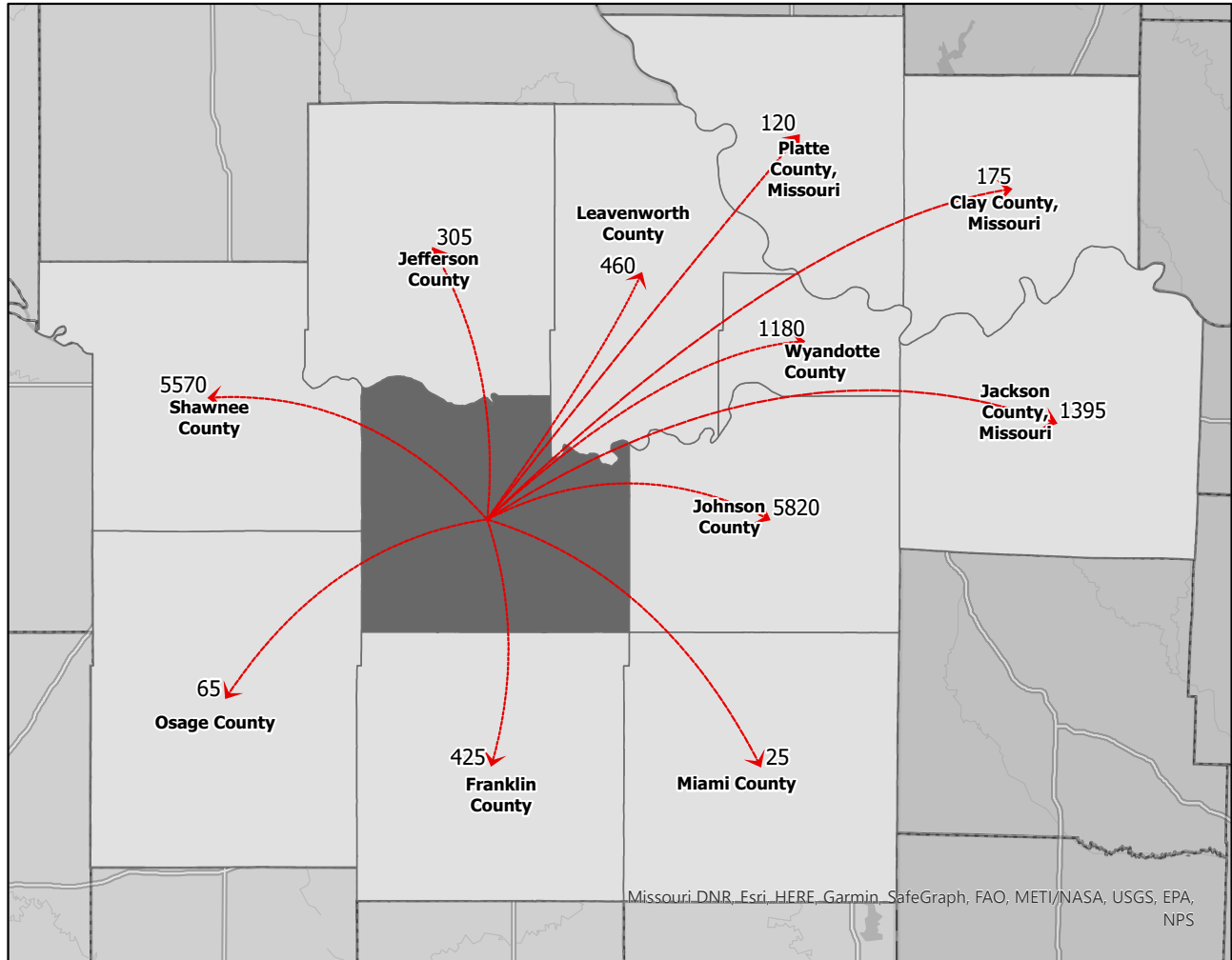
Date Exported: 10/13/2022
Source: Census Transportation Planning Products - A302100 (CTPP)
(2012-2016 5-yr ACS)
Produced: Lawrence-Douglas County MPO

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Figure 2.33: Commuting Patterns - Outbound

Outbound Commuters



Date Exported: 10/13/2022
Source: Census Transportation Planning Products - A302100 (CTPP)
(2012-2016 5-yr ACS)
Produced: Lawrence-Douglas County MPO

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Performance Measure

23 - Daily Vehicles Miles Traveled (VMT) per Capita

	Daily VMT Per Capita					
	Baldwin City	Eudora	Lawrence	Lecompton	Rural Areas	Douglas County
2011	5.5	6.6	12.7	7.9	118.7	23.3
2012	5.3	6.9	12.9	8.2	122.1	23.7
2013	4.7	6.6	12.3	3.3	115.7	22.6
2014	4.7	6.2	12.3	11.2	116.4	22.6
2015	4.8	12.0	12.7	2.9	115.3	23.0
2016	5.4	13.6	12.9	3.5	121.5	23.9
2017	5.4	15.3	12.8	3.4	134.7	25.0
2018	5.5	15.8	12.7	3.5	132.0	24.8
2019	5.8	15.1	12.3	3.6	129.7	24.0
2020	4.6	13.1	10.9	3.1	87.6	20.5
2021	5.5	15.0	12.3	3.8	128.4	24.0

Source: KDOT (2021), US Census (2021)



Performance Measure

7 - Average commute times

Entity	2018	2019	2020
Lawrence	19.6	19.6	19.6
Baldwin City	25.8	25.3	24
Eudora	25.3	23.6	22.5
Lecompton	22.1	21.3	25.4
Douglas County	20.6	20.4	20.4

Note: This data is based on where people begin their trip regardless of where they are traveling. Time in minutes.

Source: ACS 5-year estimates (S0801)



Performance Measure

8 - Truck Travel Time Reliability (TTTR) Index on the Interstate system

2018	1.08
2019	1.12
2020	1.08
2021	1.09

Source: NPMRDS (2022)

Table 2.11: Roadway Level of Service

Level of Service	A	B	C	D	E	F
Traffic Flow	Free-flow conditions	Reasonably Free-flow	Influence of Traffic Density is Noticeable	Influence of Traffic Density is Severe	Unstable	Forced or Breakdown
Maneuverability	Almost Completely Unimpeded	Slightly Restricted	Noticeably Restricted	Severely Restricted	Extremely Unstable	Almost None
Driver Comfort	High	High	Some Tension	Poor	Extremely Poor	Extremely Poor
Average Speed	Speed Limit	Close to Speed Limit	Close to	Some Slowing	Significantly Slower than Speed Limit	Significantly Slower than Speed Limit
Volume to Capacity Ratio (V/C)	< 0.40	0.40 – 0.59	0.60 – 0.79	0.80 – 0.89	0.90 – 0.99	> 1.00

h. Busy Road Segments & Intersections

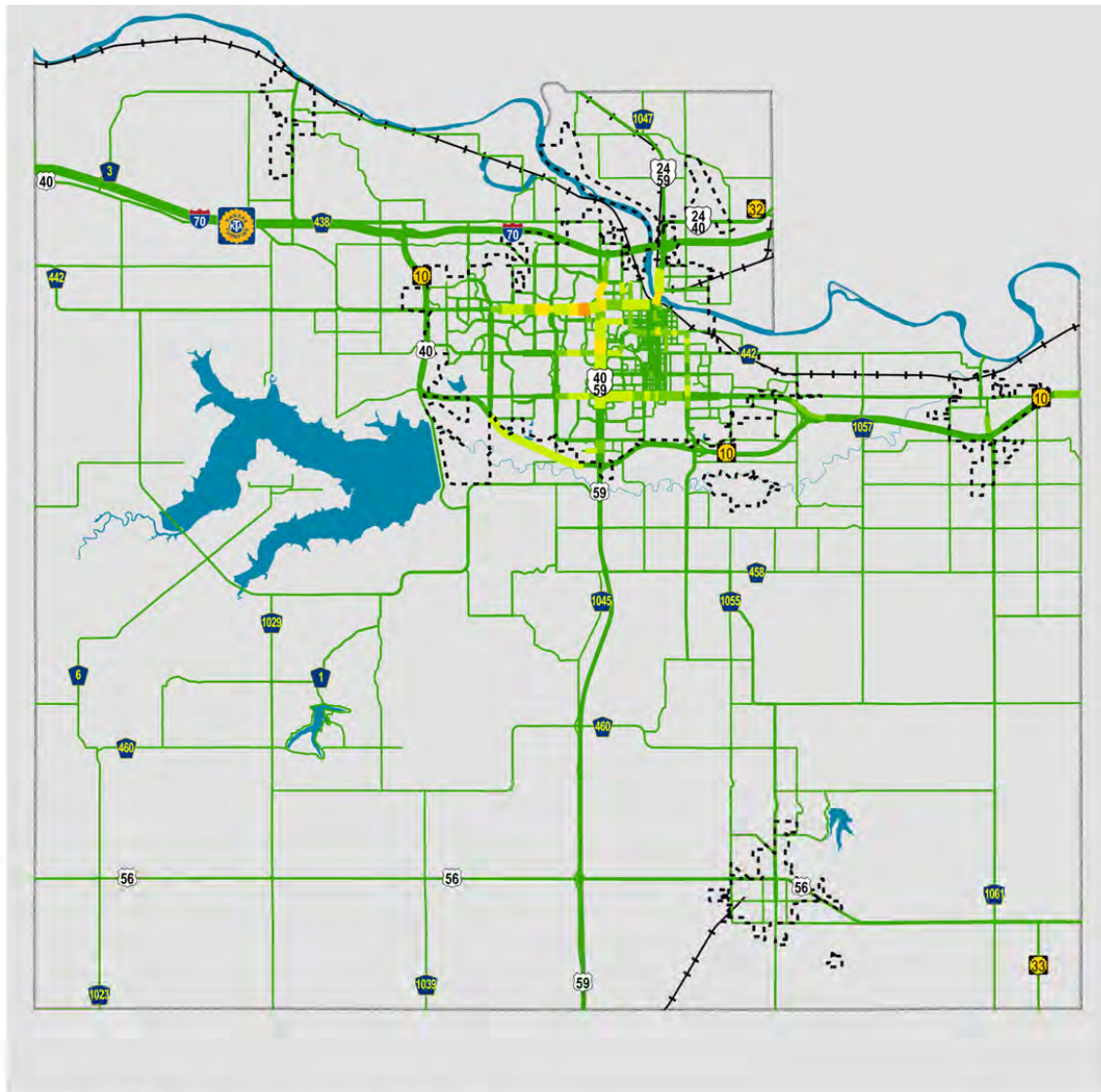
Level of Service (LOS) can be explained in terms of vehicular traffic flow, maneuverability, driver comfort, average speed, and the ratio of traffic volume to a roadway’s maximum traffic capacity. It is typically reported for the peak traffic hour (rush hour) of a typical weekday. Table 2.11 defines each LOS rating.

The region’s Travel Demand Model provides the Level of Service for major streets, roads, and highways in Douglas County. Many communities around the country try to maintain LOS C or D, or better for their roadway systems, although it is acceptable with some locations, such as a busy downtown area, to operate at an even lower Level of Service during peak times. Many communities also use their Level of Service standard to develop and prioritize projects to improve transportation facilities and services as well as to regulate growth and development. The City of Lawrence and Douglas County currently do not have a LOS standard for roadway corridors.

Much of the area’s road and bridge system is operating with comfortable levels of traffic and are not close to operating at or near capacity. Some other parts of the system do experience traffic congestion for certain periods of the day, reflected by LOS D or E on Figures 2.34 and 2.35. These figures display the base year (2019) Level of Service from the Travel Demand Model during afternoon peak hour (4PM - 5PM). Most of the traffic congestion within Douglas County occurs in Lawrence.

Congestion is generally occurring on multi-lane facilities designed to carry high traffic volumes so their congestion at peak hours is expected and tolerated by most drivers, All of these locations are well known to Lawrence drivers, are busy roads, and are important to the smooth function of the region’s roadway network.

Figure 2.34: Douglas County 2019 Base Year Level of Service



- LOS Categories**
- A - less than 0.6
 - B - 0.6 - 0.7
 - C - 0.7 - 0.8
 - D - 0.8 - 0.9
 - E - 0.9 - 1.0
 - F - 1.0 +

- Railroad
 - City Boundary
 - County Boundary
- Total Flow Rates**
-



Date Exported: 2/28/2023
 Source: T2050 Travel Demand Model
 Produced: Lawrence-Douglas County MPO

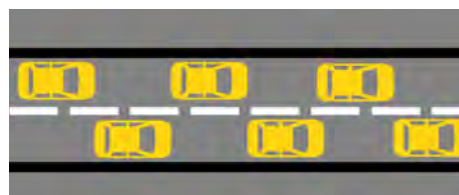
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Uncongested (A-C)



Congesting (D)



Congested (E-F)

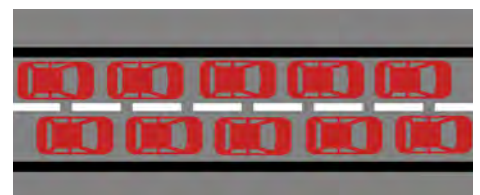
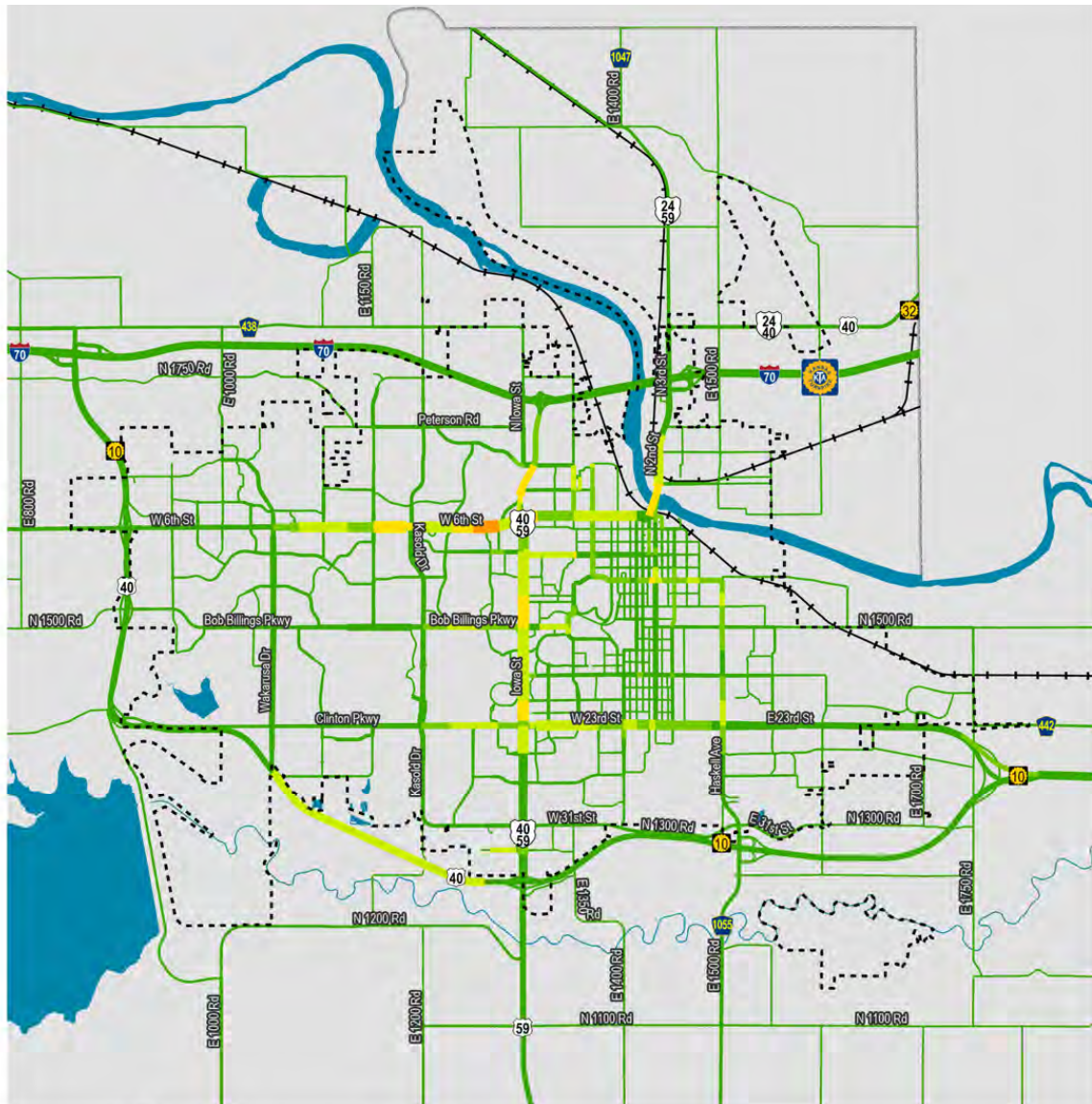


Figure 2.35: Lawrence 2019 Base Year Level of Service



- LOS Categories**
- A - less than 0.6
 - B - 0.6 - 0.7
 - C - 0.7 - 0.8
 - D - 0.8 - 0.9
 - E - 0.9 - 1.0
 - F - 1.0 +

- Railroad
 - City Boundary
 - ▭ County Boundary
- Total Flow Rates**
-

N

Date Exported: 2/28/2023
 Source: T2050 Travel Demand Model
 Produced: Lawrence-Douglas County MPO

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Uncongested (A-C)



Congesting (D)



Congested (E-F)





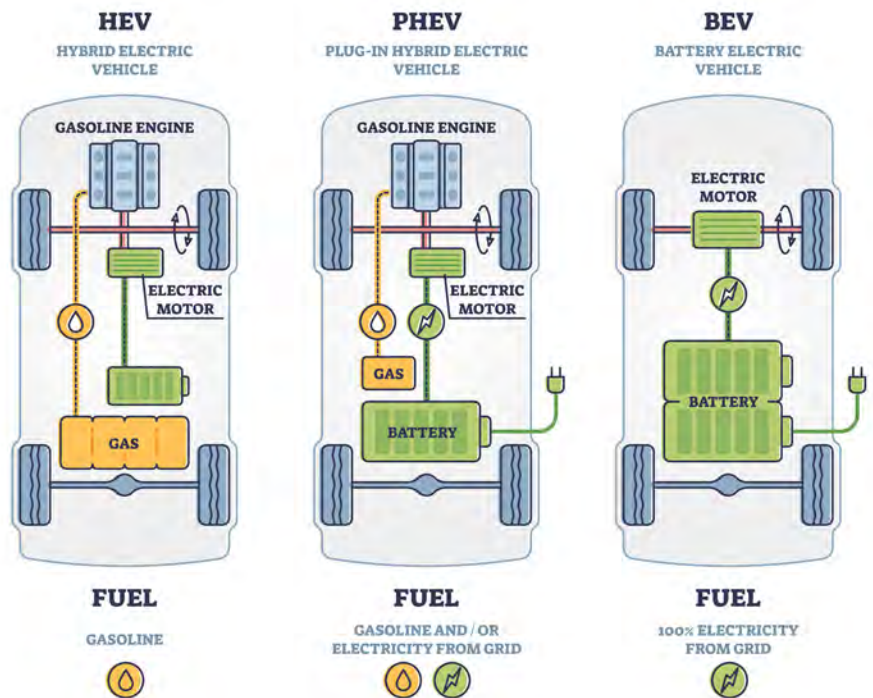
Source: Adobe Stock

i. Electric Vehicles & Infrastructure

Electric Vehicles (EVs) make up a small but growing portion of vehicles in use. In Kansas there were 7800 battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) vehicle registrations in 2021, which is less than 1% of all light-duty registrations but an increase of 388% from 2016. Nationwide, the U.S. Energy Information Administration (EIA) projects EVs will increase from less than 1% of on-road light duty vehicles in 2021 to 9% in 2050. EVs are growing in popularity for several reasons including improvements in battery cost and range, their smaller environmental impact, and lower cost of ownership.

The transportation sector is the largest producer of greenhouse gas emissions and EVs offer a lower emission alternative to conventional internal combustion engines. All-electric vehicles, plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs) typically produce lower tailpipe emissions than conventional vehicles do, and zero tailpipe emissions when running only on electricity. The life cycle emissions of an electric vehicle depend on the source of the electricity used to charge it.

Figure 2.36 Type of Electric Vehicles



Source: Adobe Stock



Types of Electric Vehicles

Battery Electric Vehicles (BEVs)

Also referred to as “all-electric vehicles”—run on electricity only and are recharged from an external power source. They are propelled by one or more electric motors powered by rechargeable battery packs.

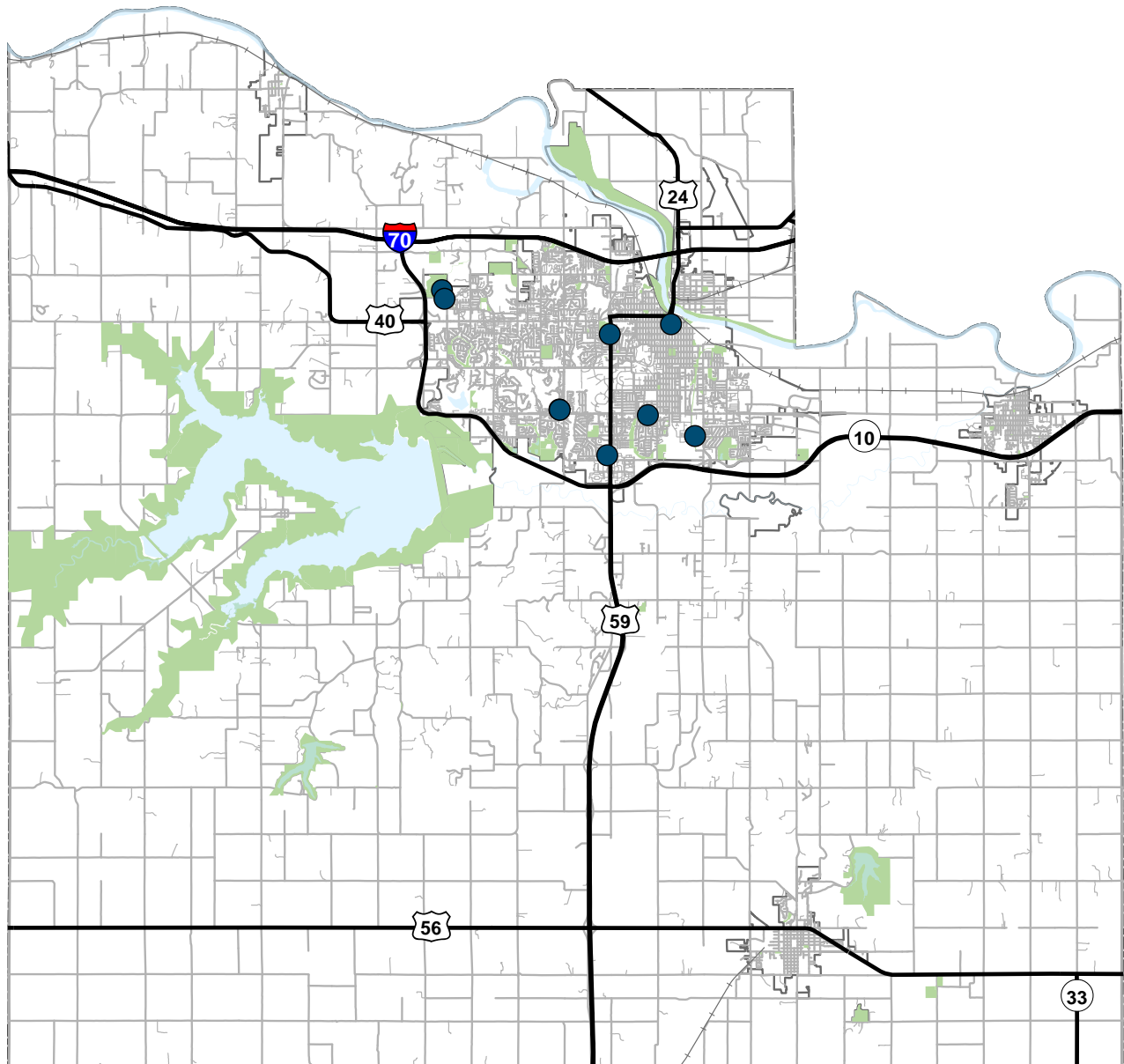
Plug-In Hybrid Electric Vehicles (PHEVs)

Use batteries to power an electric motor and can be recharged from an external power source, but they incorporate a smaller internal combustion engine that can recharge the battery (or in some models, directly power the wheels) to allow for longer driving ranges.

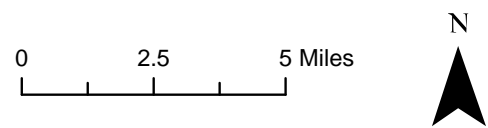
Hybrid Electric Vehicles (HEVs)

Powered by a combination of an internal combustion engine with electric motors running off a battery pack for greater efficiency. The batteries of an HEV cannot be recharged from an external source.

Figure 2.37 Public Electric Vehicle Charging Stations



- Electric Charging Stations
- ▭ County Limits
- Parks
- Water Bodies
- ▭ City Limits



Date Exported: 11/29/2022
 Source: US Department of Energy Alternative
 Fueling Station Locator
 Produced: Lawrence-Douglas County MPO

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Source: Adobe Stock

Lawrence Transit Fleet

Lawrence Transit has an existing fleet of 22 gasoline-powered paratransit cutaways and 26 fixed route vehicles of the following sizes and fuel types:

- 9 gasoline cutaways
- 8 heavy duty diesels
- 4 heavy duty hybrids
- 5 heavy duty electric

This means that the current fixed route fleet is 34% hybrid or electric and the overall fleet is 19% hybrid or electric. With 6 additional electric vehicles scheduled to arrive by 2024, which will change the fixed route fleet composition to:

- 7 gasoline cutaways
- 2 electric cutaways
- 5 heavy duty diesels
- 3 heavy duty hybrids
- 9 heavy duty electric

This will result in a fixed route fleet that is 54% hybrid or electric and an overall fleet that is 29% hybrid or electric by 2024.

In 2020 renewable energy consumption in Kansas accounted for 24.4% of all energy consumption, which ranks 10th in the United States. The Lawrence City Commission adopted a goal of 100% renewable electricity supply city wide by 2035 in [Ordinance 9744](#).

Drivers mostly rely on charging EVs at home; however, access to public charging is a key factor in decreasing range anxiety and increasing the convenience of driving EVs. Charging infrastructure at multifamily developments, workplaces, and other public locations can help support more widespread adoption of EVs. As shown in Figure 2.37, Douglas County currently has eight public charging locations. U.S. Department of Energy provides an online tool that helps estimate the number of charging plugs needed to support a given number of EVs within select cities, including Lawrence. Assuming 9% of light duty vehicles registrations are EVs, as projected by U.S. EIA, Lawrence would be home to approximately 6,500 EVs. The tool suggests this would require 142 Level 2 Charging Plugs, 87 Public Level 2 Charging Plugs, and 14 Public DC Fast Charging Plugs. Information about types of EV chargers is shown in Table 2.12.

Table 2.12: EV Charger Types

Charger Type	Electric Current	Charging Rate	Primary Use	Cost Estimate
Level 1	Alternating current (AC) 120 volt (V), 20 amp (A)	2 to 5 miles of range per hour of charging	Residential Workplace Fleet	\$300- \$1,500
Level 2	AC 208/240V, 30A	10 to 20 miles of range per hour of charging	Residential Workplace Fleet Public	\$400- \$6,500
DC Fast	Direct current (DC) 208/480V, 80-200A (and higher)	60 to 80 miles of range per 20 minutes of charging	Fleet Public	\$10,000- \$40,000.

Cost estimate does not include installation costs which can be significant but vary widely based site conditions.

In addition to personal vehicles, businesses and governments are also increasingly employing EVs in vehicle fleets to help meet climate or other goals. Lawrence Transit has received Low-No Emissions Program funding from the Federal Transit Administration to purchase a total of 11 electric buses which are being deployed in 2022 – 2024. Ultimately, Lawrence Transit plans to transition its entire bus fleet (50 buses) to zero-emissions by 2035. In 2023 both Lawrence

Transit and Lawrence Municipal Services and Operations will be working to create zero emission transition plans.

G. Freight, Intermodal, and Rail

The economic success of a region depends to a large degree on its connections to the rest of the world and its ability to facilitate the movement of people and goods across and within its boundaries. Fortunately, for Douglas County, major truck and rail routes traverse the area and make connections to other markets. The close proximity of Kansas City, which is a major rail center and truck route connection point, also helps freight move into and out of Douglas County. The connections in Kansas City are important nationally, and are just an hour or less away from Lawrence and other parts of Douglas County.

On a more regional and statewide scale, since Lawrence and Douglas County are located between the Topeka and Kansas City Metropolitan Areas, they fulfill a role as an important link along the I-70 and K-10 corridors. This is a significant link in moving traffic from Topeka and western Kansas into the Kansas City area and providing connections that serve traffic between Topeka and the growing economic development areas in Johnson County.

1. Freight Movements

Freight movements invariably impact land uses, especially along truck and rail corridors. Additionally, the northeast part of the state is located within a 24-hour drive of a majority of the Continental United States. Growth in freight traffic within Douglas County and surrounding counties is expected over the next few decades and that will impact the traveling public as more trucks will be using highways, major city streets, and some county roads adding to the traffic loads on the region’s major roads.

a. Existing Conditions

The largest freight corridor in the County is I-70, with 6,300 to 6,500 trucks passing through the region daily according to the 2021 KDOT Traffic Flow map (Figure 2.35). This is an increase of approximately 50% from 2016. The east leg of the South Lawrence Trafficway opened in

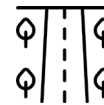


What is freight?

Freight is the transportation of goods by truck, train, ship, or aircraft. The majority of freight in Douglas County is carried on the highways within the county.



Source: Adobe Stock



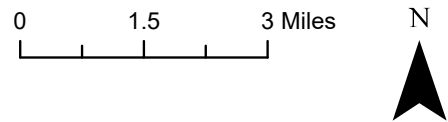
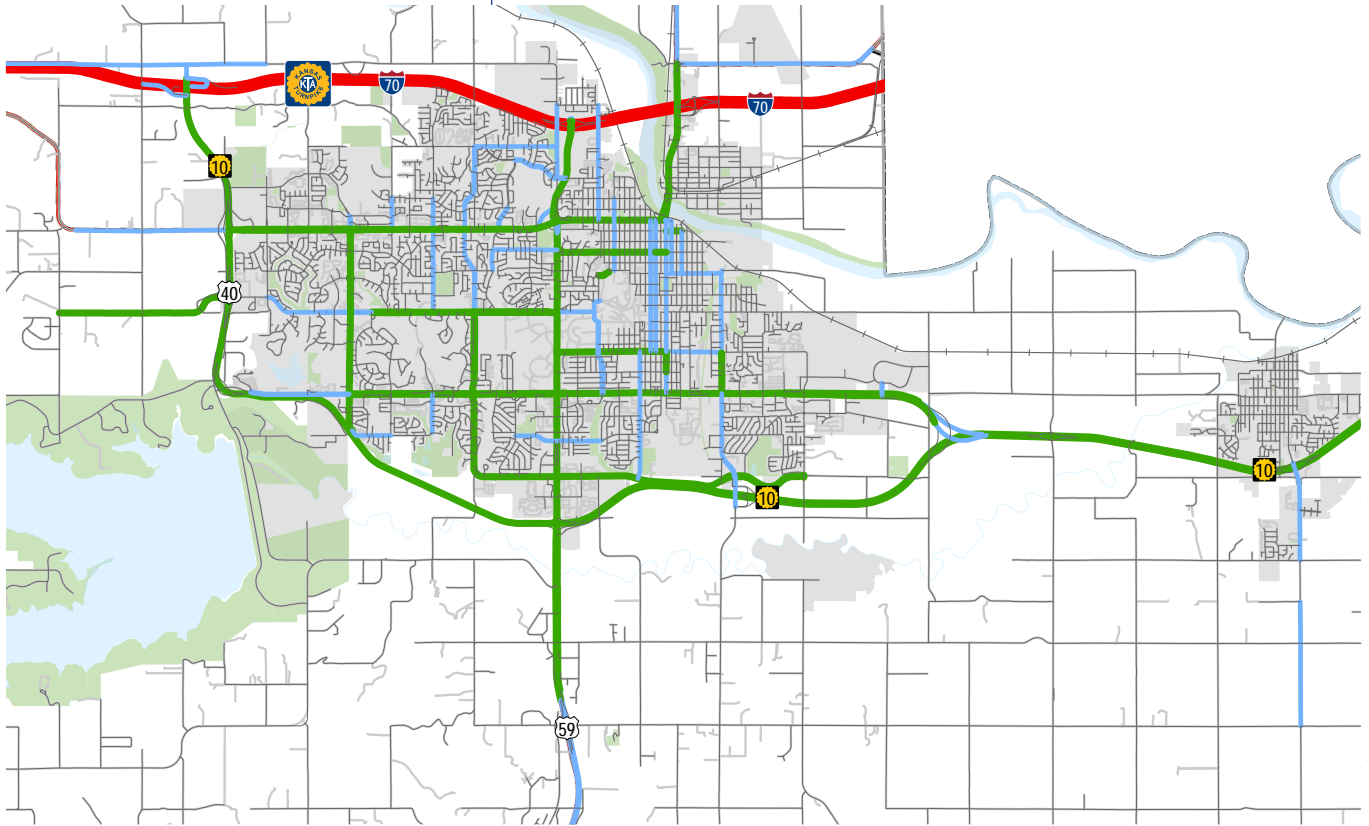
South Lawrence Trafficway

The South Lawrence Trafficway was completed in the fall of 2016. The following traffic counts represent the deferment of traffic before and after the completion.

	Pre-SLT	Post-SLT
Eastbound 23 rd Street	30,713	22,280
West leg SLT	8,504	18,470

Source: KDOT Traffic Counts, 23rd St 2007-2013 AVG and 2016 and West Leg 2009-2015 AVG and 2017

Figure 2.38: Traffic and Truck Flow



Traffic Flow Volume

- < 5,000
- 5,000 - 10,000
- 10,001 - 30,000
- > 30,000
- Parks
- Water Bodies
- County Limits
- City Limits

Date Exported: 1/10/2023
 Source: KDOT 2022 Traffic Flow Map (2021)
 Produced: Lawrence-Douglas County MPO (2023)

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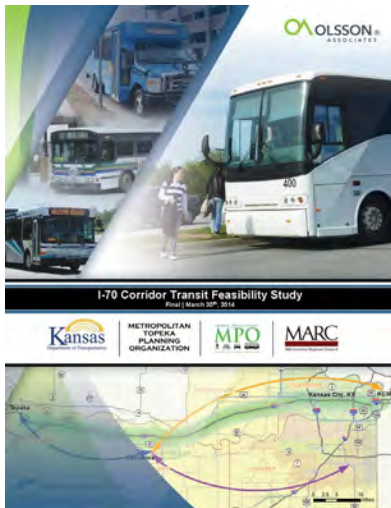
Figure 2.39: Critical Freight Corridors



Date Exported: 1/11/2023
 Source: Kansas Statewide Freight Plan (2017)
 Produced: Lawrence-Douglas County MPO

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2016 and sees between 750 and 1730 trucks, with 750 to 1340 trucks on the west leg. Truck traffic on the west leg has increased approximately 75% since the opening of the east leg. West K-10 was designated as a Critical Freight Corridor in the Kansas Freight Plan in 2017 (Figure 2.39).

Part of the reason for the increase in truck traffic in the region may be due to the rise of e-commerce, the buying and selling of goods or services via the internet. In 2021, Amazon delivered 5 billion packages in the United States, equivalent to 39 packages per household. There is a limited body of research on the impact of E-commerce on transportation. Some studies suggest a reduction of vehicle miles traveled (VMT) is possible with e-commerce deliveries replacing shopping trips by individuals, but many variables make it difficult to predict. Issues to consider as e-commerce continues to grow include electrification of delivery fleets, the use of drones for delivery, and managing limited curb space.

b. Upcoming and Recent Efforts

Recent and upcoming freight planning includes:

- MARC Regional Freight Study (TBD) – The Mid-America Regional Council (MARC, the MPO for Metro Kansas City) will be developing a regional freight study in 2023 covering a 14 county area, including Douglas County, in which the L-DC MPO will participate.
- Statewide Freight Plan (2023) – KDOT is currently finalizing a new [Statewide Freight Plan](#) in tandem with the Statewide Rail Plan to guide the state’s vision for freight transportation and to identify strategies to achieve this vision.
- Kansas Statewide Freight Network Truck Parking Plan (2016) – The Kansas Department of Transportation and the Kansas Turnpike Authority completed the [Statewide Freight Network Truck Parking Plan](#) to improve the state’s freight competitiveness by studying and developing strategies for improving its statewide freight network’s safety, efficiency and competitiveness, especially along primary and secondary freight corridors of significance, which include Interstate 70, Interstate 35 and the Kansas Turnpike. The I-70 corridor through Douglas County has several parking lots that accommodate large freight trucks and have been identified for possible Tier 1 (out of 3) projects.

2. Intermodal Facilities

a. Existing Conditions

Intermodalism is the concept that binds the modes together so that people and freight movements can be made in the most efficient manner possible. Although none currently exist in Douglas County, intermodal freight facilities in Kansas City and Topeka provide the region with those connections. Freight destined for Douglas County can be moved by rail to Kansas City and then trucked a short distance to its final destination. Douglas County does not currently have an intermodal center to handle rail-truck transfers, but large amounts of cargo in containers from those facilities do travel through the region as evidenced by the many containers on truck rigs noticed on the I-70 corridor and the multitude of containers on trains passing through Lawrence.

BNSF Intermodal Facility at Edgerton

In 2013 the Burlington Northern Santa Fe (BNSF) Railroad opened an intermodal facility at the City of Edgerton in Johnson County east of the Lawrence-Douglas County planning area. The facility provides for the transfer of freight between rail and trucks. The facility is part of Logistics Park Kansas City, which is home to 14 million square feet of distribution and warehouse facilities that take advantage of the proximity of the intermodal facility. Projections when the facility opened were for up to 7,000 trucks and 140 trains per day by 2030. Most of that truck traffic from the facility appears to be carried on I-35. It is possible that a small portion of trucks use US-56 through Baldwin City to US-59, US-59 to Lawrence and K-10, and K-10 to I-70. However, according to KDOT traffic count maps, overall truck counts on US-56 in Douglas County have decreased slightly since the facility opened.

3. Rail

Kansas is seen as a prime area for the development of freight distribution centers due to its location on two major interstate highways (I-70 and I-35) and by the state being traversed by two major rail systems.



What are Intermodal Facilities?

Intermodal Facilities refer to facilities where people and/or goods transfer between modes (e.g., combined commuter rail and bus stations, rail/truck freight transfer facilities, etc.).





What is an at-grade crossing?

An at-grade crossing is an intersection in which a railroad line crosses a street or path at the same level as the roadway. In active urban areas at-grade crossings typically use electronic warning devices for vehicles, pedestrians, or bicyclists that consist of warning lights and barrier gates. Passive at-grade crossings are often used in rural areas that use cross buck signs without gates or lights.



Table 2.13: Rail Tonnage

Douglas County Inbound Rail Tonnage	
Commodity	2014 Tonnage
Coal	2.3 million
Chemicals or Allied Products	0.2 million
Food or Kindered Products	0.2 million

Source: Kansas Statewide Freight/Rail Plan

a. Existing Conditions

Freight Rail

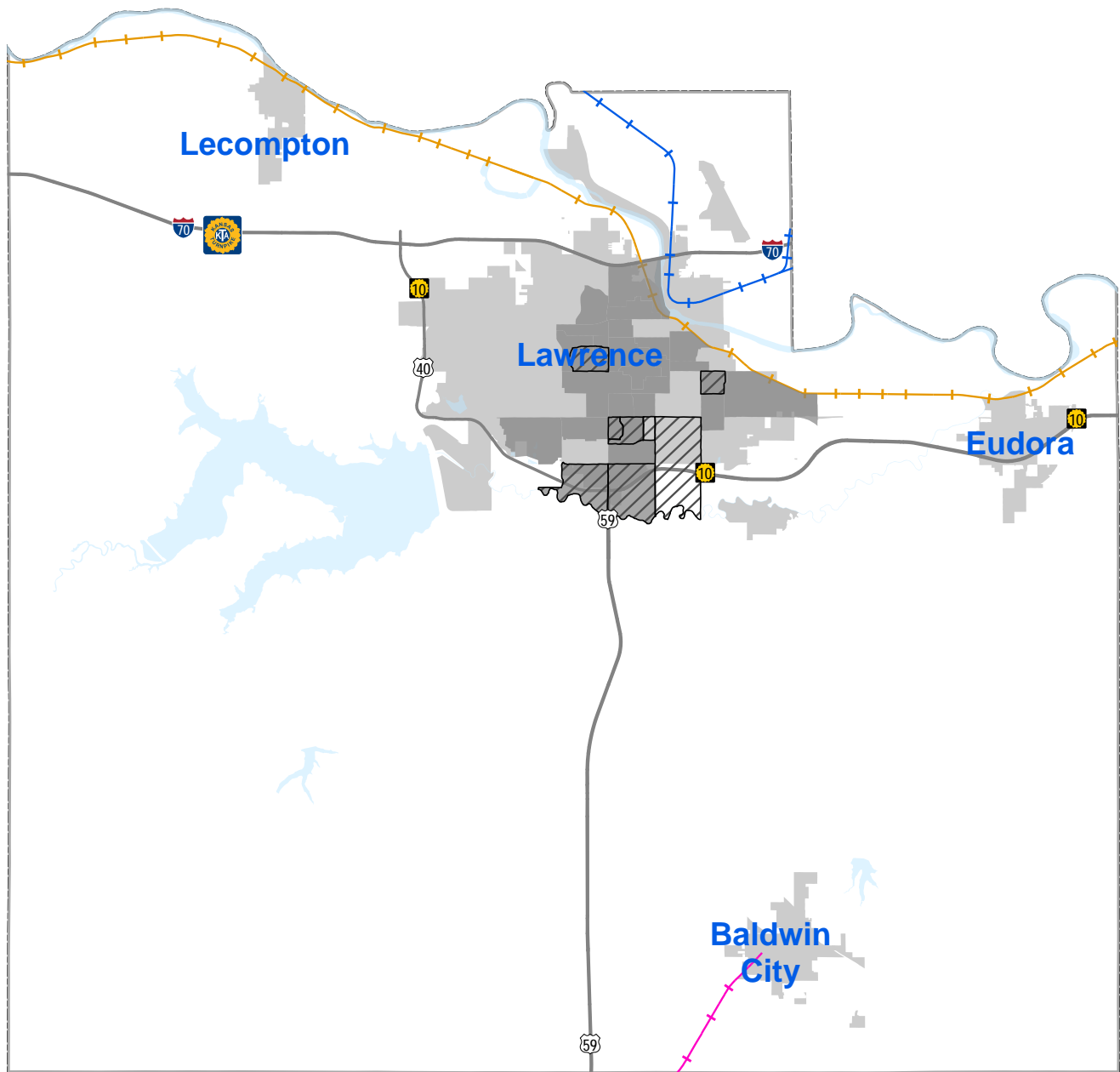
There are two active freight rail lines that pass through Douglas County (Figure 2.40). The Burlington Northern Santa Fe (BNSF) has 27.6 miles as part of the Topeka Subdivision which sees an average of seven trains per day, per the Kansas Statewide Freight/ Rail Plan. The Union Pacific (UP) has 9.3 miles as part of the Marysville Cutoff, comprised of the Marysville and Kansas Subdivisions which sees an average of 40 trains per day.

The rail facilities in the area provide access to national rail networks so that local businesses can ship to a larger market. The railroads in the area also interact with the road system and both at-grade and grade separated railroad crossings in the region. There are currently two at-grade BNSF crossings that intersect with the Lawrence Loop shared use path along the west side of the Kansas River through Burcham Park.

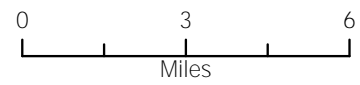
At the UP Railroad and North 3rd Street just north of the Kansas River Bridge Pair in Downtown Lawrence, there is a substandard height limit on an arterial road due to a railroad crossing only allowing 14 feet of clearance and restricting some tall truck loads that must detour around that site.

There are 38 at-grade public crossings in Douglas County. These at-grade rail crossing locations have potential vehicle, pedestrian, bicycle, and train conflict. Based on data from the Federal Railroad Administration, there were two fatalities in Douglas County between 2017-2021. At-grade crossings can also create negative quality of life impacts due to the noise from train horns. KDOT has been heavily involved in efforts to improve the safety of the statewide rail system, which includes 5,133 at-grade public crossings. KDOT maintains an inventory of prioritized crossing projects for inclusion in its work program.

Figure 2.40: Railroads and Highways



- +— BNSF
- +— Santa Fe Trail Historical (Midland Railroad)
- +— Union Pacific
- Minority Block Groups
- Low/Moderate Income Tracts
- Water Bodies
- City Limits
- County Limits
- Freeways



Date Exported: 2/21/2023
 Source: Federal Functional Classification (2022)
 Produced: Lawrence-Douglas County MPO

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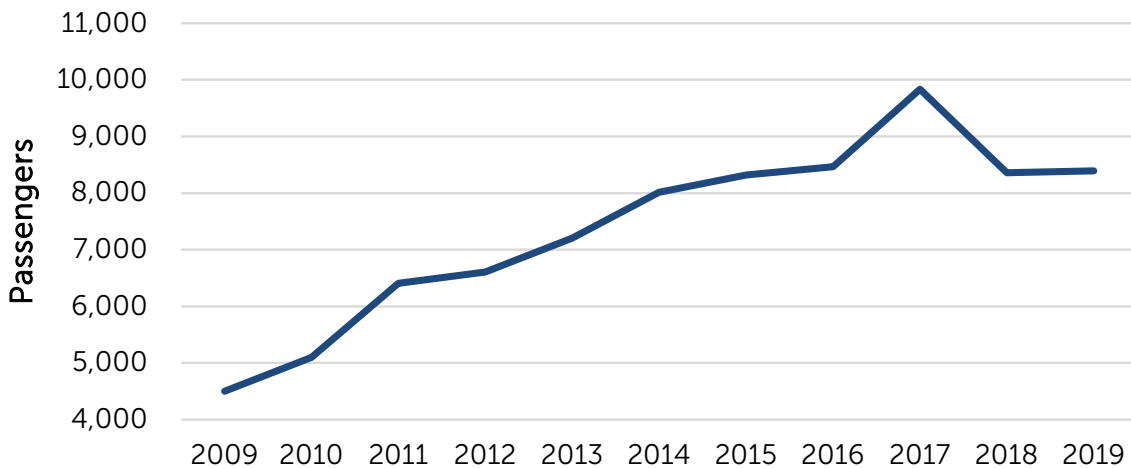


Passenger - Intercity Rail Service

Limited passenger service exists at the Lawrence Santa Fe Depot through Amtrak, but this service is not conducive to commuter travel. The long distance Amtrak train serving Kansas, the Southwest Chief, operates between Los Angeles and Chicago with daily service once in each direction. In Northeast Kansas this Amtrak service is scheduled for nighttime hours with scheduled stops in Lawrence at 11:49 PM westbound and 5:09 AM eastbound. The Lawrence station is located at 413 East 7th Street along the Kansas River east of Downtown Lawrence. The Southwest Chief boarding/deboardings take place at six points in Kansas: Lawrence, Topeka, Newton, Hutchinson, Dodge City, and Garden City. Amtrak ridership arriving and departing at the Lawrence is shown in Figure 2.41. Ridership data for 2020-2022 is not yet available for individual stations but Amtrak ridership system-wide was greatly impacted by the Covid-19 Pandemic. Amtrak data shows overall ridership on the Southwest Chief decreased 60% from 2019 to 2021. Ridership rebounded in 2022, but remained 34% below 2019 ridership.

The Midland Railway is an excursion railroad that extends from Baldwin City to Ottawa - it serves as a sightseeing and heritage attraction but does not serve a transportation function.

Figure 2.41: Amtrak Ridership



Source: National Association of Railroad Passengers (2020)

b. Recent Efforts

Several rail plans have been completed recently.

- [Kansas State Rail Plan](#) (2022) – KDOT is currently finalizing a new rail plan in tandem with the Kansas State Freight Plan. The Kansas Department of Transportation (KDOT) developed the Kansas State Rail Plan to guide the state’s vision for railroad transportation and to identify strategies to achieve this vision. One concept discussed in the plan is the possibility to consider is an extension of the Missouri River Runner from its terminus in Kansas City, MO to destinations in Kansas, such as Lawrence and Topeka. Further analysis is needed to better understand the potential cost and ridership of such a change.
- [Kansas City-Wichita-Oklahoma City-Fort Worth Corridor Passenger Rail Service Development Plan](#) (2011) – KDOT determined service between Kansas City and Fort Worth would be feasible. The Kansas City to Fort Worth service would serve Lawrence with a morning and evening arrival/departure.



H. Safety

The safety of the traveling public is a top priority for the Lawrence-Douglas County MPO, the Lawrence Transit System, KDOT, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), Douglas County, and the cities in the planning area. Safety pertains to vehicles, bicyclists, pedestrians, and transit.

1. Non-Motorized

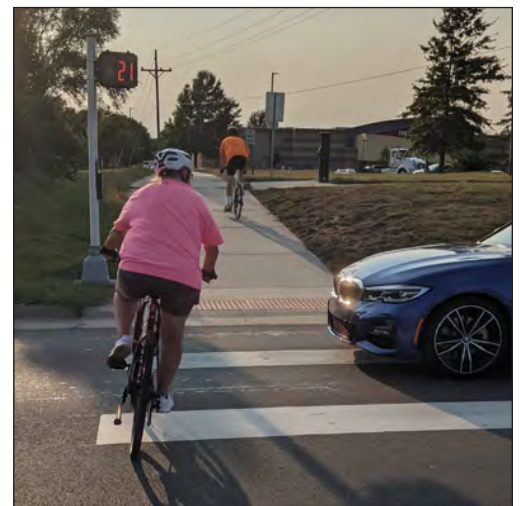
a. Existing Conditions

Whichever route a bicyclist or pedestrian may choose or need to use, that route should be reasonably safe for bicycling and walking. Issues may include hazards (e.g., drainage grates, overhead obstructions, etc.), lighting, vehicular conflicts, or conflicts with other sidewalk or bikeway users. The number of non-motorized fatalities and serious injuries are shown in Performance Measure 13. Figures 2.42 - 2.45 display the location of bicycle and pedestrian crashes in Lawrence, Douglas County, Eudora, Baldwin City, and Lecompton.

Motor Vehicle Speed & Pedestrian Safety



Source: *Impact Speed and a Pedestrian's Risk of Severe Injury or Death*, Brian Tefft, AAA Foundation for Traffic Safety, 2011



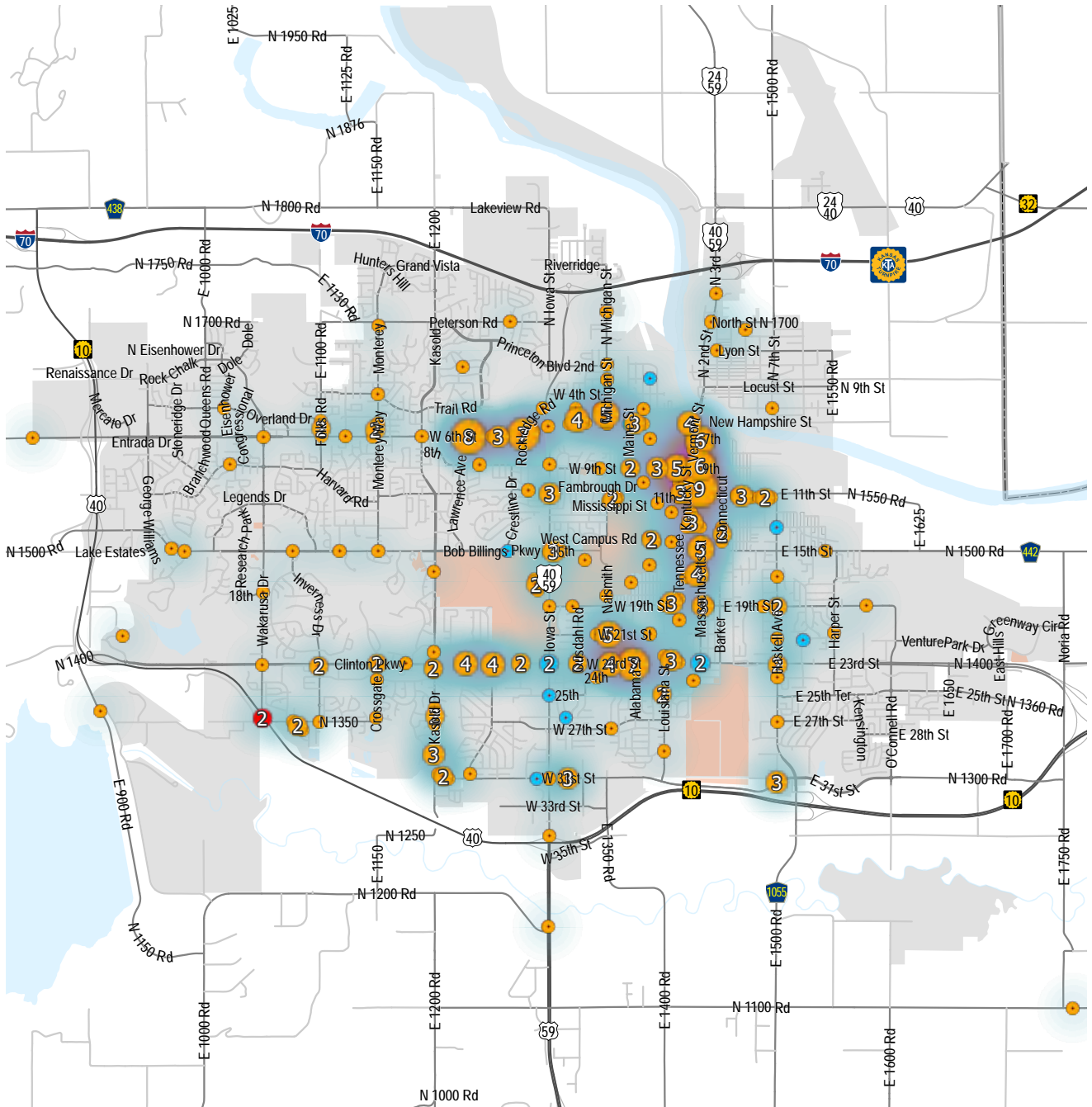


Performance Measure

13 - Number of non-motorized fatalities & serious injuries

Crash on Road Maintained by	Rolling Averages						
	2011-2015	2012-2016	2013-2017	2014-2018	2015-2019	2016-2020	2017-2021
City of Baldwin City	0.4	0.0	0.0	0.0	0.0	0.0	0.0
City of Lawrence	5.4	5.6	5.4	5.0	4.0	3.8	3.4
Douglas County	0.4	0.4	0.4	0.4	0.2	0.2	0.2
Kansas Department of Transportation	0.0	0.0	0.2	0.2	0.2	0.2	0.2
Kansas Department of Wildlife, Parks, & Tourism	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kansas Turnpike Authority	0.2	0.2	0.2	0.2	0.2	0.0	0.0
Private (Lawrence)	0.0	0.2	0.2	0.2	0.2	0.2	0.0
University of Kansas	0.6	0.8	0.6	0.4	0.4	0.4	0.2
Wakarusa Township	0.4	0.2	0.2	0.0	0.0	0.0	0.0
Total Mapped*	7.4	7.4	7.2	6.4	5.2	4.8	4.0
KDOT Douglas County Non-Motorized Fatal and Serious Injuries	7.4	7.4	7.8	7.0	5.8	5.4	4.6

Figure 2.42: Lawrence Bicycle Crash Locations



- | | |
|---|---|
| <ul style="list-style-type: none"> ● Fatal ● Injury ● Property Damage Only ● Fatal Cluster (count) ● Injury Cluster (count) ● Property Damage Cluster (count) | <ul style="list-style-type: none"> University City Limits County Limits Bike Crashes Heat Map Sparse Dense Road Centerline Freeways Major roads Street |
|---|---|

Private
Other

0 0.8 1.5 Miles



Date Exported: 1/4/2023

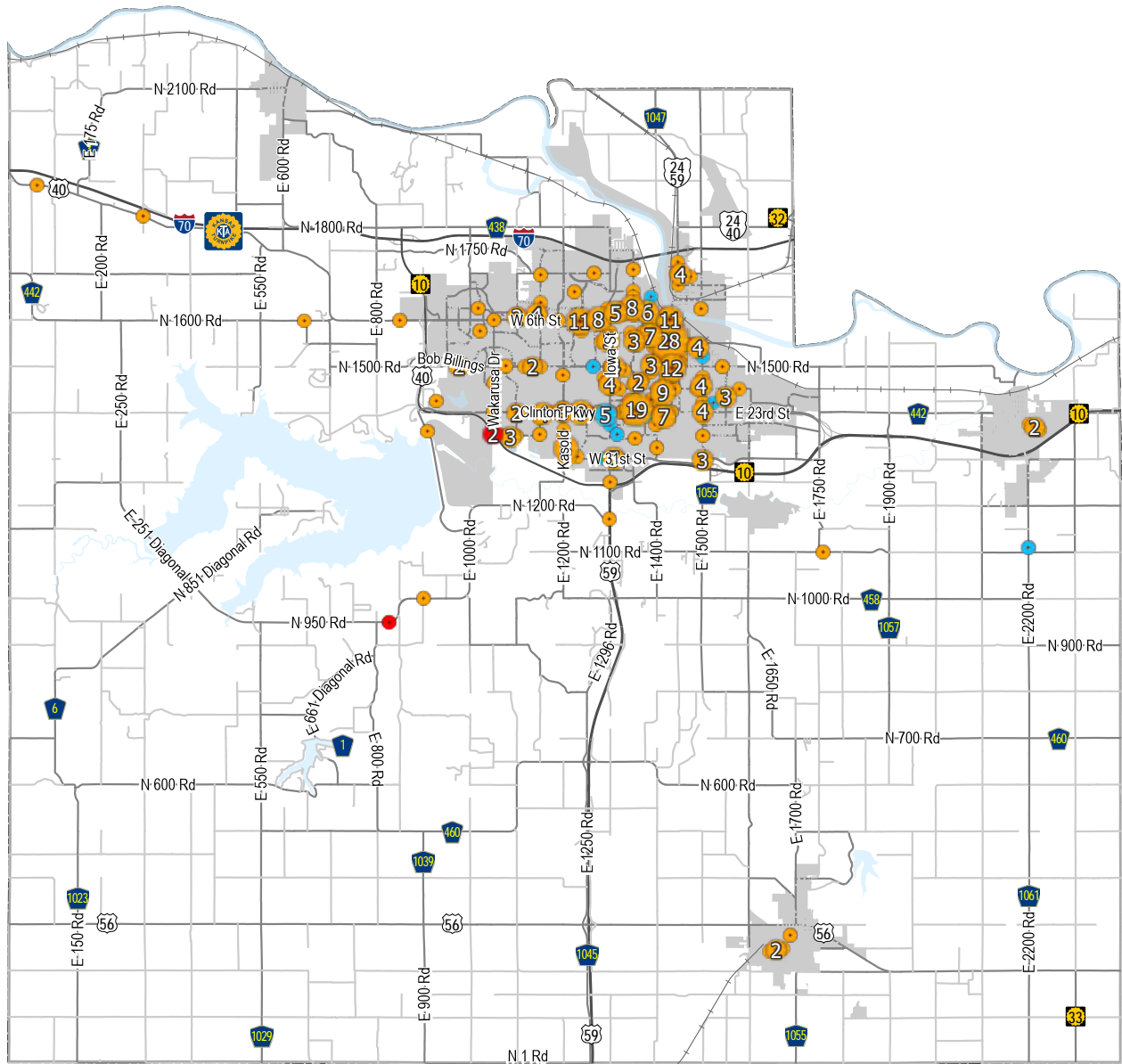
Source: Kdot , CDBG

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Figure 2.43: Douglas County Bicycle Crash Locations



City Boundary
 MPO/County Boundary

Bike Crashes since 2012

- Fatal
- Injury
- Property Damage Only
- Fatal Cluster (count)
- Injury Cluster (count)
- Property Damage Cluster (count)

0 2.5 5 Miles



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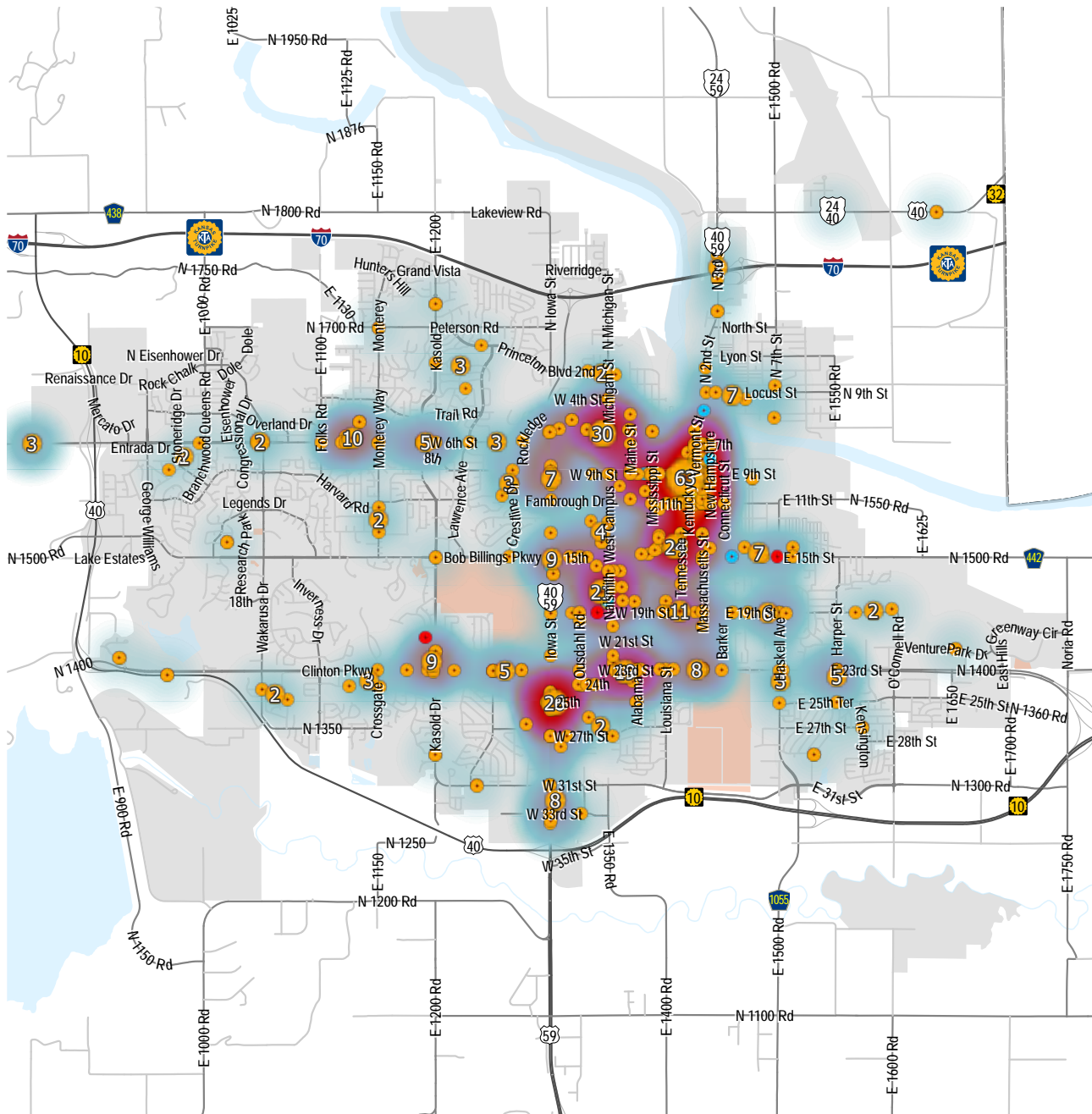
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Figure 2.44: Lawrence Pedestrian Crash Locations



- | | |
|---|--|
| <ul style="list-style-type: none"> ● Fatal ● Injury ● Property Damage Only ● Fatal Cluster (count) ● Injury Cluster (count) ● Property Damage Cluster (count) | <ul style="list-style-type: none"> University City Limits County Limits Pedestrian Crashes Heat Map Sparse Dense |
|---|--|

0 0.8 1.5 Miles

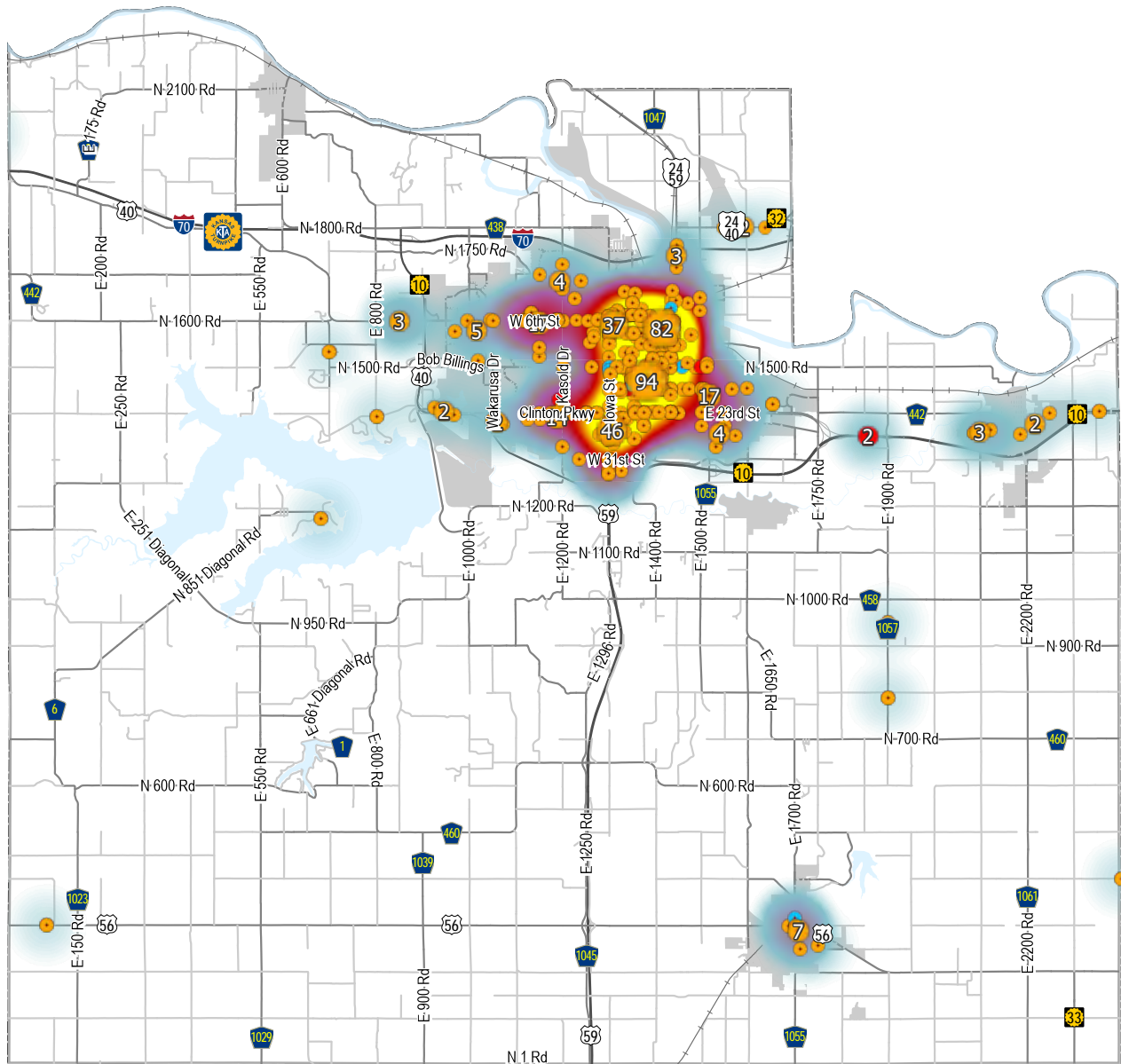


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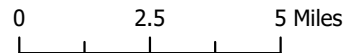
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Figure 2.45: Douglas County Pedestrian Crash Locations



- Pedestrian Crashes since 2012**
- Fatal
 - Injury
 - Property Damage Only
 - Fatal Cluster (count)
 - Injury Cluster (count)
 - Property Damage Cluster (count)

- City Limits
- ▭ County Limits
- Pedestrian Crashes Heat Map**
- Sparse
 - Dense



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2. Transit

a. Existing Conditions

A major safety concern for transit operators is the possibility of a transit vehicle crash and injuries to riders, but for each rider, the safety issues are much more personal. Bus drivers are trained in ways to avoid accidents and keep their passengers and themselves safe, but they cannot control all the other drivers on the roads. Performance Measure 27 compares the revenue miles (miles in service to passengers) driven by Lawrence Transit buses to the number of accidents involving transit buses.

Safety events are comprised of collisions, fires, hazardous material spills, act of nature (Act of God), evacuation, or [other safety occurrence not otherwise classified] occurring on transit right-of-way, in a transit revenue facility, in a transit revenue facility, or in a transit revenue vehicle and meeting established NTD thresholds. Safety performance is an organization’s safety effectiveness and efficiency, as defined by safety performance indicators and targets, measured against the organization’s safety objectives

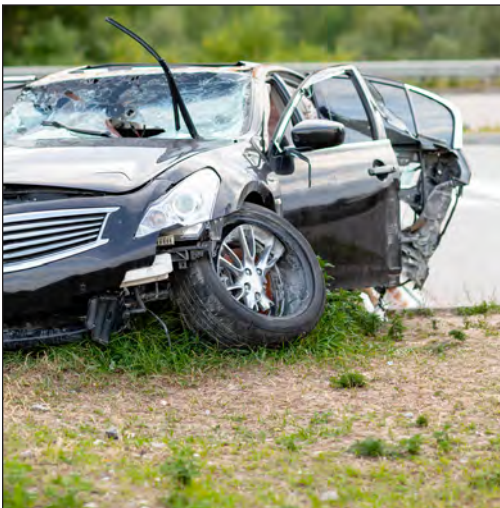


Performance Measure 27 - Transit Safety Performance

Mode of Transit Service	Fatalities (total)	Fatalities (per 100 thousand vehicle revenue miles)	Injuries (total)	2021		Safety Events (total)	Safety Events (per 100 thousand vehicle revenue miles)	System Reliability (vehicle revenue miles/failures)*
				Injuries (per 100 thousand vehicle revenue miles)				
Fixed Route Bus Service	0	0	1	0.000001		0	0	5,338
Demand Response Bus Service	0	0	0	0		1	0.000003	27,425



Source: Lawrence-Douglas County Fire Medical



Source: Adobe Stock



3. Roadway

a. Existing Conditions

For people that regularly drive around Lawrence and Douglas County, the perception of safety on the roadways is relatively high for most roads and at most times. However, there are some road segments that are narrow, congested at times, have sharp turns, have numerous driveway conflicts, have hills, and/or all of those plus several other attributes that make safety seem less than ideal. There are also several behavioral issues in play within the traffic stream that can affect one's perceived safety level. Those behavioral items include people making rolling stops at stop signs instead of coming to a full complete stop, people driving through signalized turns as the light goes red, speeding by drivers, and inattentive drivers texting or talking on the phone.

The Kansas Department of Transportation (KDOT) collects traffic crashes that occur on public roadways involving property damage of at least \$1,000 or an injury or fatality. Each year approximately 3,500 motor vehicle accidents occur in the Lawrence-Douglas County MPO Planning Area.



Performance Measure

9 - Number of fatalities (All public roads)

Crash on Road Maintained by	2013-2017	2014-2018	2015-2019	2016-2020	2017-2021
Army Corps of Engineers	0.0	0.0	0.0	0.0	0.0
City of Baldwin City	0.0	0.0	0.0	0.0	0.0
City of Eudora	0.0	0.0	0.0	0.0	0.0
City of Lawrence	1.8	1.2	1.4	2.2	2.4
Douglas County	2.0	2.2	2.0	2.4	2.2
Kansas Department of Transportation	1.2	1.4	2.0	3.8	4.4
KS Dept of Wildlife, Parks, & Tourism	0.0	0.0	0.0	0.0	0.0
Kansas Turnpike Authority	0.6	0.8	0.8	0.6	0.6
Private (Lawrence)	0.0	0.0	0.0	0.0	0.0
Private (Unincorporated)	0.0	0.0	0.0	0.0	0.0
University of Kansas	0.0	0.0	0.0	0.0	0.0
Townships	1.4	1.4	1.6	1.0	0.8
Total	7.2	7.2	8.0	10.2	11.5

(Includes Vehicles, Bicyclists, and Pedestrians Crashes)

Source: KDOT (2021)



Performance Measure

10 - Rate of fatalities per 100 million VMT (All public roads)

	2013- 2017	2014- 2018	2015- 2019	2016- 2020	2017- 2021
Douglas County Total	0.7	0.7	0.7	1.0	1.0



Performance Measure

11 - Number of serious injuries (All public roads)

Crash on Road Maintained by	2013- 2017	2014- 2018	2015- 2019	2016- 2020	2017- 2021
Army Corps of Engineers	0.0	0.0	0.0	0.0	0.0
City of Baldwin City	0.0	0.0	0.0	0.0	0.4
City of Eudora	0.0	0.0	0.0	0.0	0.0
City of Lawrence	16.4	14.0	12.2	12.0	10.8
Douglas County	3.6	3.4	3.8	3.2	4.4
Kansas Department of Transportation	3.6	2.8	3.6	4.4	6.4
KS Dept of Wildlife, Parks, & Tourism	0.0	0.0	0.2	0.2	0.2
Kansas Turnpike Authority	4.4	3.6	3.2	2.6	2.8
Private (Lawrence)	0.2	0.2	0.2	0.2	0.0
Private (Unincorporated)	0.0	0.0	0.0	0.0	0.0
University of Kansas	0.6	0.4	0.4	0.4	0.4
Townships	0.0	0.0	0.0	0.0	0.4
Total	31.0	26.6	25.4	25.0	25.5

(Includes Vehicles, Bicyclists, and Pedestrians Crashes)

Source: KDOT (2021)



Performance Measure

12 - Rate of serious injuries per 100 million VMT (All public roads)

	2013- 2017	2014- 2018	2015- 2019	2016- 2020	2017- 2021
Douglas County Total	3.1	2.6	2.4	2.4	2.5

(Includes Vehicles, Bicyclists, and Pedestrians Crashes)

Source: KDOT (2021)



Calculating Crash Rates

The crash rate for road segments is calculated as:

$$R = \frac{100,000,000 \times C}{365 \times N \times V \times L}$$

Where:

R = Crash rate for the road segment expressed as crashes per 100 million vehicle-miles of travel (VMT).

C = Total number of crashes in the study period.

N = Number of years of data.

V = Number of vehicles per day

L = Length of the roadway segment in miles.

For example: 31st Street from Iowa to Louisiana was assessed with the following values:

C = 222 crashes over the past 10 years on this segment

N = 10 years of data

V = 17,977 vehicles per day

L = 0.99 miles

The resulting segment crash rate would be

$$R = \frac{100,000,000 \times 222}{365 \times 10 \times 17,977 \times 0.99}$$

= 342 crashes per 100 million vehicle miles of travel on 31st street from Iowa to Louisiana

The most appropriate use of this crash rate is to determine the relative safety of a roadway segment when compared to similar segment within a specific jurisdiction.

[Figures 2.46 - 2.48](#) display analysis of traffic crashes.

Crash rate analysis of the relative safety of a segment or intersection takes into account exposure data. The crash rate is calculated to determine relative safety compared to other similar roadways, segments, or intersections. Crash rate analysis typically uses exposure data in the form of traffic volumes or roadway mileage.

Traffic Volumes are expressed in the form of Average Annual Daily Traffic (AADT) which is obtained from the Kansas Department of Transportation using the 2021 AADT. Crash data is also obtained from KDOT which includes ten years of crash history.

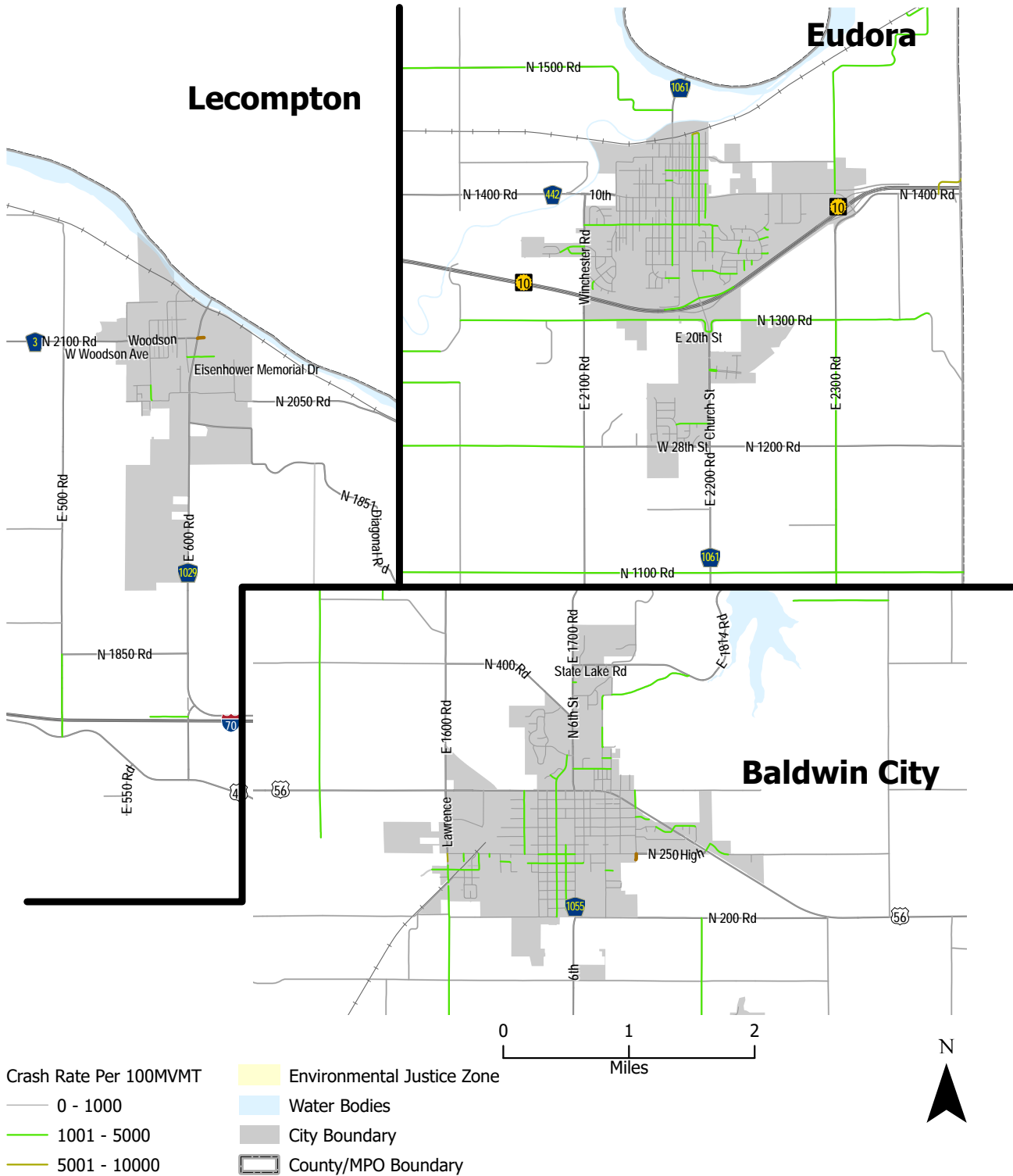
The benefit of crash rate analysis is that it provides a more effective comparison of similar locations with safety issues. This allows for prioritization of these locations when considering safety improvements with limited resources.

The measure of exposure is the total number of motor vehicles traveling on the road segment during the specified time period. This is called vehicle miles of travel (VMT). VMT is usually expressed as Million Vehicle Miles (MVM).

Crash rates tend to over-emphasize sites with lower traffic volumes. It is best to use crash rates as a comparison tool only for sites that have similar functional classifications, number of lanes, surrounding land uses, and traffic volume. Crash rates also tend to over-emphasize sites with very short segments. For the Lawrence Douglas County segments less than about 200' were not included in the maps, most of the segments shorter than 200' that were removed were short turn around/left turn connection segments connecting across medians of dual carriageway roads such as Bob Billings, Clinton Parkway, etc.

Association of crash locations to road segments for crash rate analysis was performed in a GIS application using an average intersection influence area of 36', so a crash that occurs within 36' of an intersection center point would be counted in the rate for each of the segments of that intersection for the crash rate calculation.

Figure 2.47: Eudora, Baldwin City, Lecompton Vehicle Crash Rates



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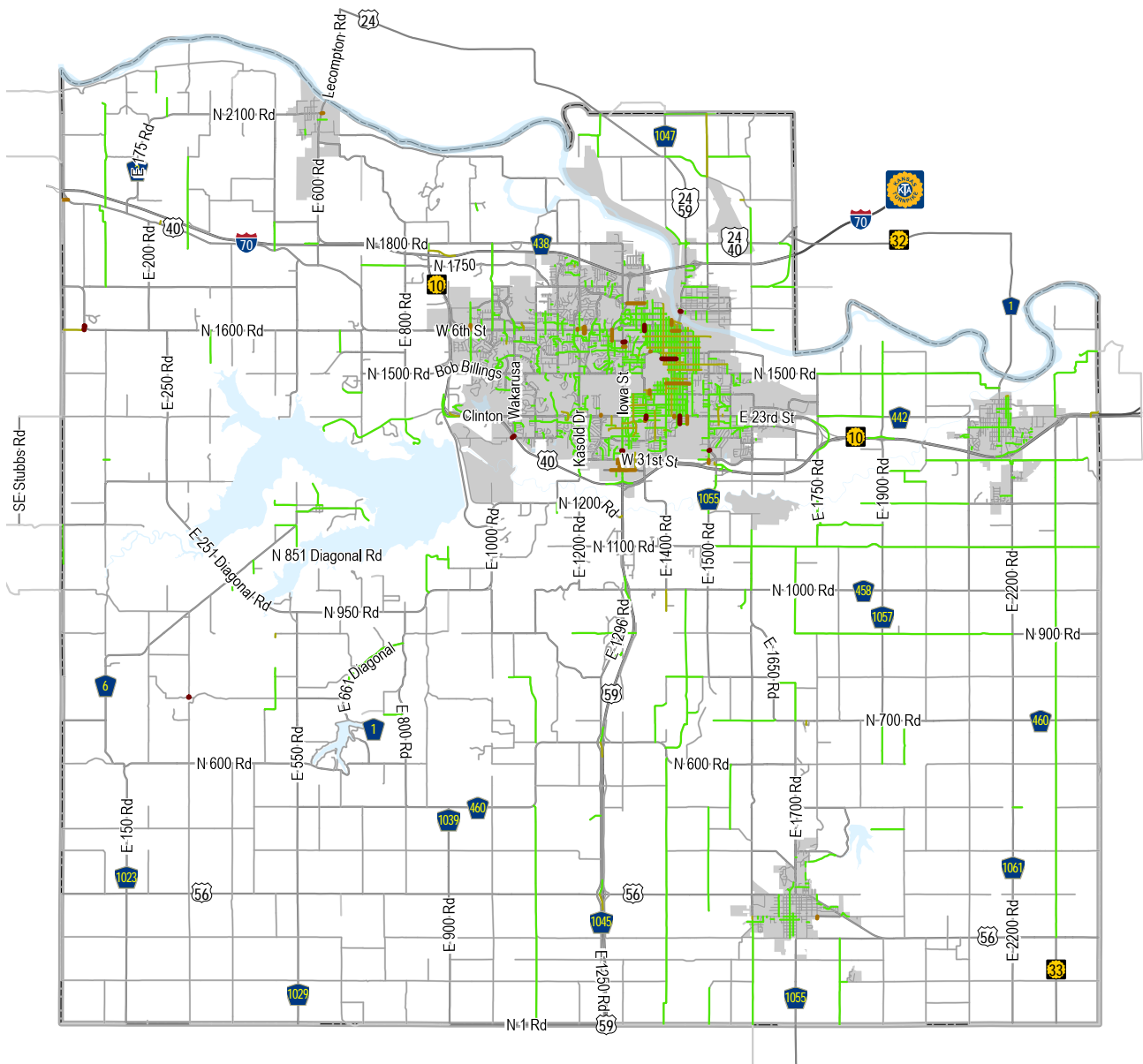
Source: KDOT

Produced: Lawrence-Douglas County MPO

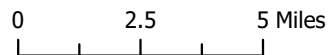
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Figure 2.48: Unincorporated Douglas County Crash Rates Normalized for Traffic Volume



- City Boundary
 - County/MPO Boundary
- Crash Rate Per 100M VMT
- 0 - 1000
 - 1001 - 5000
 - 5001 - 10000
 - 10001 - 15000
 - 15001 - 20000
 - 20001 - 213000



$$R = \frac{C \times 100,000,000}{V \times 365 \times N \times L}$$

R = Rate per segment in crashes per 100 million vehicle miles traveled
C = Total Number of Crashes in 10 year Period
V = Traffic Volumes using Average Annual Daily Traffic (AADT)
N = Number of years of crash data (10 years used)
L = length of the roadway segment in miles

Date Exported: 1/4/2023
 Sources: KDOT Crash Data, Years 2012-2021,
 KDOT AADT 2021, CDBG 2019
 Produced: Lawrence-Douglas County MPO

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b. Projects Improving Safety

A number of projects have been completed in recent years that have improved safety in the region. The projects documented below are a snapshot of just a few of these types of projects:

1. County Route 458

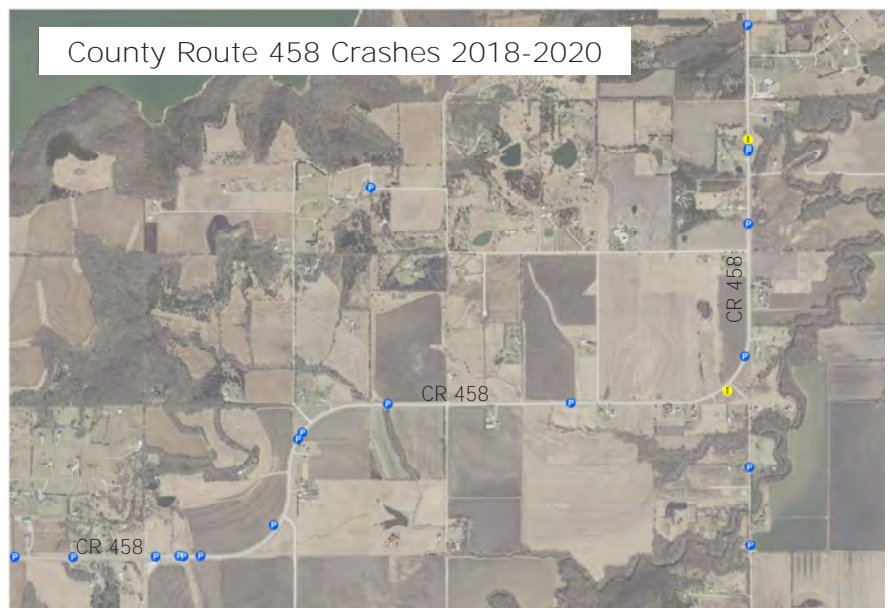
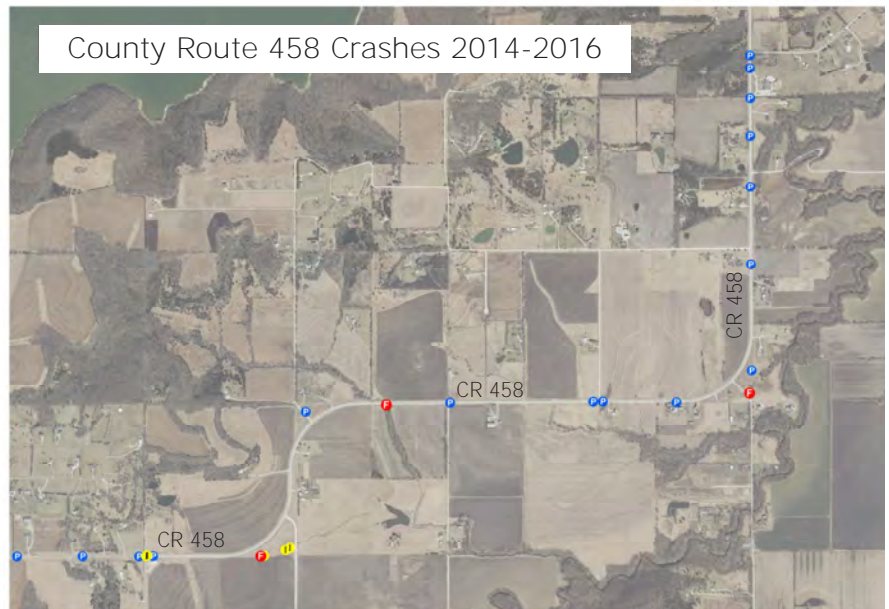
In 2017 Douglas County completed improvements to a four mile section of County Route 458 to improve safety. The project realigned curves, added paved shoulders, rehabilitated pavement, replaced narrow drainage structures, and improved roadside safety. In the three years prior to the project there were three fatal crashes, five injury crashes, and sixteen other crashes (involving property damage only). In the three years following completion of the project there were no fatal crashes, two injury crashes and sixteen other crashes.

2. Massachusetts Street

The City of Lawrence was awarded HSIP Funds and completed a project on Massachusetts Street between 11th Street and 14th Street in 2018 with a construction cost of \$98,000. The project reconfigured Massachusetts Street from two Northbound lanes and 1 Southbound lane with parallel parking to one lane in each direction with buffered bicycle lanes in both directions and a two-way left turn lane at the intersection with 13th Street.



Source: Douglas County



The project also included green pavement marking at the street intersections and a southbound bicycle box at 14th Street and Massachusetts Street to increase awareness of bicycles using the facility.

In the three years prior to the construction of the project, there were 11 reported crashes at the intersection of 13th Street and Massachusetts Street; three (3) of those crashes involved pedestrians and bicycles. In the most recent three years since the construction of the project, there have been three (3) reported crashes at the intersection; one (1) of those crashes involved a pedestrian. The crash data before and after the project indicates a reduction in both total crashes and crashes involving pedestrians and bicycles.



c. Recent Efforts:

- [Kansas Strategic Highway Safety Plan](#) (SHSP) (2020) – The Plan’s mission is to “drive strategic investments that reduce traffic injuries and deaths and the emotional and economic burdens of crashes, utilizing the 4E’s (education, enforcement, engineering and emergency medical services) in a collaborative process.” There are eight key emphasis areas which have been identified as providing the biggest potential for improving safety: Impaired Driving, Intersections, Occupant Protection, Older Drivers, Roadway Departure, Local Roads, Teen Drivers and Pedestrians & Cyclists.
- [Crash Safety Analysis and Countermeasure Identification](#) (2018) – This project identified crash hotspots in Douglas County based on a quantitative assessment and provide recommendations for preventive measures.



19th Street Practical Road Safety Assessment

The [19th Street Practical Road Safety Assessment](#) analyses the 19th Street corridor from Iowa Street to Barker Avenue. The report looks at bicycle and pedestrian safety concerns, identifies risks and opportunities, and provides suggested solutions. The assessment can be accessed at



Source: Adobe Stock



Douglas County Emergency Management Department

The [Douglas County Emergency Management Department](#) prepares for, responds to, and recovers from major emergencies and disasters. In addition, the DC EMD also educates and trains citizens, responders, governing officials. Four phases of the comprehensive emergency management program include mitigation, preparedness, response, and recovery.

Source: Douglas County Emergency Management Department

I. Security

Planning for transportation security has to do with securing key infrastructure from natural disasters, man-made violence, and hazardous material spills. Fortunately, in some cases improvements that can help maintain roadway network operations (e.g., ITS deployment including cameras at key intersections and a traffic control center) can also aid in network security efforts. In other cases improvements designed to strengthen transportation facilities for natural disaster purposes (e.g., wrapping bridge supports with steel as a seismic retrofit or strengthening levees to better handle floods) can also make those facilities harder targets. The State Fire Marshal's Office Hazardous Materials Division maintains hazardous materials (Haz-Mat) teams throughout the state to respond when events occur by supporting local first responders. A Haz-Mat team may be required for hazardous materials incidents, accidents, weapons of mass destruction (WMDs), and acts of terrorism.

The existing security planning in the region has been completed by the Douglas County Emergency Management Department. [The Douglas County Emergency Operations Plan \(EOP\)](#) was completed in June 2014. The purpose of the EOP is to establish a comprehensive, countywide, all-hazards approach to incident management across a spectrum of activities including prevention, preparedness, response, and recovery, in the event of a disaster or emergency.

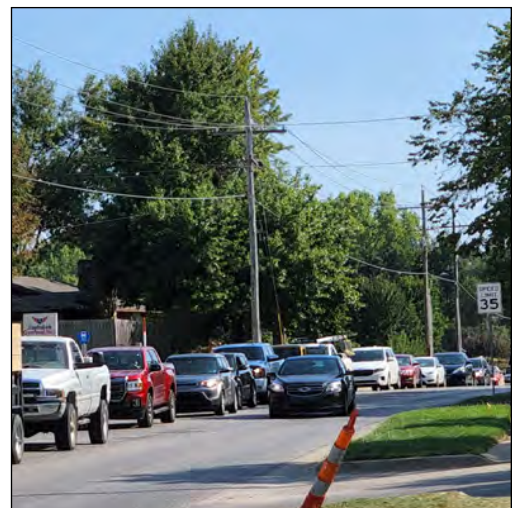
There is a Transaction Emergency Support Function (ESF-1) provided by Lawrence Transit, which is responsible for coordinating countywide transportation support to local governments and voluntary organizations. The [Douglas County Multi-Jurisdictional Multi-Hazards Mitigation Plan](#) was completed in 2008. It identifies proactive mitigation planning at the local level that can help reduce the cost of disaster response and recovery to property owners and government by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption. [The Northeast Kansas \(Homeland Security Region K\) Multi-Hazard, Multi-Jurisdictional Mitigation Plan](#) was completed in 2014. The plan provides realistic actions to reduce potential vulnerability and exposure to identified hazards for the 9 participating counties and 1 participating tribe located in the northeast region of the State.

Like all other places where people congregate and all other public buildings and facilities, the transit system is a potential target for attack. Thinking of the transit system that is designed to help people who need a ride get around town (or other transport infrastructure like bridges and intersections) as items to protect from damage but also as potential targets for more than vandalism is uncomfortable. Every facility and every service needs to be reviewed for security and safety issues. Fortunately, for our region the things that have been completed and can be done to address safety issues are also capable of addressing security issues for our transit system.

J. Summary

Each update to the region's long-range transportation plan is an opportunity to assess where we have been and where we are going. Chapter 2 documents existing conditions, guiding plans and planning processes that lay the groundwork to guide the transportation investments in our region.

The future growth of our region provides opportunities to create safe, comfortable, and reliable multimodal ways to get around the region. These opportunities will address transportation challenges created by our growing and aging population, the need for affordable housing with multimodal transportation access, continuing risks to air quality, and greater demand for comfortable active transportation modes. How we choose to grow will largely influence how we can successfully move people and goods throughout our region, and we know from transportation best practices it is unfeasible to "build our way out of congestion." Multimodal transportation infrastructure will be key to ensure a high quality of life for our region, providing people travel choices. Therefore, ensuring we have adequate resources to invest in our infrastructure and services will be paramount. The goals, objections, and strategies identified in Chapter 4 set the tone for the next phase of work to plan, construct, and maintain our multimodal transportation system.





*What we heard:
"The planning process
has improved and
more people have an
opportunity for input."*



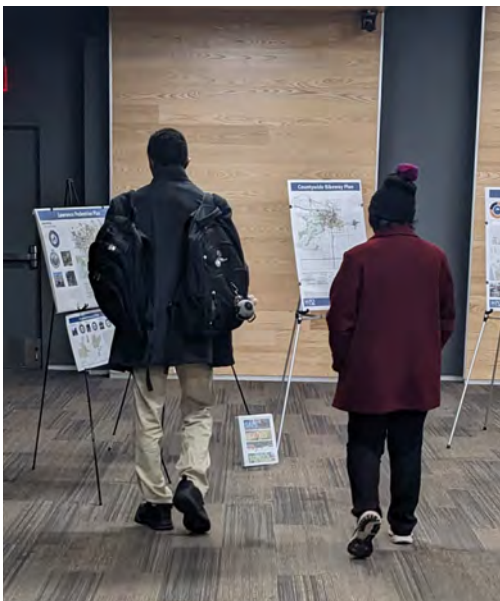
Chapter 3

Plan Development & Public Involvement



What is a Metropolitan Transportation Plan (MTP)?

A Metropolitan Transportation Plan (MTP) is a document resulting from regional or statewide collaboration and consensus on a region or state's transportation system, and also serves as the defining vision for the region's or state's transportation systems and services. The plan lays out transportation improvements scheduled over the next 20 years. The MTP must be updated every 5 years. MPOs are required to develop a MTP that is fiscally constrained, contains performance measures, goals to identify needed transportation improvements and project selection. The Federal Transit Administration has more information about [MTP requirements](#).



3. Plan Development and Public Involvement

A. Plan Development Process

A Steering Committee was created by the Lawrence-Douglas County Metropolitan Planning Organization Policy Board and a Staff Advisors group was assembled to guide the plan's development and review stakeholder input. These groups met regularly throughout the T2050 process helping to build consensus and reach recommendations through informed consent. MPO staff presented information and the Committee and Staff Advisors reviewed materials for accuracy, relevancy, and importance in the development of T2050. The Committee and Staff Advisors shaped T2050 into a plan that is comprehensive, sensitive to design and use of a multimodal transportation system. The update process is shown in Figure 3.1.

Figure 3.1: T2050 Update Process



Steering Committee members represent:

- Baker University
- Baldwin City Chamber of Commerce
- Eudora City Commission Appointee
- Haskell Indian Nations University
- Lawrence Association of Neighborhoods
- Lawrence Chamber of Commerce
- Lawrence Multimodal Transportation Commission
- Lawrence Public Transit Advisory Commission
- Lawrence Douglas County MPO Policy Board
- Lecompton City Council Appointee
- LiveWell Douglas County
- MPO Bicycle Advisory Committee
- United Way Human Services Coalition

Staff Advisors represent:

- Baldwin City City Manager
- Douglas County Public Works Director
- Douglas County Sustainability Coordinator
- Eudora City Manager/Public Works Director
- Federal Highway Administration KS Division
- Federal Transit Administration Region 7
- Haskell Indian Nations University - Facilities
- Kansas Department of Transportation Urban Planning Manager
- Kansas Turnpike Authority
- Lawrence - Douglas County Planning & Development Services
- Lawrence - Douglas County Public Health
- Lawrence Equity and Inclusion Director
- Lawrence Municipal Services and Operations
- Lawrence Transit System
- Lecompton City Clerk
- University of Kansas - Facilities Planning & Development
- University of Kansas - Transportation Services

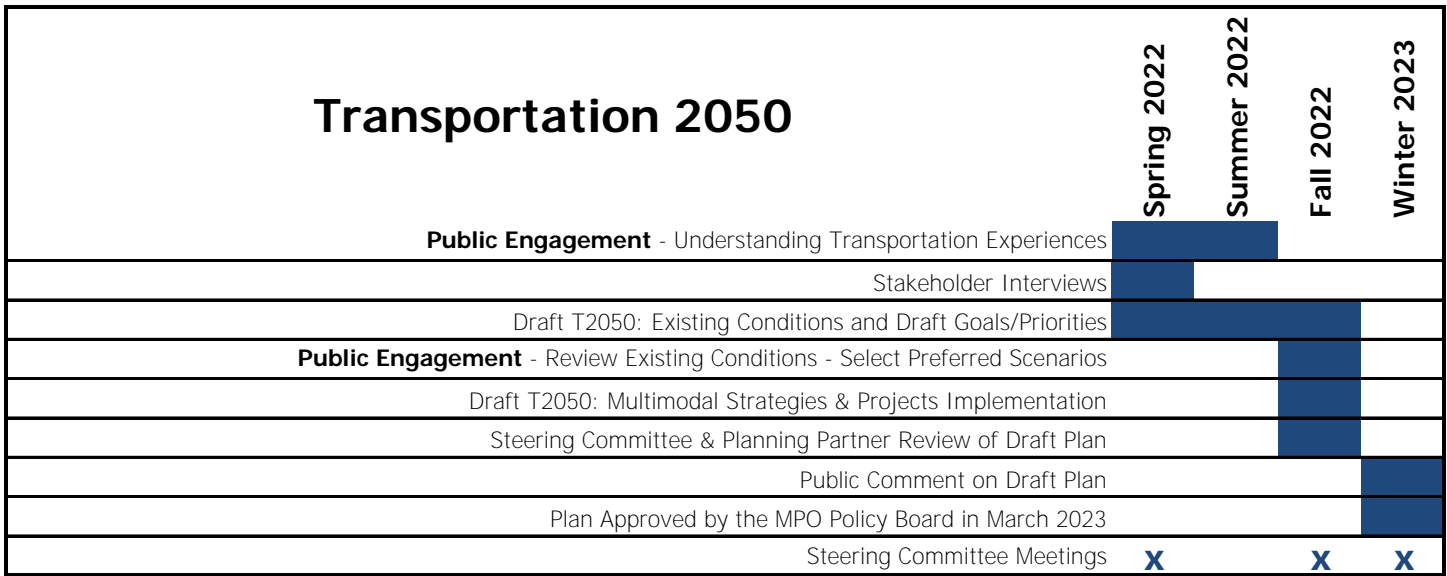


MPO Public Participation Plan

The MPO public participation process is guided by the [Public Participation Plan](#).



Figure 3.2: T2050 Timeline



B. Public Involvement Process

Public involvement is a high priority in the planning and development process for T2050. The Lawrence-Douglas County MPO’s Public Involvement for Transportation Planning procedures reflect the region’s rigorous approach to public involvement. It outlines a process that provides complete information, timely public notice, and full public access.

This planning process was divided into two public engagement phases. The first phase began with the release of the transportation survey on April 19, 2022. Stakeholder interviews were also held to gather input regarding transportation needs and issues from public agencies and interested parties.

The second phase of public engagement began on December 12, 2022 with the release of the second transportation survey.



C. T2050 Public Participation Activities

There were several ways to participate in the planning process.

1. T2050 Website

A [project website](#) was created to provide all planning materials. Staff also used the MPO [Tell Us Portal](#) to conduct surveys and collect public comment throughout the process.

2. Email List

The MPO compiled a list of interested parties to send email notifications about the on-going T2050 events. The website offers a link for any member of the public to sign up for notifications. At each opportunity, recipients on the list were sent emails notifying them of participation opportunities including surveys, open houses, mobile meetings, and public comment periods.

3. Surveys

Two surveys were utilized in this planning process. The first survey was centered on identifying respondents' experience and vision for transportation in the Lawrence-Douglas County region. The survey was available from April 19 to June 20, 2022. Surveys were collected online and through paper copies via staff tabling at events. The online version utilized the Tell Us Portal through the City of Lawrence website and collected responses anonymously. The survey was also promoted through social media posts posted by the local governments and news releases. Nineteen tabling events were held May 03 – June 19, 2022 during the first phase of public engagement and are listed in [Appendix B: Public Input](#). Surveys were distributed to interested groups, including the Senior Resource Center and a class at Lawrence High School. A total of 728 surveys were collected.

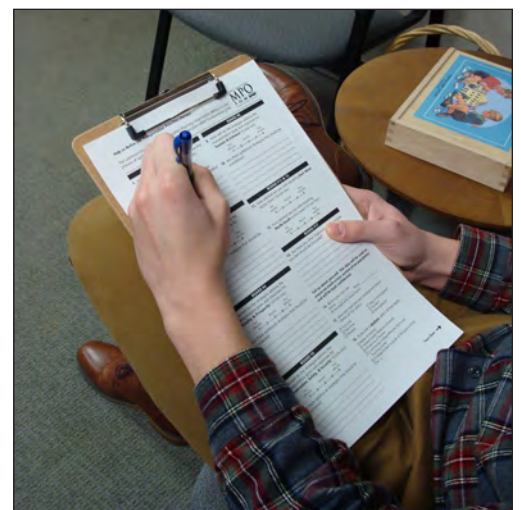
The second survey asked participants to weigh in on the strategies and projects that would best address the transportation priorities throughout Douglas County. The survey was available from December 12-23, 2022.

The survey was promoted through social media posts posted by the local governments, news release, and at the open house meetings (one in person and two virtual). An email was sent to everyone who provided their email



Email Subscription

Want to receive news on transportation planning in Lawrence-Douglas County? [Sign up](#) for email updates at by selecting the "Transportation Planning" list.



address on the first survey and a notice was sent through Tell Us Portal telling past participants a new survey opportunity was available. Surveys were collected through the Tell Us Portal and paper copies at the open house meetings. A total of 13 surveys were collected.

4. Stakeholder Interviews

Approximately 90 different groups or organizations were invited to participate in stakeholder interviews. Out of those parties, twenty-two interviews were conducted to gather input regarding transportation needs and issues. These interviews included representatives from a wide cross section of the community including representatives of organizations not normally included within the transportation planning process. A list of participants in stakeholder interviews is included in [Appendix B: Public Input](#).

5. Written Comment

MPO staff accepted email and hand written comments, as well as public comments left in the general comment area within Tell Us Portal during the public participation process. Written comments about the draft T2050 Plan were collected from January 23 -February 22, 2023. A full summary of the results can be found in [Appendix B: Public Input](#).

D. What we heard

1. Experience and vision for transportation (Survey 1)

The first phase of public engagement was centered on identifying respondents' experience and vision for transportation in the Lawrence-Douglas County region. Figure 3.3 displays satisfaction by mode (walking, bicycling, public transit, and auto/car). Figure 3.4 shows responses to how important various factors should be in the region.

2. Goals, Objectives, and Strategies (Survey 2)

The second phase of public engagement focused soliciting input on proposed goals, objectives, and strategies. The survey was more open ended and responses are included in [Appendix B: Public Input](#).

E. Summary

Overall, the community desires more choices, connections, and safety improvements for all user types and improvements to existing conditions of sidewalks, roads, bicycle networks, and transit frequency. This is reflected in the strategies and projects included throughout this plan and delineated in [Chapter 6: Multimodal Projects and Strategies](#).

Figure 3.3: Mode Satisfaction and Factors Impacting Satisfaction

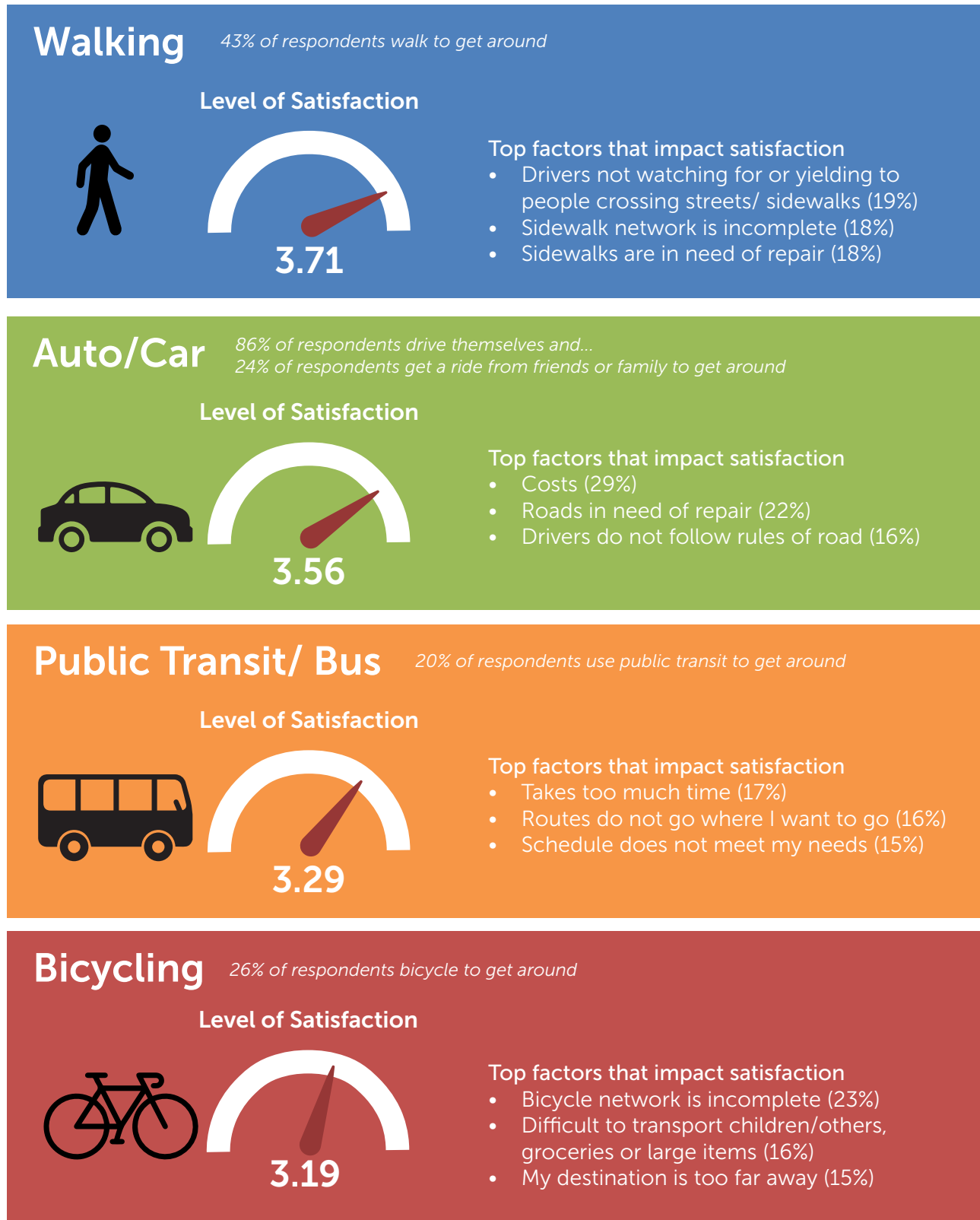
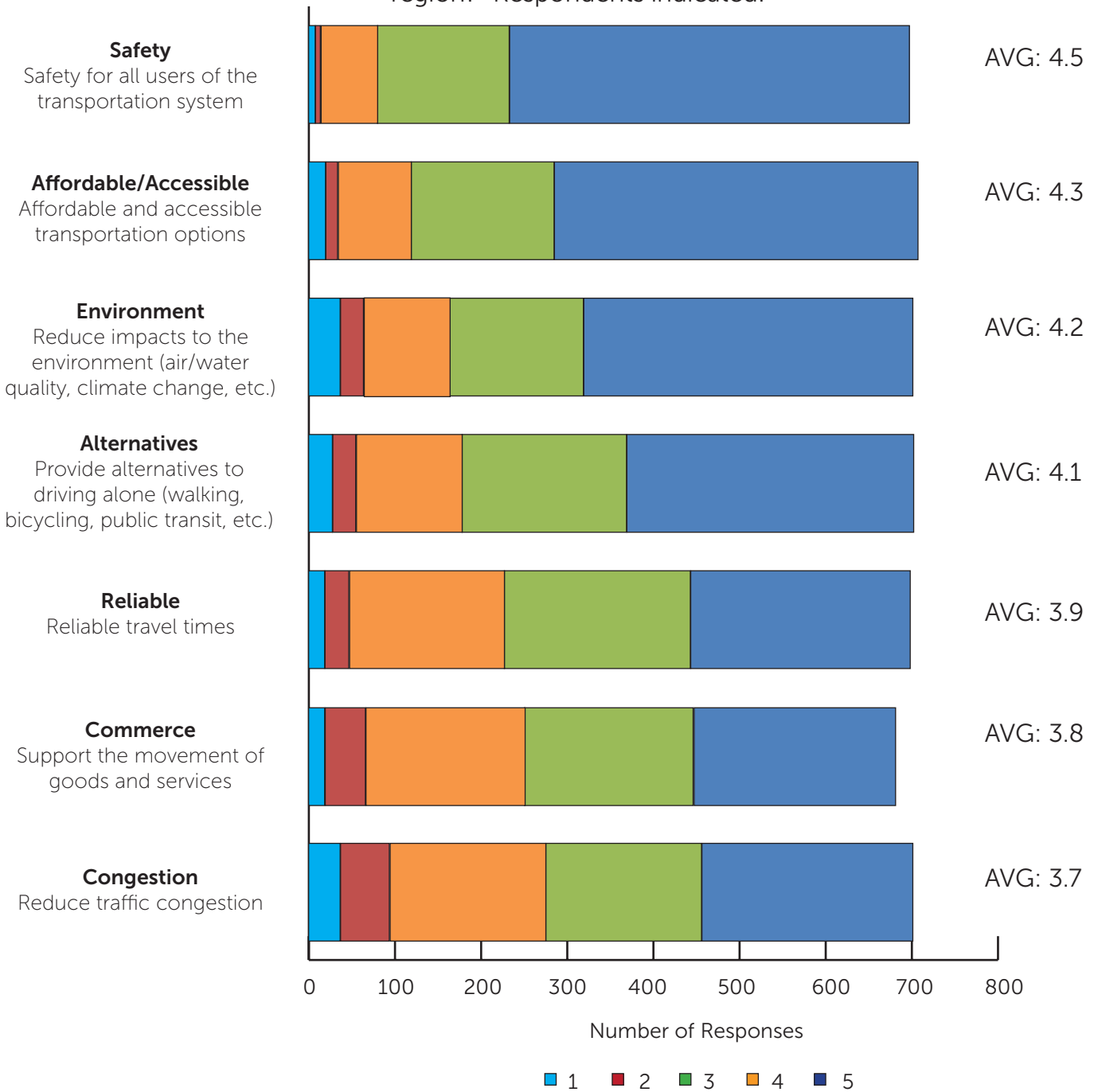


Figure 3.4: Ranking Planning Factors

When asked “How important should the following factors be for the Lawrence-Douglas County region?” Respondents indicated:

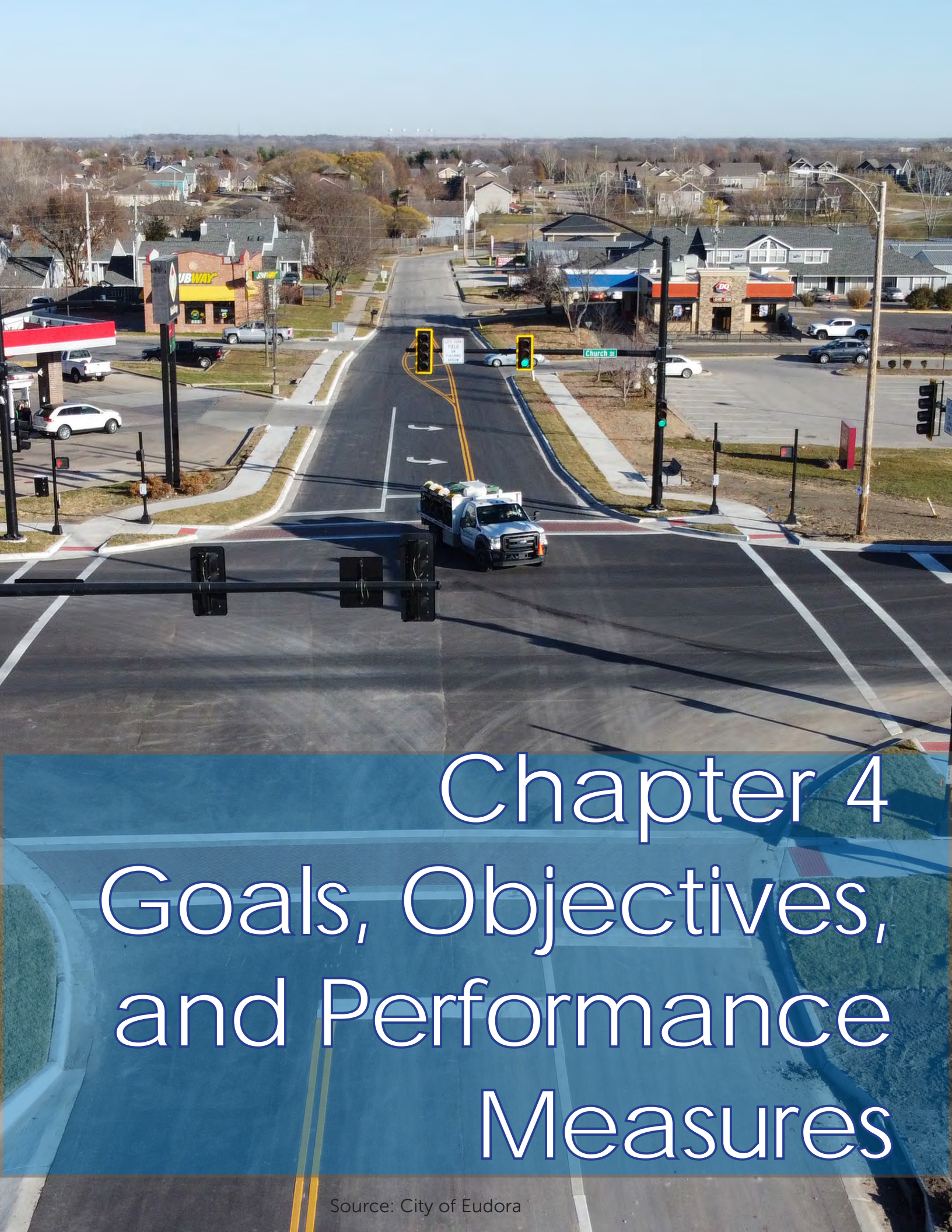


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What we heard:

“Success should be determined through stakeholder engagement and not just hearing from “normal” voices.”





Chapter 4

Goals, Objectives, and Performance Measures

Source: City of Eudora

4. Goals, Objectives, and Performance Measures

Transportation 2050 forms a vision for the region's transportation system. This chapter articulates the details of this vision through goals and objectives, provides a path to implementation through specific strategies, and outlines performance measures to track progress.

The goals and objectives in this T2050 Plan are based on the following considerations:

- Public Participation from meetings and interviews with transportation stakeholders, various advisory committees, and written comments from the public
- The previous MTP; Transportation 2040 – Lawrence- Douglas County Long Range Transportation Plan
- Plan 2040 – Lawrence-Douglas County Comprehensive Plan
- Eudora Comprehensive Plan
- Planning Factors from the previous Federal surface transportation act - Fixing America's Surface Transportation (FAST) Act – which continue in the current transportation act - Infrastructure Investment and Jobs Act (IIJA)/Bipartisan Infrastructure Law (BIL)
- New directives in the Infrastructure Investment and Jobs Act (IIJA)/Bipartisan Infrastructure Law (BIL), particularly in relation to the link between transportation and housing.
- Planning Emphasis Areas issued jointly in 2021 by the Federal Highway Administration and the Federal Transit Administration Offices of Planning.
- Multimodal transportation plans of the region
- Interdisciplinary knowledge and experience of numerous agencies and local governments involved in our region's MPO process
- Guidance from the Kansas Department of Transportation and the Eisenhower legacy transportation program.
- Federal transportation planning regulations for MPOs

A. National Goals

The national Federal highway program performance goals as established by Congress are:

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

System Reliability - To improve the efficiency of the surface transportation system

Freight Movement and Economic Vitality - To improve the National Highway 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

B. Planning Emphasis Areas

The Federal Highway Administration and the Federal Transit Administration Offices of Planning jointly issued the following [Planning Emphasis Areas](#) in 2021:

- Tackling the Climate Crisis – Transition to a Clean Energy, Resilient Future
- Equity and Justice40 in Transportation Planning
- Complete Streets
- Public Involvement
- Strategic Highway Network (STRAHNET)/U.S. Department of Defense (DOD) Coordination
- Federal Land Management Agency (FLMA) Coordination
- Planning and Environment Linkages (PEL)
- Data in Transportation Planning

C. Transportation 2050 – Moving Forward Together Vision Statement

Develop a multimodal transportation system that safely, efficiently, and equitably serves all people with a focus on prosperity for all and environmental sustainability.

This vision emphasizes the importance of multimodal system planning and the transportation network's value as a community asset. This plan supports an accessible environment serving to improve the quality of life and prosperity in the region. The goals, objectives, and performance measures below support the plan's multimodal vision.



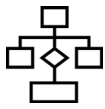
What is system reliability?

System reliability, or travel time reliability, means the consistency or dependability in travel times, as measured from day-to-day and/or across different times of the day.

Source: Federal Highway Administration

Federal Planning Emphasis Areas

More information on the Planning Emphasis Areas issued by the Federal Highway Administration and the Federal Transit Administration Offices of Planning can be found [here](#).



Goals, Objectives, Strategies, and Performance Measure

The following graphic shows the hierarchical structure of how Goals, Objectives, Strategies, and Performance Measure relate to one another.



D. Goals, Objectives, Strategies, and Performance Measures

Goals, Objectives, Strategies and Performance Measures are defined below.

Goals

Goals are long range approaches articulating the vision of the community. They represent an improvement to the status quo that can be generally supported by the community.

Objectives

Objectives are defined approaches to attain the identified goal. Many objectives can fall under each goal.

Strategies

Strategies included in [Chapter 6](#) detail the specific action to reach goals. They establish specific future actions that should be completed and reflect reasoned choices among all of the available alternatives. Strategies are the responsibility of many actors to implement the plan, including the MPO, local governments, and the KDOT.

Performance Measures

Performance measures are used to assess progress toward meeting goals and objectives and are integral to implementing a performance-based plan. The results of the performance measures advise the outcomes of the implemented projects and strategies. In addition to the federally required performance measures, the plan development process identified additional locally selected performance measures using the following considerations: Performance measures are meaningful to the goal or objective it supports and the measure can be influenced by policy and investment decisions. The data is feasible and practical for the MPO to collect, store, analyze, and report. Metrics are used to track performance trends on an annual basis.

Performance measure data is reported throughout [Chapter 2](#) and all the measures, data, trends, and federal targets are reported in [Appendix E \(System Performance Report\)](#).

Trends are shown for performance measures that have sufficient data history. Trends are observations about the general direction of the data, and can be found in [Appendix E](#). Targets are set for performance measures federally required with varying timelines as the requirements to do so occur. Targets represent the

desired direction of the measure to meet the goal and objective. Targets approved by the MPO Policy Board are incorporated into [Appendix E](#).

Performance data allows staff the ability to track performance and assess the impacts of transportation polices, programs, and projects to assess whether projects and strategies have worked to accomplish their goal. All measures will be tracked annually or as data availability allows. [Appendix E](#). will be updated annually.

1. Goals and Objectives

T2050 consists of a goal for each of the plan’s 5 themes: Access and Choices; Shared Prosperity; Safety, and Security; Sustainability; and Operations and Maintenance. These themes and goals are tied to the performance measures found throughout [Chapter 2](#) and in [Appendix E](#).

Goals	Objectives
<p>Transportation Options</p> <p>People have a variety of transportation options that provide safe, accessible, convenient, healthy, and affordable travel that connect them to their destinations.</p> 	<p>Complete a connected network of pedestrian and bicycle facilities comfortable to all ages and abilities.</p> <p>Provide a transportation system that supports multimodal options that are affordable, sustainable, reliable, efficient, safe, and easy to use.</p> <p>Improve access to comfortable transit stops, routes, and on-demand services.</p> <p>Utilize land use policies and regulations to support multimodal travel options.</p>
<p>Shared Prosperity</p> <p>The transportation system supports prosperity for all by connecting people and places in an equitable, reliable, affordable, and efficient manner.</p> 	<p>Support efficient freight, commuting, travel and tourism through transportation investments that increase regional access and incorporate placemaking.</p> <p>Support fiscally responsible development patterns and infrastructure investments that are in accordance with the Major Thoroughfares map.</p> <p>Elevate equity in transportation planning and investments by prioritizing the fair and just distribution of benefits and burdens related to transportation and by ensuring traditionally underrepresented communities participate in decision making.</p>
<p>Safety & Security</p> <p>People’s lives are saved, crashes are avoided, and people and goods are safe and secure.</p> 	<p>Improve safety of all modes and decrease fatalities and serious injuries.</p> <p>Mitigate the transportation system’s vulnerability to crime, terrorism, natural disasters and climate change.</p> <p>The transportation system supports emergency preparedness, response, and recovery.</p>
<p>Sustainability</p> <p>Protect and enhance the natural environment and support energy conservation.</p> 	<p>Increase the percentage of trips made using active, shared, and low carbon transportation modes to reduce vehicle miles traveled.</p> <p>Minimize negative environmental impacts by reducing transportation-related greenhouse gas emissions and by designing projects to avoid, minimize, or mitigate impacts to water and air quality and habitat.</p> <p>Maintain a transportation planning process integrated and coordinated with land use, water, and natural resource planning and management.</p>
<p>Operations & Maintenance</p> <p>Existing infrastructure is prioritized through maintenance, operations, and strategic improvements to provide for the best return on public investments.</p> 	<p>Preserve and maintain transportation system assets to maximize their useful life and minimize project construction and maintenance costs.</p> <p>Strive for equitable outcomes when maintaining existing infrastructure and designing new facilities by considering mobility needs for all ages and abilities.</p> <p>Incorporate technology to enhance the capacity, operations, user experience, and performance evaluation of the multimodal transportation system.</p>

Transportation Options



Performance Measures

1. Percentage of people who have access within a ¼ mile to the Level of Comfort 3 or below bikeway network
2. Percentage of public streets with sidewalks on at least one side
3. Percentage of public streets with bikeway network
4. Unlinked Passenger Trips per Vehicle Revenue Hour for demand response and fixed route service
5. Percentage of population with access within a ¼ mile to a bus stop for fixed route transit

Note: See [Appendix E for the System Performance Report](#).

Goal

People have a variety of transportation options that provide safe, accessible, convenient, healthy, and affordable travel that connect them to their destinations.

Objectives

- Complete a connected network of pedestrian and bicycle facilities comfortable to all ages and abilities.
- Provide a transportation system that supports multimodal options that are affordable, sustainable, reliable, efficient, safe, and easy to use.
- Improve access to comfortable transit stops, routes, and on-demand services.
- Utilize land use policies and regulations to support multimodal travel options.

Strategies

- Pursue Land Development Code policies and regulations that support multimodal transportation, such as a connected street grid, residential density that supports transit, a mix of uses, and urban design that creates comfortable places for walking and bicycling.
- Integrate multimodal elements in project planning, design, construction, and maintenance, consistent with the Complete Streets Policy (Lawrence, Eudora, Baldwin City, and Lecompton). Adopt Complete Streets policies and explore revisions to add development code/street standards to expand multimodal options (e.g. FHWA Small Town and Rural Design Guide).
- Implement the Lawrence Bikes Plan, Countywide Bike Plan, Safe Routes to School Plan, Lawrence Pedestrian Plan, and Regional Pedestrian Plan. Prioritize investments on the bicycle and pedestrian priority networks and crossings.
- Implement an Americans with Disabilities Act (ADA) Transition Plan and right-of-way management policies (e.g. multimodal detours).
- Explore options to implement public or private Shared Mobility options such as microtransit, rideshare, bicycle, and scooter share and car share.
- Develop a more efficient, integrated, and coordinated network of human services transportation options by implementing the relevant Douglas County portion of the KDOT Coordinated Public Transit-Human Services Transportation Plan.
- Continue deployment of transit amenities (shelters, benches, etc.) based on the Bus Stop Improvement Program - Technical Guidelines, consider connections between modes (e.g. bicycle parking, park and ride), and address barriers to access.

Note: See [Chapter 6](#) for more detailed strategies.

Shared Prosperity

Goal

The transportation system supports prosperity for all by connecting people and places in an equitable, reliable, affordable, and efficient manner.

Objectives

- Support efficient freight, commuting, travel and tourism through transportation investments that increase regional access and incorporate placemaking.
- Support fiscally responsible development patterns and infrastructure investments that are in accordance with the Major Thoroughfares map.
- Elevate equity in transportation planning and investments by prioritizing the fair and just distribution of benefits and burdens related to transportation and by ensuring traditionally underrepresented communities participate in decision making.

Strategies

- Implement the Regional Intelligent Transportation System Strategic Deployment Plan strategies to maximize network capacity and improve efficiencies.
- Plan and implement citywide multimodal wayfinding and expansion of transit passenger information.
- Participate in development of Statewide Freight Plan and MARC Regional Freight Study.
- Invest in streets that build economic prosperity and sense of community through placemaking that creates places people want to spend time in rather than simply pass through.
- Explore opportunities of emerging technologies and new market driven transportation options (e.g. autonomous vehicles, electric vehicles, rideshare) and consider equitable outcomes.
- Center equity in the decision making process by implementing public engagement with a focus on including traditionally underrepresented people
- Use the planning process to assess potential benefits and burdens of transportation projects, policies, and programs through use of qualitative and quantitative analysis.
- Expand intercity and commuter transit options based on demand and build capacity to support regional transportation initiatives (airport trips, World Cup, medical trips).
- Implement service consistent with the Lawrence Transit Route Redesign Study including development of Central Station, Downtown Station, and Express Hubs and evaluate the 2023 Fare Free Pilot.

Note: See [Chapter 6](#) for more detailed strategies.



Performance Measures

6. *Percent of the person-miles traveled on the Interstate and Non-Instate NHS that are reliable
7. Average commute times
8. Truck Travel Time Reliability (TTTR) Index on the Interstate system

Note: * indicates a federally required performance measure. See [Appendix E for the System Performance Report](#).

What is Shared Prosperity?

Shared prosperity means businesses thrive, individuals have equitable access to opportunity, and government operates in the interest of long-term fiscal, social, and environmental sustainability.



Safety, & Security

Goal

People's lives are saved, crashes are avoided, and people and goods are safe and secure.

Objectives

- Improve safety of all modes and decrease fatalities and serious injuries.
- Mitigate the transportation system's vulnerability to crime, terrorism, natural disasters and climate change.
- The transportation system supports emergency preparedness, response, and recovery.

Performance Measures

9. *Number of fatalities
10. *Rate of fatalities per 100 million VMT
11. *Number of serious injuries
12. *Rate of serious injuries per 100 million VMT
13. *Number of non-motorized fatalities & non-motorized serious injuries
16. *Percentage of revenue and non-revenue vehicles met or exceeded their Useful Life Benchmark
17. *Percentage of assets with a condition rating below 3 on the FTA Transit Economic Requirements Model scale

Note: * indicates a federally required performance measure. See [Appendix E for the System Performance Report](#).

Strategies

- Develop a Vision Zero Safety Action Plan to improve safety through actionable, measurable strategies, emphasizing design and policy solutions.
- Plan and coordinate for the needs of transportation routes and resources for moving people, equipment, materials, and supplies in emergencies or disasters in Douglas County.
- Deliver a roadway system that allows for intuitive understanding of reasonable travel speed through design controls (e.g. turn radii or lane widths) and uses access management to improve safety.
- Increase transportation/transit security by reducing intentional crime, such as harassment, targeting, and terrorist acts, by utilizing crime prevention through environmental design and designing security into projects (such as cameras, lighting, visibility, and call boxes).
- Prioritize investments that improve the resiliency of the transportation system by preparing infrastructure to deal with impacts of climate change and severe weather.

Note: See [Chapter 6](#) for more detailed strategies.

Sustainability

Goal

Protect and enhance the natural environment and support energy conservation.

Objectives

- Increase the percentage of trips made using active, shared, and low carbon transportation modes to reduce vehicle miles traveled.
- Minimize negative environmental impacts by reducing transportation-related greenhouse gas emissions and by designing projects to avoid, minimize, or mitigate impacts to water and air quality and habitat.
- Maintain a transportation planning process integrated and coordinated with land use, water, and natural resource planning and management.

Strategies

- Implement Travel Demand Management (TDM) and land use strategies to improve multimodal options to reduce single occupancy motor vehicle trips.
- Use Nature Based Solutions best practices such as street trees and green infrastructure.
- Plan to transition publicly funded vehicle fleets (e.g. Lawrence Transit /city fleets) to zero emission vehicles and plan for implementation of public electric vehicle charging infrastructure.
- Embrace a transportation planning process that considers transportation needs alongside environmental, regional, community goals, plans and programs in decision making.

Note: See [Chapter 6](#) for more detailed strategies.



Performance Measures

21. Density of urban area (people/acre)
22. Average cost of transportation per household
23. Daily Vehicles Miles Traveled (VMT) per Capita
24. Percentage of sensitive lands
25. Percentage of single occupancy motor vehicles
26. Percentage of mode choice

Note: See [Appendix E for the System Performance Report](#).



Performance Measures

14. *Percentage of NHS bridges by deck area classified as in Good and Poor condition
15. Percentage of non-NHS bridges by deck area classified as in Good and Poor condition
18. *Percentage of pavements of the Interstate System in Good and Poor condition
19. *Percentage of pavements of the non-Interstate NHS in Good and Poor condition
20. Percentage of pavement of non-NHS major roads (collector and above) in Good and Poor condition

Note: * indicates a federally required performance measure. See [Appendix F for the System Performance Report](#).

Operations & Maintenance

Goal

Existing infrastructure is prioritized through maintenance, operations, and strategic improvements to provide for the best return on public investments.

Objectives

- Preserve and maintain transportation system assets to maximize their useful life and minimize project construction and maintenance costs.
- Strive for equitable outcomes when maintaining existing infrastructure and designing new facilities by considering mobility needs for all ages and abilities.
- Incorporate technology to enhance the capacity, operations, user experience, and performance evaluation of the multimodal transportation system.

Strategies

- Maintain an inventory of transportation infrastructure and assets and track transportation system performance. Implement asset management policies to maintain and improve roadway and bridge, bikeway, and pedestrian network conditions.
- Maintain and replace transit vehicles that are past their useful life.
- Use Intelligent Transportation Systems (ITS) to provide cost-effective and practical technologies that enhance the safety, capacity, operations, and evaluation of the multimodal transportation.
- Implement technology solutions to support transit operations and passenger information (e.g. General Transit Feed Specification, Automated Vehicle Annunciators, Rear Destination Sign Retrofit, Digital Rider Alert Panels, and Transit Signal Priority).

Note: See [Chapter 6](#) for more detailed strategies.

What is Vision Zero Safety Action?

Vision Zero Action Plans should lay out actionable, measurable strategies, emphasizing design and policy solutions, including designing Complete Streets and lowering speeds for safety, with a goal of zero crashes.

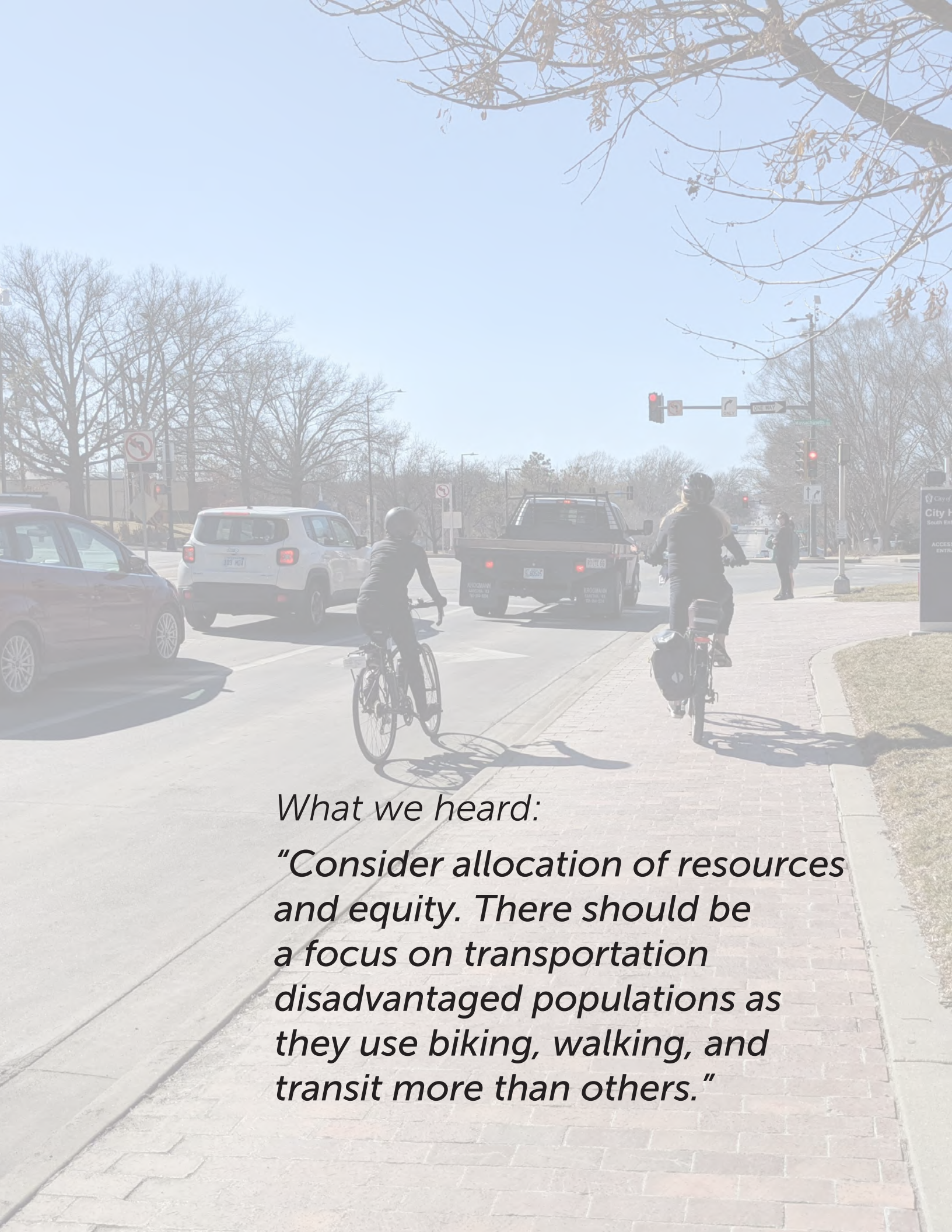
2. Relationship between T2050 Goals and Federal Planning Factors

The 10 federal planning factors represent a comprehensive transportation system planning accommodating all users. Table 4.1 shows how each goal correlates with the federal planning factors expressed throughout the plan.

Table 4.1: T2050 Goals and Federal Planning Factors

	Transportation Options People have a variety of transportation options that provide safe, accessible, convenient, healthy, and affordable travel that connect them to their destinations	Shared Prosperity The transportation system supports prosperity for all by connecting people and places in an equitable, reliable, affordable, and efficient manner	Safety and Security People's lives are saved, crashes are avoided, and people and goods are safe and secure.	Sustainability Protect and enhance the natural environment and support energy conservation	Operations and Maintenance Existing infrastructure is prioritized through maintenance, operations, and strategic improvements to provide for the best return on public investments.
Economic Vitality	X	X	X	X	X
Safety	X	X	X	X	X
Security		X	X	X	X
Accessibility & Mobility	X	X	X		X
Quality of Life	X	X		X	X
Integration & Connectivity	X	X			
System Management		X	X		X
Preservation			X		X
Resiliency & Reliability	X	X	X	X	X
Travel & Tourism	X	X	X	X	X

Source: Federal Planning Factors (23 CFR 134(h))



What we heard:

“Consider allocation of resources and equity. There should be a focus on transportation disadvantaged populations as they use biking, walking, and transit more than others.”



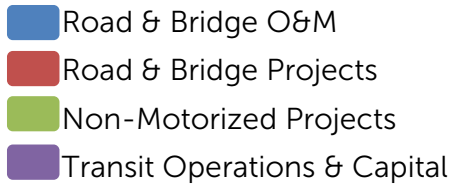
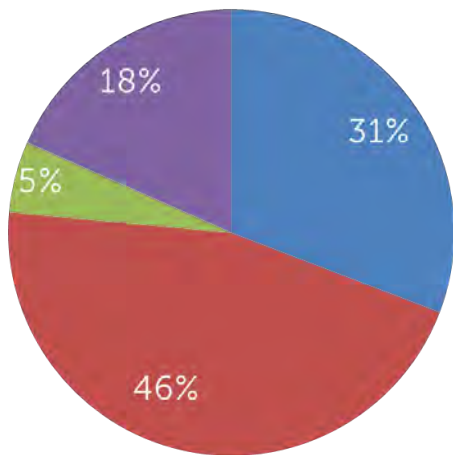
Chapter 5 Financial Analysis



What are Operations and Maintenance (O&M)?

Operations and maintenance (O&M) refers to the running and preservation of the transportation system, including roadways, sidewalks, bicycle routes, and transit vehicles.

Projected Revenues 2023-2050



5. Financial Analysis

A. Overview

T2050 includes a financial analysis which demonstrates how the plan can be implemented with available resources. T2050 places a high priority on Operations and Maintenance (O&M) and preservation of the existing transportation system; therefore, the plan subtracts the O&M expenses "off the top" from the available revenue before projects are selected (Figure 5.1).

This financial analysis establishes funding projections for three separate categories: non-motorized, transit, and road and bridge. Each category includes an analysis of historical revenues, historical O&M expenditures, and projections based on the historical numbers with inflation applied to both the revenue and the O&M.

Figure 5.1: Road & Bridge O&M "Off the Top" Illustration and FY2023-2050 Funding Projections



B. Non-Motorized - Methodology, Assumptions, and Findings

In Lawrence, bicycle and pedestrian infrastructure projects have been historically incorporated into larger road projects budgets, unless they were funded through grants or special allocations. This integration of bicycle and pedestrian elements in roadway projects is consistent with the MPO's Complete Streets Resolution and the Lawrence [Complete Streets Policy](#). Calculations of expenditures for bicycle & pedestrian elements that were part of roadway projects are not tracked independently. Lawrence, Eudora, and Baldwin City provided historical bicycle and pedestrian revenue from FY2018-2022 for standalone budgeted projects (Table 5.1).

Table 5.1: Bicycle and Pedestrian Standalone Project Revenues

Lawrence	FY2018	FY2019	FY2020	FY2021	FY2022	5-Year Average	FY2023 Projected
Local - Bike/Ped- general fund/debt	\$ 450,000	\$ 3,468,557	\$ 2,665,000	\$ 2,182,000	\$ 2,115,000	\$ 2,685,000	\$ 2,008,000
Local - ADA Ramps	\$ -	\$ -	\$ 250,000	\$ 325,000	\$ 325,000	\$ 180,000	\$ 325,000
Federal - CDBG Sidewalk Gap Program	\$ 100,000	\$ 100,000	\$ 300,000	\$ 300,000	\$ 300,000	\$ 157,143	\$ -
Local - Sidewalk Improvement	\$ -	\$ 1,000,000	\$ 1,500,000	\$ 832,000	\$ 965,000	\$ 859,400	\$ 999,000
State - KDOT- Grants/Cost Share	\$ -	\$ -	\$ -	\$ -	\$ 326,000	\$ 65,200	\$ 650,000
Federal -Transportation Alternatives (TA)	\$ -	\$ 1,868,556	\$ 394,128	\$ 480,000	\$ 1,570,000	\$ 1,053,537	\$ 955,000
Eudora							
Local	\$ -	\$ -	\$ 176,000	\$ -	\$ 741,000	\$ 183,400	\$ 431,600
Federal -Transportation Alternatives (TA)	\$ -	\$ -	\$ 283,824	\$ -	\$ 1,781,000	\$ 412,965	\$ 947,000
Sunflower Foundation	\$ -	\$ -	\$ -	\$ -	\$ 55,000	\$ 11,000	\$ -
Kansas Department of Wildlife & Parks	\$ -	\$ -	\$ -	\$ -	\$ 224,056	\$ 44,811	\$ -
Baldwin City							
Local	\$ -	\$ 285,000	\$ -	\$ 340,000	\$ 620,000	\$ 52,200	\$ 167,500
Federal -Transportation Alternatives (TA)	\$ -	\$ 580,000	\$ -	\$ 1,162,111	\$ 261,000	\$ 124,000	\$ 670,000
Lecompton							
Local	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 375,000
Federal -Transportation Alternatives (TA)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 727,000

Note: 5-Year Averages are rounded to nearest 100.

Projections are based on historical averages and known funds budgeted in the city's 5 year Capital Improvement Program and assumptions about availability of competitive grant funds and the history of awards that the region has won.

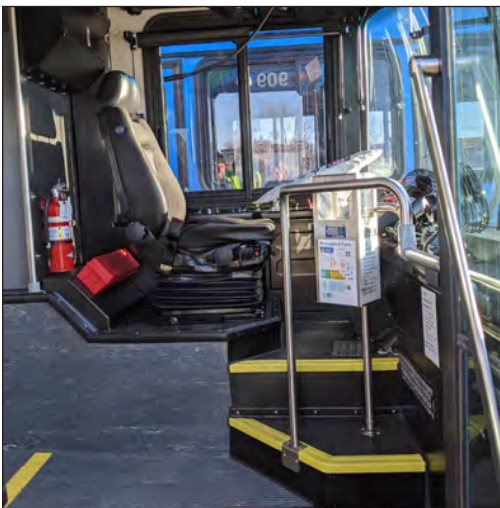
Based on the historical data it was assumed Lawrence will receive a TA grant of \$1,00,000 every other year and the other municipalities will receive either a grant of \$500,000 every other year. Table 5.2 displays the anticipated funding based on the historical data with a 1.5% growth applied annually.

Table 5.2: Bicycle and Pedestrian Projections - 1.5% Growth Annually

Lawrence	1.5% Growth Annually					
	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Sidewalk O&M	\$ 4,041,200	\$ 4,273,400	\$ 5,712,200	\$ 6,153,900	\$ 6,629,500	\$ 7,142,000
Revenues/\$ Available for Projects	\$ 15,793,000	\$ 15,356,400	\$ 21,285,000	\$ 20,947,600	\$ 23,362,400	\$ 23,886,600
Other Municipalities						
Revenues/\$ Available for Projects	\$ 3,318,100	\$ 1,200,000	\$ 1,800,000	\$ 1,200,000	\$ 1,800,000	\$ 1,200,000
MPO Region						
Revenues/\$ Available for Projects	\$ 23,152,300	\$ 20,829,800	\$ 28,797,200	\$ 28,301,500	\$ 31,791,900	\$ 32,228,600

*O&M for bike and pedestrian projects is not currently tracked by the municipalities; except for Lawrence Sidewalk Improvement Program

*Lawrence includes \$1,000,000 TA or State Bike/Ped grant every other year and other Municipalities includes a \$500,000 every other year.



C. Transit - Methodology, Assumptions, and Findings

Historical funding for Lawrence Transit and KU on Wheels does not provide a complete picture of transit funding in the area. This is because transit funding sources are not always predicated on historical levels and KU on Wheels is funded by a student fee, which historic data does not provide an accurate depiction. Therefore, Lawrence Transit and KU on Wheels utilized FY2023 projected revenues as the base year of funding with modifications for known future projections that vary by funding source (Table 5.3). Lawrence Transit and KU on Wheels funding was separated into operating and capital, as the funding are distinct pots of funding provided by the Federal government and KDOT, or in the case of KU on Wheels, separated in the University of Kansas budget.

Table 5.3: FY2023 Transit Revenues Projected

Lawrence Transit Operating	FY23 Projected
Local	\$ 4,943,000
State	\$ 1,155,400
Federal	\$ 3,864,700
Operating Reserve -Local	\$ 3,326,900
Lawrence Transit Capital	FY23 Projected
Capital Reserve - Local	\$ 14,000,000
State	\$ -
State- Access Innovation & Collaboration	\$ 2,700,000
Federal	\$ 1,815,800
KU on Wheels Operating	FY23 Projected
Local/User Fee	\$ 2,745,100
KU on Wheels Capital	FY23 Projected
Local/User Fee	\$ 1,447,200

Note: Rounded to nearest 100.

Lawrence Transit is piloting fare free in 2023 so farebox is projected at \$0. State funding is capital and/or operating eligible, and is projected where it is needed each year.

The human service transportation providers in Douglas County (Bert Nash CMHS, Cottonwood, Inc., Independence, Inc., Lawrence-Douglas County Housing Authority Babcock Bus, Senior Resource Center for Douglas County, and Lawrence Presbyterian Manor) provided historical revenue and operations expenditures data from FY2017-2021 (Table 5.4).

Table 5.4: Historical Human Service Transportation Revenues and Expenditures for Capital and Operations

	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	5-Year Average
Federal	\$ 93,925	\$ 93,925	\$ 96,969	\$ 90,364	\$ 226,985	\$ 120,400
State	\$ 55,307	\$ 51,465	\$ 125,703	\$ 45,539	\$ 42,499	\$ 64,100
Local	\$ 673,021	\$ 755,606	\$ 774,692	\$ 745,871	\$ 721,894	\$ 734,200
Total	\$ 822,253	\$ 900,996	\$ 997,364	\$ 881,775	\$ 991,378	\$ 918,800

Lawrence Transit and KU on Wheels provided FY2023 projected Operations and Maintenance (O&M) information, while the Other Human Service Transportation Providers furnished FY2017-2021 O&M data. O&M consists of routine things such as vehicle and systems inspections, refueling, filter, oil, and fluid replacements, major component repair and replacement, operator wages, and other miscellaneous operating expenses. Table 5.5 shows the projected expenses for Lawrence Transit and KU on Wheels, which were used as the base year for O&M projections.

Table 5.5: FY2023 Transit Operations and Maintenance Projected Expenditures

Lawrence Transit Operations Expenditures	FY23 Projected
Personal Services	\$ 159,100
Contractual Services	\$ 3,066,900
Commodities	\$ 1,410,000
State-Operations	\$ 1,506,000
FTA Operations	\$ 4,392,200

Lawrence Transit Capital Expenditures	FY23 Projected
State	\$ -
Federal	\$ 1,815,800
State- Access Innovation & Collaboration	\$ 2,700,000
Capital Reserve - Local	\$ 14,000,000

KU on Wheels Operating Expenditures	FY23 Projected
Local/User Fee	\$ 2,944,800
Safe Ride	

KU on Wheels Capital Expenditures	FY23 Projected
Local/User Fee	\$ 1,446,500

Note: Rounded to nearest 100.



What are Operations and Maintenance (O&M) for transit?

Operations and maintenance (O&M) for transit refers to vehicle and systems inspections, refueling, filter, oil, and fluid replacements, major component repair and replacement, operator wages, and other operating expenses.



Source: Adobe Stock

Table 5.6: Transit Projections -(Revenue and O&M Expenditures)

1.5% Growth Annually for Lawrence/Other and Sales Tax Renewal Scenario with 1.5-5% Increase for O&M Annually						
Lawrence Transit	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues - Operations	\$ 41,190,500	\$ 42,483,460	\$ 55,724,500	\$ 60,239,000	\$ 65,064,100	\$ 69,223,000
Operations Expenditures	\$ 41,190,500	\$ 43,947,000	\$ 60,003,800	\$ 65,464,500	\$ 72,654,500	\$ 79,673,600
Balance/(Shortfall)	\$ -	\$ (1,463,540)	\$ (4,279,300)	\$ (5,225,500)	\$ (7,590,400)	\$ (10,450,600)
** operations expenditures cannot exceed revenue- cuts to service or fee increases will be required to maintain service.						
Revenues - Capital	\$ 29,985,800	\$ 14,127,400	\$ 18,286,300	\$ 18,963,600	\$ 19,732,000	\$ 21,598,400
	\$ 71,176,300	\$ 56,610,860	\$ 74,010,800	\$ 79,202,600	\$ 84,796,100	\$ 90,821,400
KU on Wheels/Saferide	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues - Operations	\$ 12,601,400	\$ 12,980,400	\$ 16,225,500	\$ 16,225,500	\$ 16,225,500	\$ 16,225,500
Operations Expenditures	\$ 12,805,100	\$ 15,608,300	\$ 24,322,200	\$ 31,041,700	\$ 39,617,800	\$ 50,563,500
Balance/(Shortfall)	\$ (203,700)	\$ (2,627,900)	\$ (8,096,700)	\$ (14,816,200)	\$ (23,392,300)	\$ (34,338,000)
** operations expenditures cannot exceed revenue- cuts to service or fee increases will be required to maintain service.						
Revenues - Capital	\$ 5,954,800	\$ 5,788,800	\$ 7,236,000	\$ 7,236,000	\$ 7,236,000	\$ 7,236,000
Capital Expenditures	\$ 5,954,800	\$ 5,788,800	\$ 7,236,000	\$ 7,236,000	\$ 7,236,000	\$ 7,236,000
Balance/(Shortfall)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	\$ 18,556,200	\$ 18,769,200	\$ 23,461,500	\$ 23,461,500	\$ 23,461,500	\$ 23,461,500
Other Paratransit Providers	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 3,758,400	\$ 3,988,900	\$ 5,332,100	\$ 5,745,300	\$ 6,189,700	\$ 6,668,000
O&M/Capital Expenditures	\$ 3,758,400	\$ 3,988,900	\$ 5,332,100	\$ 5,745,300	\$ 6,189,700	\$ 6,668,000
Balance/(Shortfall)	\$ 3,758,400	\$ 3,988,900	\$ 5,332,100	\$ 5,745,300	\$ 6,189,700	\$ 6,668,000

The Lawrence Transit FY2023 anticipated revenues were projected with 1.5% growth annually unless there were more detailed projections provided expenditures were projected with a 3-5% increase based on historical trends. Farebox revenue was projected at zero through 2050. KU on Wheels revenues were projected with no growth, future revenue increases require student fee increases or new funding sources. The other human service transportation providers historical revenues and O&M averages were projected with 1.5% growth annually. Table 5.6 displays these projections summed into year bands. Funding available per entity is shown by subtracting O&M expenditures from revenues. These funding projections are based on the assumption that the Lawrence transit sales taxes would be renewed and the KU student fees would continue through 2050.

The operating revenues for Lawrence Transit and KU on Wheels show a deficit. As a result, changes in service may have to occur to meet the revenue realities if additional funding is not secured. With increasing prices to operate service, it is impossible to provide the same level of service year to year at the same cost.

Table 5.7: 5-Year Historical Averages Road & Bridge Revenues

	5-Year Average
Lawrence	Revenue
Surface Transportation Program-Federal Fund Exchange**	\$ 1,206,300
State Gas Tax (Special City/County Highway Fund)*	\$ 3,178,800
Stormwater Fund	\$ 140,000
General Fund Support- CIP Projects*	\$ 801,000
General Obligation Debt- CIP reconstruction*	\$ 10,709,600
Infrastructure Sales Tax*	\$ 3,484,000
Internal O&M budget	\$ 4,548,600
Eudora	
Surface Transportation Program-Federal Fund Exchange	\$ 75,500
Motor Fuel Tax	\$ 187,900
Mud Bond Fees	\$ 14,200
Bond Proceeds	\$ 4,700
KDOT Cost Share Program	\$ 148,900
Transfer from CIP 4-Mill & 3/4 Sales Tax	\$ 208,200
General Fund	\$ 155,400
Transfer from Storm Drainage	\$ 324,600
Special Highway Fund Balance Use	\$ 65,600
Baldwin City	
Motor Fuel Tax - State	\$ 126,900
Motor Fuel Tax - County	\$ 9,900
General Fund Support	\$ 473,700
Special Highway Fund - Cash Carry	\$ 205,400
Lecompton	
Local	\$ 31,500
Douglas County	
U.S. Fish and Wildlife Service	\$ 50,300
Surface Transportation Program-Federal Fund Exchange	\$ 442,300
Local	\$ 5,000,000
Capital Improvement Program Allocation	\$ 3,400,000
State Gas Tax (Special City/County Highway Fund)	\$ 1,896,700
Capital Improvement Program Reserve *	\$ 3,770,200

Note: Rounded to nearest 100

* 5 year average based on projections FY23-27 from Capital Improvement Plan, since historical information is unavailable or not as realistic

** Lawrence STP average is based on FY 22 calculation

KDOT	FY 2011-21 Average
Road & Bridge projects	\$ 28,987,500

KTA	FY 2023
Toll Revenues budget for Douglas County	\$ 672,800
Additional Toll Revenue is budgeted with the project	
Note: Rounded to nearest 100	

D. Road and Bridge - Methodology, Assumptions, and Findings

Lawrence, Eudora, Baldwin City, Lecompton, and Douglas County provided historical revenue information from FY2017-2022 or future projected funds based on adopted Capital Improvement Plans. 5-year rounded revenue averages were calculated based on data provided by each entity (for some funds FY2017-2021 5-year averages were used, for others FY2018-2022 were used) based on the best information available (except for KDOT which was a 11-year average). KDOT evaluated state projects in the region between FY2011-2021 and the average was used to forecast a reasonable amount of state funding per year. KTA is funded by toll revenues and projects come with funding as shown in Table 5.7.

Each entity provided historical [Operations and Maintenance \(O&M\)](#) information for 5 years from FY2017-2022, with the exception of KDOT which provided O&M from SFY2019-2021 and KTA which provided FY2023 planned expenditures. O&M consists of routine things such as pothole patching, minor repairs to pavements and curbs, snow removal, striping and marking, utility work and patching, electrical repairs, tree trimming, mowing, signal repairs, sign replacement, bridge maintenance, and other minor work tasks. At KDOT, O&M estimates are derived on a sub area basis rather than by county. The sub areas are organized largely by how the agency works to control ice and snow operations in winter. Some of these sub areas may cross county lines and contain parts of two or more portions of a particular county. This is the case with the Douglas County as a sub area covers most of this county and also a portion of an adjacent county. The KDOT O&M estimates represent the closest estimates that are available based upon the geographic boundaries that guide KDOT's operations and maintenance activities.

Table 5.10 shows the 5-year rounded averages for O&M, which were calculated based on data provided by each entity (except for KDOT which was a 3-year average, Douglas County which is on planned estimates, and KTA which is 2023 planned estimates).

The historical revenues average was projected at 1.5% annually. The historical O&M average was projected annually at 3.5%. Table 5.13 displays these projections summed into bands. It shows the revenues minus the O&M expenditures to present funding available for projects per entity. There is an O&M shortfall identified in Eudora, Baldwin City, and Lecompton due to O&M costs outpacing revenues. Where shortfall exists, additional revenue will need to be generated to cover expenses or operations & maintenance will not be able to be maintained at current levels. Potential revenue sources municipalities could explore include new, increased, or reallocated sales or property tax; bonds or other financing; and transportation impact fees. These funding projections are based on the assumption that the Lawrence infrastructure sales taxes would be renewed and continued through 2050.

E. Summary

This financial analysis utilized historical data to create projections for anticipated revenues and operations and maintenance expenditures to understand how much funding is reasonably expected to be available for transportation projects. As shown, in Table 5.9 there is sufficient projected revenue to account for the O&M expenditures and the programmed projects, which are discussed in Chapter 6.

Table 5.8: Historical Road & Bridge Operations & Maintenance Expenditures - 5 Year Averages

Lawrence	Expenditures
Gas Tax Fund * ^	\$ 2,786,000
Stormwater Fund (505)	\$ 140,000
Street Division (3000)	\$ 3,071,800
Traffic Division (3020)	\$ 861,800
Engineering Division (3010)	\$ 350,100
Mill and Overlay (CIP Program to O&M)	\$ 2,547,800
General Fund *	\$ 416,000
Infrastructure Sales Tax*	\$ 2,449,000
* 5 year average based on projections FY23-27 from Capital Improvement Plan, since historical information is unavailable or not as realistic	
^ 4 year average	
Eudora	
Overhead and Administration	\$ 330,400
Asphalt/Concrete Road Maintenance	\$ 711,700
Baldwin City	
Overhead and Administration	\$ 312,610
Asphalt/Concrete Road Maintenance	\$ 195,600
Lecompton	
Overhead and Administration	\$ 2,100
Asphalt/Concrete Road Maintenance	\$ 1,800
Gravel/Earth Road Maintenance	\$ 1,500
Chip n' Seal	\$ 24,900
Crack seal/Maintenance	\$ 1,000
Sand/Salt - Icy Road preventative	\$ 200
Douglas County	
Road & Bridge	\$ 6,800,000
KDOT	
Pavement	\$ 70,000
Shoulders	\$ 19,400
Drainage	\$ 30,800
Roadside	\$ 136,500
Bridge	\$ 5,600
Snow & Ice	\$ 265,700
Traffic Guidance	\$ 62,000
KTA	
Pavement Maintenance	\$ 427,800
Bridge Maintenance	\$ 245,000
**KDOT calculated 3 year averages	
Note: Rounded to nearest 100	

Table 5.9: 2023-2050 Road and Bridge Projections
 Revenues (-) O&M Expenditures = \$ Available for Projects

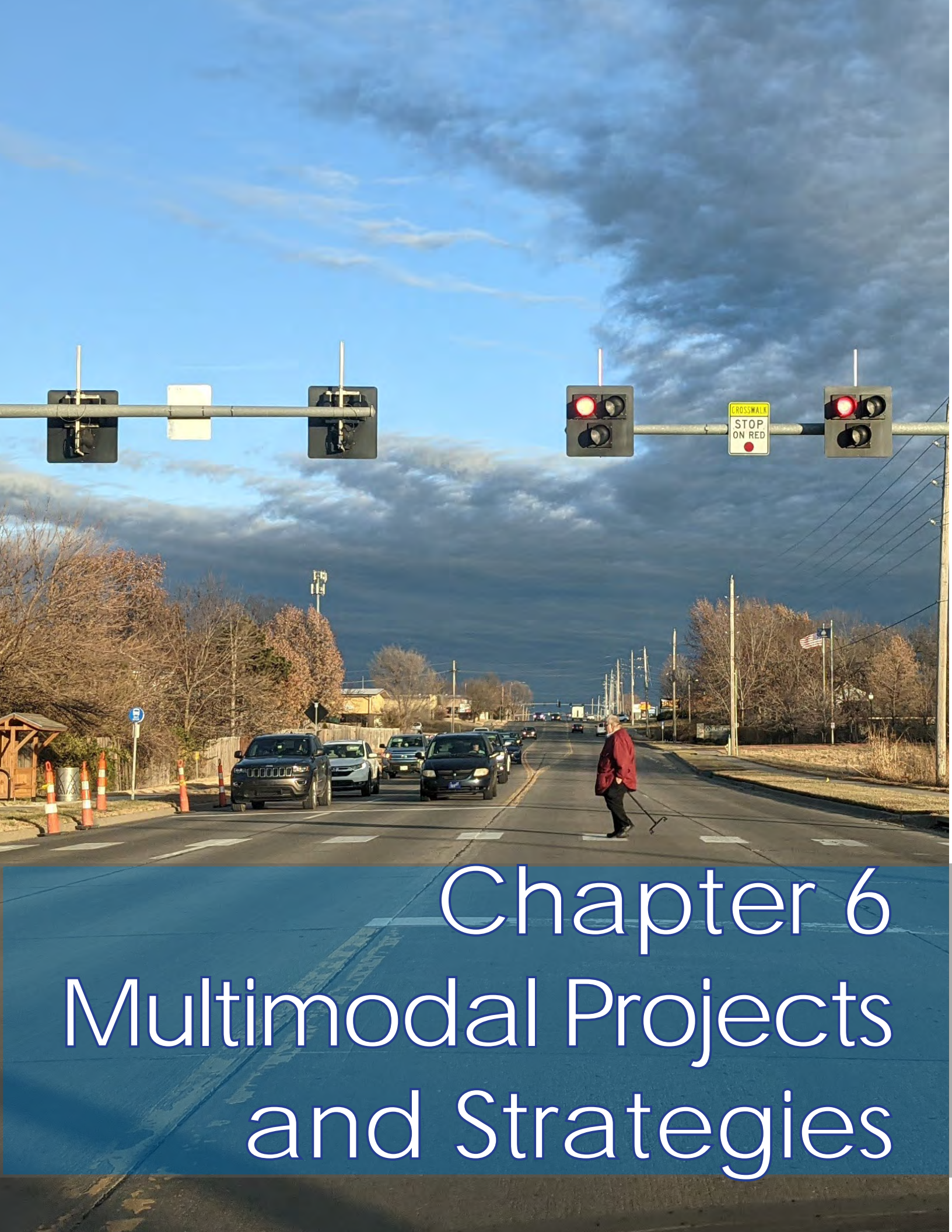
Roads and Bridges						
Revenues (-) O&M Expenditures = \$ Available for Projects						
1.5% Growth Annually and Lawrence Sales Taxes with 3.5% O&M Increase Annually						
Lawrence	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 92,905,600	\$ 100,674,700	\$ 129,203,300	\$ 138,722,300	\$ 148,977,100	\$ 160,024,600
O&M Expenditures	\$ 52,707,700	\$ 57,160,700	\$ 80,197,600	\$ 95,250,100	\$ 113,126,700	\$ 134,358,100
Shortfall	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$ Available for Projects	\$ 40,197,900	\$ 43,514,000	\$ 49,005,700	\$ 43,472,200	\$ 35,850,400	\$ 25,666,500
Eudora	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 7,895,700	\$ 23,832,000	\$ 7,170,000	\$ 7,693,100	\$ 8,256,600	\$ 8,863,200
O&M Expenditures	\$ 4,392,600	\$ 5,040,700	\$ 7,359,000	\$ 8,740,400	\$ 10,381,300	\$ 12,330,000
Shortfall	\$ -	\$ -	\$ (189,000)	\$ (1,047,300)	\$ (2,124,700)	\$ (3,466,800)
\$ Available for Projects	\$ 3,503,100	\$ 18,791,300	\$ -	\$ -	\$ -	\$ -
Baldwin City	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 3,337,600	\$ 3,542,400	\$ 4,735,500	\$ 5,101,500	\$ 5,495,800	\$ 5,578,200
O&M Expenditures	\$ 2,141,700	\$ 2,457,500	\$ 1,361,400	\$ 6,362,400	\$ 17,959,600	\$ 21,329,600
Shortfall	\$ -	\$ -	\$ -	\$ (1,260,900)	\$ (12,463,800)	\$ (15,751,400)
\$ Available for Projects	\$ 1,195,900	\$ 1,084,900	\$ 3,374,100	\$ (1,260,900)	\$ (12,463,800)	\$ (15,751,400)
Lecompton	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 129,000	\$ 137,000	\$ 182,600	\$ 197,000	\$ 212,000	\$ 228,500
O&M Expenditures	\$ 129,000	\$ 153,500	\$ 223,700	\$ 264,300	\$ 311,200	\$ 367,200
Shortfall	\$ -	\$ (16,500)	\$ (41,100)	\$ (67,300)	\$ (99,200)	\$ (138,700)
\$ Available for Projects	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Douglas County	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 61,028,300	\$ 48,766,600	\$ 65,187,000	\$ 70,224,000	\$ 75,651,800	\$ 81,499,400
O&M Expenditures	\$ 27,438,000	\$ 30,703,035	\$ 44,824,510	\$ 53,237,457	\$ 63,229,398	\$ 75,096,691
Shortfall	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$ Available for Projects	\$ 33,590,300	\$ 18,063,565	\$ 20,362,490	\$ 16,986,543	\$ 12,422,402	\$ 6,402,709
KDOT	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 291,608,900	\$ 125,861,900	\$ 168,243,200	\$ 181,246,100	\$ 195,253,200	\$ 210,343,100
O&M Expenditures	\$ 2,486,900	\$ 2,853,400	\$ 4,166,100	\$ 4,947,900	\$ 5,876,100	\$ 6,978,700
Shortfall	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$ Available for Projects	\$ 289,122,000	\$ 123,008,500	\$ 164,077,100	\$ 176,298,200	\$ 189,377,100	\$ 203,364,400
KTA	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 7,952,300	\$ 6,121,300	\$ 3,904,900	\$ 4,206,500	\$ 4,531,500	\$ 4,881,600
O&M Expenditures	\$ 7,952,300	\$ 6,121,300	\$ 3,904,900	\$ 4,206,500	\$ 4,531,500	\$ 4,881,600
Shortfall	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$ Available for Projects	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
MPO Region	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
Revenues	\$ 464,857,400	\$ 308,935,900	\$ 378,626,500	\$ 407,390,500	\$ 438,378,000	\$ 471,418,600
O&M Expenditures	\$ 97,248,200	\$ 104,490,135	\$ 142,037,210	\$ 173,009,057	\$ 215,415,798	\$ 255,341,891
Shortfall	\$ -	\$ (16,500)	\$ (230,100)	\$ (2,375,500)	\$ (14,687,700)	\$ (19,356,900)
\$ Available for Projects	\$ 367,609,200	\$ 204,445,765	\$ 236,589,290	\$ 234,381,443	\$ 222,962,202	\$ 216,076,709

Note: Shortfalls represent a reduction in services that will need to occur if additional funding is not allocated. Private development roadways are not included in the fiscal constraint.

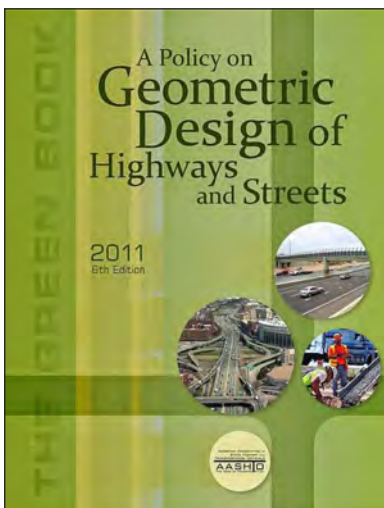
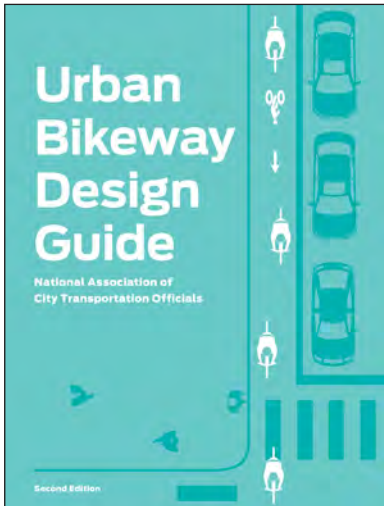
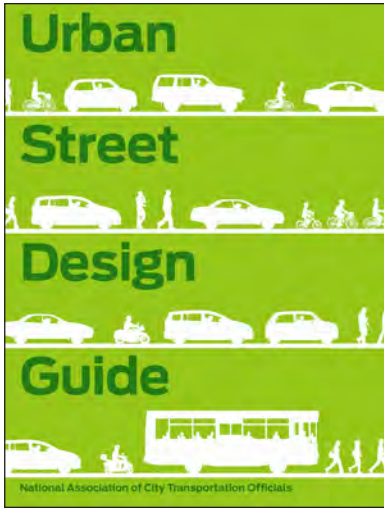


What we heard:

“Governments at all levels must promote and support active transportation by improving infrastructure by building and repairing sidewalks and bikeways and improving intersections to make them safer.”



Chapter 6 Multimodal Projects and Strategies



6. Multimodal Projects and Strategies

Previous chapters discussed the existing conditions, plans and programs in the Lawrence-Douglas County region. Chapter 5 provides the financial analysis for potential funding. This chapter lays out details to the strategies identified in Chapter 3 and incorporates existing mode-specific plans into the long-range plan.

While there are different transportation modes, the transportation system needs to be thought of as a comprehensive system, which works together to provide mobility. There are several strategies that impact all transportation users and illustrate the interconnectedness of the modes. Each of these strategies builds on the work the region is already doing to achieve the vision and goals set out in this plan.

A. Implementing Transportation Options

The US Department of Transportation (DOT) Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations states, "Walking and bicycling foster safer, more livable, family-friendly communities; promote physical activity and health; and reduce vehicle emissions and fuel use." In this context, Planning must consider all transportation users, including individuals who cannot or prefer not to drive. All users should have the same safe and efficient transportation choices as those offered to drivers. Pedestrian and bicycle facilities should meet accessibility requirements and provide safe, convenient, and interconnected transportation networks. Considering all members of Lawrence and Douglas County Communities, including children and adults for whom car ownership is not an option, bicycle and pedestrian facilities must be part of the regional transportation planning process. Particular care must be taken, in rehabilitating existing routes and future roadway improvements, to consider how these routes, especially major arterial routes, have in the past created barriers for both bicyclists and pedestrians.

Pursue Land Development Code policies and regulations that support multimodal transportation, such as a connected street grid, residential density that supports transit, a mix of uses, and urban design that creates comfortable places for walking and bicycling.

[Lawrence Land Development Code Update](#) - The City of Lawrence recently launched an effort to update its Land Development Code (LDC). The Land Development Code is the set of regulations that guide how development should occur in our community. It is also one of the primary tools used to implement Plan 2040 – the comprehensive plan for the City of Lawrence and Douglas County – and the Lawrence Strategic Plan. The Lawrence Land Development Code update provides an opportunity to:

- **Establish Lawrence street classifications.** Street types guide implementation for both public and private infrastructure based on desired multimodal outcomes. The LDC update should identify limitations of the current street classifications and create a framework for categorizing streets that support multimodal trips.
- **Deploy pedestrian oriented development.** This serves to create places where people feel safe and comfortable through using a pedestrian-oriented lens when reviewing development proposals. Staff should consider the comfort of the pedestrian within the walking spaces in the built environment (adequate lighting, shade, shelter, walkway width, seating opportunities).
- **Plan and construct connective road patterns.** When planning road connections, Code should emphasize grid style streets, as studies show curvilinear style streets make it harder for people to have multimodal trip choices. It should also provide pedestrian access within pedestrian easements to reduce trip length. Designing the street and sidewalk network for short trips between residential and commercial areas advocates that residents have access to parks, healthy food destinations and bus stops that improve their opportunities for access.
- **Allow denser residential and commercial construction and prevent low-density sprawl.** Ensure that densification improves the pedestrian environment with an active ground floor at the human scale and reduction in setbacks. Densification also increases small neighborhood commercial which serves to create complete neighborhoods which highlight walkability for all users. Making space for people of all ages and income levels by setting appropriate citywide policies to maintain and encourage housing variety and affordability.
- Incentivize development within the city instead of



Connected and Disconnected Road Patterns

Source: Engineering News Record





on the fringes, by focusing inward. A strategy to meet this goal is to remove parking minimums from development proposals and create parking maximums which allows developers to build space for people instead of cars.

- Deploy bicycle friendly end-of-trip amenities and bicycle parking.
- Consider the long-term pedestrian vision identified in the Lawrence Pedestrian Plan.

Integrate multimodal elements in project planning, design, construction, and maintenance, consistent with the [Complete Streets Policy \(Lawrence\)](#). Adopt Complete Streets policies and explore revisions to add development code/street standards to expand multimodal options (e.g., FHWA Small Town and Rural Design Guide) (Eudora, Baldwin City, and Lecompton).

Street design should strive to accommodate all users and best practices for integrated streets that prioritize people over motor vehicles. Eudora, Baldwin City, and Lecompton should develop and implement Complete Street policies and expand development code and street standards to support multimodal transportation.

Implement the Lawrence Bikes Plan, Countywide Bike Plan, Safe Routes to School Plans (Lawrence, Eudora, & Baldwin City), Lawrence Pedestrian Plan, and Regional Pedestrian Plan. Prioritize investments on the bicycle and pedestrian priority networks and crossings.

- Enhance multimodal friendliness and minimize crashes and injuries of people who walk, wheel, or bicycle as a means of transportation. This can be done through design and implementation of comfortable, low-stress, well maintained networks that reduce barriers and connect neighborhoods to destinations.
- Prioritize bicycle and pedestrian improvements based on plan priorities to construct the priority networks. In Lawrence, the Non-Motorized Prioritization Policy should be used when prioritizing improvements.
- Develop a culture that supports multimodal transportation throughout our region through programs and events to educate and encourage active transportation.

Projects: Bicycle & Pedestrian Projects

The City of Lawrence has a Non-Motorized Infrastructure Prioritization Process to program funds towards standalone bicycle and pedestrian projects, a sidewalk improvement program to prioritize the reduction of hazards along existing sidewalks/raps and an ADA transition program. Other regional bicycle and pedestrian improvements will be prioritized and implemented as funding becomes available. Table 6.1 shows the fiscally constrained non-motorized projects.

Table 6.1: Fiscally Constrained Bicycle & Pedestrian Projects

Lawrence								
#	Name	Description	FY2023-2025	FY2026-2030	FY2031-2035	FY2036-2040	FY2041-2045	FY2046-2050
		Construct a grade-separated crossing for the Lawrence Loop Trail at Iowa Street. Currently, non-motorized users of the Lawrence Loop cross five lanes of vehicular traffic on Iowa Street (US Highway 59) to continue on the trail.	\$ 1,898,000					
520	Lawrence Loop - Iowa Crossing							
522	Lawrence Loop Trail from Queens Rd to Kasold Mass. St. - 14th to 23rd St Multimodal Improvement	the Baldwin Creek Trail at Queens Road, to E 1130 Road to	\$ 2,000,000	\$ 2,800,000				
607	Sandra Shaw Park	Construction of bicycle/pedestrian facilities	\$ 1,800,000					
516	Wayfinding	Design and construction of 10' shared use path.	\$ 964,000					
-		Multimodal Wayfinding planning & installation	\$ 693,000					
		Pedestrian, Bicycle, & ADA ramp projects throughout Lawrence includes Community Development Block Grant (CDBG) projects and SRTS TA projects/ funding. Funding in out years is not yet committed to projects. Project selection is based on approved Bike/Ped/SRTS plans.						
507	Various Lawrence Bike/Sidewalk/ADA Ramps Projects and Sidewalk Improvement		\$ 8,389,900	\$ 20,919,100	\$ 26,997,200	\$ 27,101,500	\$ 29,991,900	\$ 31,028,600
		Total Project Cost	\$ 15,744,900	\$ 23,719,100	\$ 26,997,200	\$ 27,101,500	\$ 29,991,900	\$ 31,028,600
		Projected Revenues	\$ 15,744,900	\$ 23,719,100	\$ 26,997,200	\$ 27,101,500	\$ 29,991,900	\$ 31,028,600
		Fiscally Constrained	Yes	Yes	Yes	Yes	Yes	Yes

Other Municipalities								
#	Name	Description	FY2023-2025	FY2026-2030	FY2031-2035	FY2036-2040	FY2041-2045	FY2046-2050
515	Lecompton Sidewalk: Historic & Grand Loop	Construct 5' wide concrete sidewalk and install sharrows.	\$ 1,102,000					
500	Baldwin City: Maple Leaf Trail	Construct shared use path from train depot to city limits.	\$ 837,500					
501	Eudora Church Street Shared Use Path	Construct shared use path over K-10	\$ 1,136,400					
-	Bike and Pedestrian Projects	Unprogrammed projects		\$ 1,200,000	\$ 1,800,000	\$ 1,200,000	\$ 1,800,000	\$ 1,200,000
		Total Project Cost	\$ 3,075,900	\$ 1,200,000	\$ 1,800,000	\$ 1,200,000	\$ 1,800,000	\$ 1,200,000
		Projected Revenues	\$ 3,075,900	\$ 1,200,000	\$ 1,800,000	\$ 1,200,000	\$ 1,800,000	\$ 1,200,000
		Fiscally Constrained	Yes	Yes	Yes	Yes	Yes	Yes

*O&M for bike and pedestrian projects is not currently tracked by the municipalities; therefore, it was not included as a project.

Implement an Americans with Disabilities Act (ADA) Transition Plan and Right-of-Way management policies (e.g. multimodal detours).

- The Lawrence ADA Transition Plan for the Public Rights-of-Way highlights the barriers through the self-evaluation process and prioritizes improvements to be made to remove barriers and increase accessibility and equitability. Additionally, the right-of-way management policies should continue to accommodate pedestrians in the work zones.
- The City of Lawrence should continue to implement Right-of-Way (ROW) management to reduce any negative impact to people who walk or wheel when work is done in the ROW.
- City of Lawrence should Establish Brick Sidewalk and Street Standards.
- Within older areas of Lawrence, including the Oread Neighborhood and portions of East Lawrence, a significant character defining material is the red brick streets and brick sidewalks. These streets and sidewalks give the neighborhoods a character not found in newer developments. [The Oread Design Guidelines](#) serve as guidelines for development in the area and include language on how character defining aspects should be protected. However, clearer City-wide brick sidewalk reconstruction standards would greatly benefit ADA accessibility. Brick sidewalks, especially those in poor condition, can be difficult (if not impossible) to traverse for those with limited mobility.



RideKC Microtransit Vehicle
Source: RideKC

Explore options to implement public or private shared mobility options such as microtransit, rideshare, bicycle, and scooter share and car share.

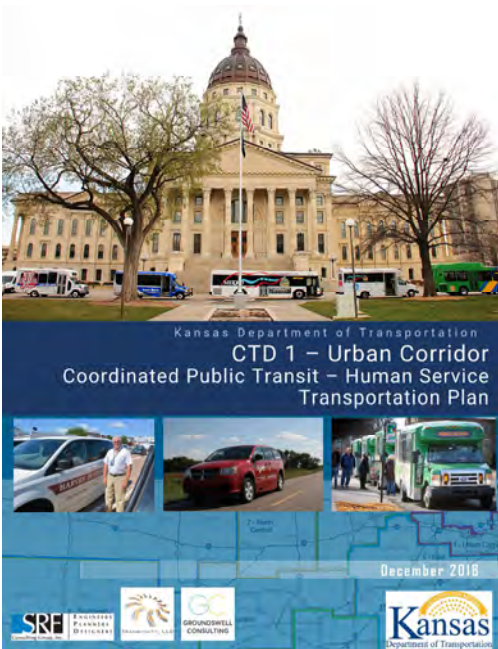
Project: Microtransit Pilot

Lawrence Transit is implementing a new microtransit service in Lawrence in 2023. Microtransit functions similarly to Uber and Lyft, but it uses transit vehicles and drivers. Anyone can request a trip to and from locations within the city limits of Lawrence between the hours of 8am-8pm on Sunday using a smartphone app or by dialing a phone number.

Project: Explore opportunities for Vanpool, employee shuttle programs and/or bicycle/scooter & car share.

Cities and transit providers should explore expanding mobility options to increase affordability and provide greater access to opportunity, both for commuters and last mile trips as an alternative to car ownership.

Develop a more efficient, integrated, and coordinated network of human services transportation options by implementing the relevant Douglas County portion of the KDOT Coordinated Public Transit-Human Services Transportation Plan.



The [Coordinated Public Transit –Human Services Transportation Plan \(CPT-HSTP\) \(2018\)](#) outlines how transit providers can most efficiently and effectively work together to improve mobility for individuals with special transportation needs. Transit providers throughout Douglas County should continue to coordinate transportation services to meet transportation needs. The statewide expansion of the Mobility Management program is one implementation activity to evolve from the 2018 plan. Mobility Managers are tasked with improving relationships with regional transit providers (Lawrence Transit, KU on Wheels, Senior Resource Center, Independence Inc., etc.) to improve the use of resources, responsiveness, emergency preparedness in response to the community. Douglas County has a Mobility Manager as part of the Transportation Planning division. The Shawnee County and Douglas County Mobility Managers have coordinated efforts with the National Aging and Disability Transportation Center to form a coalition of Lawrence and Topeka transportation providers to address the need for cross-county medical trips between the two counties. Mobility managers should

continue to coordinate transportation needs between healthcare providers and human service agencies; this is one of the largest unmet transportation needs identified by the public.

Continue deployment of transit amenities (shelters, benches, etc.) based on the Bus Stop Improvement Program - Technical Guidelines, consider connections between modes (e.g. bicycle parking, park and ride), and address barriers to access.

Project: Bus Stop Improvement Program

Lawrence Transit’s Bus Stop Improvement Program includes efforts through multiple processes to improve bus stops on an ongoing basis. Bus stops are often the first interaction that someone has with the Lawrence Transit bus system. Bus stops should be easy to find, accessible for all, comfortable and safe to wait at, and contribute to an aesthetically pleasing streetscape.

B. Implementing Shared Prosperity

Plan and implement citywide multimodal wayfinding and expansion of transit passenger information.

Project: Wayfinding Planning and Implementation

A wayfinding system helps create a culture of walking as it helps residents and visitors create multimodal routes to nearby destinations. The City of Lawrence should develop and implement a multimodal wayfinding plan and the City has planned the first step with a Bicycle wayfinding project planned for 2023.

Project: Transit Passenger Outreach and Education

Lawrence Transit should conduct rider outreach and education through implementation of the Travel Training Program, developing relationships to support the local business community, and utilizing new bus information technology (Token Transit app, MyBusLawrence app, Transit app, transit website, ride guide, real-time arrival information).



Haskell and 12th bus shelter
Source: Lawrence Transit



Wayfinding sign
Source: Toole Design Group



What is Wayfinding?

Wayfinding is a network of signage that directs users to specific spaces and/or locations.



Source: Lawrence Transit



Autonomous Vehicle Illustration

Source: Adobe Stock

Participate in development of Statewide Freight Plan and Mid America Regional Council (MARC) Regional Freight Plan.

Planning: MARC Regional Freight Plan & Statewide Freight Plan

The MPO will participate in the development of the MARC Regional Freight Plan in 2023. The study will allow agencies an opportunity to identify, select and prioritize local, regional, state and national multimodal freight projects along freight corridors and for intermodal connections. This regional study will link the KDOT and MoDOT freight plans.

Invest in streets that build economic prosperity and sense of community through placemaking that creates places people want to spend time in rather than simply move through.

Street designs should promote a feeling of comfort and allow for a mix of non-vehicular modes of transportation. Consideration should be taken when designing new roads or redeveloping existing roads to assess the impact on transportation disadvantaged populations when investments are made. Recognition that the local road network can function as a barrier to employment, healthcare, and commerce for individuals who cannot or choose not to drive should influence the planning process.

Explore opportunities of emerging technologies and new market driven transportation options (e.g. autonomous vehicles, electric vehicles, rideshare) and consider equitable outcomes.

The MPO should continue to follow emerging technologies and market driven transportation (autonomous vehicles, electric vehicles, rideshare). As these technologies advance and are implemented they may alter infrastructure, which needs to be addressed through planning.

Center equity in the decision making process by implementing public engagement with a focus on including traditionally underrepresented people

Process: Transportation and Transit Planning Public Participation Planning

The MPO and Lawrence Transit are committed to implementing meaningful and responsive public engagement through education and outreach, implementing the [Public Participation Plan](#).

Use the planning process to assess potential benefits and burdens of transportation projects, policies, and programs through use of qualitative and quantitative analysis.

Incorporate and evaluate the distribution and impacts of transportation programs, projects, and services during planning, design, and construction.

Expand intercity and commuter transit options based on demand and build capacity to support regional transportation initiatives (airport trips, World Cup, medical trips).

Transit providers should facilitate regional transportation by:

- Connecting with Greyhound and K10 Connector stops at Central Station in Lawrence
- Participating in the process to update the KDOT I-70 Corridor Plan and any state efforts to expand commuter service in the K-10 corridor
- Explore innovative transit options to meet the needs of the community (passenger rail enhancements, medical or airport trips, or ride-hail subsidies)
- Panasonic

Implement service consistent with the Lawrence Transit Route Redesign Study including development of Central Station, Downtown Station, and Express Hubs and evaluate the 2023 Fare Free Pilot.

Project: Implement Route Redesign Study for Lawrence Transit and KU on Wheels

With the development of Central Station at Bob Billings & Crestline Drive, bus routes will be redesigned to better serve this new transfer center and the community at large. Route Redesign will go into effect in two phases, with Phase 1 in August 2022 and Phase 2 in 2023. Phase 2 will include the introduction of Sunday microtransit service, as well as fare free service system-wide.



Source: Lawrence Transit

Table 6.2: Fiscally Constrained Transit Service and Capital

#	Name	Description	2023-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050
-	Operations, Maintenance, & Admin	Transit operations, maintenance, and administration	\$ 30,950,000	\$ 54,187,496	\$ 60,003,800	\$ 65,464,500	\$ 72,654,500	\$ 79,673,600
-	Bus Transfer Stations	Location(s) to facilitate transfers between buses & other modes	\$ 14,000,000					
-	Bus Replacement	Bus replacement after vehicles have met their useful life benchmark and transition to zero emissions	\$ 11,148,800	\$ 18,085,400	\$ 18,286,300	\$ 18,963,600	\$ 19,732,000	\$ 21,598,400
		Total Project Cost	\$ 56,098,800	\$ 72,272,896	\$ 78,290,100	\$ 84,428,100	\$ 92,386,500	\$ 101,272,000
		Projected Revenues	\$ 56,098,800	\$ 71,688,287	\$ 74,010,800	\$ 79,202,600	\$ 84,796,100	\$ 90,821,400
		Remaining Unprogrammed Revenues	\$ -	\$ (584,609)	\$ (4,279,300)	\$ (5,225,500)	\$ (7,590,400)	\$ (10,450,600)
		Fiscally Constrained	Yes	No	No	No	No	No

KU on Wheels

#	Name	Description	2023-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050
-	Operations, Maintenance, & Admin	Transit operations, maintenance, and administration	\$ 9,356,300	\$ 19,057,100	\$ 24,322,200	\$ 31,041,700	\$ 39,617,800	\$ 50,563,500
-	Bus Replacement	Bus replacement after vehicles have met their useful life benchmark	\$ 4,507,600	\$ 7,236,000	\$ 7,236,000	\$ 7,236,000	\$ 7,236,000	\$ 7,236,000
		Total Project Cost	\$ 13,863,900	\$ 26,293,100	\$ 31,558,200	\$ 38,277,700	\$ 46,853,800	\$ 156,846,700
		Projected Revenues	\$ 13,863,900	\$ 23,461,500	\$ 23,461,500	\$ 23,461,500	\$ 23,461,500	\$ 23,461,500
		Remaining Unprogrammed Revenues	\$ -	\$ (2,831,600)	\$ (8,096,700)	\$ (14,816,200)	\$ (23,392,300)	\$ (133,385,200)
		Fiscally Constrained	Yes	No	No	No	No	No

Other Paratransit Providers

#	Name	Description	2023-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050
-	Operations, Maintenance, Admin, & Capital	All aspects of transit service	\$ 2,797,700	\$ 4,949,600	\$ 5,332,100	\$ 5,745,300	\$ 6,189,700	\$ 6,668,000
		Total Project Cost	\$ 2,797,700	\$ 4,949,600	\$ 5,332,100	\$ 5,745,300	\$ 6,189,700	\$ 6,668,000
		Projected Revenues	\$ 2,797,700	\$ 4,949,600	\$ 5,332,100	\$ 5,745,300	\$ 6,189,700	\$ 6,668,000
		Remaining Unprogrammed Revenues	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
		Fiscally Constrained	Yes	Yes	Yes	Yes	Yes	Yes

Table 6.2 shows the fiscally constrained Lawrence Transit, KU on Wheels, and Other Human Service Transportation Providers projected revenues and expenses. The two main categories of funding are Operations, Maintenance, & Admin and Bus Replacement. Lawrence Transit also has funding programmed for a Bus Transfer Stations in 2023-2025.

Project: Lawrence Transit Central Station, Downtown Station and Express Hubs

Since 2010, Lawrence Transit has operated the majority of bus transfers from a temporary location in Downtown. Site selection studies in 2014 and 2018, in addition to a TIGER grant application in 2016, informed potential viable sites for a permanent facility. In July 2020 the City and University of Kansas agreed to develop Central Station on University property located at Bob Billings Parkway & Crestline Drive.

Upon completion of Central Station, it will be served by 7 local routes and 2 regional routes, with 5 routes continuing to serve Downtown Lawrence. Express Hubs, or smaller bus transfer stations, where fewer routes have transfers, are expected to be introduced near Clinton Parkway and Wakarusa Drive, 6th Street and Wakarusa Drive, and south Iowa Street.

Project: Lawrence Transit Fare Free Pilot

Lawrence Transit will initiate a pilot program to go fare free for the 2023 calendar year for all services (fixed route, T Lift, Night Line, and planned Sunday microtransit). The 2023 Fare Free Pilot Program is financially supported by increased federal transit funding. The program will be re-evaluated in Fall 2023 to determine the feasibility of extending the pilot.

[The Fare Free Pilot](#) is expected to positively affect several areas of the City of Lawrence's Strategic Plan key performance indicators, which aim to increase transit ridership and shift travelers toward more sustainable modes of transportation and streamline transit operations.



Concept 3D Rendering of Central Station

Source: Lawrence Transit

- Ridership has not fully recovered from pandemic impacts that began in March 2020. Fare free programs in other communities have resulted in ridership increases of 20% to 60%.
- Fare free has a greater impact on people in our community who have less income. To advance community goals around equity, eliminating bus fare can make a tangible difference for many riders. Riders spending \$400 to \$1,000 per year on bus fare today can instead invest those dollars back into their family, their homes, food, health care, and retail in Lawrence.
- Without fares, bus drivers can speed up service without pausing to verify reduced fare eligibility, fill out transfer slips, or manage conflicts that can result from issues at the fare box.

C. Implementing Safety & Security:

Develop a Vision Zero Safety Action Plan to improve safety through actionable, measurable strategies, emphasizing design and policy solutions.

Project: Vision Zero Safety Action Plan

The MPO and regional partners should develop a Vision Zero Safety action plan to identify and improve mobility through a [US DOT Safe Systems](#) approach by focusing on safe people, safe speeds, safe roads, and post-crash care to develop a Vision Zero Safety Action Plan. A safety action plan will elevate implementation of our multimodal plans and will provide an opportunity to understand and address serious and fatal crashes and safety perceptions that impact people's concerns about being able to travel safely by foot or bicycle. A plan should assess current



Source: Lawrence Douglas County Fire Medical



Source: Lawrence Journal World

metrics, propose projects and strategies that have proven crash reduction to create a culture of safe streets and provide a framework for continued collaboration to improve safety through community input and equity considerations. Successful completion of a Safety Action Plan will make the region eligible for an implementation grant, through the [Safe Streets and Roads for All program](#).

Plan and coordinate for the needs of transportation routes and resources for moving people, equipment, materials, and supplies in emergencies or disasters in Douglas County.

Transportation plays a vital role in emergency response and recovery. Transportation agencies should coordinate to provide emergency response as determined in the [Douglas County Emergency Operations Plan](#).

Deliver a roadway system that allows for intuitive understanding of reasonable travel speed through design controls (e.g. turn radii or narrowed lane widths) and uses access management best practices to improve safety.

Use design to affect desired outcomes, guiding user behavior through physical and environmental cues. Examples include narrower streets with fewer travel lanes, narrower lane widths, roadside landscaping, speed cushions, raised intersections, speed humps or other bus- and emergency-vehicle-compatible raised elements, and curb extensions

Increase transportation/transit security by reducing intentional crime, such as harassment, targeting, and terrorist acts, by utilizing crime prevention through environmental design and designing security into projects (such as cameras, lighting, increased visibility, and call boxes).

Lawrence Transit should continue to improve rider safety through the following strategies: smart bus stop design (durability, visibility, placement), continued ADA compliance, implementing security services at the transit facility (human strategy), and using on-board and facility cameras.

Prioritize investments that improve the resiliency of the transportation system by preparing infrastructure to deal with impacts of climate change and severe weather.

Douglas County is [building a plan](#) to mitigate and adapt to the impact of climate change; it will be tailored to

our community's priorities, account for our assets and vulnerabilities, and recommend short and long-term policy changes and program implementation. The following strategies should be considered:

- Integrate climate change considerations into asset management.
- Strengthen or abandon infrastructure that is vulnerable to flooding.
- Raise standards for the resilience of new infrastructure.
- Add redundant infrastructure to increase system resiliency.
- Promote zoning, insurance, and disaster recovery policies that discourage development in vulnerable areas.

D. Implementing Sustainability

Implement Travel Demand Management (TDM) and land use strategies to improve multimodal options to reduce single occupancy motor vehicle trips.

Planning: Plan for Travel Demand Management

TDM programs can reduce, or postpone, the need for capital-intensive projects that increase roadway capacity. TDM activities can include options such as eliminating or shortening trip distances, changing the mode of travel (through carpooling, vanpooling, transit, bicycling and walking), or changing the time of day a trip is made, shifting trips from peak commuter travel times. TDM strategies can also include employer-based programs such as alternative work schedules, which can shift demand away from peak commuter travel times, and work from home, which reduces the need for trips. TDM strategies should be explored to maximize the efficiency of the existing and future transportation network.

Use Nature Based Solutions best practices such as street trees and green infrastructure.

Employ nature-based solutions to create sustainable solutions to infrastructure needs. Examples of nature-based solutions include restoring and protecting wetlands, protecting greenway corridors, open space managed for

What is Travel Demand Management (TDM)?



Travel Demand Management refers to strategies which help people use the infrastructure for transit, ridesharing, walking, bicycling that changes their travel behavior (how and when people travel) to increase transportation system efficiency and achieve specific objectives.



What are Nature Based Solutions?

Nature-based solutions are sustainable planning, design, environmental management and engineering practices that weave natural features or processes into the built environment to promote adaptation and resilience



Source: City of Alexandria Transportation & Environmental Services

What are is Context Sensitive Solutions?

A collaborative, interdisciplinary approach that involves all stakeholders in providing a transportation facility that fits its setting. It is an approach that leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety, mobility, and infrastructure conditions.

both conservation and recreation, permeable pavement, green streets that use a suite of green infrastructure practices to manage stormwater runoff and improve water quality, use of street trees to reduce air pollution, stormwater runoff, and urban heat island effect.

Plan to transition publicly funded vehicle fleets (e.g. Lawrence Transit /City fleets) to zero emission vehicles and plan for implementation of public electric vehicle charging infrastructure.

Project: Lawrence Transit Zero Emissions Transition Plan and Continue to Electrify Infrastructure and Vehicles

The [Zero-Emissions Transition Plan](#) will allow Lawrence Transit to continue to acquire zero-emissions buses and associated charging equipment at the needed rate of 1-2 buses per year. Lawrence Transit plans to transition its entire bus fleet (50 buses) to zero-emissions by 2035, following [sustainability goals set by the City](#).

Project: City of Lawrence Zero Emissions Transition Plan and Continue to Electrify Infrastructure and Vehicles

Lawrence Zero Emissions Transition planning process is underway, the plan will evaluate existing facilities and fleet, explore budgetary options, evaluate risk, recommendations & preliminary deployment projections planning. The City of Lawrence plans to transition its entire operations fleet to zero-emissions by 2035, following [sustainability goals set by the City](#).

Embrace a transportation planning process that considers transportation needs alongside environmental, regional, community goals, plans and programs in decision making.

Use Context Sensitive Solutions in developing transportation facilities that fit their physical setting and preserve scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility.

E. Implementing Operations & Maintenance

Maintain an inventory of transportation infrastructure and assets and track transportation system performance. Implement asset management policies to maintain and improve roadway and bridge, bikeway, and pedestrian network conditions.

Program: Lawrence Asset Management

Implementing an asset management program establishes effective and innovative infrastructure investment and treatment strategies for the entire asset lifecycle - or simply the right treatment at the right time for the right reason. Asset management is never complete. Nor is this strategy a quick fix, rather it is a measured, programmatic approach. The objective is determining the appropriate preventative maintenance, rehabilitation, reconstruction, and stop gap measures to keep the City's assets in the desired serviceable condition utilizing the most effective investment of resources.

Maintain and replace transit vehicles that are past their useful life.

Plan: Transit Asset Management Plan

It is the Lawrence Transit Service policy to replace fixed route and paratransit vehicles that have exceeded their useful life while maintaining an adequate number of spare vehicles in order to provide safe, comfortable, and reliable transportation to passengers and effective and efficient service to the community. Lawrence Transit is required to submit a Vehicle Replacement Plan to the Federal Transit Administration (FTA) and coordinates [Transit Asset Management](#) as part of the State sponsored group plan.

Implement the Regional Intelligent Transportation System (ITS) Strategic Deployment Plan to provide cost-effective and practical technologies that enhance the safety, capacity, operations, and evaluation of the multimodal transportation.

Programs: Implementing ITS

Lawrence-Douglas County Regional ITS Plan identifies technological and communication strategies to improve system performance. This includes programs and projects such as signal coordination, traffic detection improvements, fiber communications expansion, emergency/transit signal preemption, bicycle & pedestrian warning systems, shared mobility, dynamic message signs, parking management, work zone, event and incident management improvements.



What is Useful Life?

Useful Life means the minimum acceptable period a capital asset purchased with FTA funds should be used in service. Capital assets purchased with FTA funds may frequently be used beyond their minimum useful lives, without being considered part of a grantee's state of good repair backlog.

Implement technology solutions to support transit operations and passenger information (e.g. General Transit Feed Specification, Automated Vehicle Annunciators, Rear Destination Sign Retrofit, Digital Rider Alert Panels, and Transit Signal Priority).

Project: Lawrence Transit Implementation of Access, Innovation and Collaboration (AIC) Projects & Upgrade Bus Technology.

Lawrence transit is implementing a range of passenger accessibility, comfort, and informational needs on fixed route buses. Project components include shareable real-time bus arrival information, automated vehicle annunciators, exterior rear destination signs on buses, interior digital signs on buses, flip-seat retrofits for grocery carts and strollers, and bus decals & wraps for more coordinated branding between the City and KU buses.

Project: Implementing Transit Signal Priority

Transit Signal Priority improves operations and on time performance for transit service where delay is experienced, this ensures that transfer connections can be made. Fixed-route buses would be equipped with a device that alerts a traffic signal controller that the bus is present and would like an early or extended green light. The signal controller, or Traffic Operations Center determines whether it is feasible to shift the signal cycle at the intersection to expedite the bus's movement through the intersection.

F. Travel Demand Modeling

In order to understand transportation impacts from growth a travel demand model was developed using population and employment projections in connection with the road network. The first step was to develop the 2019 Base Year model (Figure 6.1). Level of Service (LOS) was utilized to categorize congestion based on the user experience.

The scale ranges from Congested (E-F) to Congesting(D) and Uncongested (A-C) (see below). Daily volumes were also shown in the model indicated by the thickness of the line. The base year model includes approximately 2.86 million vehicle miles traveled (VMT) and 284 hours of delay.



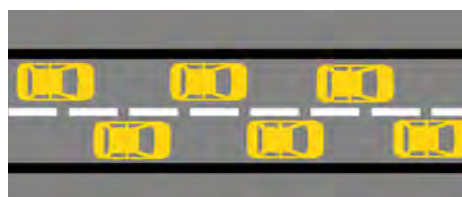
Level of Service (LOS) Categories

Uncongested (A-C)



Level of Service A-C are uncongested roadways ranging from free-flow traffic with unrestricted ability to select speed and maneuvering to restricted flow that remains stable. The maps display LOS A-C as green lines.

Congesting (D)



Level of Service D consists of congesting roadways, which consists of restricted speed and the freedom to maneuver, although flow remains stable. The maps display LOS D as yellow lines.

Congested (E-F)



Level of Service E-F are congested roadways, meaning traffic is bumper to bumper, characterized by stop-and-go waves, and poor travel times. The maps display LOS E-F as red lines.

Next, a 2050 No-Build model (Figure 6.6) was developed to show the level of service and congestion if no improvements are constructed, but the population increased by approximately 40,000 people. As shown, there are more congested and congesting segments. The vehicle miles traveled increased to 4.2 million miles and 1,705 hours of delay.

Fiscally-constrained projects were then introduced into the model’s street network to help address the congestion issues, these are projects that the region has committed to funding and/or that are in the planning pipeline. Projects programmed address level of service, safety, infrastructure condition, and multimodal access to support the regional goals identified in Chapter 4, although not all projects impact the roadway networks’ operating characteristics. Two land use scenarios were developed one with population and employment projections under the Plan 2040/Eudora Comprehensive Plan growth tiers and the other with more of the Lawrence density growing within the current Lawrence City limits. The location and density of projected population and employment can be found on Figure 6.2, through 6.5. The resulting traffic flow scenarios show the projected impact to the system based on differing locations of growth. The final preferred scenario chosen for this plan is Scenario A, which follows the current plans and land development code requirements. While scenario B models for more densely concentrated growth. There are local ongoing conversations about increasing density, however there have not been changes to the regulations that would allow it at this point in time.

Based on the preferred scenario, there is still some level of service delay shown in Figures 6.7 and 6.8 even with the projects shown in Figure 6.11; however, the level of congestion is improved compared to the No-Build scenario (Figure 6.6). This is apparent because despite the fact that the vehicle miles traveled are 30,251 miles over the No-Build scenario at 4.23 million miles- the hours of delay are greatly decreased at 782 hours, a decrease of 923 hours from the No-Build scenario, an improvement of 54% over the otherwise projected delay. Tables 6.4 and 6.5 display the fiscally constrained road and bridge projects. Alternatively, when comparing scenario B to the No-Build Scenario, vehicle miles traveled are 95,108 miles, and the hours of delay are 789 hours.

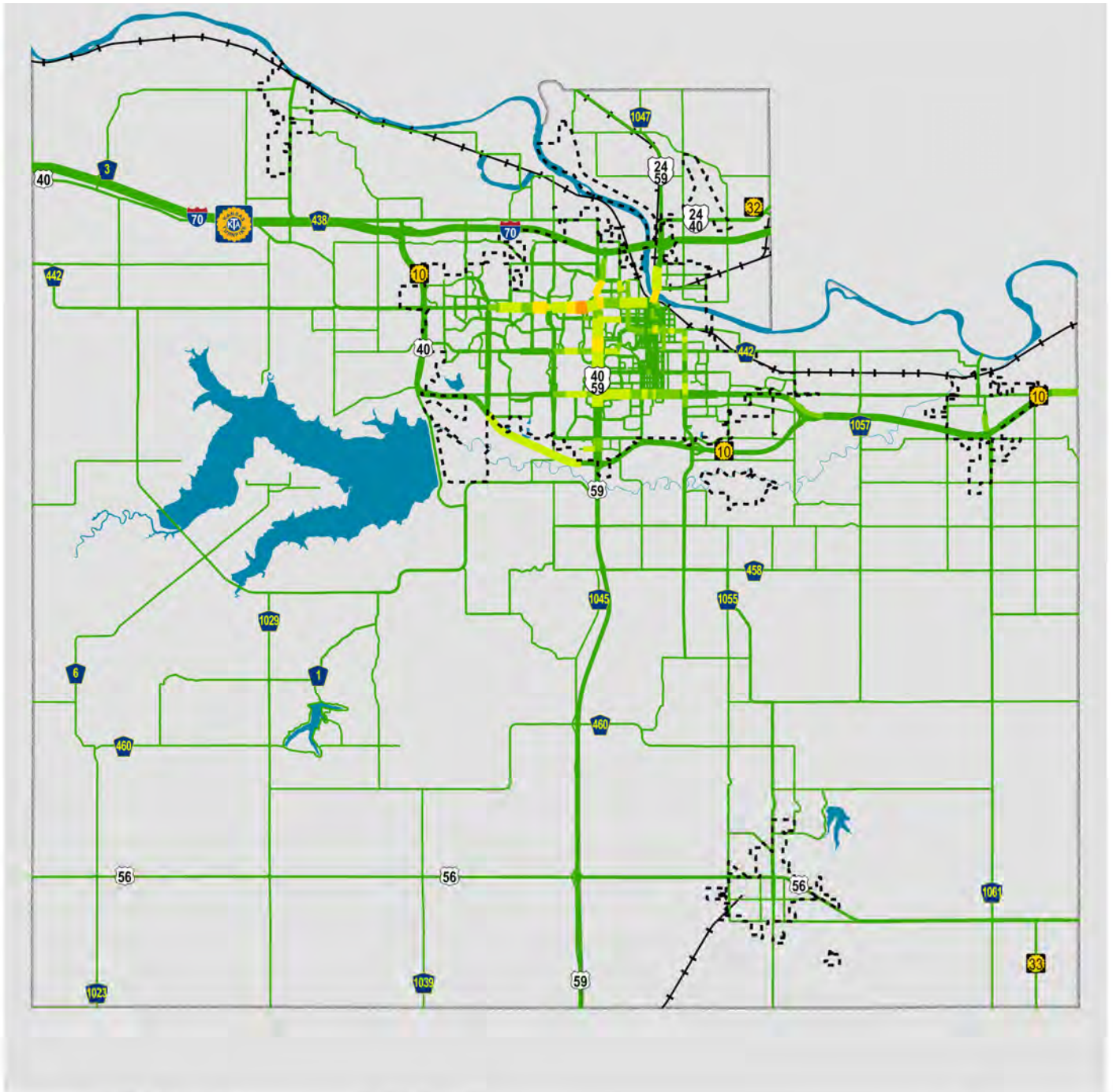
Table 6.3: Scenario Comparison

Scenario	Network Year	Total Population	Total Employment	Average Vehicle Miles Traveled (Weekday)*	Vehicle Hours Traveled*	Delay (Hours)
Base year	2019	127,627	51,683	2,856,150	67,336	284
T2050 No Build	2019	158,524	61,487	4,202,100	96,798	1,705
A T2050 Preferred	2050	158,524	61,487	4,232,351	95,645	782
B T2050 Denser Growth	2050	158,524	61,487	4,198,164	95,108	789

Note: *Without Centroids

Table 6.3 displays the predicted vehicle miles traveled, vehicle hours traveled, and delay in hours for the Base Year, No-Build, and both the preferred scenario (scenario A) and denser growth scenario (scenario B). The 2050 No-Build and scenarios A and B both accommodate over 40,000 new people in the County and almost 16,000 new jobs. However, the Preferred Scenario accounts for fewer vehicle hours traveled and hours of delay compared to the No-Build Scenario, which is reflective of the desire to reduce congestion.

Figure 6.1: 2019 Base Year Traffic Flow - Douglas County



- LOS Categories**
- █ A - less than 0.6
 - █ B - 0.6 - 0.7
 - █ C - 0.7 - 0.8
 - █ D - 0.8 - 0.9
 - █ E - 0.9 - 1.0
 - █ F - 1.0 +

- Railroad
 - City Boundary
 - County Boundary
- Total Flow Rates**
-
- 3000 0

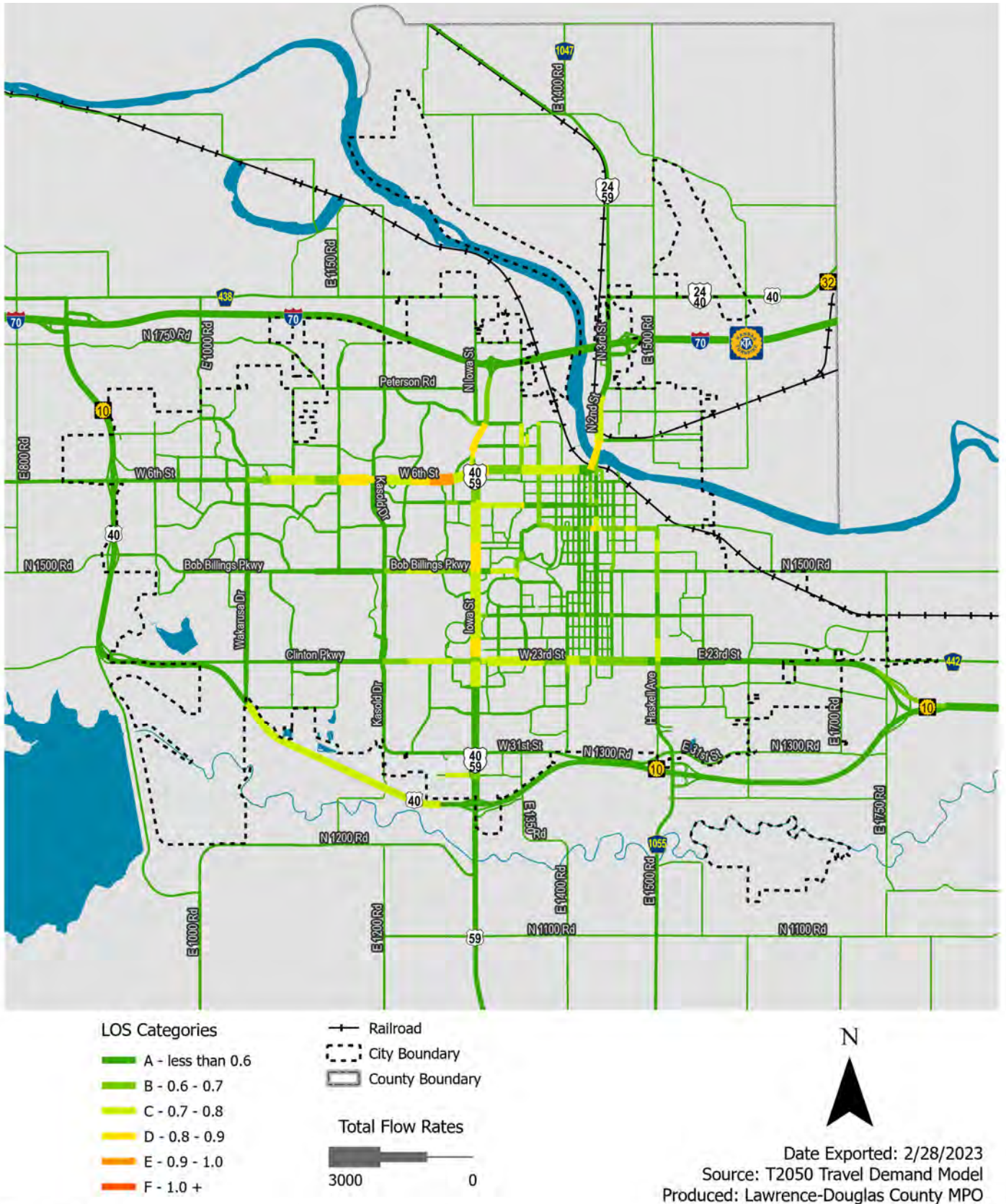


Date Exported: 2/28/2023
 Source: T2050 Travel Demand Model
 Produced: Lawrence-Douglas County MPO

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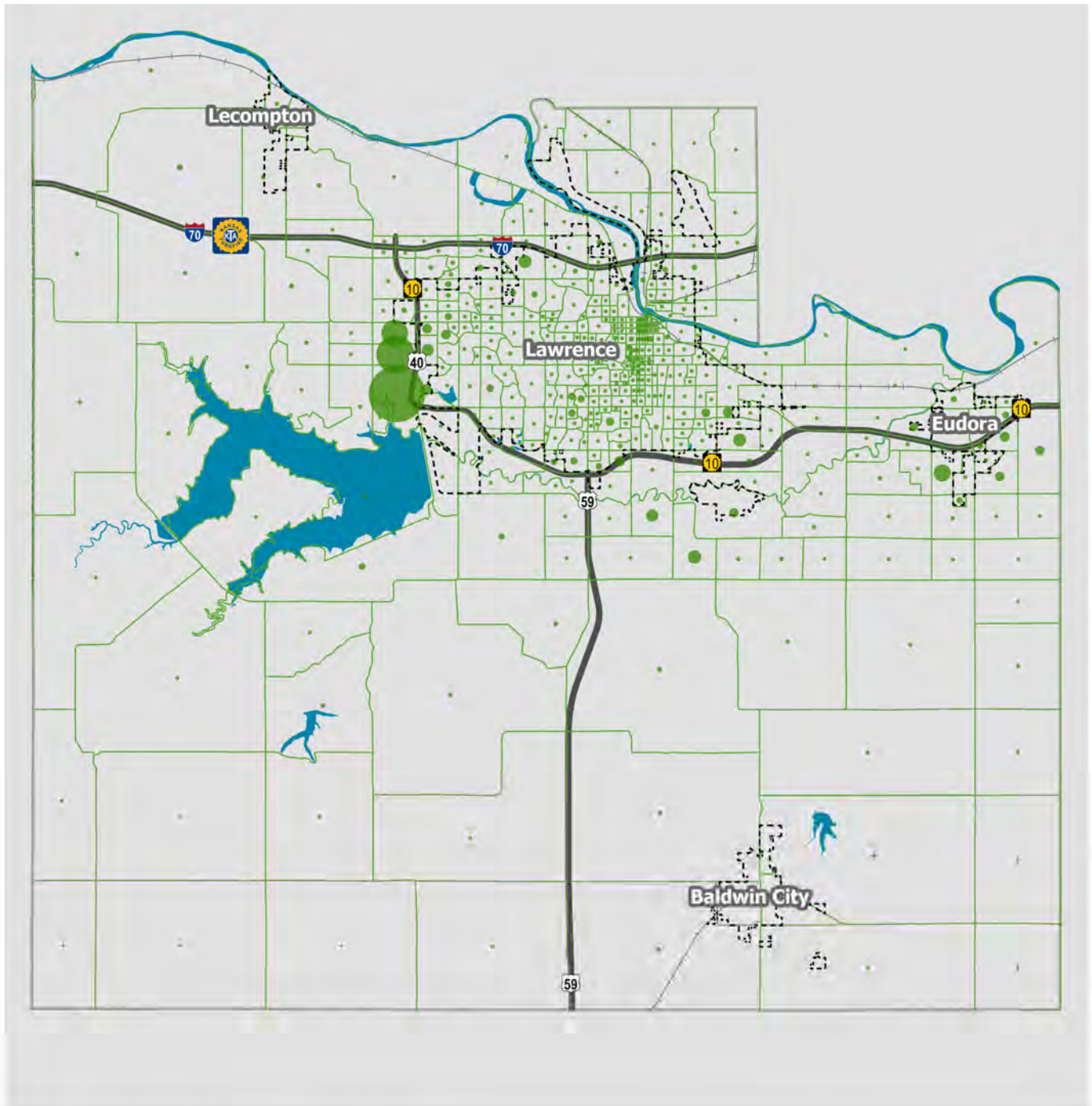
Figure 6.2: 2019 Base Year Traffic Flow - Lawrence



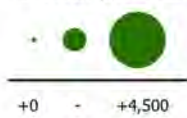
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Figure 6.3: Projected 2050 Population - Growth Under Scenario A



Projected Population Growth per TAZ



- Railways
- Water Bodies
- - - City Boundaries
- TAZ Boundaries

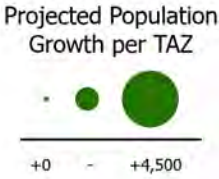
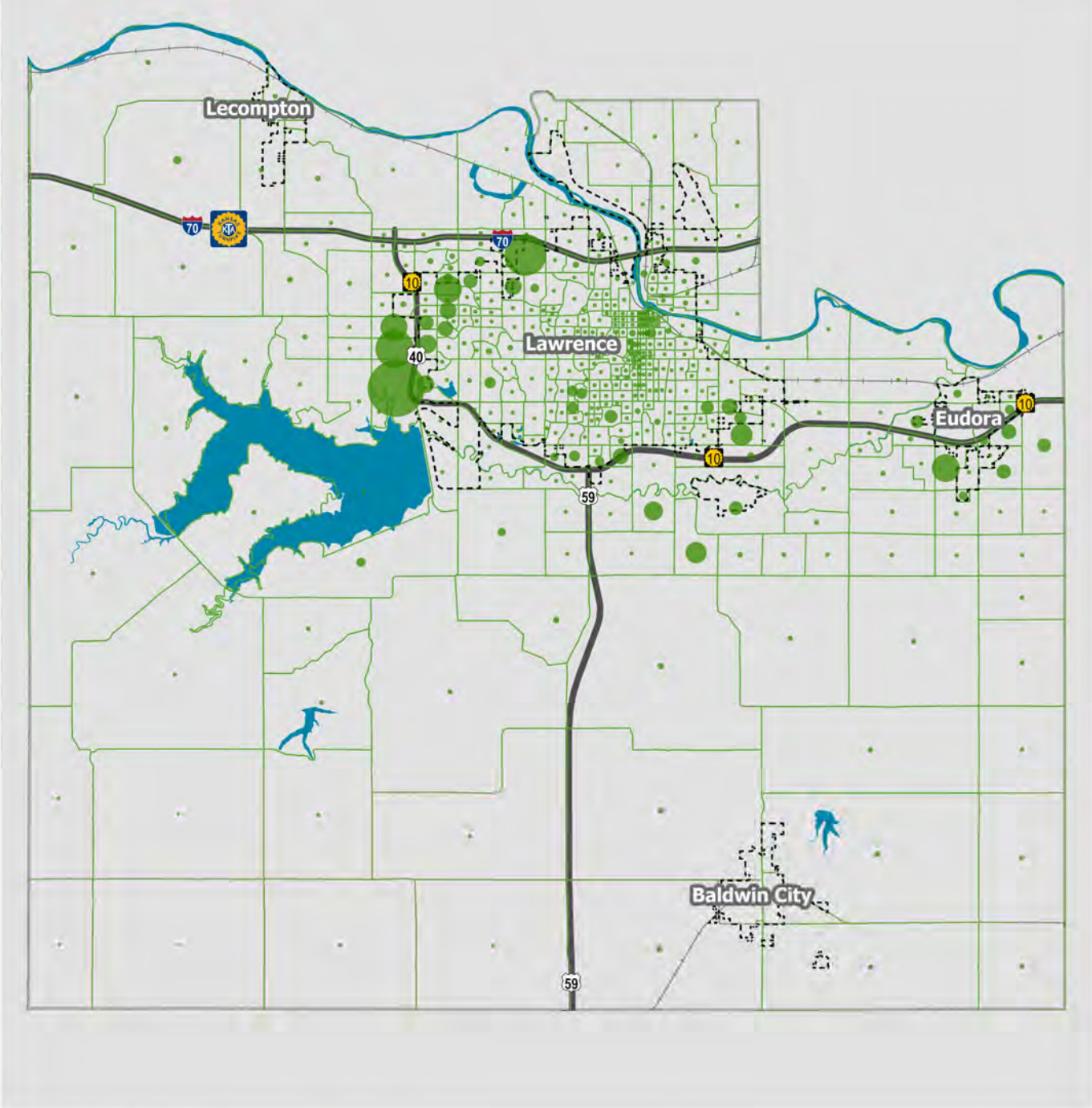


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 Source: T2050 Travel Demand Model
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Figure 6.4: Projected 2050 Population – Growth Under Scenario B



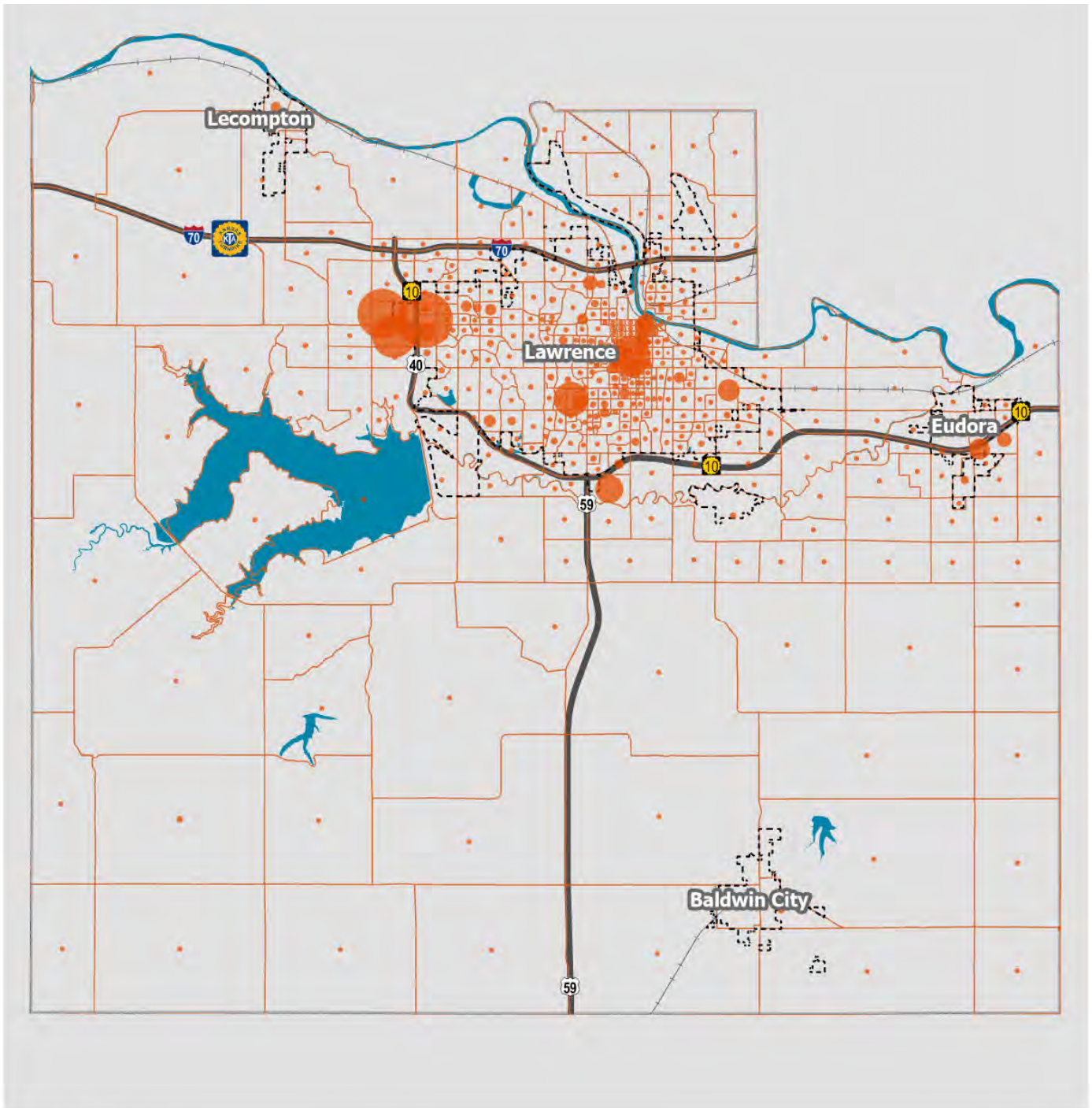
- Railways
- Water Bodies
- - - City Boundaries
- TAZ Boundaries



Date Exported: 3/2/2023
 Source: T2050 Travel Demand Model
 Produced: Lawrence-Douglas County MPO

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Figure 6.5: Projected 2050 Employment - Growth Under Scenario A



Projected Job Growth per TAZ



- Railways
- Water Bodies
- City Boundaries
- TAZ Boundaries

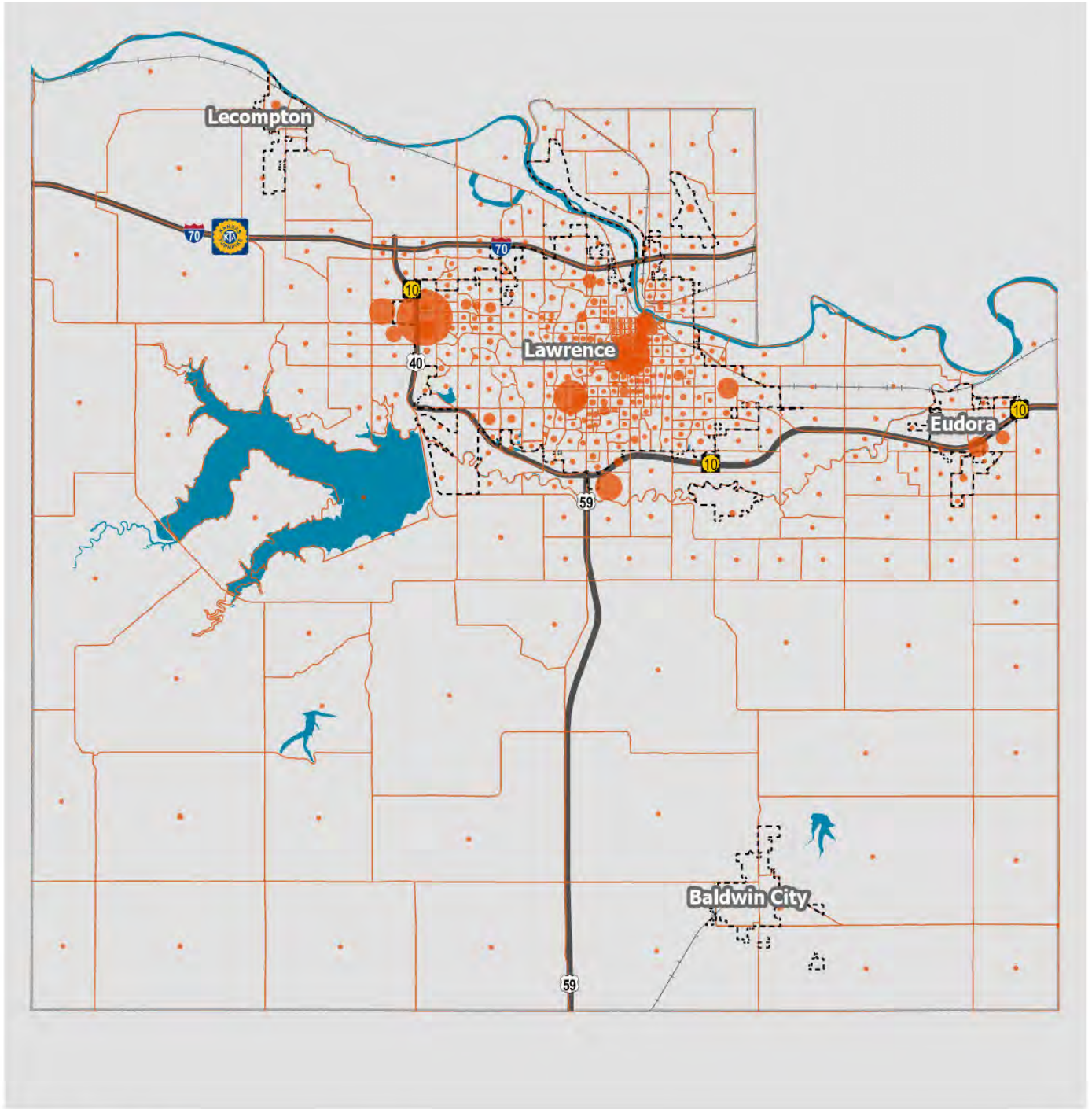


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Figure 6.6: Projected 2050 Employment - Growth Under Scenario B



Projected Job Growth per TAZ



- Railways
- Water Bodies
- City Boundaries
- TAZ Boundaries

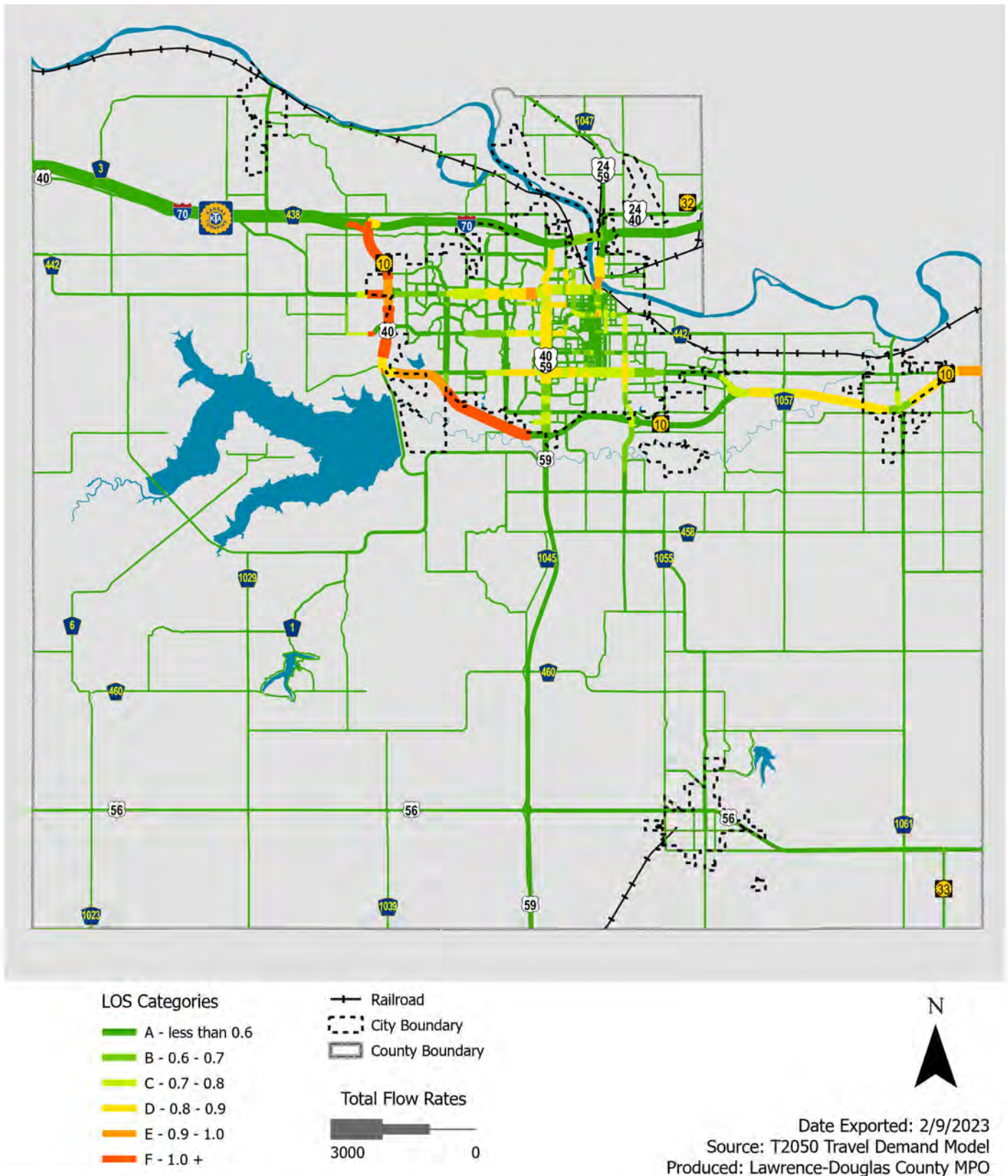


Date Exported: 3/2/2023
 Source: T2050 Travel Demand Model
 Produced: Lawrence-Douglas County MPO

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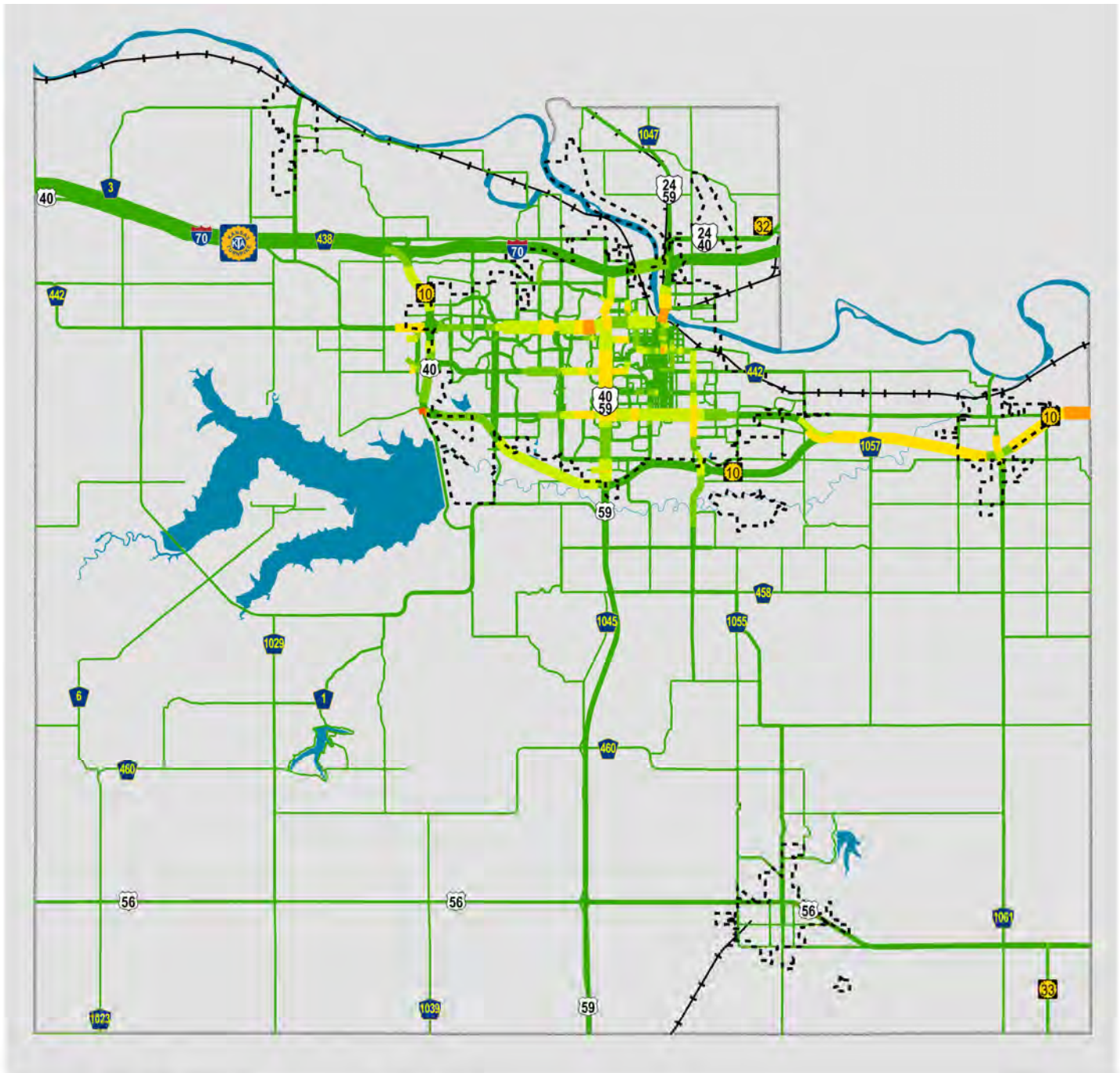
Figure 6.7: 2050 No Build Traffic Flow



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Figure 6.8: Scenario A – Growth under Plan 2040 Tiers
Countrywide View



- LOS Categories**
- █ A - less than 0.6
 - █ B - 0.6 - 0.7
 - █ C - 0.7 - 0.8
 - █ D - 0.8 - 0.9
 - █ E - 0.9 - 1.0
 - █ F - 1.0 +

- Railroad
 - City Boundary
 - County Boundary
- Total Flow Rates**
-
- 3000 0

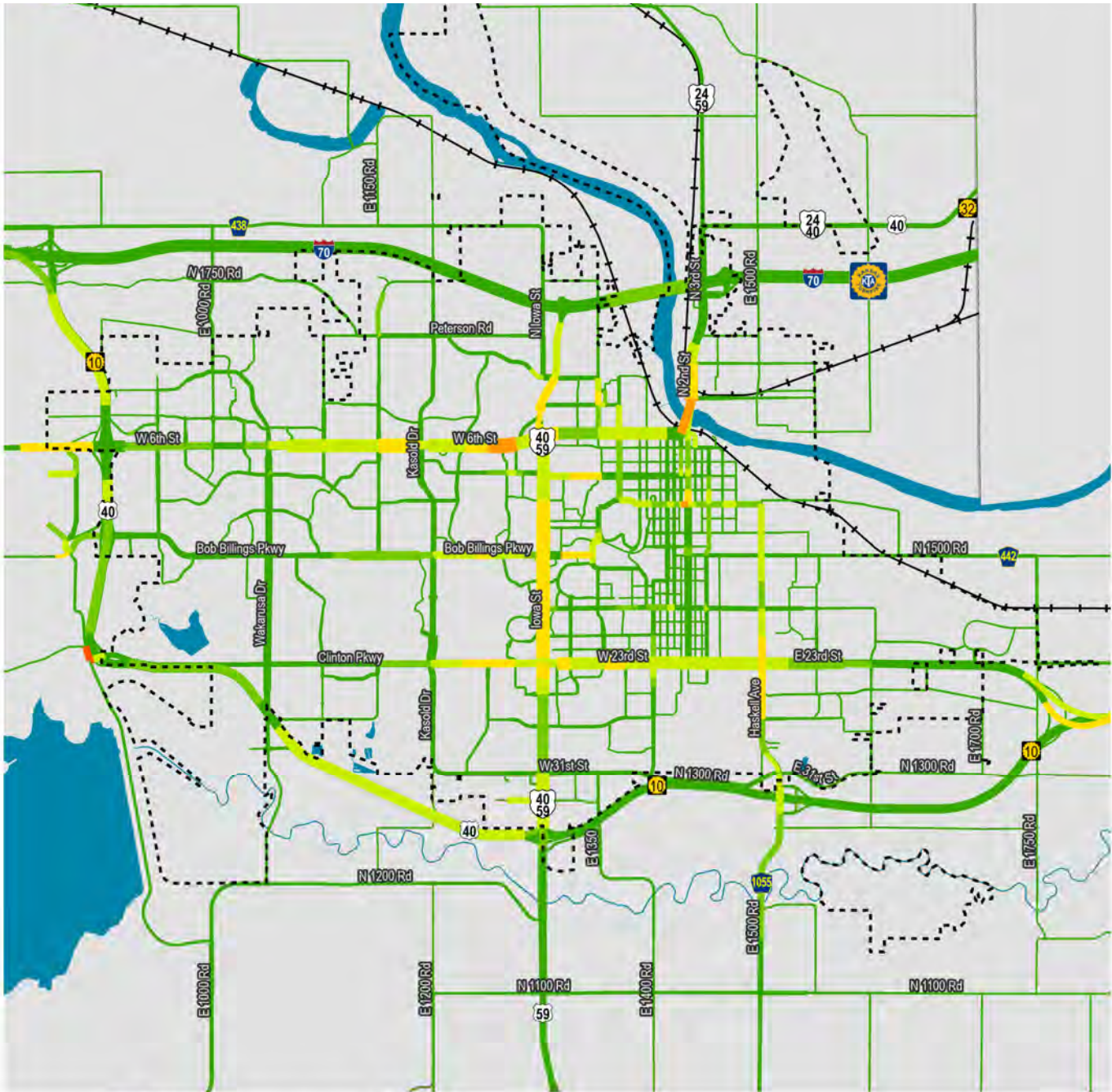


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Figure 6.9: Scenario A – Growth under Plan 2040
Lawrence Zoom



- LOS Categories**
- █ A - less than 0.6
 - █ B - 0.6 - 0.7
 - █ C - 0.7 - 0.8
 - █ D - 0.8 - 0.9
 - █ E - 0.9 - 1.0
 - █ F - 1.0 +

- Railroad
 - City Boundary
 - County Boundary
- Total Flow Rates**
-
- 3000 0

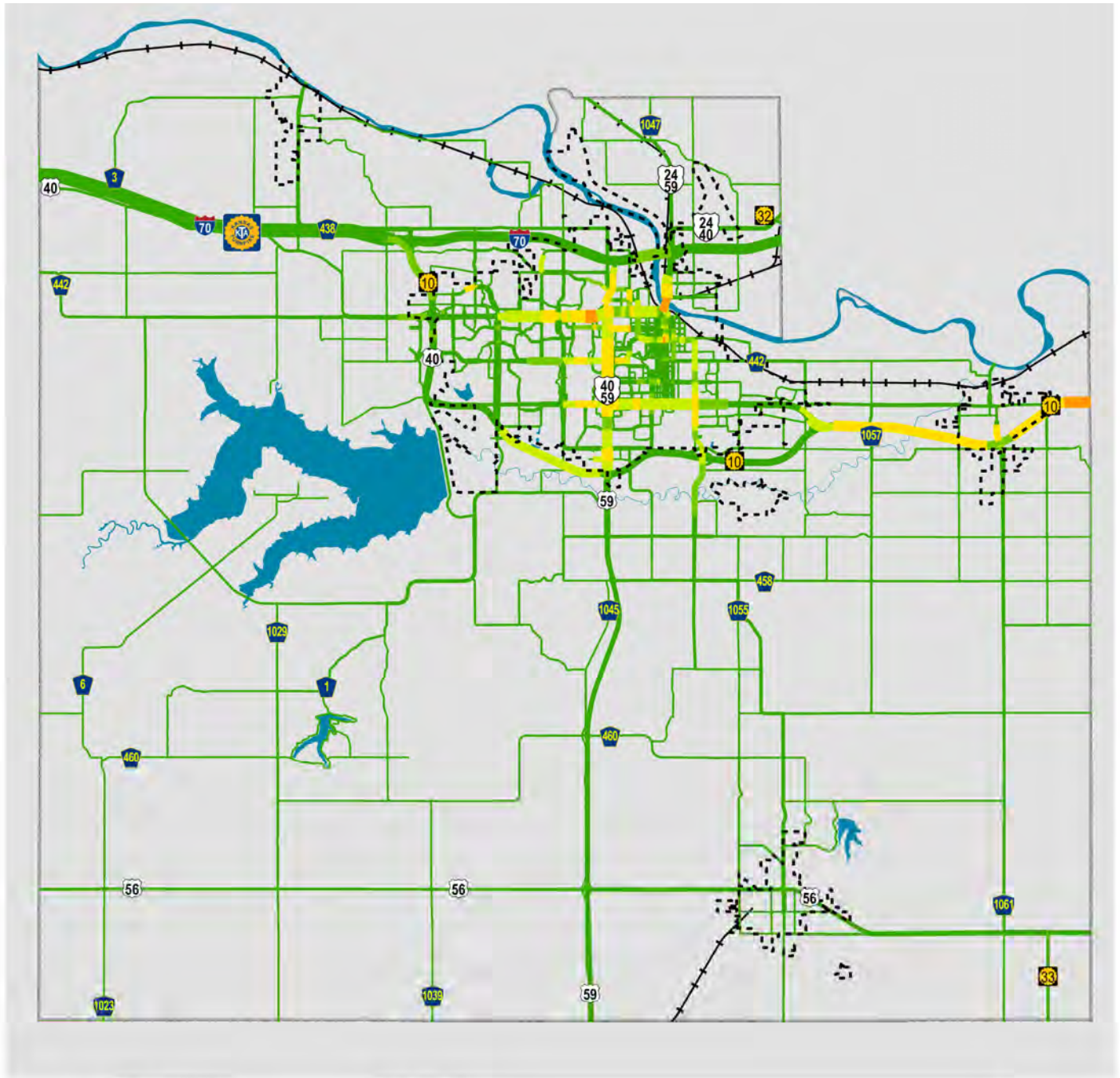


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Figure 6.10: Scenario B – Denser Growth within existing Lawrence City Limits
Countrywide View



- LOS Categories**
- █ A - less than 0.6
 - █ B - 0.6 - 0.7
 - █ C - 0.7 - 0.8
 - █ D - 0.8 - 0.9
 - █ E - 0.9 - 1.0
 - █ F - 1.0 +

- Railroad
 - City Boundary
 - County Boundary
- Total Flow Rates**
-
- 3000 0

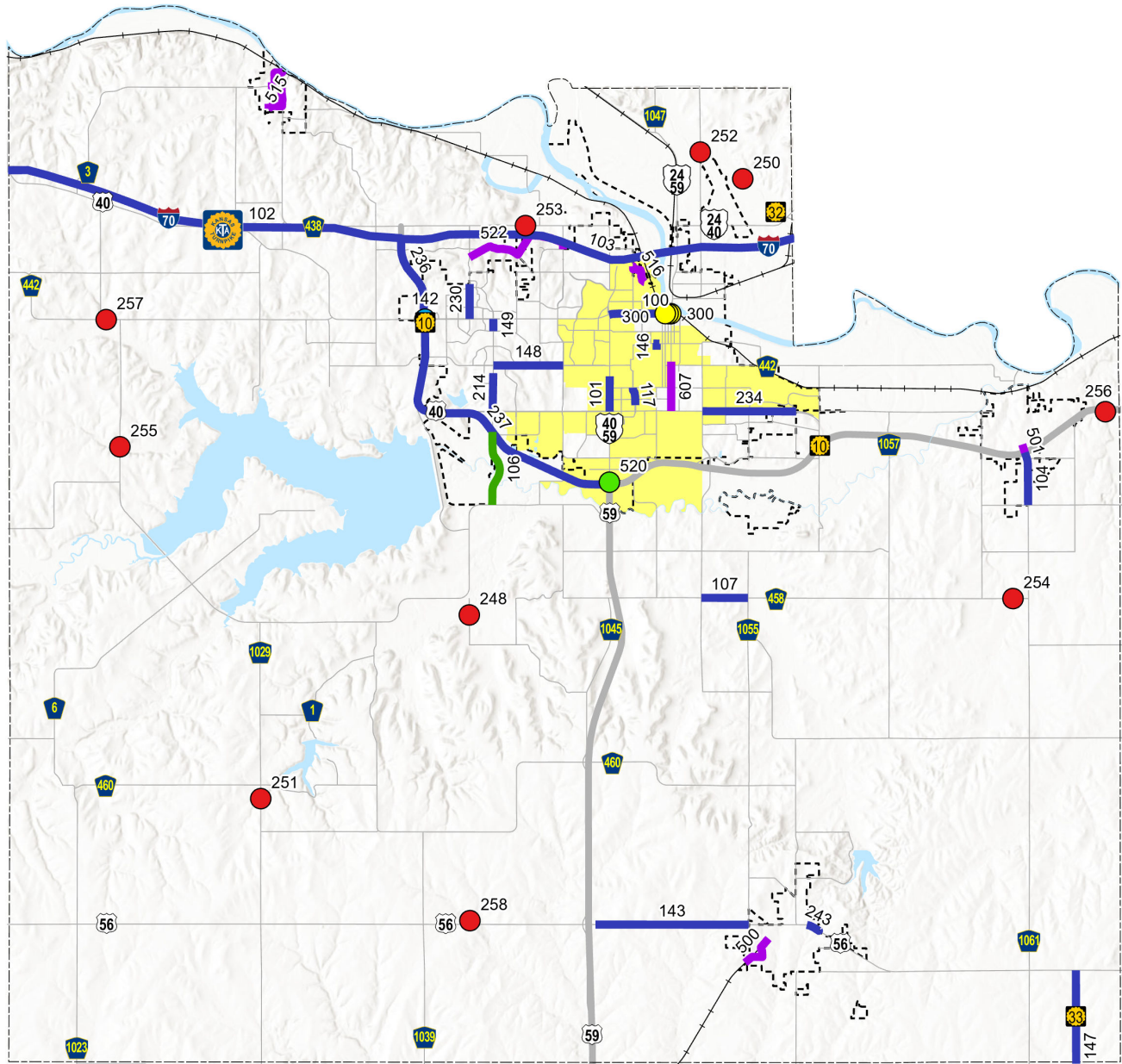


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Figure 6.12: Fiscally Constrained Road and Bridge Projects (w/EJ)



Projects (Labeled)

- Bike/Ped
- Bridge
- Interchange
- Signal
- Pedestrian/Bicycle
- Road
- Road, Bridge

Environmental Justice Zone

- Railroads
- City Boundaries
- County Boundary
- Water Bodies

0 1.25 2.5 5 Miles



Date Exported: 8/30/2023
 Source: 2020 ACS 5-year Est. & LMISD
 Produced: Lawrence-Douglas County MPO

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Table 6.4: Fiscally Constrained Road and Bridge Projects

Lawrence								
#	Name	Description	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
100	6th St.: Iowa St. to Massachusetts St.	6th St. pavement maintenance project including full depth patching, curb & gutter and storm sewer upgrades. Shared-use path on north side of 6th St. to be included from Iowa St. to Wisconsin St. Project will include replacement of 3,000 feet of 8" diameter waterline on the north side of 6th St between Bluffs Dr. and Maine St.	\$ 2,100,000					
101	Iowa St. Reconstruction: Irving Hill Rd. to 23rd St.	Reconstruction of Iowa from the Irving Hill Road bridge to north of 23rd St. (with the exception of the 19th and Iowa intersection recently reconstructed). Project will include full reconstruction of Iowa similar to the section from 15th St. to Irving Hill Bridge with concrete pavement. The project includes sidewalk and storm sewer improvements.	\$ 7,000,000					
117	Mainmitch Drive Reconstruction: 15th St. to 23rd St.	Reconstruction of Mainmitch from 15th St. to 23rd St. including new pavement, curb and gutter, storm sewer, sidewalks and bike facilities.	\$ 4,300,000					
146	11th St.: Indiana to Ohio; Louisiana: 11th St. to 12th St, Reconstruction	11th St. (Indiana to Ohio) including concrete pavement, storm sewer, bike/ped improvements & sanitary sewer improvements at 11th/Ohio, Louisiana St. (11th to 12th St.) including concrete pavement, storm sewer, bike/ped improvements.	\$ 1,750,000					
148	Bob Billings Pkwy.: Kasold Dr. to Wakarusa Dr.	Reconstruction of Bob Billings Pkwy. from Kasold Dr. to Wakarusa Dr. including new pavement, storm sewer, waterline, sidewalks and bike facility.	\$ 1,100,000	\$ 12,000,000				
149	Wakarusa Dr. Reconstruction - Harvard Rd to 6th St.	Reconstruction of street will include subgrade treatment, surfacing, storm sewer, geometric improvements, and multimodal facilities.	\$ 1,250,000					
214	Wakarusa Dr. Reconstruction: Research Pkwy. to 23rd St.	Reconstruction of street will include subgrade treatment, surfacing, storm sewer, geometric improvements, and multimodal facilities.	\$ 7,600,000					
230	Queens Road: 6th to North City Limits	Construct Queens Rd., roundabout at Overland Dr. & Queens Rd., construct sidewalk & bike lanes	\$ 4,900,000					
234	23rd Street Reconstruction: Maskell Ave. to East City Limits	Reconstruction of street including pavement, storm sewer, geometric improvements and multimodal facilities.	\$ 4,100,000					
300	6th and Massachusetts St. Traffic Signal Improvement Project	Project will replace the 3 signals on 6th (Massachusetts St., Vermont St., Kentucky St.). Upgrades will include Accessible Pedestrian Signals and Detectors.	\$ 600,000					
-	O & M and Local Capital Projects	General Operations & Maintenance activities	\$ 52,707,700	\$ 57,160,700	\$ 80,197,600	\$ 95,250,100	\$ 113,126,700	\$ 134,358,100
		Total Project Cost	\$ 87,407,700	\$ 69,160,700	\$ 80,197,600	\$ 95,250,100	\$ 113,126,700	\$ 134,358,100
		Projected Revenues	\$ 92,905,600	\$ 100,674,700	\$ 129,203,300	\$ 138,722,300	\$ 148,977,100	\$ 160,024,600
		Remaining Unprogrammed Revenues	\$ 5,497,900	\$ 31,514,000	\$ 49,005,700	\$ 43,472,200	\$ 35,850,400	\$ 25,666,500
		Fiscally Constrained	Yes	Yes	Yes	Yes	Yes	Yes
Baldwin City								
#	Name	Description	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
O&M	Operations & Maintenance (O&M) activities	General Unprogrammed O&M	\$ 2,141,700	\$ 2,457,500	\$ 1,361,400	\$ 6,362,400	\$ 17,955,600	\$ 21,329,600
		Total Project Cost	\$ 2,141,700	\$ 2,457,500	\$ 1,361,400	\$ 6,362,400	\$ 17,955,600	\$ 21,329,600
		Projected Revenues	\$ 3,337,600	\$ 3,542,400	\$ 4,735,500	\$ 5,101,500	\$ 5,495,800	\$ 5,578,200
		Remaining Unprogrammed Revenues	\$ 1,195,900	\$ 1,084,900	\$ 3,374,100	\$ (1,260,900)	\$ (12,463,800)	\$ (15,751,400)
		Fiscally Constrained	Yes	Yes	Yes	No	No	No
Eudora								
#	Name	Description	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
104	Church Street Connectivity & Multimodal Enhancements	Reconstruct 1.4 miles of Church St & conversion from 2 to 3 lanes with center turn lane. Realignment of the 20th St. intersection, new roundabouts at 20th & 23rd St. shared use path across K-10 & both sides of Church St.	\$ 3,848,000	\$ 17,750,600				
O&M	Operations & Maintenance (O&M) activities	General Unprogrammed O&M	\$ 4,352,600	\$ 5,040,700	\$ 7,359,000	\$ 8,740,400	\$ 10,381,300	\$ 12,330,000
		Total Project Cost	\$ 8,240,600	\$ 22,791,300	\$ 7,359,000	\$ 8,740,400	\$ 10,381,300	\$ 12,330,000
		Projected Revenues	\$ 8,940,700	\$ 23,135,600	\$ 7,170,000	\$ 7,693,100	\$ 8,256,600	\$ 8,863,200
		Remaining Unprogrammed Revenues	\$ 700,100	\$ 344,300	\$ (189,000)	\$ (1,047,300)	\$ (2,124,700)	\$ (3,466,800)
		Fiscally Constrained	Yes	Yes	No	No	No	No
*Eudora has an O&M shortfall as O&M costs outpace revenues. However, if additional funding is required, Eudora will allocate general funding to fill the gap.								
Lecompton								
#	Name	Description	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
O&M	Operations & Maintenance (O&M) activities	General Unprogrammed O&M	\$ 129,000	\$ 153,500	\$ 223,700	\$ 264,300	\$ 311,200	\$ 367,200
		Total Project Cost	\$ 129,000	\$ 153,500	\$ 223,700	\$ 264,300	\$ 311,200	\$ 367,200
		Projected Revenues	\$ 129,000	\$ 137,000	\$ 182,600	\$ 197,000	\$ 212,000	\$ 228,500
		Remaining Unprogrammed Revenues	\$ -	\$ (16,500)	\$ (41,100)	\$ (67,300)	\$ (99,200)	\$ (138,700)
		Fiscally Constrained	Yes	No	No	No	No	No
Douglas County								
#	Name	Description	2023-2026	2027-2030	2031-2035	2036-2040	2041-2045	2046-2050
106	Wakarusa Drive Extension	New road construction to extend Wakarusa Drive from planned K-10 interchange to Route 458. Includes new bridge over Wakarusa River. *Alignment not finalized	\$ 9,000,000					
107	Rte 458/1055 Improvements, E1500 thru E1600	Safety improvements on N1000 Road (Rte 458), from E1500 Road to E1600 Road modify road elevations, add paved shoulders, replace several culverts, regrade ditches, mill and overlay .6 mile on E1600 rd.	\$ 3,350,000					
248	Bridge 0964-1000 replacement	Replacement of the bridge carrying E1000 RD over Washington Creek	\$ 1,500,000					
250	Bridge 1900-1608 Replacement	Replacement of the bridge carrying N1900 Road over a tributary to Mud Creek	\$ 500,000					
251	Bridge 0565-0550 Replacement	Replacement of the bridge carrying E550 Road over Washington Creek	\$ 1,950,000					
252	Bridge 2058-1500 Replacement	Replacement of the bridge carrying E1500 RD over a tributary to Mud Creek	\$ 635,000					
253	Bridge 1800-1124 Replacement	Replacement of the bridge carrying N1800 Road (Rte 438) over Baldwin Creek	\$ 1,740,000					
254	Bridge 1000-1332 Replacement	Replacement of the bridge carrying N1000 Road (Rte 458) over a tributary to the Wakarusa River	\$ 1,720,000					
254	Bridge 1326-0250 Replacement	Replacement of the bridge carrying E250 Road (Rte 1023) over Dry Creek	\$ 1,940,000					
256	Bridge 1400-2342 Replacement	Replacement of the bridge carrying N1400 Road (Rte 442) over a tributary to Captain Creek	\$ 1,340,000					
257	Bridge 1600-0211 Replacement	Replacement of the bridge carrying N1600 Road (Rte 442) over a tributary to Deer Creek	\$ 155,000	\$ 1,700,000				
258	Bridge 0306-1000 Replacement	Replacement of the bridge carrying E1000 Road over a tributary to Tsay Creek	\$ 50,000	\$ 440,000				
-	O & M and Local Capital Projects	General Operations & Maintenance activities and other local capital projects	\$ 37,148,300	\$ 37,741,035	\$ 44,824,510	\$ 53,237,457	\$ 63,229,398	\$ 75,056,691
		Total Project Cost	\$ 61,028,300	\$ 39,881,035	\$ 44,824,510	\$ 53,237,457	\$ 63,229,398	\$ 75,056,691
		Projected Revenues	\$ 61,028,300	\$ 48,766,600	\$ 65,187,000	\$ 70,224,000	\$ 75,651,800	\$ 81,499,400
		Remaining Unprogrammed Revenues	\$ -	\$ 8,885,565	\$ 20,362,490	\$ 16,986,543	\$ 12,422,402	\$ 6,402,709
		Fiscally Constrained	Yes	Yes	Yes	Yes	Yes	Yes

The Eisenhower State Legacy Transportation Program (IKE) is a 10-year program that addresses highways, bridges, public transit, aviation, short-line rail and bicycle/pedestrian needs across Kansas. The program selects highway modernization and expansion projects every two years (rather than once a decade as in previous programs) for the development pipeline allows communities to adjust priorities and project scopes to better address both current and future needs through local consultation with KDOT. IKE's flexibility enhances the State's ability to address the most pressing needs, adjust to fluctuating revenues and capture emerging opportunities. State projects identified in the IKE pipeline are included in the fiscally constrained project list. Other projects, developed as part of the local consult process are included in the illustrative list.

Table 6.5: Fiscally Constrained Road and Bridge Projects - KDOT, KTA

Kansas Department of Transportation														
#	Name	Description	FFY2023-2025	FY2026-2030	FY2031-2035	FY2036-2040	FY2041-2045	FY2046-2050						
236	SLT/K-10 West Leg I-70/K10 Junction South to 3500 ft N of K-10/US-40 Junction	Add 2-lanes to the existing 2-lanes for a 4-Lane Freeway section. This will include reconstruction of existing interchange at I-70(KTA). Includes Bridges #200 (New), #201 (New), #202 (New), #203 (Replace Br #095), #204 (New), #205 (New), #086 (Repair).	\$	91,922,000										
237	SLT/K-10 West Leg 3500 ft N of K-10/US-40 Junction, to K-10 US-59/Iowa St Junction	Add 2-lanes to existing 2-lanes for a 4-Lane Freeway section. Existing interchanges at US-40 (6th St.), Bob Billings Pkwy, Clinton Pkwy, US-59 (Iowa St.) A new interchange for the Wakarusa/27th intersection, including replacing/repairing bridges.	\$	149,666,000										
143	US-56 Reconstruction: US-56/US-59 Junction east to 1600 Rd.	Roadway reconstruction based on 44 ft. roadway with 10 ft. shoulders. Add acceleration/deceleration lanes as warranted.		\$	15,486,000									
147	K-33: Wellsville to U.S. 56 (N. 200th Road) junction	A portion of this project is in Douglas County. Discovery Phase to determine the appropriate rehabilitation/reconstruction improvements for the location. It includes resurfacing and widening shoulders.		\$	16,137,000									
142	US-40/K-10 Interchange Improvement (Diverging Diamond Interchange) O & M	Construct a Diverging Diamond Interchange (DDI) includes bridge #088-for the addition of sidewalk with barriers for pedestrian protection down center of bridge. General Operations & Maintenance activities	\$ \$	15,911,000 1,832,800	\$ \$	3,507,500 4,166,100	\$ \$	4,947,900 5,876,100	\$ \$	6,978,700 6,978,700				
Total Project Cost			\$	259,331,800	\$	35,130,500	\$	4,166,100	\$	4,947,900	\$	5,876,100	\$	6,978,700
Projected Revenues			\$	259,331,800	\$	156,173,500	\$	168,243,200	\$	181,246,100	\$	195,253,200	\$	210,343,100
Remaining Unprogrammed Revenues			\$	-	\$	121,043,000	\$	164,077,100	\$	176,298,200	\$	189,377,100	\$	203,364,400
Fiscally Constrained				Yes		Yes		Yes		Yes		Yes		Yes

Note: #143 & 147 in the Statewide IKE Transportation Program project pipeline, but have not yet been committed for construction.

Kansas Turnpike Authority														
#	Name	Description	FFY2023-2025	FY2026-2030	FY2031-2035	FY2036-2040	FY2041-2045	FY2046-2050						
102	I-70 Pavement Surfacing	I-70 from Shawnee/Douglas County line to Leecompton Interchange	\$	5,200,000										
103	I-70 Pavement Surfacing	I-70 from Leecompton Interchange to Douglas/Leavenworth County line		\$	3,200,000									
-	O & M	General Operations & Maintenance activities	\$	2,048,800	\$	3,624,800	\$	3,904,900	\$	4,206,500	\$	4,531,500	\$	4,881,600
Total Project Cost			\$	7,248,800	\$	6,824,800	\$	3,904,900	\$	4,206,500	\$	4,531,500	\$	4,881,600
Projected Revenues			\$	7,248,800	\$	6,824,800	\$	3,904,900	\$	4,206,500	\$	4,531,500	\$	4,881,600
Remaining Unprogrammed Revenues			\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Fiscally Constrained				Yes		Yes		Yes		Yes		Yes		Yes

Through the plan development process several projects were identified, but are not currently funded. These projects are on the illustrative project list shown in Table 6.6. These projects would be amended into the fiscally constrained project list if allocated funding is greater than anticipated or if funding is secured for a specific project. This list is not exhaustive. If funding is available other projects could be amended into the fiscally constrained project list. Illustrative projects are not required to be selected. Illustrative projects are beyond the available financial capacity and/or horizon year for city and state transportation programs.

Table 6.6: Illustrative Project List

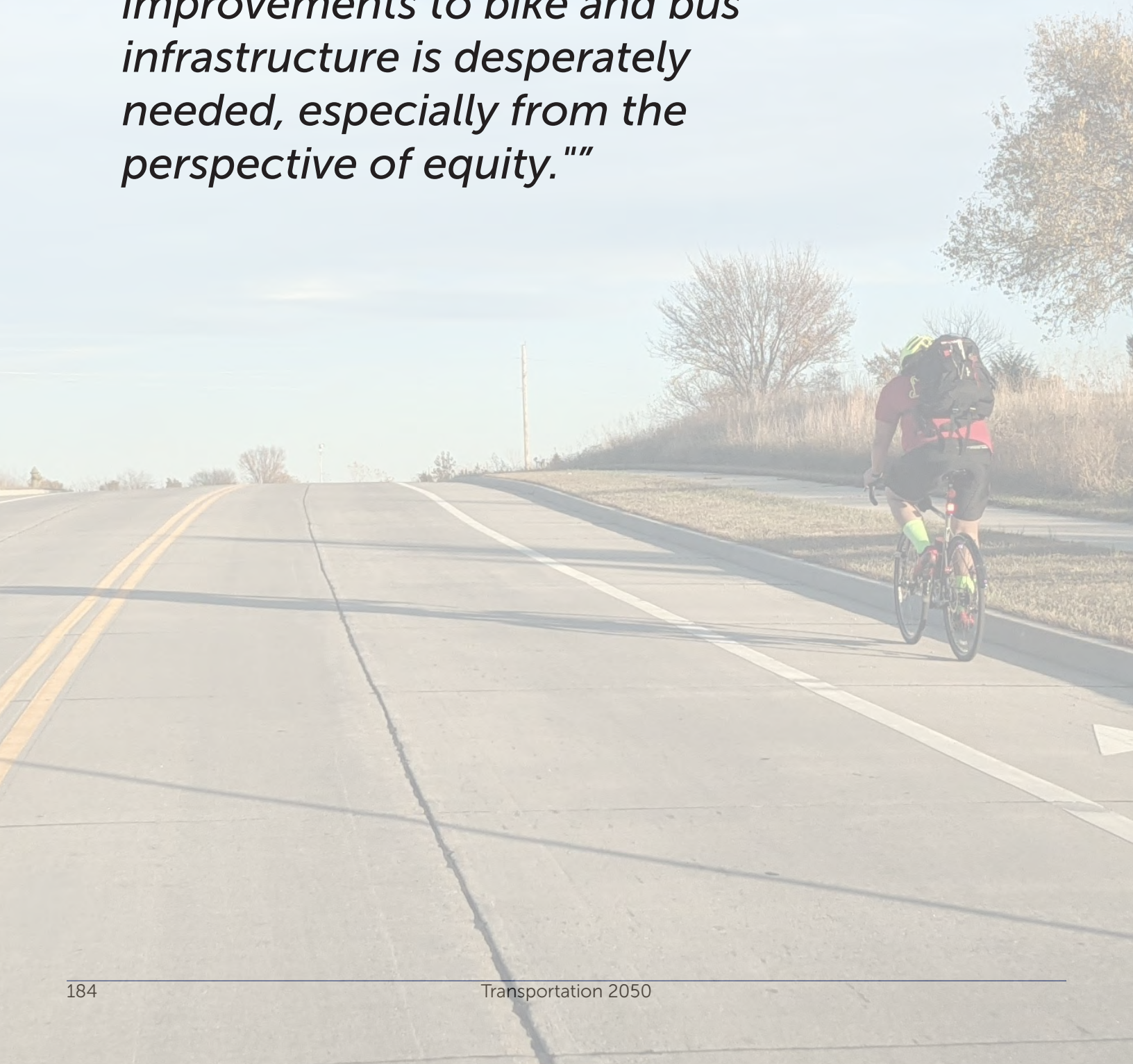
Illustrative Projects List			
Entity	Project Route	Project Description	Project Location
Lawrence	6th Street/US-40	Extension of 6th Street to arterial street standards including pavement, storm sewer, bike/ped facilities.	John Wesley Way to E800 Rd.
Lawrence	Bob Billings Pkwy	Construction of major arterial street to accommodate future growth west of K-10. Improvements include street, storm sewer, sidewalk, and bike facility.	K-10 to E 800 Rd
Lawrence/DG Co/KDOT	US-40	Widen to 4 lanes	E 800 Rd. to Stull Rd./CR. 442 at E 700 Rd.
KDOT	US-56	Reconstruction and addition of paved shoulders, intersection improvements and other safety upgrades	E1600 Rd to the Douglas/Johnson County Line
KDOT	US 56	Reconstruction	US 59 west to Osage County Line
Lawrence	Massachusetts St	Reconstruction includes new concrete parking, street, curb and gutter, traffic signals, concrete planters, street lights, irrigation, mid block crossings, landscaping, bollards, street furniture, and gateway/wayfinding signage	6th Street to North Park Street.
Lawrence	31st Street and Louisiana Intersection	Intersection improvements with signals and turn lanes	31st Street and Louisiana
Lawrence	6th St. and McDonald Rd./US-59	Replacement and Upgrades	6th St. and McDonald Rd./US-59 Interchange
Lawrence	McDonald Drive	Reconstruction to City standards, addition of bike/ped accommodations and Intersection improvements at Princeton Boulevard Intersection	McDonald Dr: I-70 to 6th St.
Lawrence	Lawrence Loop Trail - Kaw River - 7th street to Constant Park	Complete the downtown section of the Lawrence Loop Trail	Lawrence Loop Trail from the Santa Fe Depot on 7th Street to Constant Park
KDOT	K-10	Widen to 6 lanes	Lawrence to Johnson County line
Douglas Co	Route 1061 at N700	Intersection relocation	Route 1061 and N700
Douglas Co	Route 1061 at N700	Paved shoulders	Eudora South to US56

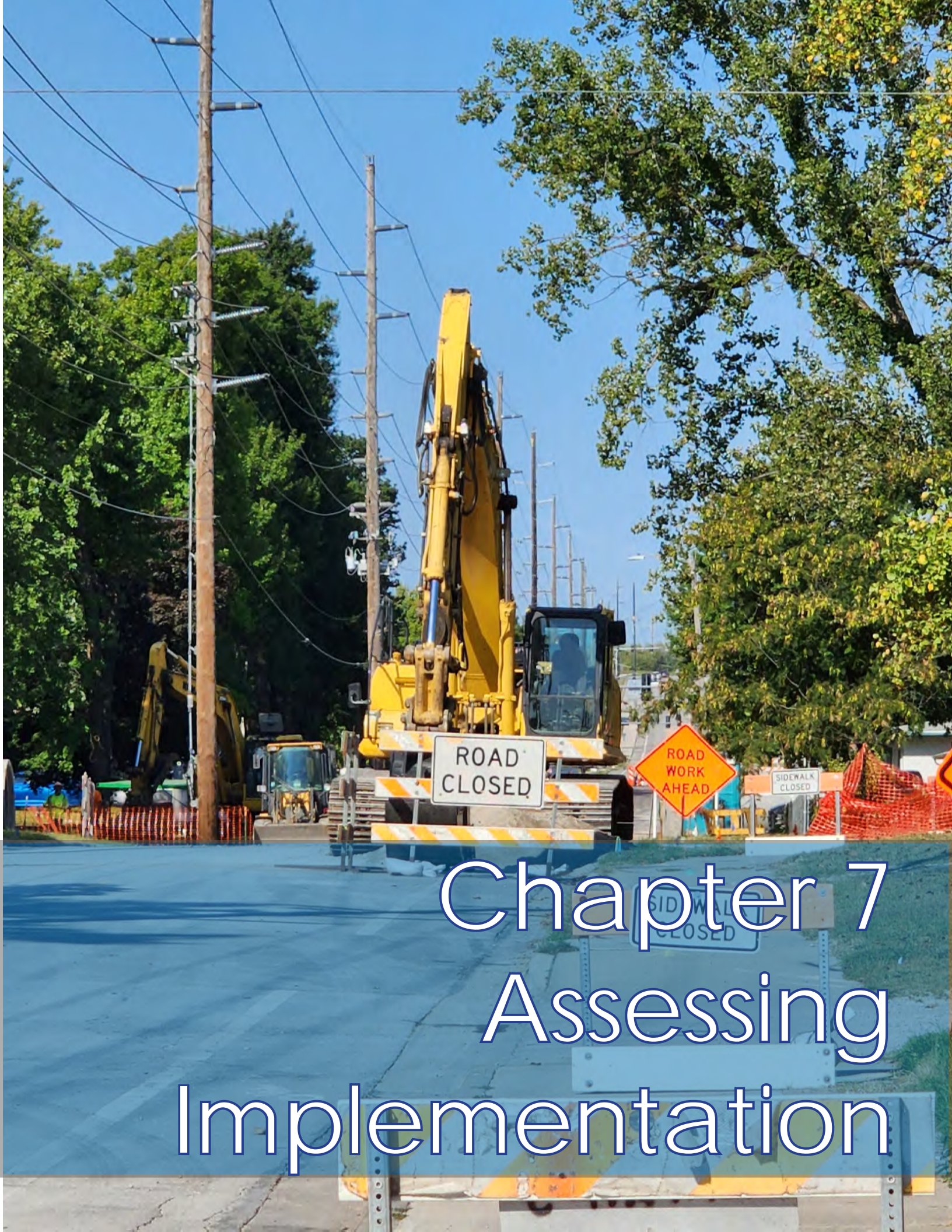
Note: Standalone bicycle and pedestrian infrastructure identified in approved plans, that exceed the available bike/ped funding should be considered illustrative

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What we heard:

“Alternatives to cars and massive improvements to bike and bus infrastructure is desperately needed, especially from the perspective of equity.””





Chapter 7

Assessing Implementation

7. Assessing Implementation

Transportation 2050 is the long-range transportation vision that ensures projects are implementing the MPO's vision for a healthy, safe, and efficient transportation system, which adequately serves Lawrence, Eudora, Baldwin City, Lecompton, and unincorporated areas of Douglas County.

This plan identifies the planned and committed transportation investments, which need to be evaluated to ensure they do not disproportionately adversely affect the environmental justice populations, to understand how they impact multimodal safety and the environment. This chapter also includes an analysis about how the projects are anticipated to impact the performance measures included in Appendix E - Performance Measures.

A. Environmental Justice (EJ) Analysis

The Environmental Protection Agency (EPA) defines Environmental Justice as the "fair treatment for people of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and policies." Environmental Justice (EJ) is a federal requirement that projects using federal funds be selected and distributed fairly to all people regardless of income or race and that all people have equal access to the benefits afforded by federally funded projects as well as equal access to the decision-making process for the selection of those federal projects. This concept is conveyed in the three [US DOT Environmental Justice Principles](#) below:

1. To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision making process.
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Methodology for Identifying EJ Populations

The MPO identifies minority and low-income populations and evaluates their proximity to projects and anecdotal impacts of projects at a regional scale. However, ultimate project selection, budget and scope are the responsibility of the project sponsor within the constraints of the transportation plan. Thus, the MPO recommends project sponsors consider equity when selecting projects.

Environmental Justice (EJ) Analysis

Fiscally Constrained Projects (Road & Bridge / Bicycle & Ped)

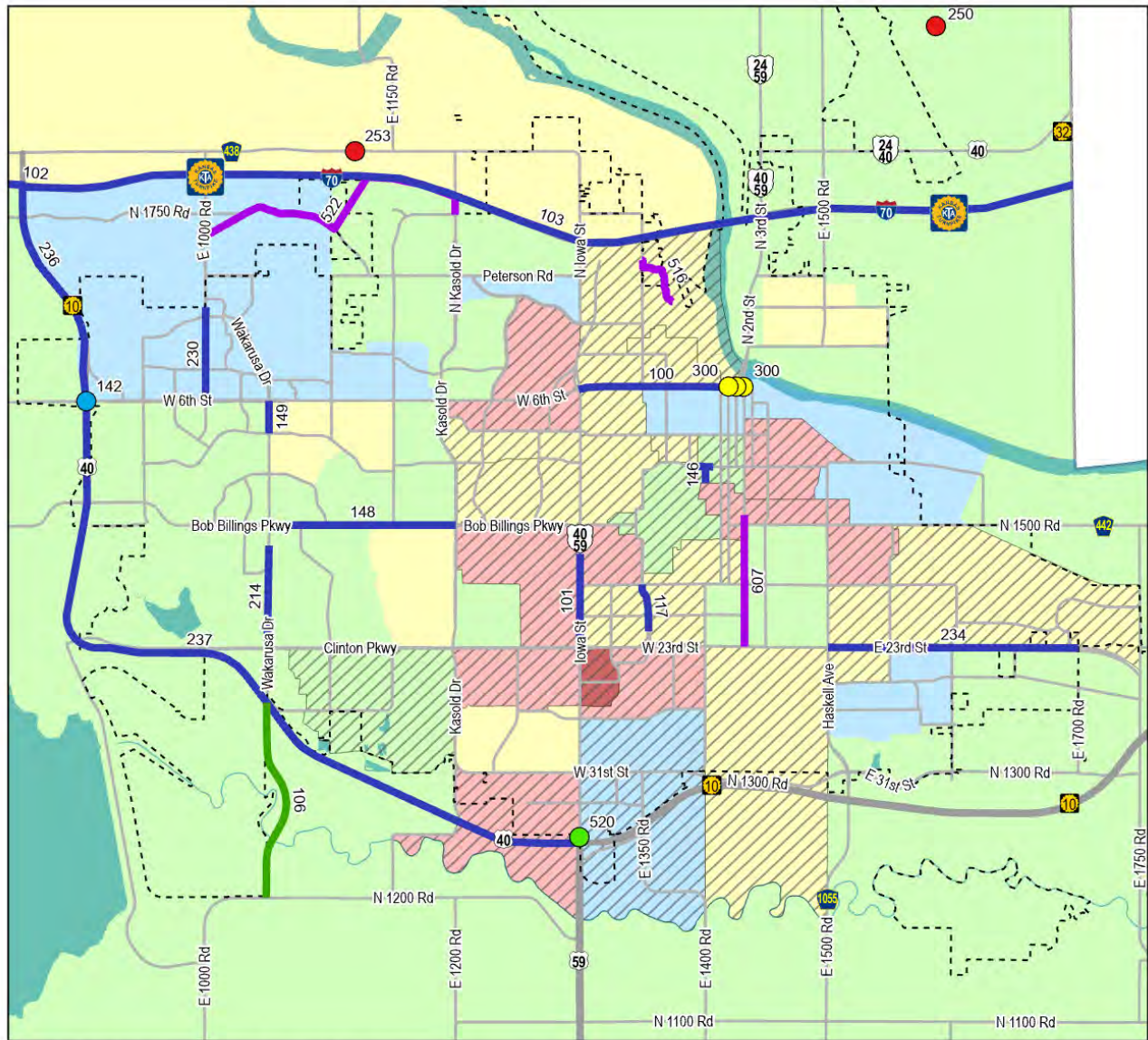
The Environmental Justice (EJ) zone was established by identifying the low-income and minority populations in Douglas County. Chapter 2 details how the EJ zone was developed (it is located primarily in or near the City of Lawrence limits). The evaluation of EJ impacts was integrated into the planning process. In Chapter 2 where possible, there was data that pertained to the EJ zone, it was delineated so the impacts on the EJ zone population could be shown.

Table 7.1 Project List (Road & Bridge and Bike & Ped) Located in the EJ Zone

MPO #	Project Name	Project Type	EJ Zone	Benefits
100	6th St.: Iowa St. to Massachusetts St.	Preservation	Yes	Improves multi modal facilities, pavement condition, safety improvements
101	Iowa St. Reconstruction: Irving Hill Rd. to 23rd St.	Preservation	Yes	Improves multi modal facilities, pavement condition, safety improvements
102	Lecompton Interchange I-70 Pavement Surfacing: Shawnee County line to	Preservation	No	Pavement Condition, Safety improvements
103	Lecompton Interchange to 103 Leavenworth County Line	Preservation	Yes	Pavement Condition, Safety improvements
104	Church Street Community Connectivity and Multimodal Enhancement Project	Modernization	No	Improves multi modal facilities, pavement condition, safety improvements
106	Wakarusa Drive Extension	Expansion	No	Emergency response times, Improves multi modal facilities
107	Rte. 458/1055 Improvements: E 1500 thru E 1600	Modernization	No	Pavement Condition, Safety improvements
117	Naismith Drive Reconstruction: 19th St. to 23rd St.	Preservation	Yes	Improves multi modal facilities, pavement condition, safety improvements
142	US-40/K-10 Interchange Improvement (Diverging Diamond Interchange)	Modernization	Yes	Improves multi modal facilities, safety improvements
143	US-56 Reconstruction: US-56/US-59 Junction east to 1600 Rd.	Preservation	No	Pavement Condition, Safety improvements
146	11th St.: Indiana to Ohio; Louisiana: 11th to 12th Reconstruction	Preservation	Yes	Improves multi modal facilities, pavement condition, safety improvements
147	K-33 Douglas County Reconstruction (Franklin County Line to US-56)	Preservation	No	Pavement Condition, Safety improvements
148	Bob Billings Pkwy.: Kasold Dr. to Wakarusa Dr.	Preservation	No	Pavement Condition
149	Wakarusa Dr. Reconstruction: Harvard Rd. to 6th St.	Preservation	No	Pavement Condition
214	Wakarusa Drive Reconstruction: Research Pkwy. to Clinton Pkwy.	Preservation	No	Improves multi modal facilities, pavement condition, safety improvements
230	Queens Road, W 6th St to North City Limits	Modernization	No	Improves multi modal facilities, pavement condition, safety improvements
234	23rd Street Reconstruction, Haskell Ave. to East City Limits	Preservation	Yes	Improves multi modal facilities, pavement condition, safety improvements
236	SLT/K-10 West Leg I-70/K10 Junction South to 3500 ft. N of K-10/US-40 Junction	Expansion	No	Capacity expansion, system performance
237	SLT/K-10 West Leg 3500 ft. N of K-10/US-40 Junction, to K-10 US-59/Iowa St Junction	Expansion	Yes	performance, improves multi modal facilities, safety improvements
243	US-56 Improvement: Eisenhower St. to 1st St.	Preservation	No	Pavement Condition, Safety improvements
248	Bridge 0964-1000 Replacement	Preservation	No	Safety, bridge condition
250	Bridge 1900-1608 Replacement	Preservation	No	Safety, bridge condition
251	Bridge 0565-0550 Replacement	Preservation	No	Safety, bridge condition
252	Bridge 2058-1500 Replacement	Preservation	No	Safety, bridge condition
253	Bridge 1800-1124 Replacement	Preservation	No	Safety, bridge condition
254	Bridge 1000-1332 Replacement	Preservation	No	Safety, bridge condition
255	Bridge 1326-0250 Replacement	Preservation	No	Safety, bridge condition
256	Bridge 1400-2342 Replacement	Preservation	No	Safety, bridge condition
257	Bridge 1600-0211 Replacement	Preservation	No	Safety, bridge condition
258	Bridge 0306-1000 Replacement	Preservation	No	Safety, bridge condition
300	6th and Massachusetts St. Traffic Signal Improvement Project	Modernization	Yes	Safety, multi modal improvement, system performance
500	Maple Leaf Trail	Pedestrian/Bicycle	No	Improves multi modal facilities, safety improvements
501	Church St Shared Use Path	Pedestrian/Bicycle	No	Improves multi modal facilities, safety improvements
515	Lecompton Sidelwalk Loop Project: Historic Loop and Grand Loop Connectivity	Pedestrian/Bicycle	No	Improves multi modal facilities, safety improvements
516	Lawrence Loop Shared Use Path: Michigan St. to Sandra Shaw Park	Pedestrian/Bicycle	Yes	Improves multi modal facilities, safety improvements
520	Lawrence Loop: Iowa Crossing	Pedestrian/Bicycle	Yes	Construct a grade-separated crossing for the Lawrence Loop Trail at Iowa Street.
522	Lawrence Loop: Queens Rd. to Kasold Dr.	Pedestrian/Bicycle	No	Improves multi modal facilities,
607	Massachusetts Street: 14th to 23rd Street Multi modal Improvements	Pedestrian/Bicycle	Yes	Improves multi modal facilities, safety improvements

As seen in Table 7.1, twelve projects are located within EJ zones, while Figure 7.1 shows the location of all mapped projects in relation to Environmental Justice Zones and Transportation Disadvantaged Populations. In Lawrence, the non-motorized prioritization process used for standalone bicycle and pedestrian projects recognizes consideration should be given to Transportation Disadvantaged Populations in project selection, these projects are not mapped in T2050.

Figure 7.1 Mapped Projects (Road & Bridge and Bike & Ped) in Relation to EJ Zones and Transportation Disadvantaged Zones



Projects (Labeled)

- Bike/Ped
- Bridge
- Interchange
- Signal
- Pedestrian/Bicycle
- Road
- Road, Bridge

Transportation Disadvantaged Population Scoring

- ≤2 (least disadvantaged)
- ≤4
- ≤6
- ≤9
- ≤12 (most disadvantaged)

- EJ Zone
- City Boundary
- County Boundary
- Water

0 1 2 Miles

Date Exported: 1/13/2023
 Source: 2020 ACS 5-yr Est. & CDBG Income
 Produced: Lawrence-Douglas County MPO



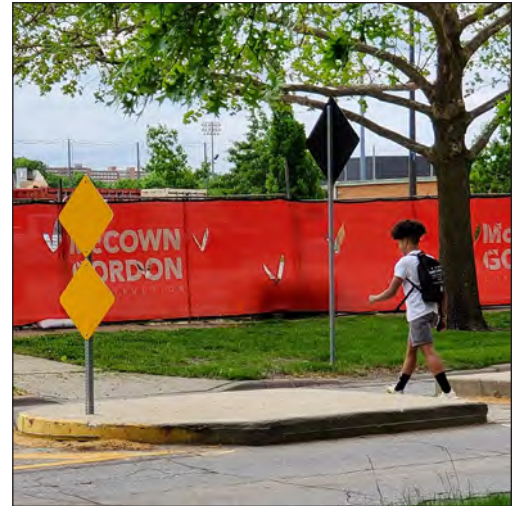
Transportation Disadvantaged Population scoring is comprised of US Census Bureau American Community Survey (ACS) data and Community Development Block Group (CDBG) income data. 2018 ACS data includes: people who have a disability, people who have less than a high school education, minorities, single parent households, zero vehicle households, and population under 18 and over 65. Higher points indicate a greater deviation from the regional average.

Thirty-six (36) fiscally constrained projects are mapped in T2050 with a combined total cost of \$383 million. Of the 36 mapped projects, 11 are considered EJ projects for the purpose of this analysis. These projects are within or intersect a road that is in an EJ zone or along an EJ zone border. Investment in EJ projects totals \$177 million, or approximately 46% of projected spending. This level of spending indicates there is no systematic disinvestment in EJ zones as approximately, 42% of all of Douglas County households are found within EJ zones.

When assessing and analyzing projects in T2050 and their effect on EJ populations and Transportation Disadvantaged Populations, there are additional considerations other than location and EJ zone status and dollar amounts. Further considerations for long- and short-term effects of projects must be considered. Table 7.1 shows the project type and benefits the project is anticipated to bring.

Of the following projects located within the EJ zones, there are 8 projects focused on preservation. These projects will maintain and enhance existing infrastructure within the EJ zones to ensure that these areas offer safe and livable public spaces. Improvements to pavement, storm sewer, curb and gutter, and other assets will help maintain the quality of the transportation network. The remaining 4 projects prioritize modernization, improve intersections create a grade separated shared use path crossing, and expand roadway capacity in these zones.

11 projects include some sort of multimodal facility, whether it is bicycle lanes, sidewalk, shared use path, accessible pedestrian signals and detectors or a pedestrian/bicycle crossing improvements. These elements in addition to pavement condition, access management and geometric improvements increase mobility and safety. Additionally, there is non-motorized funding that will be spent on projects not included in this EJ analysis but that continue to improve access, mobility, and safety for people who walk and bicycle.



Transportation Disadvantage:

Similar to EJ review, evaluating transportation disadvantage provides a data driven approach to understanding the distribution of transportation networks, services, and projects. Transportation disadvantage builds upon the approach of EJ, but includes additional criteria. These criteria include: households with a person who has a disability, people who have less than a high school education, minorities, single parent households, zero vehicle households, population under 18 and over 65, and low-moderate income households. This plan does not include analysis of transportation disadvantage but it is a tool that can be used for project selection. To view more information visit <https://lawrenceks.org/mpo/transportation-disadvantaged>.

B. Analysis of Fixed Route Transit and Transit Services

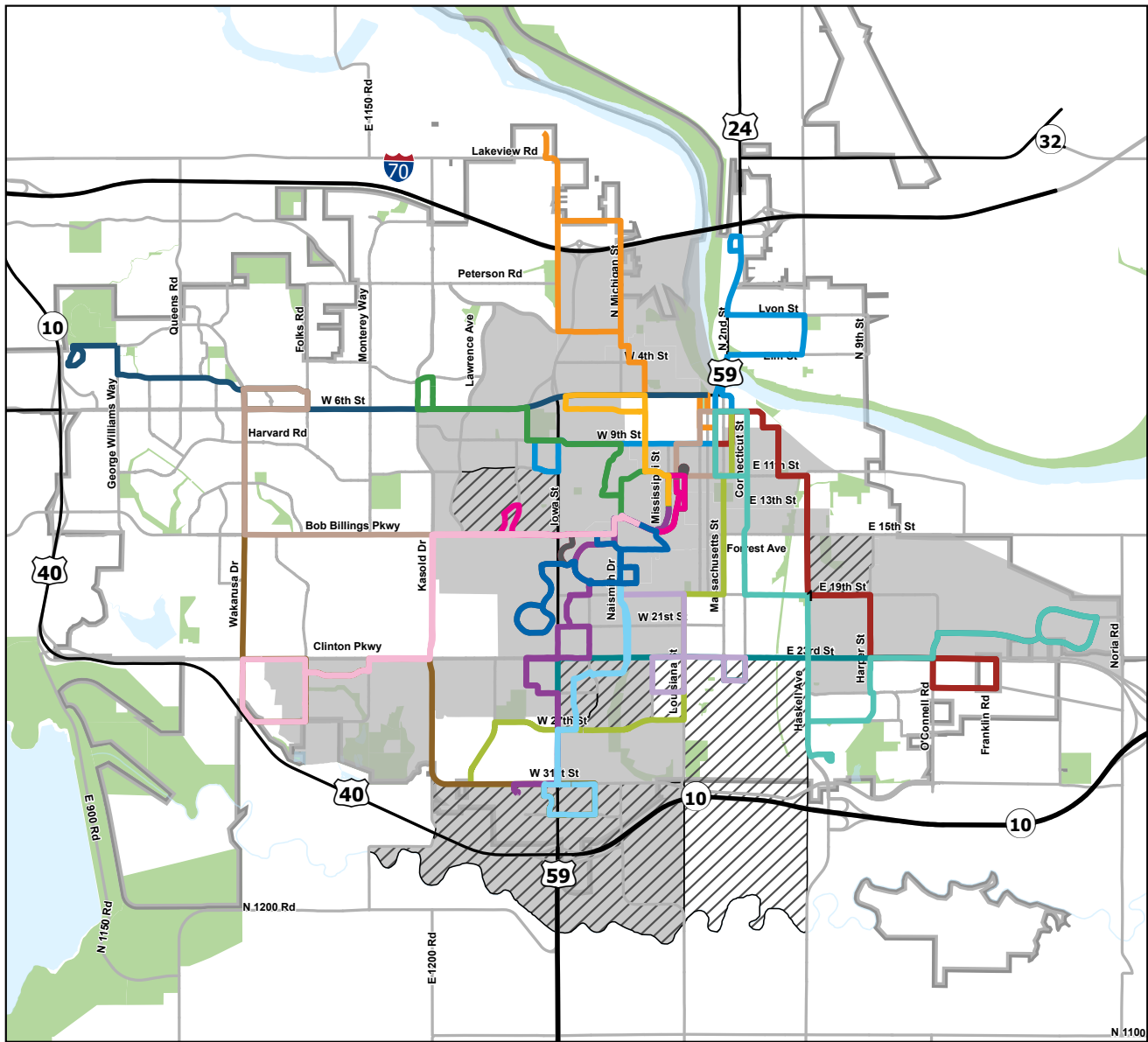
Lawrence Transit & KU on Wheels 2022 fixed routes are shown on Figure 7.3. Sixteen (16) or 80% of the current routes have 30 minute or less service during peak times.

The route changes in 2023 are expected to create a more efficient and effective transit network that incorporates the new Central Station at Bob Billings Parkway and Crestline Drive, and allows for maximum flexibility in terms of future schedule adjustments in response to any changes in funding availability. The 2021 Route Redesign Study analyzed population, employment, and socio-economic characteristics such as income, automobile availability, age, and disability status to develop the improved routes. Additionally, in response to public input through the Route Redesign Study, Lawrence Transit is transitioning midday service hours to Sunday service and high frequency service between Downtown and Central Station beginning in August 2023. KU on Wheels has seen recent service reductions due to budget constraints, that impact the frequency of service on some routes

Transportation 2050 Performance Measure #5 is the percentage of households with access within a 1/4 mile to a bus stop (Figure 13). Overall access to bus stops in EJ areas in comparison to Lawrence as a whole has increased since 2015. Based on 2023 bus service, 88% of households in EJ zones have access within 1/4 mile of a bus stop, compared to 76% of households in Lawrence. A 1/4 mile is generally the distance people are comfortable walking, households within this buffer have easy to access transit service, thereby expanding their mobility.

For the case of federally supported transit services, both the fixed route system and paratransit service areas, cover parts of Douglas County with low-income and/or minority populations. Transit and paratransit services are all considered to serve EJ populations and to be located in EJ zones for the purpose of this analysis. If there is any difference with EJ zones it seems to be that some EJ zones receive greater choice and frequency of transit services because those areas coincide with the parts of the region with population densities high enough to support frequent fixed route transit (see the transit routes overlaid on population estimates in Figure 7.4).

Figure 7.3: 2022 Fixed Routes in Relation to EJ zones



Environmental Justice (EJ) zones are comprised of low to moderate income households (shown in gray) and/or minority households (indicated with diagonal lines) populations. These zones are updated utilizing income information from the US Housing & Urban Development (HUD) Department and race data from the US Census Bureau American Community Survey.

- Low-Moderate Income Block Groups
- 2022-2023 Transit Routes
- Water
- Minority Block Groups
- Parks
- City Limits

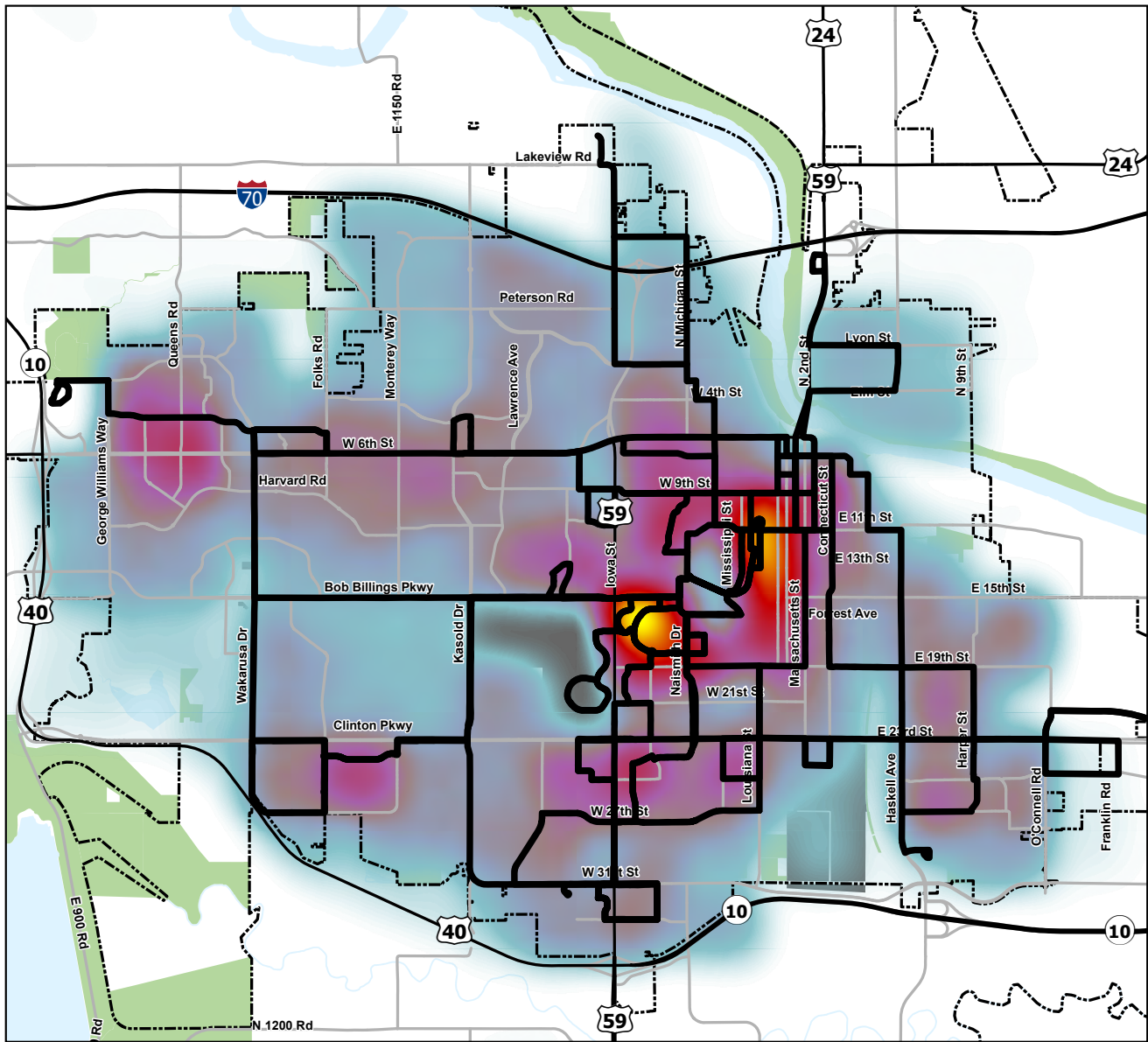
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N

0 1.25 2.5 Miles

Date Exported: 9/13/2022
 Source: Lawrence Transit, 2016-2020 ACS 5-yr Est. & CDBG
 Produced: Lawrence-Douglas County MPO Income

Figure 7.4: Lawrence Transit 2022 - 2023 Routes and 2020 Population Densities



2020 Population Estimates	2022-2023 Transit Routes	University	City Limits
Least Dense	Parks	Water	
Most Dense			

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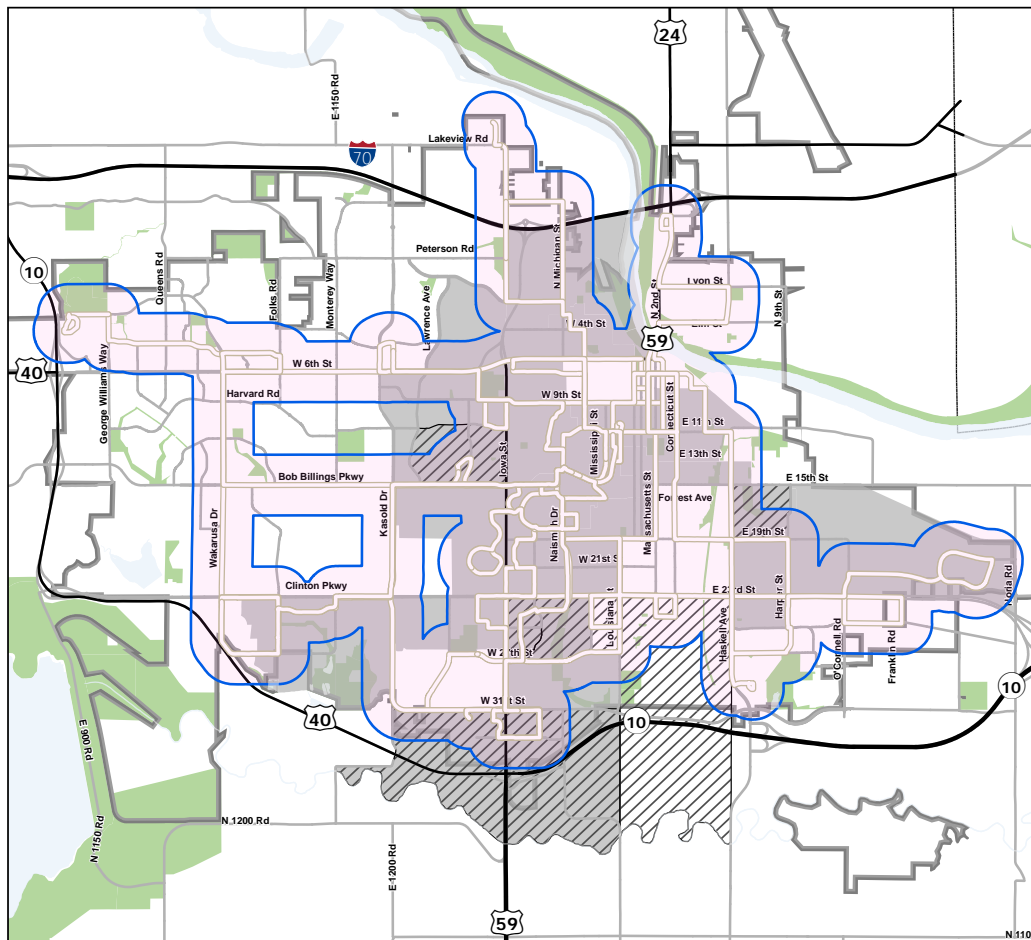
0 1 2 Miles

Date Exported: 9/21/2022
 Source: Lawrence Transit & Plan 2040 Population Est.
 Produced: Lawrence-Douglas County MPO

Based on the 2022 Route Redesign Study Final Report, public transportation is most efficient when it connects population and employment centers where people can easily walk to and from bus stops. Transit's reach is generally limited to a 10 minute walk of the nearest stop, or within 1/4 mile to 1/2 mile. For this reason, the size of a transit travel market is directly related to an area's population density. Typically, a density greater than five people per acre is needed to support base-level (hourly) fixed-route transit service.

Figure 7.4 shows the population density of Lawrence with the 2022-2023 transit routes. Yellow, orange, and red areas indicate places of high population density whereas blue and purple areas are less dense.

Figure 7.5: 1/4 Mile Fixed Route Transit Buffer and EJ Zone



Environmental Justice (EJ) zones are comprised of low to moderate income households (shown in gray) and/or minority households (indicated with diagonal lines) populations. These zones are updated utilizing income information from the US Housing & Urban Development (HUD) Department and race data from the US Census Bureau American Community Survey.

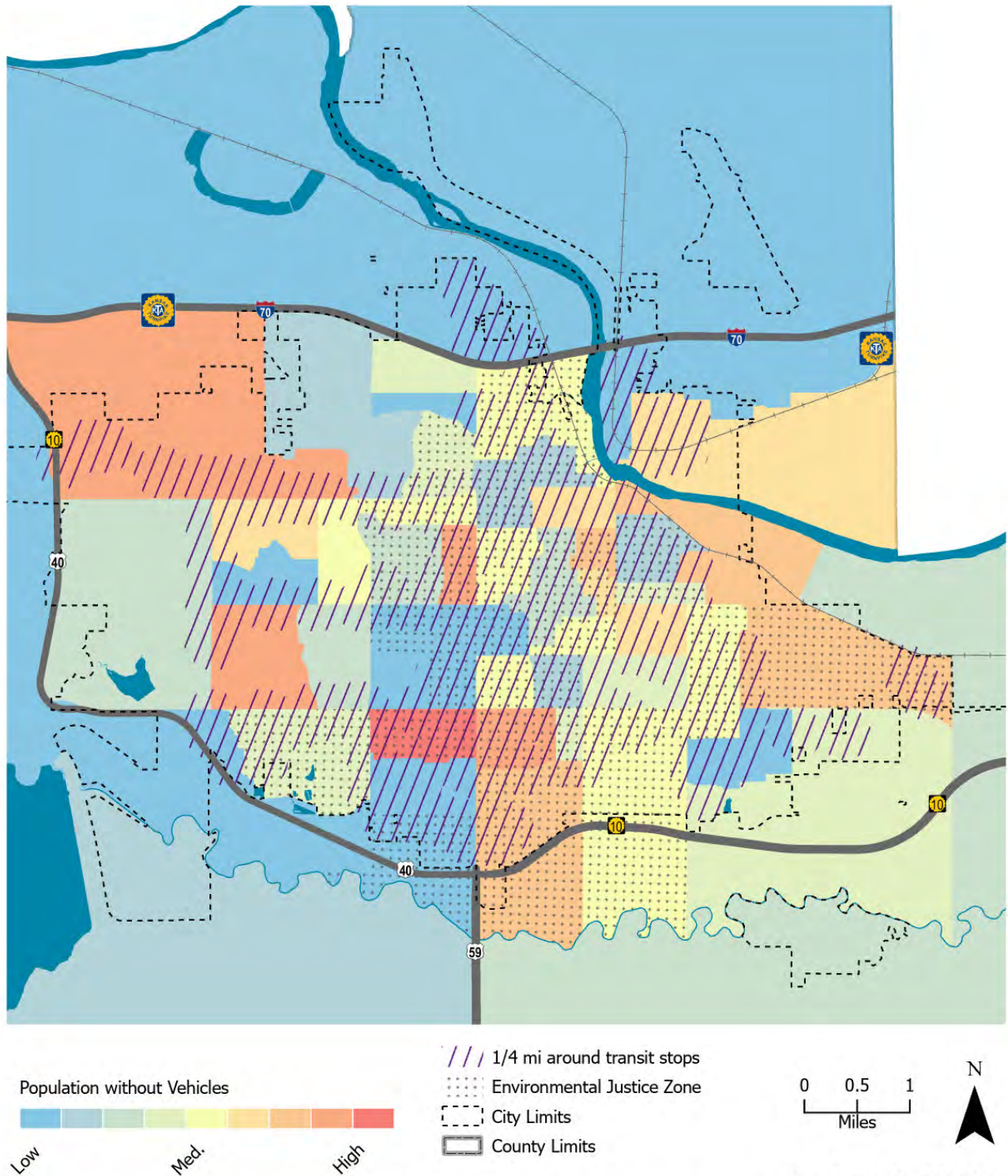
Low-Moderate Income Block Groups	1/4 Mile Bus Route Buffer 2022-2023
Minority Block Groups	Water
Transit Routes 2022-2023	City Limits

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0 1 2 Miles

Date Exported: 1/13/2023
 Source: Lawrence Transit, 2016-2020 ACS 5-yr Est. & CDBG Income
 Produced: Lawrence-Douglas County MPO

Figure 7.6: Zero Vehicle Households, the EJ Zone and 1/4 mile Transit Buffer



Date Exported: 1/27/2023
 Source: 2016 - 2020 ACS Data 5 year Est. B25045, Lawrence Transit, and LMISD
 Produced: Lawrence-Douglas County MPO

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C. EJ Analysis Conclusion

Reviewing the assessment and analysis in this chapter and throughout T2050, the MPO believes there are no significant EJ concerns with the selection of road, bridge, or transit projects in Douglas County.

Although not covered under Executive Order 12898, populations that may be transportation disadvantaged — people who have a disability, people who have less than a high school education, single parent households, zero vehicle households, and population under 18 and over 65 — were spatially analyzed and appear to be served by federal transportation investments.

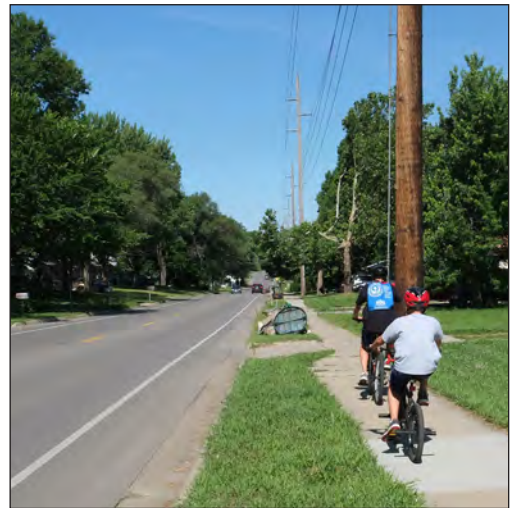
Considering the level of transit service and improved multimodal access there will be improved mobility for EJ areas with the investments projected in this plan. These services and networks provided transportation options and choices for residents and visitors alike. T2050 includes projects inside and outside of EJ zones, and projects for this plan are selected based on objective planning and engineering criteria (e.g., bridge deterioration, pavement condition, transit demand, etc.). Local governments will need to continue to utilize design to improve mobility and access for EJ populations.

The region's transportation projects are selected based on the merit of the project and the need for improvements to the transport system without any intended bias towards impacting EJ areas any more than any other area in the region. However, paying particular attention to EJ and Transportation Disadvantaged Areas when project selection occurs by the local entities will ensure equitable outcomes can be achieved. The MPO should continue to encourage best practices by project sponsors through project prioritization measures, such as scoring for EJ considerations and quality public participation.

Furthermore, performance measure reports will include an analysis about equitable access to the bikeways (PM1), sidewalk (PM2), and transit stops (PM5).



Source: Adobe Stock



D. Investment Impacts Transportation Performance Measures

Projects were evaluated to determine their contribution to meeting the region's performance measures targets and desired trends.

T2050 Projects Working Toward Safety

All but one of the non-transit projects have some component to address safety concerns. Improvements include multimodal infrastructure, geometric improvements, intersection improvements, access management. Table 12 displays the projects per category and describes the safety impact of the improvement. Further, common improvements which improve safety and corresponding projects are listed below.

Common Improvements That Impact Safety

Separated or dedicated facilities for pedestrians and bicyclists

According to a report from the Office of the New York City Mayor, when protected bicycle lanes are installed, injury crashes for all road users (motorists, pedestrians, and bicyclists) typically drop by 40% and by more than 50% in some locations. (Example: Project #520: Lawrence Loop - Iowa Crossing)

Dedicated vehicle turning movements lanes

By creating two-way left turn lanes, vehicles are separated from through traffic improving traffic flow and reduce the potential risk of rear end crashes. (Example: Project #214: Wakarusa Drive Reconstruction, Research Parkway to 23rd Street.)

Access management

Access management improves safety by separating access points so turning and cross movements occur at fewer locations. (Example: Project #234: 23rd Street Reconstruction: Haskell Avenue to East City Limits)

Roundabouts

According to AASHTO Highway Safety Manual, installing roundabouts reduce the types of crashes where people are seriously hurt or killed by 78-82% when compared to conventional stop-controlled and signalized intersections. (Example: Project #230: Queens Road: W. 6th Street to North City Limits)

Modernized design standards

The safety of the roadway can be improved by flattening roadside slopes and making geometric improvements to bring roadways up to design standards. (Example: Project #219: Route 458 Improvements, E. 1500 to E. 1600)

Table 7.2 Projects Addressing MPO Safety Targets

#	Project	Improvement
100	6th St.: Iowa St. to Massachusetts St.	Shared-use path on north side of 6th Street to be included from Iowa St. to Wisconsin St.
101	Iowa St. Reconstruction: Irving Hill Rd. to 23rd St.	Includes sidewalk
104	Church Street Community Connectivity & Multimodal Enhancements	Shared-use path, roundabout, center turn lane
106	Wakarusa Drive Extension	Remove arterial traffic from recreational areas, reduce fire and medical response time, and decrease vehicle use
107	Rte. 458/1055 Improvements: E 1500 thru E 1600	Provide paved shoulders, flatten roadside slopes
117	Naismith Dr. Reconstruction: 19th St. to 23rd St.	Add bike facilities
142	US-40/K-10 Interchange Improvement (Diverging Diamond Interchange)	Geometric improvements
143	US-56 Reconstruction: US-56/US-59 Junction east to 1600 Rd.	Widen shoulders and acceleration/deceleration lanes
146	11th St.: Indiana to Ohio; Louisiana: 11th St. to 12th St. Reconstruction	Reconstruction of pavement, sidewalks and bike improvements
147	K-33: Wellsville to U.S. 56 (N. 200th Road) junction	Widen shoulders
148	Bob Billings Pkwy.: Kasold Dr. to Wakarusa Dr.	Separated ped/bike facility
149	Wakarusa Dr. Reconstruction: Harvard Rd. to 6th St.	Separated ped/bike facility and geometric improvements
214	Wakarusa Dr. Reconstruction: Research Pkwy. to 23rd	Separated ped/bike facility, two way left turn lanes
230	Queens Road: 6th to North City Limits	Geometric improvements to meet collector Street Standards, sidewalks, and bike facilities
234	23rd Street Reconstruction: Haskell to east City Limits	Separated ped/bike facility, turn lanes, and access management
236	SLT/K-10 West Leg in Douglas County	Additional through lanes, a new grade separated interchange and reconstructed interchanges, and a reduction of traffic conflicts and decision making points
237	SLT/K-10 West Leg in Douglas County	Additional through lanes, a new grade separated interchange and reconstructed interchanges, and a reduction of traffic conflicts and decision making points
243	US-56 Improvements: Eisenhower St. to 1st St.	Geometric Improvements
248	Bridge 0964-1000 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
250	Bridge 1900-1608 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
251	Bridge 0565-0550 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
252	Bridge 2058-1500 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
253	Bridge 1800-1124 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
254	Bridge 1000-1332 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
254	Bridge 1326-0250 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
256	Bridge 1400-2342 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
257	Bridge 1600-0211 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
258	Bridge 0306-1000 Replacement	Modernize bridge: width, improve roadside slopes, improve guardrails
300	6th and Massachusetts St. Traffic Signal Improvement Project	Pedestrian activation buttons and vehicle detection
500	Baldwin City: Maple Leaf Trail	Separated ped/bike facility
501	Eudora: Church Street Shared Use Path	Construct shared use path over K-10
507	Various Lawrence Bike/Sidewalk/ADA Ramps Projects	Provide dedicated space for pedestrians and bicyclists
515	Lecompton Sidewalk Loop Project: Historic Loop & Grand Loop Connectivity	Sidewalk
516	Lawrence Loop Shared Use Path: Michigan St. to Sandra Shaw Park	Separated ped/bike facility
520	Lawrence Loop: Iowa Crossing	Grade separated Shared Use Path crossing
522	Lawrence Loop: Queens Rd. to Kasold Dr.	Separated ped/bike facility
607	Massachusetts Street: 14th to 23rd Street Multi-Modal Improvements	Ped/bike facility

Table 7.3 Projects Addressing T2050 Goals

#	Project	Transportation Options	Shared Prosperity	Safety, & Security	Sustainability	Operations & Maintenance
		People have a variety of transportation options that provide safe, accessible, convenient, healthy, and affordable travel that connect them to their destinations.	The transportation system supports prosperity for all by connecting people and places in an equitable, reliable, affordable, and efficient manner.	People's lives are saved, crashes are avoided, and people and goods are safe and secure.	Protect and enhance the natural environment and support energy conservation.	Existing infrastructure is prioritized through maintenance, operations, and strategic improvements to provide for the
100	6th St.: Iowa St. to Massachusetts St.	X	X	X	X	X
101	Iowa St. Reconstruction: Irving Hill Rd. to 23rd St.	X	X		X	X
102	Interchange			X		X
103	I-70 Pavement Surfacing: Lecompton Interchange to Leavenworth County Line			X		X
104	Church Street Community Connectivity and Multimodal Enhancement Project	X	X	X	X	
106	Wakarusa Drive Extension	X	X	X		
107	Rte. 458/1055 Improvements: E 1500 thru E 1600	X		X		
117	Naismith Drive Reconstruction: 19th St. to 23rd St.	X	X	X		X
142	US-40/K-10 Interchange Improvement (Diverging Diamond Interchange)	X	X	X		X
143	Rd.			X	X	X
146	Reconstruction	X	X	X		X
147	to US-56)			X		X
148	Bob Billings Pkwy.: Kasold Dr. to Wakarusa Dr.	X	X			X
149	Wakarusa Dr. Reconstruction: Harvard Rd. to 6th St.	X	X			X
214	Pkwy.	X	X	X		X
230	Queens Road, W. 6th St to North City Limits	X	X	X		
234	Limits	X	X	X	X	X
236	SLT/K-10 West Leg I-70/K10 Junction South to 3500 ft. N of K-10/US-40 Junction	X	X	X		
237	SLT/K-10 West Leg 3500 ft. N of K-10/US-40 Junction, to K-10 US-59/Iowa St Junction	X	X	X		
243	US-56 Improvements: Eisenhower St. to 1st St.	X		X		X
248	Bridge 0964-1000 Replacement			X		X
250	Bridge 1900-1608 Replacement			X		X
251	Bridge 0565-0550 Replacement			X		X
252	Bridge 2058-1500 Replacement			X		X
253	Bridge 1800-1124 Replacement			X		X
254	Bridge 1000-1332 Replacement			X		X
255	Bridge 1326-0250 Replacement			X		X
256	Bridge 1400-2342 Replacement			X		X
257	Bridge 1600-0211 Replacement			X		X
258	Bridge 0306-1000 Replacement			X		X
300	Project	X	X	X		X
500	Maple Leaf Trail	X	X	X	X	X
501	Church St Shared Use Path	X	X	X	X	
507	Various Lawrence Bike/Sidewalk/ADA Ramps Projects	X	X	X	X	X
515	Lecompton Sidewalk Loop Project: Historic Loop and Grand Loop Connectivity	X	X	X	X	
516	Shaw Park	X	X	X	X	
520	Lawrence Loop: Iowa Crossing	X	X	X	X	
522	Lawrence Loop: Queens Rd. to Kasold Dr.	X	X	X	X	
607	Improvements	X	X	X	X	X

T2050 Projects Working Toward Pavement & Bridge Condition

The majority of non-transit projects have either a pavement or bridge related element; 16 projects will address pavement condition and 10 projects will address bridge improvement. These projects will maintain and modernize the condition of transportation infrastructure in Douglas County to provide a safe and reliable network. For example, Project #234: 23rd Street Reconstruction, Haskell Ave. to East City Limits includes pavement reconstruction of poor pavement condition.

T2050 Projects Working Toward System Performance

Several projects will enhance system performance and overall infrastructure capacity. Projects 236 and 237 will expand existing infrastructure capacity to improve regional connectivity along K-10 in Douglas County. Project 300 will modernize traffic signals to improve local and commuter transportation in Lawrence. These projects will help create a more efficient and cohesive transportation network.

T2050 Projects Working Toward Transit

T2050 will support the operations and maintenance of the transit system in Lawrence, including bus replacement and administration. Additionally, projects that include multimodal elements inherently benefit the transit system in Lawrence by facilitating transfers between buses and other modes of transportation.

T2050 Projects Working Toward Bicycle & Pedestrian Goals

Many T2050 projects will enhance bicycle and pedestrian infrastructure in Douglas County. These projects include the construction of bicycle and pedestrian facilities, multimodal wayfinding, and sidewalk improvements. For example, Project 520 will construct a grade separated crossing for the Lawrence Loop Shared Use Path at Iowa Street. Currently, non-motorized users of the Lawrence Loop cross five lanes of vehicular traffic on Iowa Street (US Highway 59) to continue on the bicycle and pedestrian path so this project will increase pedestrian and bicycle safety at this intersection.

Evaluating Performance Over Time

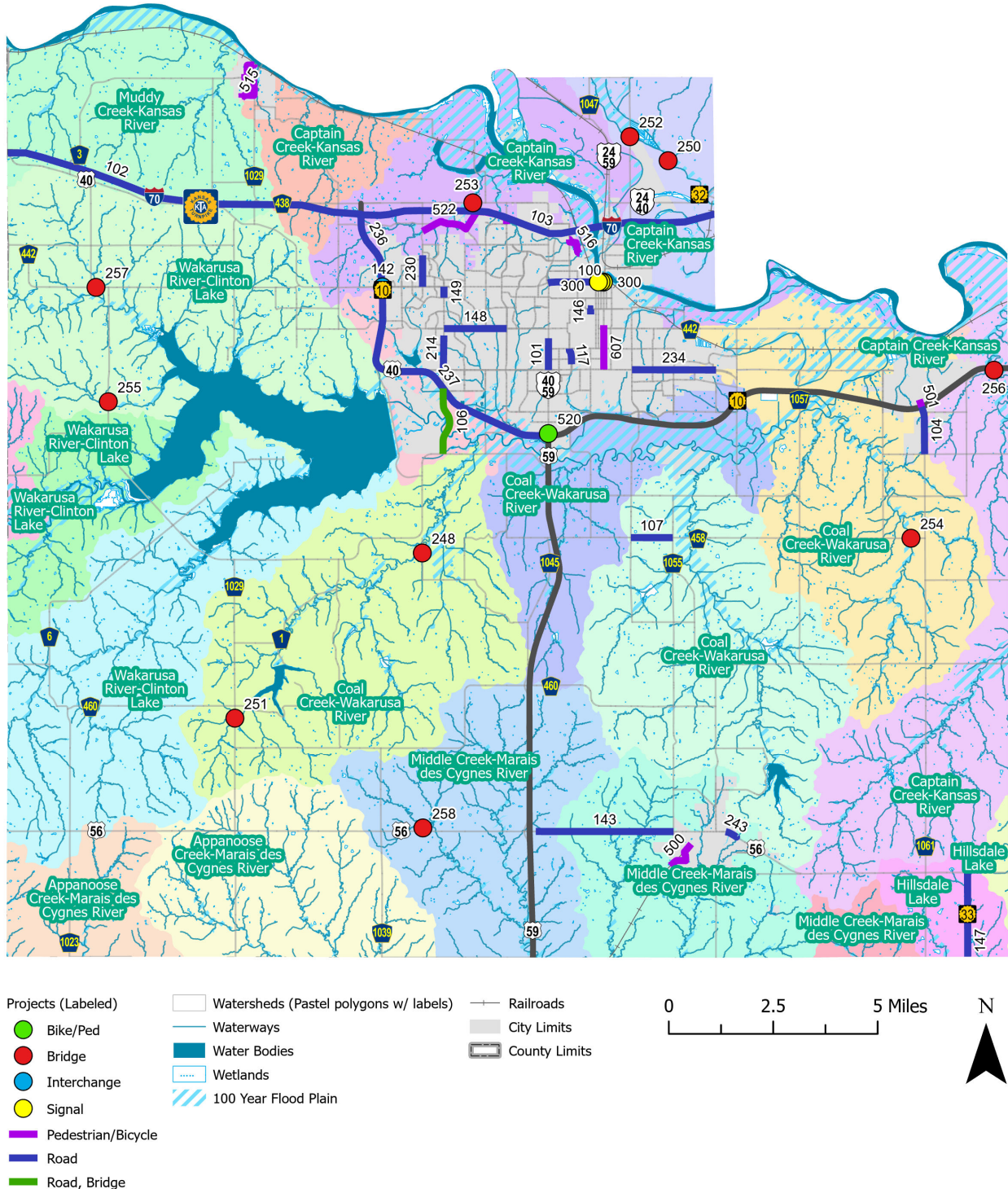
Federal performance measures will be tracked in the performance measure report – Appendix E: System Performance Report, which will be updated on a rolling basis based on when data is available. View the most current data at the performance measure website: <https://lawrenceks.org/mpo/t2050/pm/> (after adoption of T2050) Performance measures will be evaluated as part of the annual report process and may be altered as the MPO Policy Board deems necessary (based on the Public Participation Plan (PPP)).

E. Environmental Mitigation

The environmental impacts of the road and bridge projects must be evaluated. This evaluation is a system-level summary of the potential impacts on the environment based on their interaction with floodplains, wetlands, other environmentally sensitive areas, threatened and endangered species, and historic resources (Figure 7.7 – 7.10). A deeper evaluation of potential environmental impacts should be conducted by local governments as projects are designed and implemented. The National Environmental Policy Act (NEPA) requires measures to be identified to avoid, minimize, or mitigate project impacts.

As seen in Figure 7.7, there are projects located within or adjacent to the 100 year flood plain and wetlands. The impact of these projects on floodplains and wetlands needs to be assessed during project design by the project sponsor.

Figure 7.7 Floodplains and Wetlands and Mapped Projects



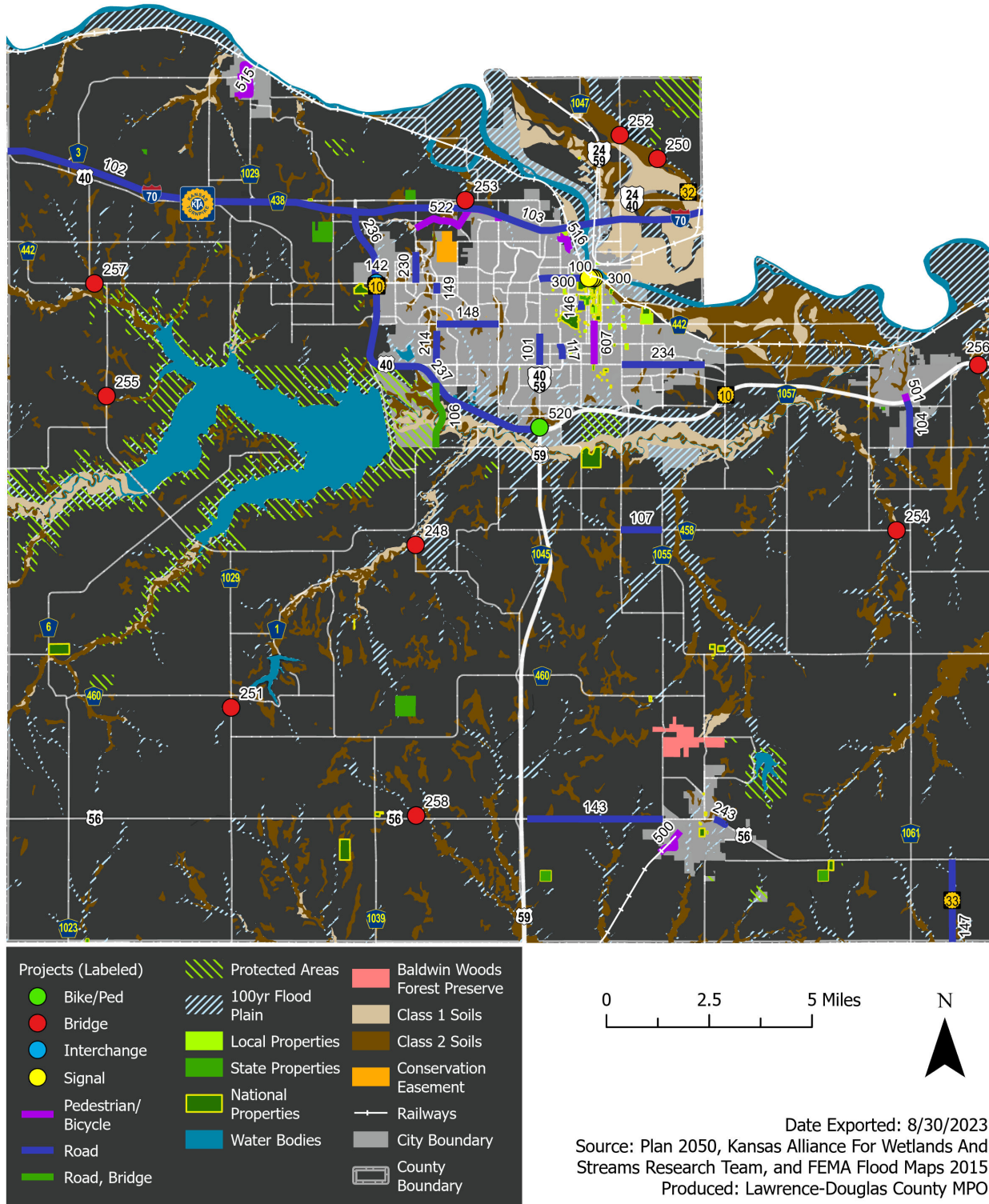
Date Exported: 8/30/2023
 Source: Plan 2050, Kansas Alliance For Wetlands And
 Streams Research Team, and FEMA Flood Maps 2015
 Produced: Lawrence-Douglas County MPO

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As seen in Figure 7.8, there are projects located near environmentally sensitive areas. The impact of these projects on environmentally sensitive areas needs to be assessed during project design by the project sponsor.

Figure 7.8 Other Environmentally Sensitive Areas and Mapped projects

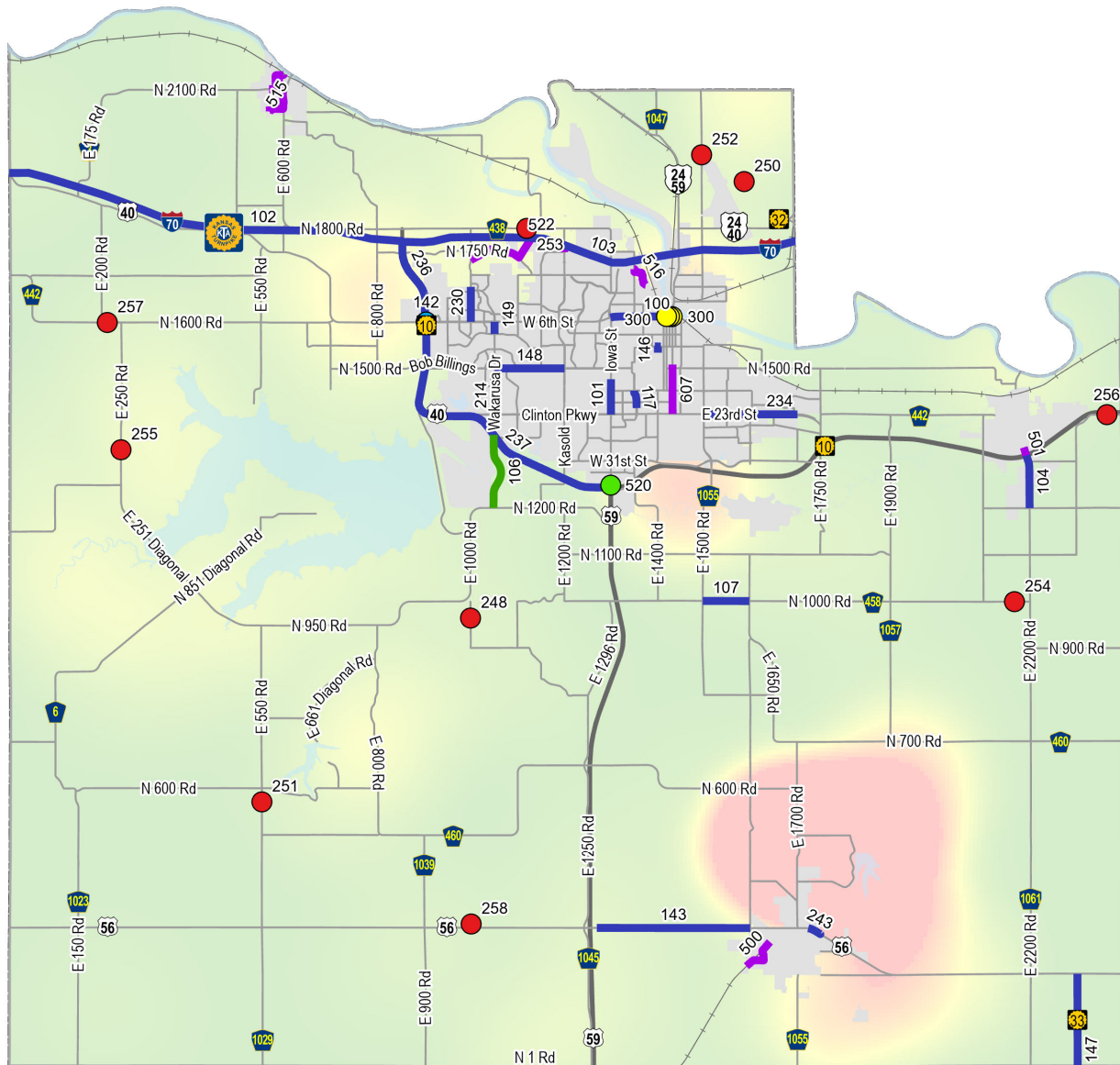


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As seen in Figure 7.9, there are projects located near areas with threatened and endangered species. The impact of these projects on threatened and endangered species needs to be assessed during project design by the project sponsor.

Figure 7.9 Threatened and Endangered Species and Mapped projects



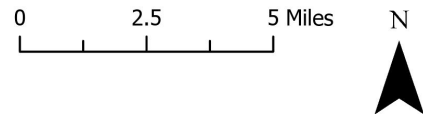
Threatened and Endangered Species

- High Intensity
- Low Intensity

- Railroads
- Water Bodies
- City Limits
- County Limits

Projects (Labeled)

- Bike/Ped
- Bridge
- Interchange
- Signal
- Pedestrian/Bicycle
- Road
- Road, Bridge



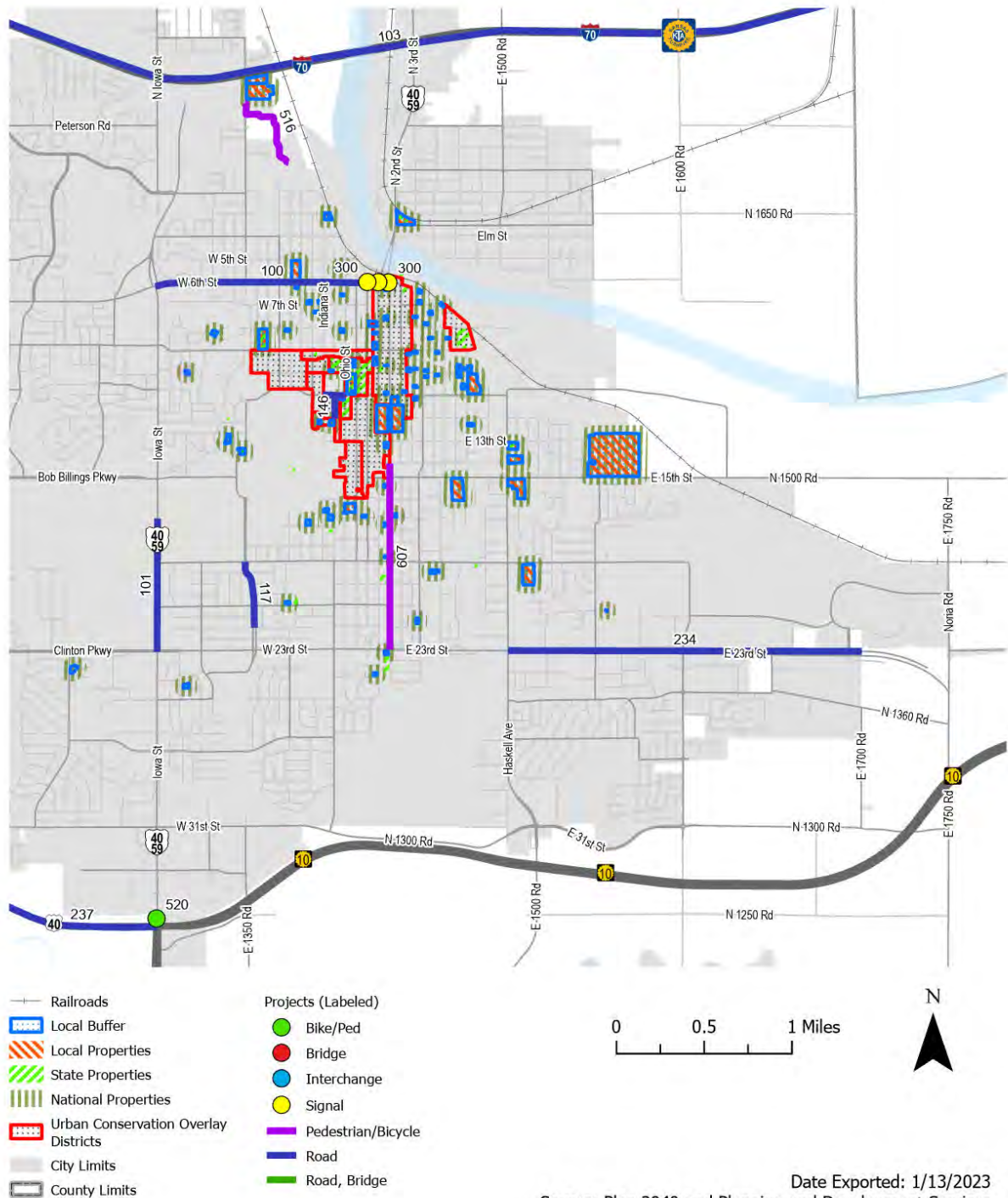
Date Exported: 8/30/2023
 Source: Kansas Alliance For Wetlands And
 Streams Research Team and Plan 2050
 Produced: Lawrence-Douglas County MPO

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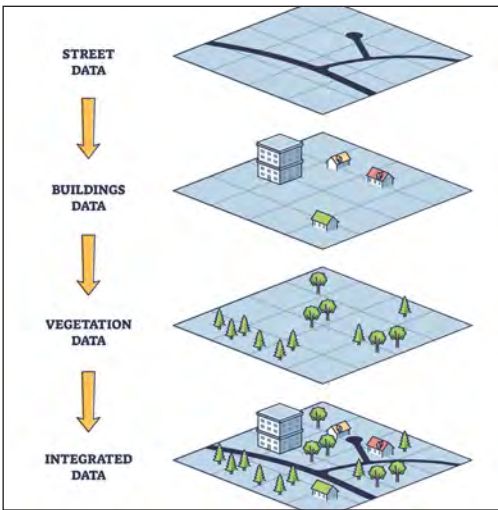
As seen in Figure 7.10, there are projects located near historic resources. The impact of these projects on historic resources needs to be assessed during project design by the project sponsor.

Figure 7.10 Historic Environs and Mapped Projects (Lawrence)



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Source: Adobe Stock

Strategies

The mitigation strategies are described at a system level and are not project specific.

- Embrace the principles of Context Sensitive Solutions (CSS) and Context Sensitive Design (CSD) and use those ideas in developing transportation facilities that fit their physical setting and preserve scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility.
- Continue to utilize the region's GIS to identify environmental features (both physical ones like wetlands and steep slopes, and man-made ones like historic buildings and sites) early in the planning process as a means of avoiding environmental impacts and/or establishing early mitigation action plans prior to project construction consistent with Plan 2040.
- Where environmental impacts are unavoidable, develop appropriate mitigation strategies through an inclusive and collaborative process involving local governments and all identified groups impacted by the project.



CITY
HALL

Appendix A

Glossary and Referenced Materials

American Association of State Highway and Transportation Officials



American Community Survey



Americans with Disabilities Act

Adopted: 1990



American Transportation Research Institute



Automated Passenger Counters

APC

Average Daily Traffic

ADT

Bike Share Feasibility Study

Adopted: 2017

Provides a framework for a bicycle share program that can be used by the region's stakeholders to guide its future development.



Bipartisan Infrastructure Bill

BIL

Burlington Northern-Santa Fe Railroad



Bus Transfer Location Analysis

Adopted: 2018

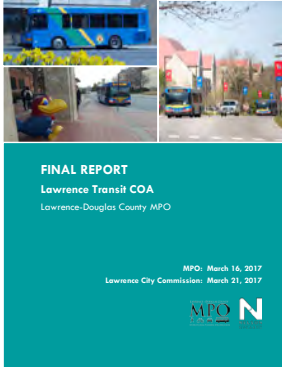
Identifies and analyzes potential bus transfer locations in Lawrence.

CIP

Capital Improvement Program

CDBG

Community Development Block Grant Program



Comprehensive Operations Analysis

Adopted: 2017

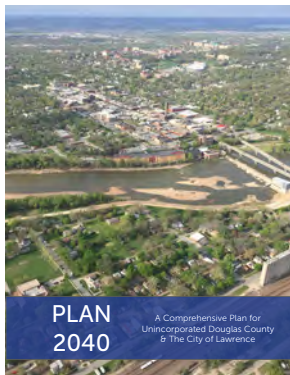
Identifies the strengths and weaknesses of the existing transit system, and to develop recommendations that could be used for improving service and meeting future system goals.



Comprehensive Plan (City of Eudora)

Adopted: 2020

The comprehensive plan helps determine community goals and aspirations in terms of community growth and development. The plan outlines public policies on economic development, utilities, land use, recreation, and housing



Comprehensive Plan for Unincorporated Douglas County

Provides a vision and expresses a community's desires about the future. Provides the foundation and framework for making future physical development and policy decisions. The Plan is also used by property owners to identify where and how development should occur; by residents to understand what the city and county anticipates for future land uses within the community; and by the city, county and other public agencies to plan for future improvements to serve the growing population of the community.

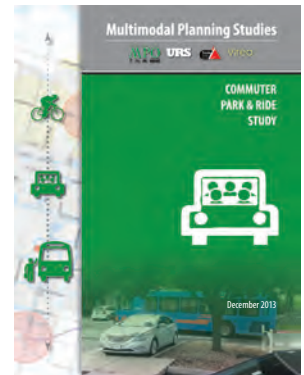
Census Transportation Planning Packages

CTPP

Commuter Park & Ride Study

Adopted: 2014

Documents the evaluation process and recommendations to develop park & ride facilities within Douglas County. w



Complete Streets (Lawrence)

Adopted: 2018

Context Sensitive Design

CSD

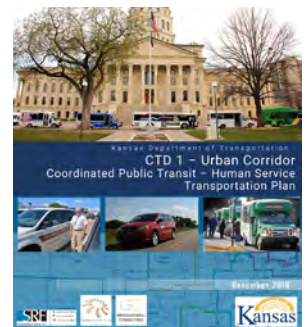
Context Sensitive Solutions

CSS

Coordinated Public Transit and Human Services Transportation Plan

Adopted: 2018

Collects and analyzes meaningful organizational and consumer information to create a plan for future coordination and improvement of services in Douglas County.



Crash Safety Analysis and Countermeasure Identification

Adopted: 2017

Compiled a geodatabase that identified locations with high traffic crash records for the county. Recommendations were made for cost-efficient crash countermeasures for the locations.

TRANSPORTATION
CRASH ANALYSIS
AND
COUNTERMEASURE
IDENTIFICATION



Developed for:
Lawrence - Douglas County
Metropolitan Planning Organization
Prepared by:
CPS Engineers



Downtown Lawrence Plan
Adopted: 2021

The plan will explore all elements including, but not limited to, land use relationships, opportunities for development and redevelopment, programming of public space, landscaping, transportation, infrastructure and streetscape, with a heavy emphasis on cultural and historical resources and activities.

DC EMD

Emergency Management Department (Douglas County)

ESF-1

Emergency Support Function - Transportation

Emergency Operations Plan

The purpose of the EOP is to establish a comprehensive, countywide, all-hazards approach to incident management across a spectrum of activities including prevention, preparedness, response, and recovery, in the event of a disaster or emergency.



EJ

Environmental Justice

Environmental Justice provisions require agencies to take steps to identify and address disproportionately high and adverse impacts on minority and/or low-income populations through the development and implementation of T2050.

EPA

Environmental Protection Agency

FFY

Federal Fiscal Year

FHWA

Federal Highway Administration

FTA

Federal Transit Administration

FY

Fiscal Year

FAST Act

Fixing America's Surface Transportation Act

The current federal surface transportation legislation. MPOs are required to develop a Metropolitan Transportation plan that is fiscally constrained, contains performance measures, goals, and targets to identify needed transportation improvements and project selection.

Geographic Information System

GIS

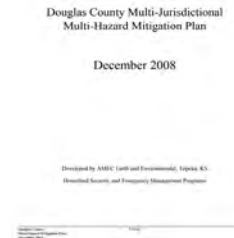
Hazardous Materials

Haz-Mat

Hazards Mitigation Plan (Douglas County)

Adopted: 2008

Identifies proactive mitigation planning at the local level that can help reduce the cost of disaster response and recovery to property owners and the government by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption.



I-70 Corridor Transit Feasibility Study

Adopted: 2014

Examined the feasibility of providing transit service operating the I-70 corridor between downtown Kansas City, Missouri; Lawrence, Kansas; and Topeka, Kansas.



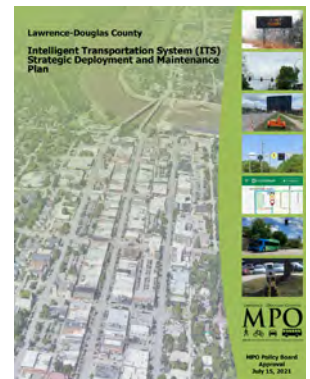
Infrastructure Investment and Jobs Act

I/AJ

Intelligent Transportation System (ITS) Strategic Deployment and Maintenance Plan (Lawrence-Douglas County)

Adopted: 2021

The ITS Plan identifies technologies and communications that enhance the safety, capacity, operations, and evaluation of the multimodal transportation.



Intelligent Transportation Systems

ITS

International Roughness Index

IRI



Intra-Regional Freight Study for Northeast Kansas

Adopted: 2010

Identified freight infrastructure needs and assessed Kansas City’s regional transportation advantages, resulting in targeted strategies and messages for the region.



Kansas City-Wichita-Oklahoma City-Forth Worth Corridor Passenger Rail Service Development Plan

Kansas City- Wichita- Oklahoma City- Forth Worth Corridor Passenger Rail Service Development Plan

Adopted: 2011

To facilitate further economic development opportunities and growth, the states of Kansas and Oklahoma, in cooperation with Texas and Missouri, have embarked on the initial stages of examining the potential for expanding passenger rail service from Kansas City to Fort Worth.



KDOT

Kansas Department of Transportation

IKE

Kansas Eisenhower Legacy Program



Kansas Statewide Freight Network Truck Parking Plan

Adopted: 2016

Studies and develops strategies for improving its statewide freight network’s safety, efficiency, and competitiveness. Allows better understanding of current and future freight truck parking needs in the state.

KTA

Kansas Turnpike Authority

KU

Univeristy of Kansas, Lawrence

KU Campus Master Plan (2013-2014)

Adopted: 2013

Lays out future growth for KU's Lawrence and Edwards Campus.



KU Bicycle Master Plan

Adopted: 2016

Outlines short- and long-term recommendations that serve as a blueprint for making progress toward a more bicycle friendly campus environment over the next ten years.



KU on Wheels Transit Service

KUOW

Lawrence-Douglas County Metropolitan Planning Organization

L-DC MPO

Lawrence- Douglas Countywide Bikeway System Plan

Adopted: 2021

This Douglas Countywide Bicycle Plan provides guidance to develop a countywide bicycle system which is accessible and comfortable for all while bicycling in Eudora, Baldwin City, Lecompton, or the unincorporated portion of Douglas County



Lawrence Bikes Plan

Adopted: 2019

The Lawrence Bikes Plan is a guide for making Lawrence a safer, more comfortable bicycle network and bicycle-friendly city. The Plan provides recommendations on the general location and types of bicycle facilities, projects, policies and programs that support the goals and vision.





Lawrence Loop Alignment Study

Adopted: 2017

This study analyzed alternative alignments to determine the feasibility and public preference for two incomplete sections of bikeway.

LEHD

Longitudinal Employer Household Dynamics

LODES

LEHD Origin- Destination Employment Statistics

LOS

Level of Service

MPA

Metropolitan Planning Area

MPO

Metropolitan Planning Organization

MTP

Metropolitan Transportation Plan

MARC

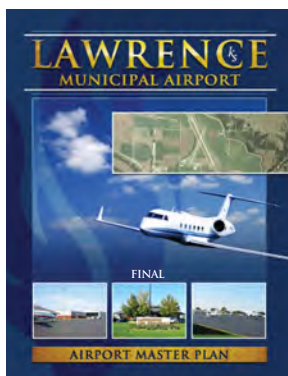
Mid-America Regional Council

MAP-21

Moving Ahead for Progress in the 21st Century

LWC

Municipal Airport Federal Aviation Administration Code (Lawrence)



Municipal Airport Master Plan (Lawrence)

Adopted: 2012

Provides systematic guidelines for the airport's overall maintenance, development, and operation.

NACTO

National Association of City Transportation Officials

NEPA

National Environmental Policy Act

NHS

National Highway Systems

Northeast Kansas Multi-Hazard, Multi- Jurisdictional Mitigation Plan

Adopted: 2014

The plan provides realistic actions to reduce potential vulnerability and exposure to identified hazards for the 9 participating counties and 1 participating tribe located in the northeast region of the State.



National Performance Management Research Data Set

NPMRDS

Operations and Maintenance

O&M

Parks & Recreation Master Plan (Baldwin City)

Adopted: 2010

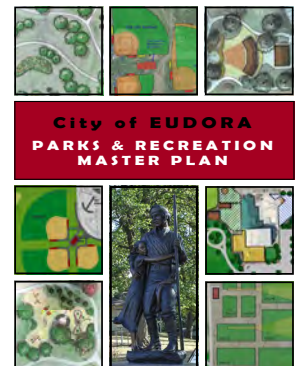
Guides the development and improvement of Baldwin City's parks, trails, and recreational amenities over the next 5 to 20 years.



Parks & Recreation Master Plan (City of Eudora)

Adopted: 2012

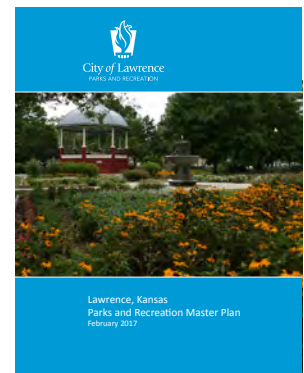
Guides the development, improvement, and maintenance of Eudora's parks, trails, and recreation programs over the next 10+ years.



Parks and Recreation Master Plan (Lawrence)

Adopted: 2017

A planning tool that both establishes parks, recreation, and facilities standards and addresses future needs. In addition, this Plan provides recommendations for a systematic and prioritized approach to implementation of parks and recreation projects and organizational needs.



Pavement Condition Index

PCI



Pedestrian Bicycle Issues Task Force Report

Adopted: 2016

Findings and recommendations on ways Lawrence can invest in a transportation system geared toward providing additional safety and comfort for all ages and abilities.

Public Participation Plan

Adopted: 2022

Outlines the public participation process and recommended methods to engage the public during the regional transportation planning decision making process.



PTAC

Public Transit Advisory Committee

Regional Pedestrian Plan

Adopted: 2021

Presents a toolbox of policy, program, and infrastructure ideas that cities in Douglas County can implement to improve the pedestrian environment.



Route Redesign Study

Completed: 2023

Bus routes will be redesigned to better serve this new transfer center and the community at large



Safe Routes to School Plan (Baldwin City)

Adopted: 2020

In Baldwin City and Douglas County, the Safe Routes to School (SRTS) program is called Be Active Safe Routes. The program is a comprehensive approach to make neighborhoods safe and accessible for everyone



Safe Routes to School Plan (Eudora)

Adopted: 2020

In Eudora and Douglas County, the Safe Routes to School (SRTS) program is called Be Active Safe Routes. The program is a comprehensive approach to make neighborhoods safe and accessible for everyone



Safe Routes to School Plan (Lawrence)

Adopted: 2020

In Lawrence and Douglas County, the Safe Routes to School (SRTS) program is called Be Active Safe Routes. Safe Routes to School is a national program using comprehensive approaches to improving walking and biking for all kids



Statewide Freight Plan

Adopted: 2017

Provides a better understanding of Kansas' existing freight transportation system, establishes goals and strategies for updating the system over the next 20 years, guides future investments in freight transportation, and prioritizes freight projects that would provide the most benefits.

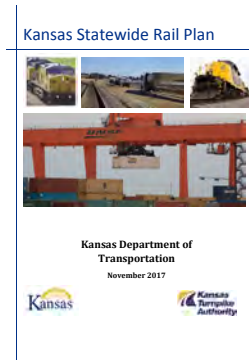




Statewide Strategic Highway Safety Plan (KDOT)

Adopted: 2020

A strategic highway safety plan is a coordinated and informed approach to reducing highway fatalities and disabling injuries on all public roads.



Statewide Rail Plan

Adopted: 2017

Formulates a state vision for railroad transportation in the future and strategies to achieve that vision.

SLT

South Lawrence Trafficway

TAZ

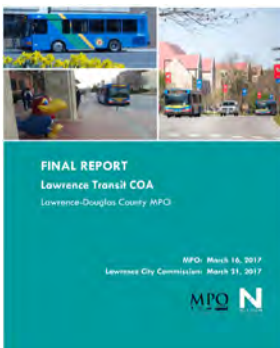
Traffic Analysis Zone

TA

Transportation Alternatives

TAM

Transit Asset Management



Transit Comprehensive Operational Analysis

Adopted: 2017

This study took a detailed look at the city's existing bus services and provided recommendations for improving service to meet the needs of both city residents and university students.

TDM

Travel Demand Management

TERM

Transit Economic Requirements Model Scale (FTA)

TIP

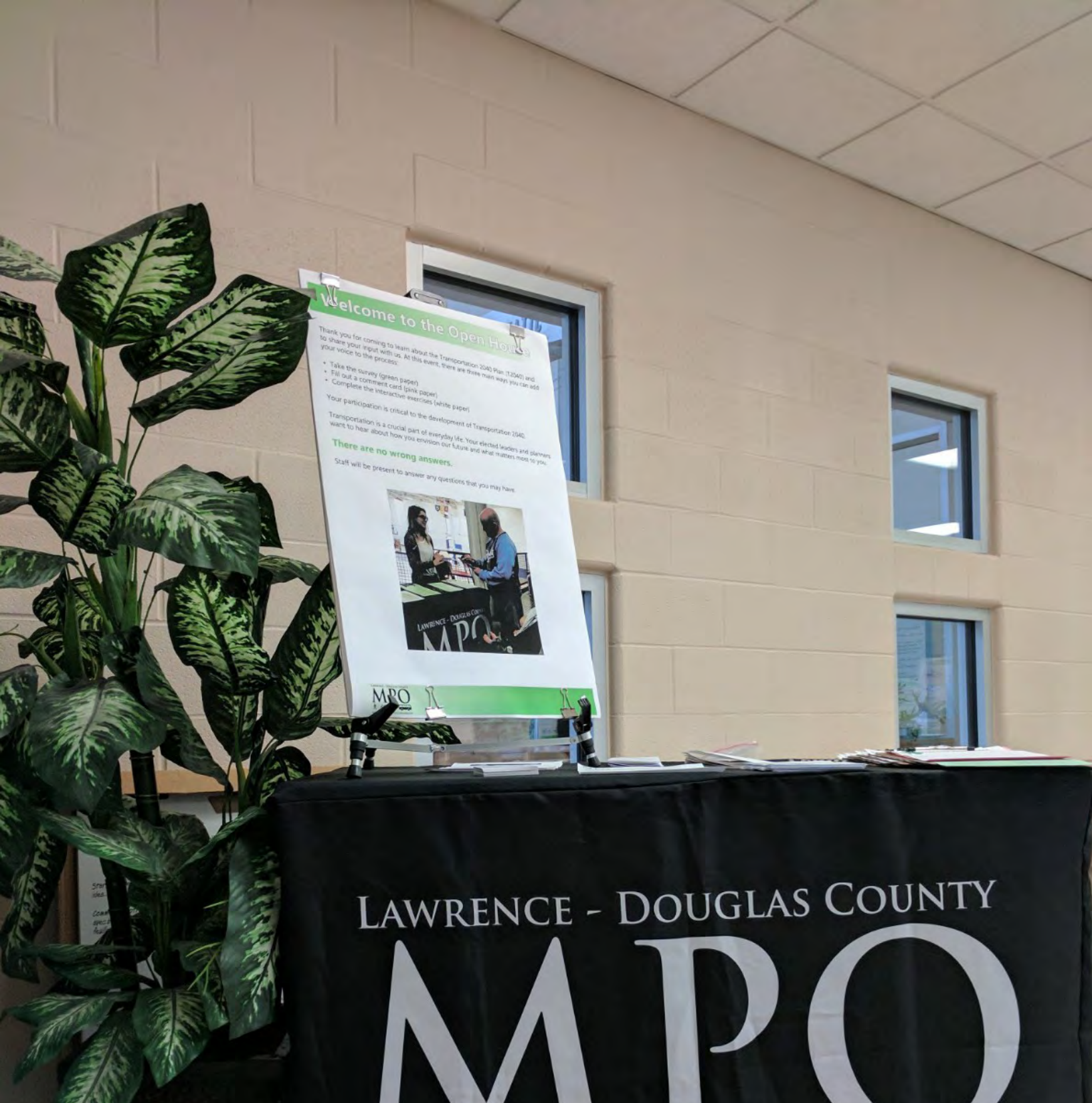
Transportation Improvement Program

Paratransit (City of Lawrence)	<i>T-Lift</i>
Transportation Works for Kansas	<i>T-Works</i>
Urban Area Boundary	<i>UAB</i>
Urban Growth Area	<i>UGA</i>
Useful Life Benchmark	<i>ULB</i>
Union Pacific	<i>UP</i>
Urbanized Area	<i>UZ</i>
United States Department of Transportation	<i>USDOT</i>
Vehicle Miles Traveled	<i>VMT</i>

Zero Emission Fleet Transition Plan

Upcoming: 2035

A Zero-Emissions Transition Plan will allow Lawrence Transit to continue to acquire zero-emissions buses and associated charging equipment



LAWRENCE - DOUGLAS COUNTY

MPO

Appendix B Public Input

Appendix B - Public Input

This appendix contains all the public input collected during the Transportation 2050 update process

A. Public Involvement Process

Public involvement is a critical component in the transportation planning process and the development of the 2050 plan. The Lawrence-Douglas County MPO's Public Involvement procedures documented reflect the region's rigorous approach to public involvement. It outlines a process that provides complete information, timely public notice and full public access.

B. T2050 Public Input

There were several ways public input was collected

1. Surveys

Two surveys were utilized in this planning process. The first survey was centered on identifying respondents' experience and vision for transportation in the Lawrence-Douglas County region. The survey was available from April 19 to June 20 2022. Surveys were collected online and through paper copies via staff tabling at events. The online version utilized the Tell Us Portal through the City of Lawrence website and collected responses anonymously. Nineteen tabling events were held May 03 – June 19, 2022 during the first phase of public engagement and are listed below. Surveys were distributed to interested survey groups, including the Senior Resource Center and a class at Lawrence High school. A total of 728 surveys were collected.

- *Library (4)*
- *Lawrence Sports Pavillion (3)*
- *Open Air Outdoor Art Market*
- *Farm Tour @ Pendletons*
- *Just Food (2)*
- *Lawrence Downtown Farmers Market*
- *Eudora Family Fun Night*
- *Cottin's Farmers Market*
- *Lecompton Territorial Days*
- *North Lawrence Farmers Market*
- *Baldwin City Farmers and Craft Market*
- *Juneteenth*
- *Eudora CPA*

The second survey asked participants to weigh in on the goals, objectives, and strategies that will best address the transportation priorities in Lawrence and throughout Douglas County. The survey was available from December 9 to December 27, 2022.

Surveys were collected through the Tell Us Portal and via paper copies at the three open house meetings held during the survey window. An email was sent to everyone who provided their email address on the first survey and a notice was sent through Tell Us Portal telling past participants a new survey opportunity was available. A total of 13 surveys were collected.

2. Stakeholder Interviews

Approximately 90 different groups or organizations were invited to participate in stakeholder interview. Out of those parties, twenty-two interviews were conducted to gather input regarding transportation needs and issues. These interviews included representatives from a wide cross section of the community including representatives of organizations not normally included within the transportation planning process. A list of participants in stakeholder interviews is identified below.

- *Baldwin City*
- *Just Food*
- *Kansas Transit Authority*
- *Livewell Built Environment Workgroup*
- *KDOT ITS*
- *Lawrence Police Department*
- *Unchained Bicycle Coop*
- *Leacompton*
- *Boys and Girls Club*
- *Sustainability Action Network*
- *KDOT Planning*
- *Justice Matters*
- *Peaslee Tech*
- *Cottonwood, Inc*
- *Jayhawk Area Agency Aging*
- *Big Brothers Big Sisters*
- *Senior Resource Center*
- *DCCCA*
- *Heartland Health*
- *Satori Counseling*
- *Fire Medical*
- *Multimodal Transmission Commission*

3. Written Comment

MPO staffed accepted email and hand written comments, as well as public comments left in the general comment area within Tell Us How portal during the public engagement process. Written comments about the draft T2050 were collected from January 23 - February 22, 2023.

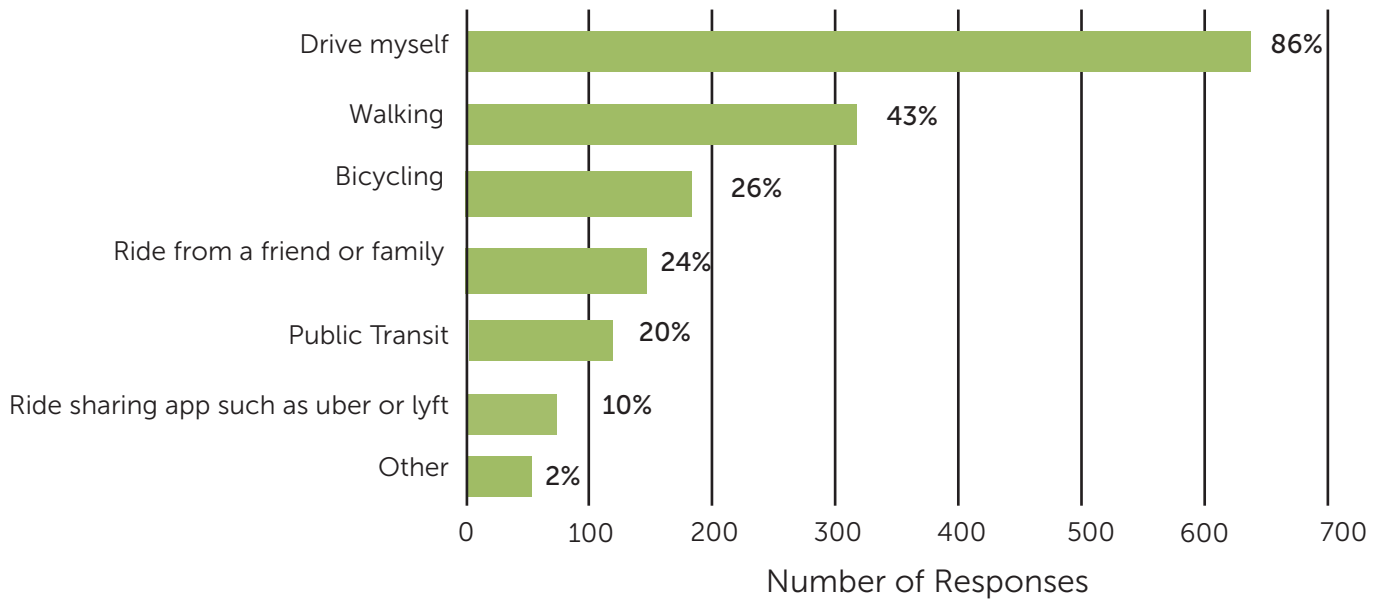
C. What we Heard

Public input is highly valued in the planning process. In holding public involvement activities, many issues and concerns were voiced. The MPO has summarized all the comments collected through the T2050 Public Participation process below.

Survey Responses:

When asked "How do you transport yourself to different places" Respondents indicated:

Figure A.1 - Recent Modes of Transportation



Total Number of Responses - 1,565

Other

Bike/Motorcycle (7)

- Scooter
- Skateboarding
- Motorcycle commuting
- Rolling (wheelchair)
- I bike in fun but not in sport
- motorcycle
- Golf cart

Retired (3)

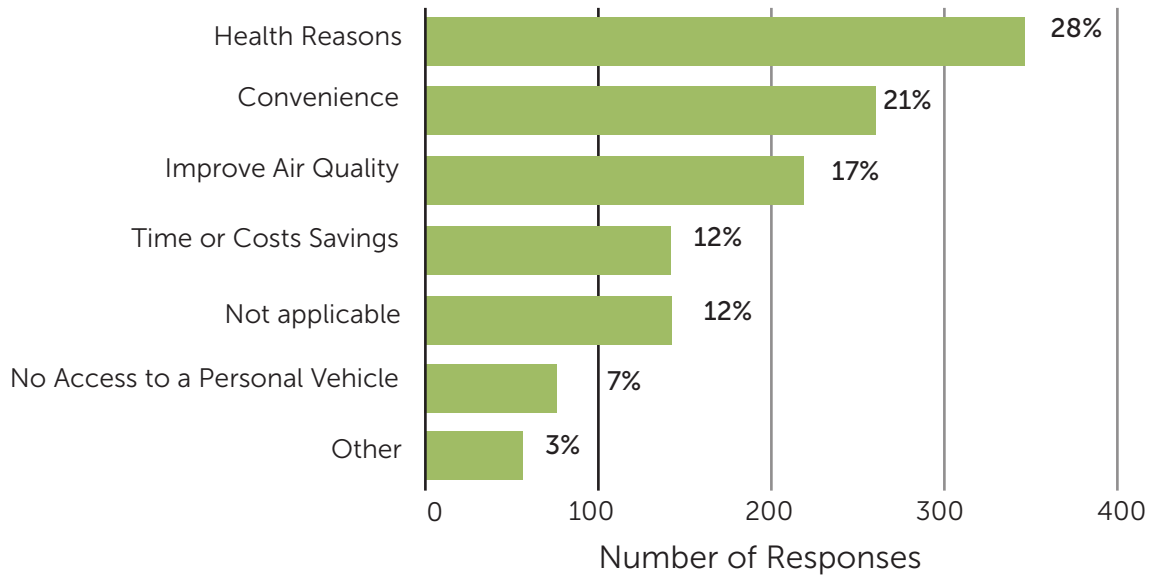
- Retired now but used to carpool to work in Topeka with others from Lawrence
- Transportation options for senior
- Senior Wheels

Other (4)

- T lift
- I'm from Hawaii
- Carpool (2)
- Uber Lyft and swim

When asked “If you travel by any means other than car, what are your main reasons for doing so?” Respondents indicated:

Figure A.2 - Reasons for traveling other than car



Total Number of Responses - 1,246

Other

Convenience (6)

- With KU ID I ride free.
- Close proximity: it’s just more convenient to walk a block or two rather than drive and the walking tends to take less time
- proximity to downtown
- Distance
- Not far from home
- I live in OWL

Environmental (2)

- Low carbon footprint
- Cars are terrible in every way

Illness/Disability (4)

- Physical/vision issues
- Disabled
- Have used paratransit several times when I was unable to drive for a period due to illness
- Too blind to drive

Price (2)

- Save \$
- Gas Prices (2)

Recreation/Enjoyment (12)

- More fun!!!!
- For walking exercise, dog walking
- Social Interaction
- For fun
- Exercise dog
- Biking, walking
- Hobby
- Because I feel like walking that day and don't have additional errands I need to run.
- I like running errands and getting exercise at the same time
- Pleasure and enjoyment
- Rec-enjoy
- For the fun of it (as in rollerblading or bicycling)

Safety (5)

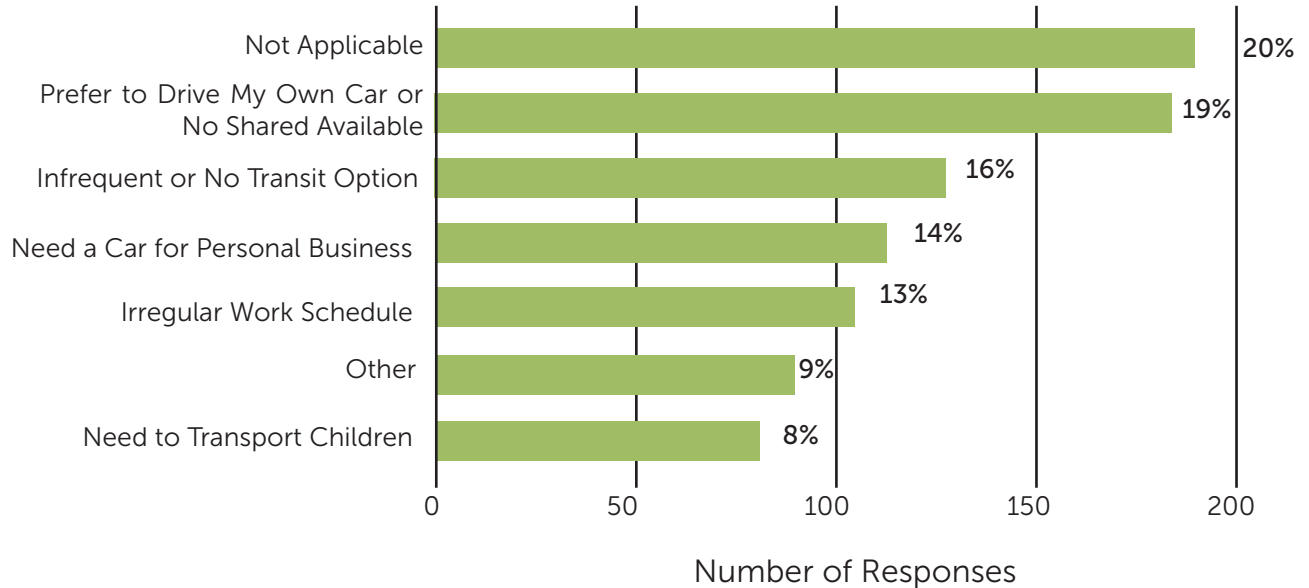
- I Uber somewhere when I plan to drink alcohol
- Safer for coming back from the bar"
- Alcohol
- going to bar
- I would like to walk or cycle but the infrastructure is poor and prioritizes cars over people.
I want protected bicycle lanes separated from traffic and pedestrian only areas/improved sidewalks

Other (2)

- Exercizing my warrants and convertible bonds
- Airplane

When asked “If you drive yourself to work, what are your main reasons for doing so? (Select all that apply)” Respondents indicated:

Figure A.3 - Reasons For Driving to Work



Total Number of Responses - 918

Other

Convenience (8)

- Have to get kid across town at a certain time
- Carry stuff needed at work
- Time spent - quicker
- Prefer to drive myself for convenience and flexibility
- Appointments throughout the day
- Faster, convenience, habit
- Convenience
- At times, I’m in a hurry and don’t have time to walk

Distance (25)

- Some days I work outside of Lawrence
- Work out of town (3)
- Too far all the way across town, even to Eudora
- Work in leavenworth
- Work is all the way across town
- I work very far away (1 hour drive)... need car
- Commute to JOCO
- Distance from home to work is too far to walk/bike
- Distance (3)
- Long commute (out of town)

- I commute to KC
- Work outside of Lawrence
- Travel to various regional locations for work in company vehicle
- Work in emporia
- I work in Topeka (4)
- Distance hard to walk
- Long commute out of town
- My job is outside of Douglas county and I need to use my own vehicle to get there
- I work in DeSoto, which is outside Douglas County
- I work outside of the county
- Live 18 miles from job
- Work is rural; too far away for self propelled transport
- Outside of Douglas County, is where I work
- My most recent job was at LCS, which was banished to the edge of town because of NIMBYism

Environmental (3)

- Weather
- Polluting the atmosphere 'cause why not
- Rain

Retired (13)

Safety (4)

- I live in North Lawrence and crossing the bridge on foot can be unpleasant. I wish the railing was more closed for better safety and less giant spiders making webs across the sidewalk (also to not drop my phone in the river)
- No safe way to bike from my house to my office, which is only 4 miles away.
- It feels unsafe and like I am not meant to walk in Lawrence. Example of this are slip lanes going on and off the bridge from new hampshire and onto 6th street. Cars turning right on red pose a danger to anyone crossing there. Build for people not cars!
- Not safe to ride bike from Eudora to Lawrence or KC

Transit (11)

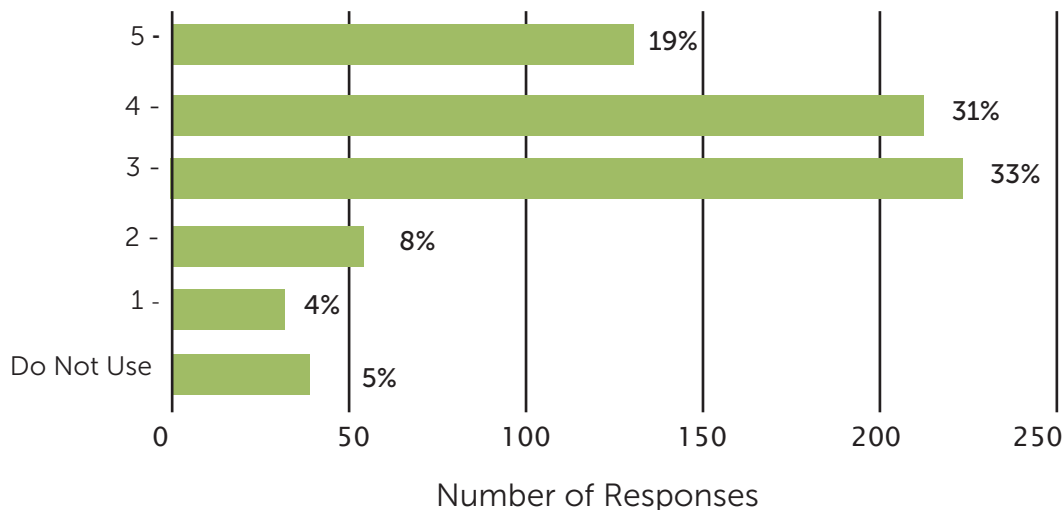
- Riding bus means taking two different lines from crest line to downtown for school/work
- Other stops along wall conflict with public transport
- Use wheelchair and too far from transit stops to negotiate system
- Don't want to use transit
- I can get to work faster than other public transportation options and its much safer than riding a bike."
- Because Lawrence Public Transit needs more buses and more running hours/days
- No public transport near my work
- Transit is too slow (not direct enough)
- Transportation (Buses) changed routes and can no longer get to the bus
- I usually take transit to work
- I work in Kansas City - too far from public transit?

Other (2)

- No shower at work
- They wont let me

When asked “How satisfied are you with your typical auto/car experience, with 1 being “Not Satisfied” and 5 being “Very Satisfied” (Select one)” Respondents indicated:

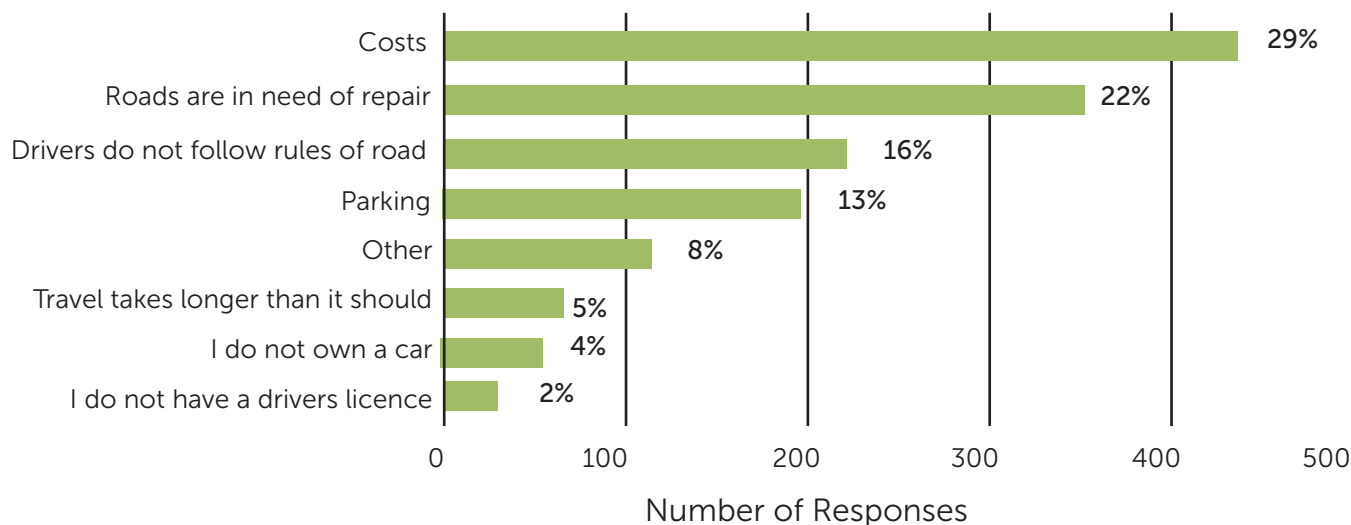
Figure A.4 - Satisfaction of Auto Experience



Average Satisfaction - 3.56
 Total number of responses - 666

When asked “Select the options that impact your auto/car satisfaction. (Select all that apply)” Respondents indicated:

Figure A.5 - Options that Impact Auto Experience



Total number of responses - 1,497

Other

Bike/Pedestian (9)

- Cyclists are waging political war on motorists
- Prefer bicycling or walking
- People riding bicycles do not follow rules of the road
- Failed bicycle parking/theft
- Car-based transportation infrastructure is bad for human's health, psyche, and soul. Humans are designed to walk and run
- Bikers & walkers walking/biking randomly in & across streets, especially when light is dim
- Prefer bicycling or walking
- People riding bicycles do not follow rules of the road
- Bike network on 19th and 9th and Maine Area messed everything up

Congestion/Traffic (9)

- HUGE and unnecessary traffic congestion on Iowa and on 6th
- Traffic
- Heavy traffic congestion to / from downtown. There's not a lot of options to downtown from the west side of town. Only 1 road-6th street
- There needs to be a way to easily get from SE Lawrence to North Lawrence. Barker and Haskell are the best ways, but not very direct
- Lack of parking, pedestrians walking across busy roads, too much traffic
- Traffic calming and absurd speed limits based only on emotion
- Poor synchronization of Lawrence traffic lights
- Frequent start/stop due to poorly coordinated traffic signals
- Traffic lights on west 6th street need to be synchronized to improve traffic flow. The lights at 6th and George Williams way take too long to cycle

Construction (3)

- Always road construction in fine areas while leaving serious potholes in other areas
- Construction
- Road construction being conducted in multiple areas at the same time

Costs (5)

- Gas and maintenance cost money
- Repair costs of vehicle
- Gas prices and cost of living are extremely high while wages have not increased enough. Parking meters are poorly marked on side streets downtown and often don't work right making the risk of getting a ticket higher
- Exorbitant gas prices
- Please stop building for cars and not people its much cheaper and people want it.

Environmental (3)

- Environmental Impact
- Environmental concerns, getting older and not as good at driving
- Not environmentally friendly

Personal Preference (13)

- Just tired of driving and don't like being in the car anymore
- I choose to drive
- The convenience of driving when and where I want to
- I like driving myself, but the checks above are negative for all drivers
- Dislike driving
- I enjoy driving so nothing listed impacts my driving
- I don't love driving
- Driving just sucks
- I don't like to spend my time driving - would rather do something else
- I do not drive
- I avoid highways
- I don't believe it is the city's responsibility to provide transportation for everyone

Transit (4)

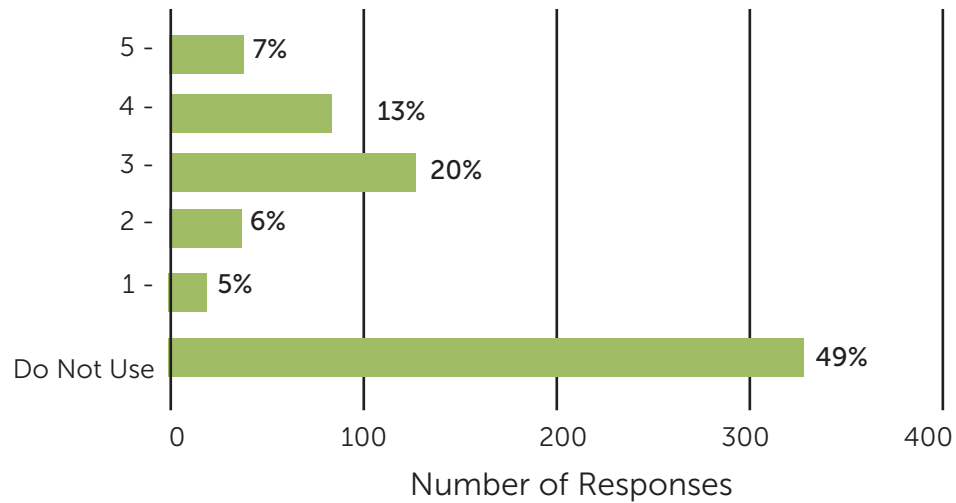
- Underutilized and unnecessary buses tend to get in the way and are prone to causing accidents. The city should discontinue that ridiculous and expensive indulgence.
- I don't believe it is the city's responsibility to provide transportation for everyone
- Buses do not come frequently enough or close enough (like they do in France, Spain, or Germany...)
- Have been to Europe and seen how convenient good mass transit can be

Other (10)

- Vision at night
- I work in a different town from where I live, so driving my car is essential
- cops
- Children crying
- Car dependency
- Cad at roundabouts
- Frivolous lawsuits
- Courtesy
- I am quite satisfied and the answers are skewed to illicit a negative response thereby biasing the outcome of the survey
- I would not prefer increasing parking capacity. Less parking makes taking an alternate mode more appealing

When asked “How satisfied are you with your typical bicycling experience, with 1 being “Not Satisfied” and 5 being “Very Satisfied”(Select one)” Respondents indicated:

Figure A.5 - Satisfaction of Bicycling Experience

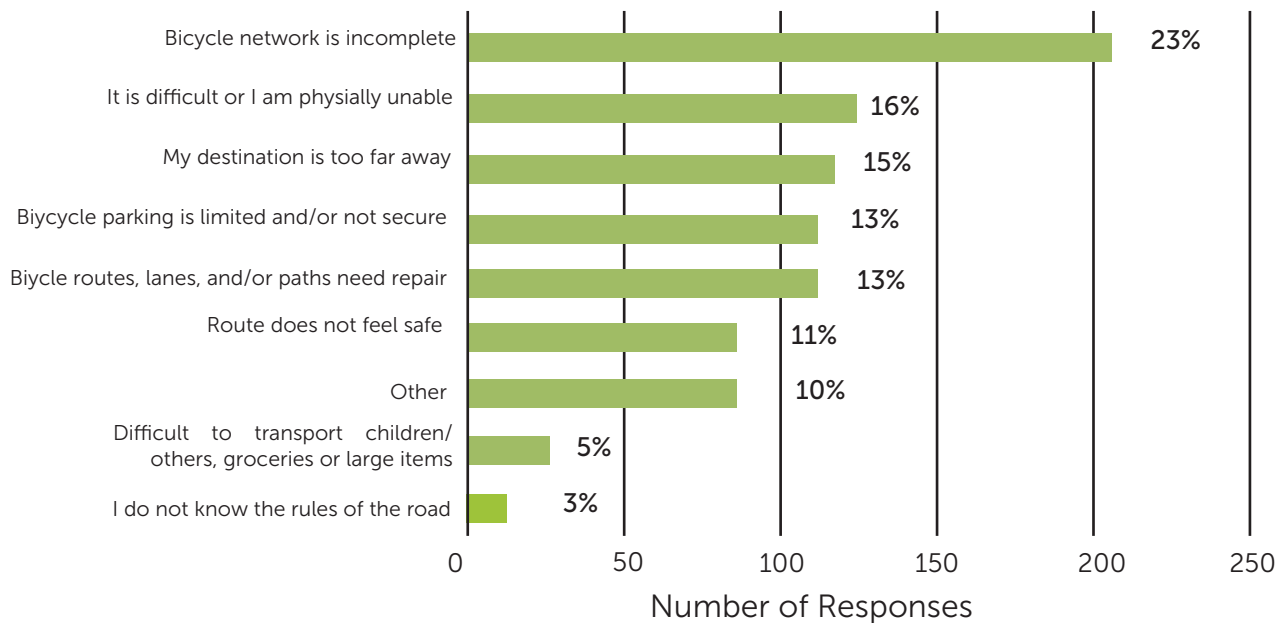


Average Satisfaction - 3.19

Total number of responses - 651

When asked “Select the options that impact your bicycling satisfaction. (Select all that apply)” Respondents indicated:

Figure A.6 - Options that Impact Bicycling Satisfaction



Total Number of Responses - 965

Other

Infrastructure (17)

- We have great bicycling options. Sure, some of the paths are incomplete, but I know we're working on them
- Need more protected bike lanes that cars cannot drive through
- Infrastructure (roads, paths) American Culture
- The bridge to/from North Lawrence is unpleasant both as a bicyclist and a pedestrian on foot. Path gets congested and traffic noise makes communication with other users difficult. Even more daunting with children
- Need crossing signs that sense pedestrians/cyclists & flash at the two most dangerous places I ride, crossing Iowa by K10 & the K10/Wakarusa crossing. Need pedestrian bridge across river, too narrow & busy with cyclists/pedestrians & close to cars
- We have limited bike facilities truly separated from cars. Would also like covered bike parking for longer-term parking
- Protected paths are great. 19th St shoulder lane is too narrow
- City needs wider sidewalks for bicycles
- Many streets in general, not just for bikes, are unsafe to ride on due to poor conditions
- There is very little good biking infrastructure. The city has wasted so much money on bad infrastructure like on 21st Street by LHS. Also on painted bike lanes that nobody uses because cars drive in them making them extremely unsafe
- Some ""bike lanes"" are actually more dangerous than just riding on the sidewalk or alley
- Need bike lanes on Mass st from 15th to 23rd. There's four lanes for cars but only two are needed
- Lawrence is woefully short of accommodations for bicycles. Painted lines on streets are a pitiful substitute for bike paths and other safe options.
- The loop section from Queens road to Kasold road should receive priority
- Bicycles do not belong on the roadway. There should be separate/not shared bike lanes
- Like the trails provide access to streamline logrates
- Some bike lanes are too narrow

No Access to Bike (6)

- I wish I had a bicycle
- I dont have a bike (9)
- I do not want to cycle
- I don't know how to ride a bike (offer class for adults)
- Can't afford a bike
- Do not bike (6)

None (4)

- NA (4)
- None! Lawrence has very safe bike paths
- N/A (Lazy)
- All the above comments are negative. Lawrence has a fantastic bicycle system

Recreation (5)

- Typically I only ride a bicycle for pleasure or to the short distance to work. My exposure to

issues with automobile traffic is very limited

- Do not wish to utilize a bike for transportation, other than leisure
- I'm a recreational rider that usually rides only in North Lawrence
- Bicycling for leisure/fun
- Bicycle for recreation mostly

Safety (6)

- I would bike but I do not feel safe on these roads
- Routes are not safe
- Bicycle infrastructure is not safe and does not have bicyclists in mind
- Many streets in general, not just for bikes are unsafe to ride on due to poor conditions
- Dangerous
- Own fears of riding on the road

Topography (6)

- Big hill in the middle of town makes it hard!
- Hills are a problem for me, but you can't fix that
- Too hilly in some places
- Big hills throughout town
- Steep hills near my home
- Biking to KC (on a huge hill) is inconvenient

User Behavior (19)

- Far too many other bicyclists in town do not know how to obey the traffic laws such as stopping at stop signs. Most motorists are just fine as are the roads whether they have unnecessary bike lanes or not.
- Drivers not passing at a safe distance
- Drivers frequently pull past crosswalks before stopping, blocking safe travel
- Drivers do not share the road
- Drivers are dangerous
- Cars often do not see me
- Dangerous auto drivers
- Cars don't watch out
- People actively hate bike riders
- Bad and/or aggressive drivers and also aggressive hecklers
- Drivers do not know the rules of road as pertains to cyclists and create dangerous situations
- I'm not comfortable biking on the road with cars
- It feels unsafe because reckless drivers don't pay attention and there are no physical barriers to prevent them from hitting cyclists
- KU kids have no idea where they are going, nor do they seem to care much about locals. Their driving makes bicycling very dangerous
- Inattentive auto drivers, bike lanes that just stop, throwing bicycle traffic into auto lanes - example 9th and Mississippi
- Motorists are not prosecuted when they hit bicyclists
- Jerk drive culture
- Cars
- I don't know how to ride a bike! Even if I did, I'd feel unsafe riding my bike on most roads here -

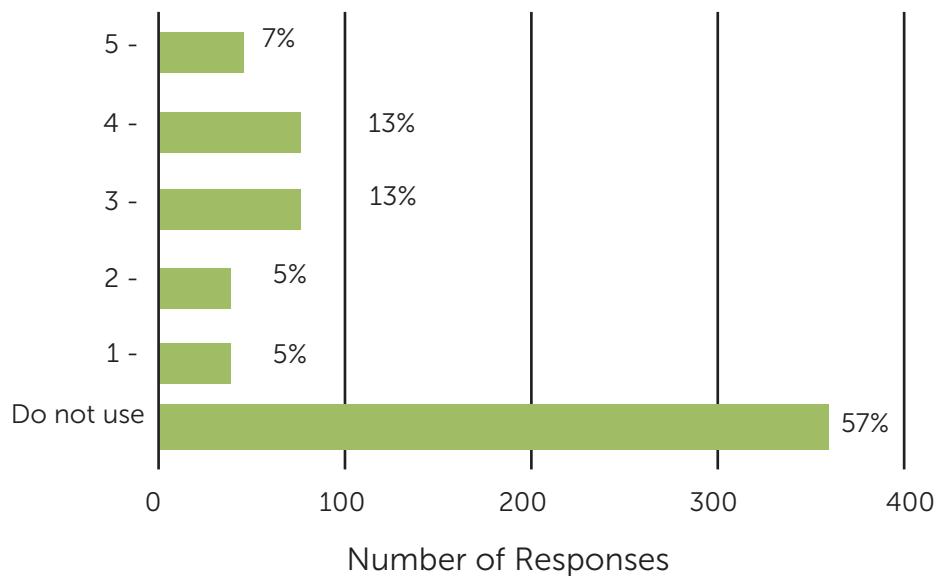
cars are just so dangerous for cyclists and it's not worth it to me

Other (11)

- Once again the options are soliciting a negative response in regards to satisfaction. This is not the case it is skewing the survey
- Not in shape
- I live on island
- Limited time dashing from one thing to another (or poor planning to allow time). Also Mt. Oread is discouraging on a bike
- All the above comments are negative. Lawrence has a fantastic bicycle system
- 21st cycle rte is a waste
- To downtown I'd bike the maze
- Folks road
- Weather conditions
- At my age - too old
- Just started riding

When asked "How satisfied are you with your typical public transit/bus experience, with 1 being "Not Satisfied" and 5 being "Very Satisfied"(Select one)" Respondents indicated:

Figure A.7 - Level of Satisfaction for Public Transit

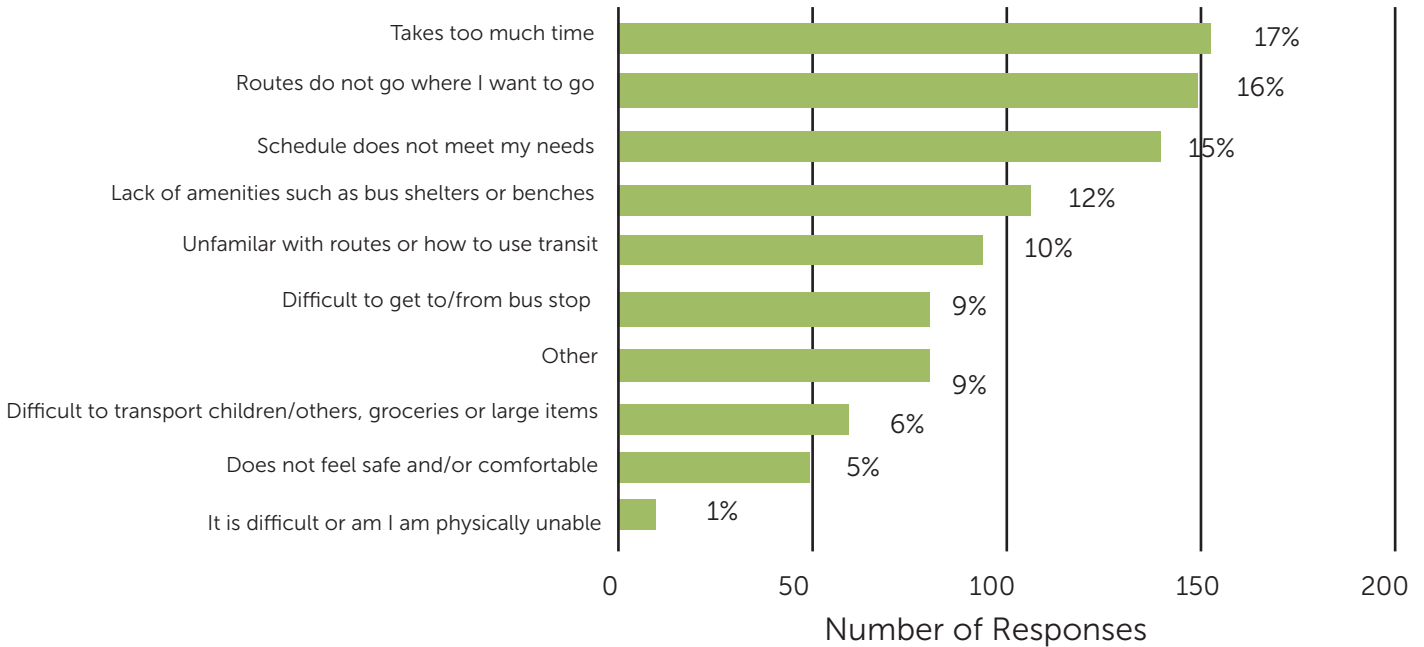


Average Satisfaction - 3.30

Total number of responses - 644

When asked “Select the options that impact your public transit/bus satisfaction. (Select all that apply)” Respondents indicated:

Figure A.8 - Options that Impact Transit Satisfaction



Total number of responses - 987

Other

Do Not Use (7)

- I answered, although I haven't taken bus in at least a couple of years
- Have no desire to use buses
- Dont use public transit (5)
- I used to take the bus when I went to college in a different city to commute. I have since graduated so I no longer take the bus
- I don't need it
- I own my own vehicle and do not need to use
- Live in Baldwin, Unaware of any Public Transportation options available

Drivers (4)

- Drivers do not stick to a proper schedule and constantly catch up to a bus on the same route
- Behaviors and comments from drivers that cause me concern for their ability to drive the bus. Drivers hitting cars or being involved in accidents more frequently
- bus doesnt always stop!

Functionality of Bus (5)

- Smaller, more ""nimble"" buses
- Cannot climb onto a public bus & accessible bus too infrequent
- Buses are too big for city streets

- Long time bus user- occasionally no bike rack capacity-too often in use
- Bus stops in east Lawrence need benches

Transit Service Characteristics (10)

- Often late
- I did not get my license until I was 21, and utilized public transit a lot. I would have to leave my house at 7 to get work at 8:30 (traveling from meadowbrook to iowa and 31st). Did not work well for me :/. Getting from campus to downtown was better
- Good system, just wish it was quicker up iowa
- I sometimes work on the weekends/evenings. It would be nice for a bus to run more frequently
- Frequency
- Hour long waits, or 40 minute irregular intervals are very inconvenient especially in bad weather
- Too far to wheel to nearest bus stop; paratransit not always available to provide transportation when I need it: no slots available or not available nights and Sundays
- Hours are too limited
- Less than savory staff
- Sundays (2)
- Headways are too long

Outside Lawrence (8)

- Need bus to Topeka for work
- No transit/bus options in Lecompton
- No public transit near where I live (4)
- NA in Baldwin
- No public transit options in Baldwin City (7)
- No bus in Eudora
- No buses in country
- Live out in the outskirts of Lawrence/lone star area

Routes (8)

- Route 27 could be more frequent
- I'd have to ride 3 different routes (make 2 transfers and I'm going from only about 3 or maybe 4 miles. Clinton Parkway and Crossgate to Independence Inc. and I believe it's only about 3.
- Routes to KU are not always active
- Does not go anywhere near my house, I can walk to my destination faster
- Lack of bus stops near my apartment
- Bus routes are foreign
- Route seem to cater to students more then residents
- Need bus stops at high rises

Safety (5)

- Too many homeless/unstable people. Its not safe!
- Houseless people living on busses, they need to be helped in a different way. Busses should be for transport
- Walker - too old! Too many crazies out!
- Mostly people on the bus like don't wear mask on it

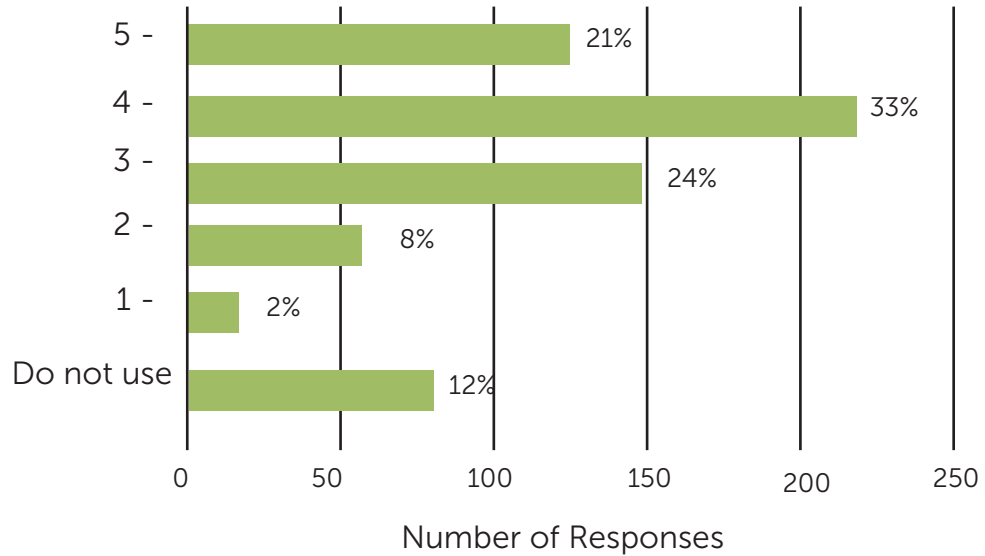
- COVID concerns

Other (4)

- They are a waste of time, public money, and are nothing but traffic nuisances at best. There have been many times that I've been driving along and a bus will pull out of a bus stop without looking and nearly sideswipe my car. Get rid of the buses!
- The Emp'T is a complete waste of tax payer money. We should either have smaller busses or offer a different ride assistance program to people who want/need public transportation. The amount of money spent on public transit in Lawrence is poorly managed
- Find Uber not buses. Too hard on poor
- Cost

When asked How satisfied are you with your typical walking experience, with 1 being "Not Satisfied" and 5 being "Very Satisfied" (Select one) Respondents indicated:

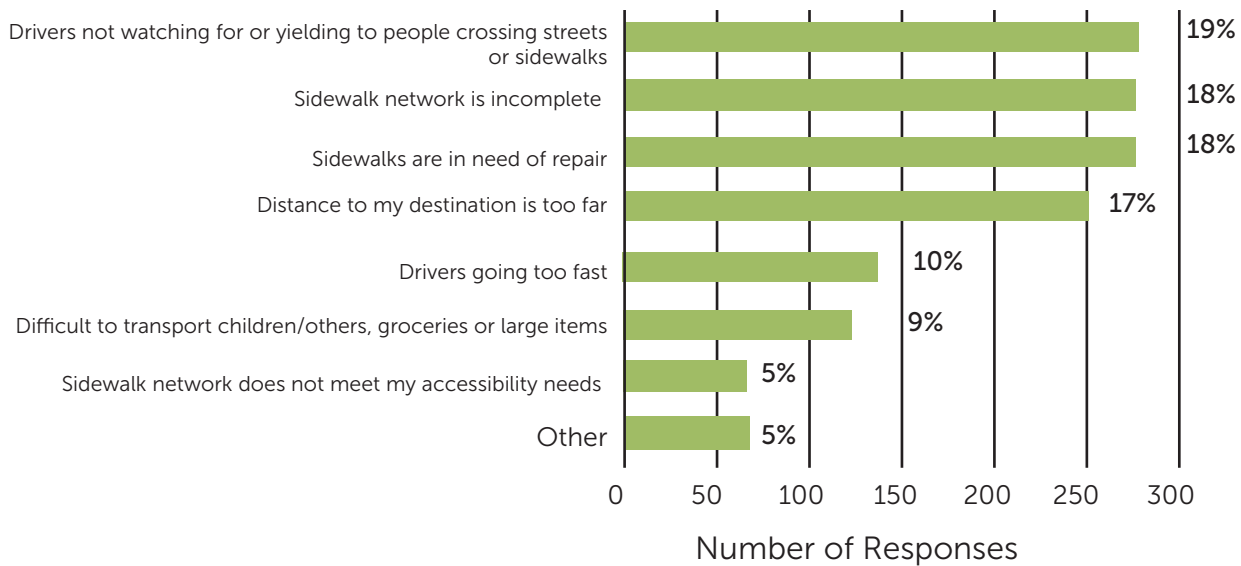
Figure A.9 - Satisfaction of Walking Experience



Average Satisfaction - 3.71
 Total number of responses - 641

When asked “Select the options that impact your walking satisfaction. (Select all that apply)” Respondents indicated

Figure A.10 - Options that Impact Walking Satisfaction



Total number of response - 1,489

Other

Bike/Pedestrian (3)

- Hazards from cyclists on shared paths
- Generally, the sidewalks are fine for those who are walking, jogging, or running but bicyclists and skateboarders should be disallowed on them. Bikes can ride on the streets and skateboards are nothing more than toys, not conveyances
- Bicyclist need to announce or ring bell well in advance of passing on multiverse trails

Connectivity (8)

- No sidewalk near my residence
- I know Lecompton is working on this, but there is not a complete sidewalk loop that connects the major parts of town together from N. to S.
- Zoning makes all amenities too distant from housing for realistic walking on a regular basis
- Much of west Lawrence is more designed for vehicles than pedestrians (ie. lots of cul de sacs with few through streets that connect directly to destinations or provide varied walking routes).
- Live in the country
- I would like a sidewalk that connects downtown Lecompton to our house 625 E 7th St
- Too far from amenities
- No sidewalks where I live

Health Concerns (7)

- My knees
- Do not have the stamina to walk
- Due to my age, distance is limited

- Poor health precludes walking very far
- I'm not as physically fit as I would like to be at this time. I am working towards being more physically fit
- Physical incapacity
- Hip & knee - not willing to kiss the ground

Infrastructure (6)

- Not enough shade or buffer zone between pedestrian network & cars
- Infrastructure favors cars, makes it dangerous and unpleasant to walk
- Lack of lighting on uneven sidewalks
- Sidewalks are placed in yards instead of along the curb, so it feels like you're walking in people's private areas instead of on public property
- Need shade
- The standard sidewalk width in neighborhoods should be 6-12 inches wider than it is. Where I grew up it was comfortable to walk side by side with someone. Here it feels too tight without one of us stepping off on the grass

Pets (3)

- Dangerous dogs off leash
- Too many Dogs not leashed or controlled by their owners
- No where to leave dog if I want to enter a building

Recreation (5)

- Walk for pleasure, talk with neighbors
- I use wetlands and parks - very satisfaction and beautiful
- I only take walks as a leisure activity, not for getting to places I need to go
- I love walking recreationally if I have time.
- I walk for pleasure and exercise

Sidewalk Maintenance (14)

- Sidewalks are not maintained with weather/debris
- The sidewalks are usually fine
- Unshoveled sidewalks in winter, mud covered sidewalks in summer
- mud filled curb-cuts
- Sidewalk improvements around priority destinations like schools are making this a more walkable community each year
- People don't shovel their sidewalks in the winter
- Private vegetation encroaching on sidewalks can be an issue - e.g. the golf course property along Inverness. Also sometimes poor drainage can be an issue
- Weather/environmental conditions (need to be clean, dry and ready for business when I get to my destination)
- East Lawrence sidewalks should be maintained better! Just like the west side of Town!
- The sidewalks on the East side of town need to be repaired. It is the responsibility of the home owner to fix the sidewalks and the responsibility of the City to enforce that responsibility. Just like they did on the West side
- It's frustrating that the City made every property owner in NW Lawrence repair their own sidewalks, but when I walk in front of Free State High School they weren't required to repair

their sidewalks. Consistency in accountability is important

- Some sidewalks need work
- OWL brick sidewalks are a disaster. New concrete replacement sidewalks a major improvement
- Sidewalks should be mandated

Safety (12)

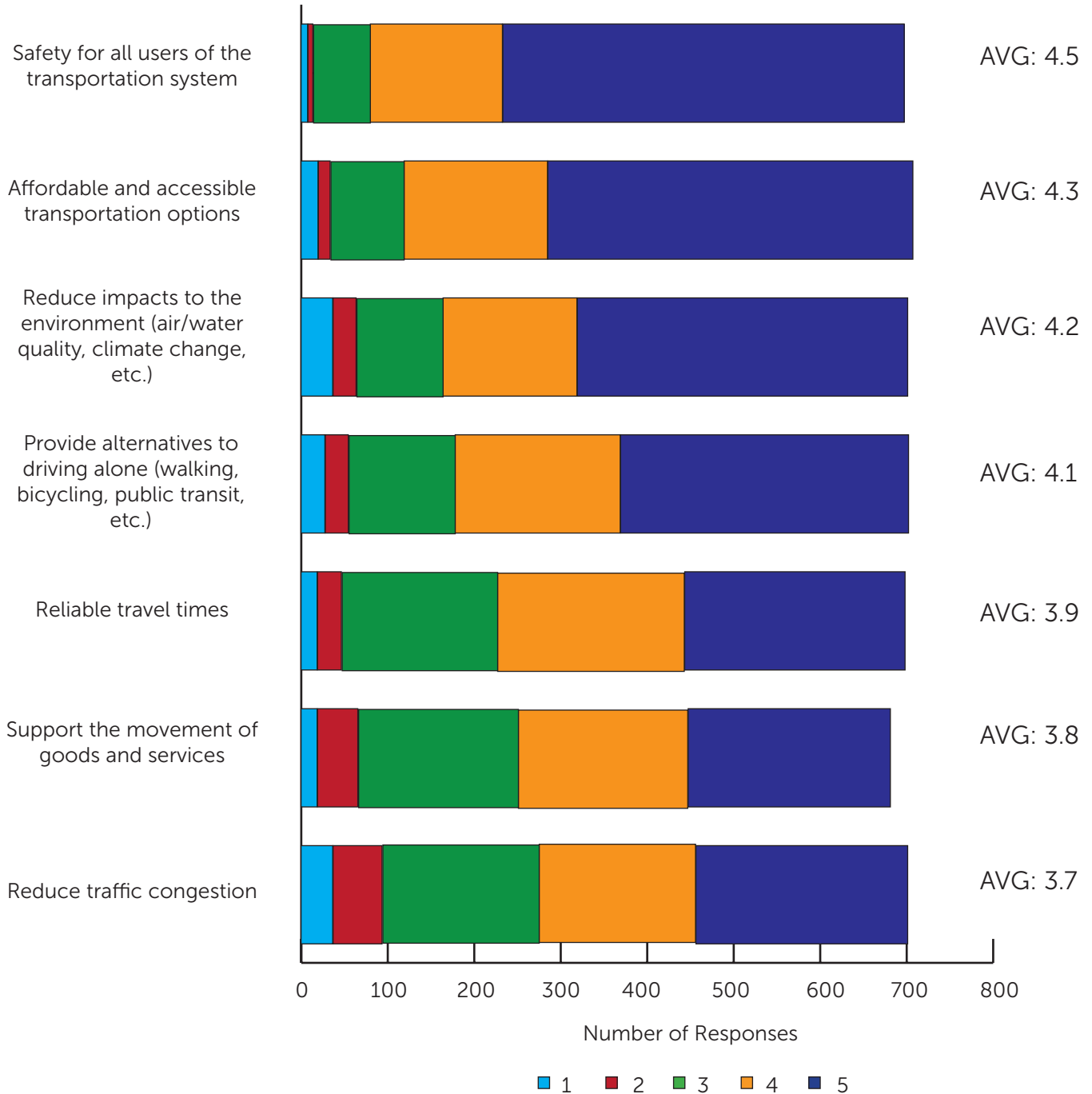
- Drivers frequently pull into crosswalks before stopping, blocking safe travel. This is especially dangerous on wider throughfares
- Vehicles parked across driveways in my neighborhood--dangerous to wheel in the streets. VERY uneven pavement in some areas and curb ramps dangerous-I have been literally bounced out of my wheelchair. I wheel for exercise around the block that's it
- How can someone feel safe walking in the streets because that's pretty the option anywhere outside of downtown and older Lawrence
- Doesn't feel safe
- Unpleasant and unsafe to walk along most major streets outside of downtown in Lawrence
- Would like a safe way to cross K-10 in Eudora
- Crossing major arteries, even with well marked crosswalks, seems highly unsafe
- Our drivers dont stop at stop signs or lights
- Drivers stop at light blocking crosswalk. Drivers turn right without stopping, which is one of the most dangerous things for pedestrians/cyclists
- Keep men from cat calling women and little girls when they walk places
- Drivers fail to yield to pedestrians in crosswalks
- Too many homeless/unstable people. I've been followed and grabbed at. STOP with the housing first!!!! Stop with the programs that interfere with these individuals taking responsibility for their lives! You Are NOT helping them!
- Got hit by a car in 2013

Other (11)

- Time slow
- I walk far away from others
- See above response about bridge
- Please a better walk route to/from freestate
- Need better walking shoes
- It's like you're not meant to walk it's seems encouraged to drive
- Not usable for me
- The city is nice to look at :)
- Only walk in my neighborhood
- I walk to grocers that are near to where I live especially if I need a few items

When asked “How important should the following factors be for the Lawrence-Douglas County region? (Circle a number for each)” Respondents indicated:

Figure A.11 - Important Factors of Lawrence



When asked “Is there anything else you would like to share about transportation issues or priorities?” Respondents indicated:

Bicycle/Pedestrian (64)

- More bike lanes/pedestrian paths, more underpasses would be great. I would like to see evenly maintained sidewalks. Im concerned about my daughter’s future ability to navigate for herself (she’s low vision)
- Again, please grand folks road etc, bike lanes and sidewalks
- Need intersection at wakarusa and 6th, is a problem
- Alternatives to cars and massive improvements to bike and bus infrastructure is desperately needed, especially from the perspective of equity. Currently implemented bike lanes are not realistic alternatives from the perspective of safety and volume and should be guarded by some sort of barrier. Paint on asphalt is not infrastructure.
- Better cycling infrastructure, with safe and direct routes separate from cars, would encourage more people to cycle and therefore reduce congestion
- Bicycling rules in regard to bike lanes and who has right of way (car or bike) for turns.
- Bicyling paths between towns and bike parking garages would be great
- Bike Parking needs to be in well-lit areas where people frequently are to deter people stealing bikes or bike parts. Having it in an alley, behind a building, tucked away makes the bikes and their riders at risk for victimization and crime. Downtown neighborhood feels unsafe for pedestrians and bikers alike. People constantly speeding down Tennessee and Kentucky. I see lots of near misses with cars parked on the side of the road. I think there needs to be more awareness of pedestrians and bicyclists on the road. We need to normalize watching out not just for cars, but people and bikes too.
- Bike routes are ridiculous. Traffic calming devices going around town are ridiculous
- Biking on any through road in town is terrifying. If the beginning/end of the trip are near the Lawrence Loop, that’s a great option, but there are barely any safe routes interior to the city.
- Biking should be safer and bike theft should be addressed
- Complete the bike network
- Cyclists cheated by denial, delay, degradation of convient, secure, bicycle parking.
- Desire more bike and pedestrian paths to get around town without being on roads. I also support public transportation even though I don’t use it.
- I would like to see the loop completed, especially between Queens Road and Kasold, and through downtown.
- Good bike facilities are important for quality of life. Separate corridors from streets would be a good planning feature of any proposed development outside the SLT. I assume this is harder to achieve in built up areas.
- I appreciate the efforts so far to provide safe cycling and walking routes. Please keep in mind that cycling on the street with the traffic flow is faster and can be safer than a path if there are too many driveway and street crossings on the path. Crossings are a major risk.
- I don’t have issues with traffic while walking or biking but connecting the network would be good to free up space and minimize hazards for some. But please don’t spend millions on pedestrian bridges.
- I feel like the contractors that the city uses often do not follow the city and MPO’s own goals for providing equitable services beyond just motorized transportation. It feels like that sidewalk infrastructure improvements never have the same level alternate routes and detour options that similar rebuilds of roads would have. And there’s never any accounting for how much more burdensome a detour for a pedestrian/

cycling route is than a detour for a car is. The current situation with Naismith Valley park is a great example. It's a huge detour - and not well marked - for someone trying to use a bike or walking to get through that part of town. Why can't the contractor accommodate some kind of walkway through the park? Why couldn't the contract with the provider made that a requirement?

- I just want Lawrence to be a more pedestrian-friendly and bike-friendly city. Other cities have been able to figure it out, so should we.
- I live around Tennessee and 20th; while biking within the Centennial Neighborhood is pleasant, anything North of 19th street feels dangerous and not conducive to biking, for pleasure or for transport. I would highly recommend improvements be made for bikers along Tennessee and Kentucky - perhaps a parking protected bike lane may ease biker's worries. It is regrettable that cities in Johnson County, having moved from the county some years ago, have better bike infrastructure, despite their car dependency, than Lawrence. A great city like Lawrence deserves to have equally as great modern and safe bike infrastructure accessible for everyone.
- I live on Mass st and I think we should convert two of the four car lanes to street parking and bike lanes all the way from 15th to 23rd street. This would have more benefits than adding badly needed bike lanes, it would also slow down the traffic. Cars and especially motorcycles love to speed down Mass around 16th and 17th streets, then when they get to where it narrows to 2 lanes, they slow down. And traffic is not heavy enough to require four lanes. This would be a big improvement!
- I think the Burroughs trail could become a destination place for both locals and tourists. Similar to the Slaughter Pen trail in Bentonville. <https://www.oztrails.com/trail-locations/slaughter-pen/> Basically a network of mountain bike trails than run through the trees next to the concrete

path. Have a place for food trucks and vendors along the path on weekends (15th st crossing park). Then add a little better bike paths/lanes connecting to it from downtown and further south.

- I would like to ride my bike more, but I don't feel safe on city streets. Drivers can be hostile (honking at me)
- I would love to bike more, but designated bike lanes are spotty, and I don't feel safe on busy streets without one.
- If the city aims to encourage people to use other means of transportation than cars, then it needs to put more priority on providing easier means of biking throughout the city, especially on 6th Street, Iowa, Tennessee, and Kentucky. A city bike share program would also be nice.
- In addition to the "concrete" associated with our priority bike and pedestrian networks, a world-class signage system and other system priorities are key. We're getting closer to a more fully connected bikeway network but we have to inform, encourage, and persuade people to utilize those networks. In addition to signage, more shade (some sections of our trails like the Loop by Baker Wetlands are far too exposed) and amenities (benches, covered bus stops, parklets) need to be added throughout the system.
- Increased dedicated bike paths or shared use paths (6 ft. sidewalk) should be priority #1 for decreasing car dependency. I bike to work frequently and every day I am dumped off a shared use path to either a sidewalk or 6th street at 6th and Monterey way. If we make cycling safer then more people will bike and we will decrease traffic and our impact on the environment. Can we not retrofit shared use paths or cycle lanes next to existing roadways? Currently the cycle infrastructure is extremely patchy and unreliable for medium to long distance travel.
- Its all about to change if long term plan needs lots of thought smaller electric vehicles, bikes, and more age of drivers

- Less emphasis on modes of travel that have few users eg bicycles
- More bike lanes please
- More bike lanes would encourage more bikers to use bikes as transportation. That makes less cars on the roads, thus, less congestion and pollution, and healthier people, thus less stress on the Health care system and health insurance industry.
- More protected bike infrastructure please. I love what Lawrence has been doing with the bike boulevards. West Lawrence (west of Iowa) street grid is a nightmare with cul de sacs, etc. and no safe way to get out there on foot or bike. Headway times on buses is extended in the evenings which can be a challenge.
- More protected bike lanes.
- More walkability and pedestrian connections between different parts of town (ie. west Lawrence to downtown) and safer routes for bicycles.
- Moved from st louis 1.5 years ago, bicycling is so much better here
- Need a bike trail between Ottawa and BC along RR and then Lawrence to BC
- Need to finish the Lawrence bike loop
- Once Lawrence loop is done it will be critical that we create cross bike paths for greater connectivity for cycling. also barker needs to be re-done, it's not easy to bike or drive on.
- Please prioritize a pedestrian bridge over the river.
- Please take notes from Dutch cycling infrastructure and peoples opinion. Cyclist's safety should be a higher priority than a drivers convenience.
- Safety for pedestrians crossing streets, especially at controlled
- Stop trying to make all of the roads for bicycles. There are only a small amount of cyclists that use the roads. We are a vehicle driven society and that will not change. Make it more vehicle friendly as that is what is used most frequently and can you please get the light timing right. It's absolutely horrible trying to drive from one side to another.
- Tags taxes and insurance required for all bicycles
- The intersection at Clinton Parkway and Lawrence Avenue must be improved for pedestrians and cyclists! It is a busy spot and having peds cross when the north/south lanes can turn left is dangerous. Someone died in 2020! Change this and give those on foot and bike a chance to live.
- The way one streets are dangerous. Bikes shouldn't be on the same road as cars, we need barriers for the bike lanes.
- There needs to be more bike lanes.
- There needs to be more sidewalks and crosswalks in Baldwin City. We would bike/walk more as a family if there were safe routes with kids.
- This city is the easiest place I've ever lived to get around w/out a car
- To build a community that bikes, there must be designated funding for bike specific projects. Piecemeal work as car road work is done will not make us a bike friendly city.
- Transportation for ALL needs to be a combined effort for the different types of commuting around town and for different types of individuals able bodied or some with a variety of disabilities. When I become more physically fit I do want to use some of the bike paths around town.
- We need to fill in the gaps all over the city when it come to bike lanes and paths. Better routes that go places people want to be.
- Love the loop!!
- Better than most cities
- Finish the Lawrence Loop, please!
- "I would like for the city take full responsibility for sidewalks. I would like for city to be MUCH more walkable and bikeable, to focus less energy on drivers and more on pedestrians This would make Lawrence more aging-friendly."
- I'm fed up with Vision zero - a product of zero vision. It's killing more people than it is "saving". We are spending \$billions on bike paths that get almost no use, while streets are more congested than ever. The

city is causing all the extra pollution with it's mindless 20mph speed limits and speed bumps and intentional obstacles. Old fat people aren't going to ride a bicycle to the hospital in a snowstorm! Not going to happen! Your survey is biased anti-motorist.

- Making the bike route east on 18th street/1500 rd safer for bikes would also benefit us
- I wish bicyclists would "ring bell" well in advance of passing walkers
- Love Burroughs creek trail
- Please keep working to connect non-vehicle paths
- Bicycle theft is a problem in Lawrence-- City may need to implement a registration system to thwart theft. With an orderly system of security --perhaps more people would be willing to invest in bicycle transportation. Electric Scooters are popular in some communities--I personally would need instruction how to ride an electric scooter
- Make Mass St between 6th and 9th car-free permanently. It was such a joy during the Championship games to see Mass for the people, especially for the children who got to run, bike and play without worry of being hit by a car. Going back to Mass after with the traffic congestion and street clogged with parking was depressing.
- Micromobility
- Biking at night showed that traffic lights will not change for a bike!

Pedestrian (14)

- Completing sidewalks includes beautifying the areas they're in and adding trees for shade so people aren't walking directly under the sun (like on 23st, east of Haskell).
- I think the city should prioritize larger sidewalks so bicycles and pedestrians can coexist. In particular, the sidewalk along Kasold Dr. on the Southside needs to be considerably widened. I would like to see a lot of pedestrian walkways throughout the city. In creating more sidewalks, there should be safety boxes so that pedestrians

can signal for help if needed.

- In addition to terrible snow removal on sidewalks causing issues for runners and walkers there are multiple sidewalks that just end and start again at Queens Road. I know the city wants residents to pay for redoing the road but can the sidewalk at least be finished so we don't have to go in the street for 100 feet when the sidewalk resumes?
- Good sidewalk in town need to remain a priority.
- Less money on roads and paving, more money for sidewalks and public transit
- More sidewalks in places without them
- Poor sidewalks
- Safety of pedestrians and bikes is most important to me, even when I drive. Traffic violence is high in the US. Are you guys working with city planning offices to increase density and mixed uses, To make it easier to use other types of transportation easier to use?
- Sidewalk repair costs should be the responsibility of the city, not the homeowner on whose property sidewalks are located. I live on a street with sidewalks on one side of the the street only, which is sufficient, but are used by people living on both sides of the street and those living on adjacent cul-de-sacs with no sidewalks. People from outside the neighborhood also use them. Homeowners with sidewalks already clean snow from them, mow and trim around them, and carry liability insurance in case a member of the public is injured on them, so these homeowners are doing their share. But sidewalks are like streets; they are for the use of everyone and, like streets, it should be the city's responsibility to pay for repairs and replacement of worn or damaged sidewalks. Also, sidewalks and streets contribute to warming in the city. Planting trees in the parkways between sidewalks and streets, and in medians, provides shade for walkers and helps cool both sidewalks and streets.
- Sidewalks are dangerous for students going up the hill in winter
- Sidewalks are not stroller friendly

- Sidewalks in Baldwin are in fairly poor repair unless you're in the newer districts (or the Downtown area) and those areas the quality of the upgrades have deteriorated much more rapidly than the unimproved areas of the town that have not had any attention. Feels like the city planners waste money on shoddy upgrades that only benefit a few select citizens and they ignore the rest of the community
- People with disabilities need transportation systems that are constructed in which they are actively thought of and consulted before and throughout the development process. People with disabilities should not simply be an afterthought once public transportation systems have been constructed. For example, a lot of the sidewalks are in Lawrence are accessible, but there are some slopes, curb cuts, and potholes that make navigating in a wheelchair difficult. As another example, people with disabilities need reliable, affordable, and accessible transportation options -- people with disabilities often have to schedule a ride far in advance and may experience extended wait times when using accessible transportation options, which creates unequal access to transportation.
- Please change the standard signage for the pedestrian activated crosswalks. Most just say "stop on red" with the one red circle. People don't understand the rules so don't know that they can go when it changes to red flashing lights if no peds or bikes are present. So mostly cars sit there for longer than they need to which I think adds to irritation drivers feel with pedestrian infrastructure. Please replace them/change the standard signage to those like <https://bikewalkkc.org/blog/2016/02/all-about-the-new-hawk-signals-and-crosswalks-showing-up-on-the-streets-of-kc/> Kansas River Bridge: from a transportation perspective, widening the sidewalks on the bridge would be a huge boon to the feeling of comfort and safety when crossing as a pedestrian-I assume

there are ways to do this that don't require the same level of investment as widening the bridge to add another car lane. Also, while it isn't a transportation issue, it would make a huge difference in the appeal of the city to do some bridge beautification. The cities of Olathe and Lenexa have been giving their bridges over the highway and other roads makeovers that add some art to the concrete and artistic metal work that, especially for Olathe, plays off the city's logo so also adds a real sense of place. the investment really humanizes that aspect of the infrastructure, making it connect to people rather than just be about convenience for cars. I hope you'll continue to investigate supporting property owners in paying for sidewalks. That said, I understand the challenge of absorbing the costs--road conditions are getting almost embarrassing in some areas. As one small example, 13th St. is a pretty discouraging welcome to KU--it's a teeth-jangling mess.

- We are just beginning to understand and provide for pedestrians. Currently, the needs of cyclists override the needs of pedestrians. For example, cyclists are allowed to ride on sidewalks, even narrow sidewalks. They have no rules for direction, stopping at curb cuts, reducing their speed, moving to the street, or pausing at an intersection.

Safety (22)

- Safety first!
- Safety for all.
- Any sort of modal shift will not be possible just with the "carrot" approach (cheaper transit, nicer bike lanes). A "stick" approach (expensive/limited parking) will likely be necessary to actually get people to consider other modes of transportation. That being said, no stick approach should be attempted before a carrot is in place.
- (1) Speed limits are not posted or enforced on major streets in Lawrence - often dangerous. (2) Lawrence school zones not adequately protected (3) We need light rail KC - Lawrence - Topeka

- Car drivers do not know bike signals. I have had drivers wave at me when I signal right, I have cars drive past me at stop signs when I signal left.
- Continue with efforts to lessen speed on residential streets.
- Enforce motor vehicle operation laws! Excessive speeds, following too closely, weaving, failing to stop at stop signs and stop lights, and failing to yield for traffic or pedestrians are violations of law; Educate bicycle riders and enforce laws about cross-walk usage, where to ride on streets and roads, and laws applicable to bicyclists
- Four way stop signs. Two way stop signs are dangerous and cause to may car accidents. I was in a car accident, one of many at a two way stop sign
- I am concerned as a motorcyclist with drivers that are aggressive, do not yield right of way and drive at excessive speeds. More law enforcement of speed limits and traffic laws are needed.
- I do not understand why the traffic laws are not better enforced. People speed, run red lights, follow too closely, do not yield the right of way, and endanger pedestrians and cyclists. Sixth Street in particular is very dangerous. I have seen five wrecks just in the past year on that street alone. I see police cars parked adjacent to each other in parking lots chatting but rarely on the streets patrolling. How about putting up some speed signs on dangerous streets? 23rd Street is in really bad shape as are lane lines, barely marked. Lawrence can do better! Potholes are everywhere as well.
- I think Mass St. employees had more accessible parking/a system like parking tags that exempt us from getting ticketed during work hours. I know many people who regularly get ticketed due to limited parking on Mass + having to park in lots due to time constraints. My workplace has a limited lot, but it still causes some stress when getting to work.
- Lawrence needs more safety in transportation. It is very important to the community and me.
- More police presence at high traffic areas (lights, etc...)
- Parking downtown is ridiculous!!! There are hardly any parking options when I need to go to work!
- People go too fast on Tennessee and sometimes drive on the wrong side of the road between 19th & 23rd.
- Phone usage while driving causes way too many accidents and needs to be addressed. Speeding seems to go unmonitored and unpunished. We've had great tragedy in our neighborhood and it's just a matter of time before we see more in Lawrence.
- Speeding in residential areas
- Roads around where I live are very bad as well as parking, which is why I choose to walk. What I have noticed with walking is careless driving and speeding. I have to be on the defensive when going through crosswalks specifically the one on mass st along south park because many drivers blow through the red light there. It would be helpful if the speed limit changed to 20 mph once entering south park. Currently the speed limit is 30 mph and changes to 20 mph when you pass by south park and enter more downtown right by Fuzzy's. I think it would be a lot safer to move that speed limit to the south end of south park. It would as be helpful to have a speed limit sign when coming from the south and entering downtown area. There is only one speed limit sign, which is in front of the rec department in south park but nothing across the street, which is where most speeding is happening and running through the red light crosswalk. The first speed limit sign for 20 mph when entering from the south is by Einstein's bagels.
- Too many cops
- Traffic control badly needed drivers are behaving dangerously
- Improving safety of K-10 should be a major focus as it is used heavily on a daily basis.
- K-10 is dangerous

Street Maintenance (29)

- Fix roads
- Fix roads/sidewalks
- Work on one section at a time, Iowa street is a mess with all the different construction.
- Fix the roads. Too many potholes especially on Wakarusa
- Key roads need help
- Obviously would to see damaged roads receive care as well as more parking for bikes
- Potholes are dangerous for cyclists. But I know it is my responsibility to report them, so I am at fault too if I do not.
- Better scheduling of major road projects
- Finish (start) the last section of bypass 4 lane expansion already.
- Fix Wakarusa... those pot holes. Literally just fix the road, and not like Louisiana for the 80th time.
- For what we pay in taxes the road system is deficient and in need of repair, not expansion. Law of induced demand, if we create more lanes we create more traffic and higher expenses.
- HWY 40 needs to be improved to have shoulders. It is a death trap now.
- I am concerned that so many of the streets in Lawrence are in such poor condition. I particularly notice 31st Street west of Iowa and 30th Street just north of there.
- I wish the K-10/40 HWY/Lecompton Farmers Turnpike had been given more attention when it was being planned for build - the design overlooks have created a lot of problems with this intersection. But some improvements have been made such as addition of rumble strips and lighting, so that is appreciated.
- Impotent drivers; want less "stroads" need either streets or roads
- Lawrence street/sidewalk maintenance is terrible.
- Mississippi St and 8th St are so full of pot holes and bumps that I have to creep along them to avoid being tossed off my bike or weave about the street trying not to hit them - neither option seems that safe.
- More money needs to be spent on street repair and less money on bicycle lanes.
- Most small roads in Lawrence do not have sidewalks and the roads need repair
- Neighborhood roads and curbing in terrible condition. Fix the neighborhood roads before you spend more money are decorative pole flags throughout city and other silliness. Your job is safety, infrastructure, and utilities.
- Pot holes
- Quit wasting money on bike boulevards and repair more roads.
- Require any new streets built in any housing subdivisions or any streets in industrial developments to be wider than present code allows. Most new streets that have been allowed in recent years are so narrow that vehicles cannot park on both sides of the street and 2 way traffic pass safely between them.
- Road conditions are terrible. There are dangerous potholes everywhere.
- Road quality is getting worse
- Roads are always in need of repairs but seems to only close roads during school and high traffic times
- Street gutters in our neighborhood need to be patched or replaced - the holes are so deep that it impacts the movement of water during storms.
- The road near the pharmacy, that the buses take to get in bus lane at junior high, needs to be repaired.
- The roads are poor, the potholes are large and the city has its priorities mixed up for not putting roads and sidewalks as high priority.
- Too many potholes and lack of spacing on roads when bicycling
- The road conditions are getting worse and worse.
- Why are we building the road to no where instead of fixing what we have?

Sustainability (8)

- More public DC fast chargers for us
- The city is run by AGW alarmists who want

to depopulate the city to reduce global warming. #1 it won't work. #2 Global warming is an unproven theory. Forecasts are not science, especially since they are totally wrong 99.99% of the time. #3 Depopulation is not in the public interest. #4 Traffic calming results in increased vehicle maintenance, increased emergency vehicle travel times, increased noise, and increased fuel consumption, and hence increased pollution. Get a life! Learn some actual science!

- Electric vehicle infrastructure.
- For too long in the US transportation has meant the internal combustion car or truck. This must change. Our climate demands it.
- Governments at all levels must promote and support active transportation by improving infrastructure by building and repairing sidewalks and bikeways, and improving intersections to make them safer.
- Now is NOT the time to transition to electric vehicles. Focus should be on conventional transportation equipment and minimizing costs while improving service. Focus should not be on experimental electric vehicles paid for with taxes.
- Reducing carbon emissions should be a priority.
- Reducing environmental impact is my absolute highest priority.
- Please make sure we are considering, if not prioritizing, the needs of lower-income residents. Upper middle class residents and those even better off are not ever going to consider public transportation so they should be considered less. Beyond that, it's important we try to be the greenest and most considerate and environmentally conscious we can be.

Topography (4)

- Stop catering to cars. More transit-oriented development. Remove parking minima.
- Denser zoning laws.
- We travel to Johnson County for a lot of our shopping since it is easier to get there than driving to Lawrence from Eudora. We also

stick to shopping around Southern Iowa. We avoid downtown and Massachusetts due to roads, traffic and lack of convenient parking. Also never go to west Lawrence unless absolutely necessary.

- Grid neighborhoods are by design to prevent congestion from adjacent streets. Diverting devices in grid neighborhoods is the antithesis of this concept. They should not be utilized under the auspice of "cut through traffic", because grid neighborhoods sometimes do, and are supposed to, function in this manner to alleviate congestion on a major road. This is relative to Old West Lawrence.

Traffic/Congestion (9)

- The ability to move safely should not change from city to city. Current traffic infrastructure encourages speeding with super wide and straight lanes. There is no traffic calming or directing infrastructure that makes big "highway-like" roads such as Iowa or 6th safe for pedestrians or beginner cyclists. The sidewalk availability is dismal at best and the crosswalks are a joke because pedestrians have to just walk into the street to cross, making it the cars' domain instead of the pedestrians'. Raised crosswalks (different from speed bumps) would help this issue, as well as make cars slow down when approaching an intersection and less likely to run a red light.
- "I wish that the city would address traffic noise.
- I wish Lawrence would relieve congestion on the major thoroughfares. There is a high waste of fuel because the lights are not synchronized. 6th street is a little better but very poor from K-10 to Kasold.
- Old West Lawrence parking lot study an unmitigated disaster. Engineering team seems incompetent - they blocked off access to the protected left turn traffic signal at 9th and Mississippi. Three drunks at Louisa's West with open cocktail napkin could produce a better plan.
- Please fix the traffic congestion around

Eudora High & Middle School. There needs to be a second exit/entrance! Drop off & pick up times are too congested and dangerous.

- The problem really comes down to terrible traffic light system timing. Takes so long to drive around in town, and unnecessary pollution is created by sitting at lights for 3 minutes with no cross traffic.
- Traffic light timing
- Traffic lights need fixed. As soon as you get a green light and reach the next light (which could be very close) the next one turns red creating a backlog all over the city. Bad placement of roundabouts too.
- I'm a mom of 4, living on the east side. The traffic light coordination has gotten better but all the calming devices and bike lanes are a pain. Stop prioritizing pedestrian and bikes and start helping families out and helping them get from point A to point B faster.
- The city of Lawrence needs to get the traffic lights timed to the traffic. Too many times they will stop multiple cars on 4 lane street for one vehicle that approaches a stop light. Either look at what Overland Park and the other metros are doing or get someone that can fix them. The flow of traffic through this city can be impossible.
- The timing of lights at intersections on 6th street should be timed to allow commuters to have ease of movement

Transit (128)

- At 83 I like senior wheels as they are reliable, friendly.
- I cannot think of any at the moment. I hope everyone is able to get the transportation they need (whether that is driving their own vehicle or taking the bus/public transportation). If it hasn't been consistent lately, then I think something needs to be changed depending on the situation.
- More transportation services like Senior Center and Independence provide for older populations.
- Teach how to use it. Provide app for using it.

- There are no real options outside Lawrence.
- There should be more routes covering the residential streets with homes and apartments. I suggest to use small vehicles in comparison to regular busses for such routes.
- I understand the cost issue but most transportation for seniors involves long waits before pickup & waiting to be picked up after appointments. I have heard of several missing medical appointments due to these delays.
- Also, buses should go to nearby cities (not just Overland Park/K-10). Topeka to Lawrence a few times a day would be super nice.
- Better compensation for drivers, more respect for drivers from riders and the transit authority. Lawrence does not do enough to publicly celebrate the people who have been putting themselves at risk to transport others around nor have they paid them enough.
- Routes also need to better serve the Oread neighborhood and the "student ghetto." Assuming proximity to campus = ability to get there is a big accessibility issue as many students live at the bottom of the hills, so any injury or disability can impact their ability to get up it as well as inclement weather. In my 4 years of living in this area, I have never seen the sidewalks along the side of the hill de-iced.
- 1) Lawrence would do well to integrate train, greyhound, etc. with general transport.
2) Transportation to and from KCI is often problematic - also for students
3) I wish there would be an after-hours regular services as an alternate to an ambulance or UBER for unanticipated non-emergencies but matters in need of a transport
- A lot of my clients use T Lift. Please know how invaluable this service is to allowing people in Lawrence to live their preferred lifestyles. It's a great service, but there could be some improvements to the customer service piece of it.
- Access to more free bus passes for frequent

- bus riders would help
- Affordable Costs (cars/bus)
- As I age, I would like to continue to access the community even if I am not able to drive or to afford my own lift van (\$52K for used vehicle in 2018!) I think that a good public transportation system is critical to a vibrant, healthy community for many reasons. Good sidewalks are also important!
- Bus benches on all sides of town
- Bus drivers are all great, keep bus route same
- Continue to add amenities to parts of 6th St and 31st St and East Lawrence. I really hate the "bus bench or chair"
- Creeps on or around busses and bus stops are a major disincentive for me when it comes to using the bus anytime past regular rider hours for KU students. It's uncomfortable and it doesn't feel safe.
- Expanding bus routes to KU would benefit my household.
- Fewer buses; more Uber-like options.
- Free fare always. More bus shelters.
- Get more people to ride mass transit.
- I don't feel that Lawrence has a variety of affordable options for all residence. As someone who has struggled with car ownership, I would find it helpful and more affordable to use public transportation however the routes and schedules do not fit with my work schedule. My employer is approximately three or four miles away from my home I often walk or receive rides. Taking transit would take me over two hours to be at work. I feel having a bus route that runs east and west through 23rd St. would be helpful, and also having access to electric scooters for transportation.
- I don't use public transport but I think its a critical public infrastructure and I want tax dollars to support it
- I don't use public transportation as I live in the county.
- I have been harassed on Lawrence Public Transit in the past and it made it difficult for me to make it a priority.
- I live in the county/rural area, so I don't have access to public transit.
- I realize that for many reasons public transportation is important and should be prioritized and used widely (environment, safety, and more). I am just plain lazy and choose to drive most places.
- I would love the ability to travel to/from destinations in Topeka/KC like the Zoo, Oak Park Mall, The Plaza, in addition to local Lawrence destinations.
- I'll likely be changing from driving my own car to public transportation within the next several years. I hope to have easy access to it and to my destinations.
- Improve access (reach of system)
- Improving bus stops in both east and north Lawrence should be made a high priority
- Increase buses to reduce bus wait time
- Info about bus routes
- It's interesting/concerning that the price of gas is noticeably higher in Lawrence then even out on the Turnpike, public transportation is really tough to operate in a town this size with little or no density, priority needs continue to be for cars/trucks infrastructure
- I've found bus routes to be user friendly.
- I've only taken the bus once out of necessity, but recently I have noticed that residents who utilize public transit do not have bus shelters at bus stop locations along major roads. It's heartbreaking when you see people waiting in the rain with no shelter.
- Later hours for all routes
- Lawrence Bus routes don't really go beyond Walkrusa however, there are large populated suburbs beyond this area to the west
- Lawrence is laid out in such a way that it truly could have a wonderful fully connected bus system.
- Light rail link to KCI
- Looking forward to the new terminals.
- Masks should be required whenever an infectious disease surges. Covid is up-ticking now (04/19/2022) and I don't feel safe among the unmasked passengers close by on the bus).

- Only suggestion is to start planning roadways to move traffic around and through Lawrence. Finish what's been started in this area.
- Our bus system is fairly slow - it's hard to want to take public transport when the bus comes so infrequently that I have to carefully plan my entire trip around not missing the bus.
- Potholes and rough roads are an issue
- Public transportation is not an option for me because of safety concerns, routes and timing. Far too much money is spent on public transportation in Lawrence as a lot of busses are empty.
- Reliable and affordable 24 hours public transportation should be available in Lawrence.
- Suburban design where most people cannot access work, school, and/or groceries on foot is a major loss to the community. Only allow urban designs with a high walk ability score. If one regular trip a day can be done on foot or a bike then traffic and health issues will decrease for basically no cost.
- Sunday availability for public transit
- Sunday transportation, even limited, would be nice
- Swap city busses for a city uber/taxi service; create an app for it
- Take a hint from Kansas City, MO on public transit; it runs 7 days a week, free to all, more running hours, more routes. It is built to help the whole community not just college kids.
- The bus system should be free to use for all people in Lawrence and routes should be expanded to cover the entire city, with more frequent service.
- The few times I have used bus have been very nice. Confusing how to transfer routes to get to various places; takes a lot of time.
- The midwest in general is not public transportation friendly - city to city public transportation is needed. I would use public transportation if I worked closer to home, as in the city of Lawrence
- The safety on the buses due to drunk people and people high on drugs is in desperate need of being addressed. The people harass other riders or are belligerent and loud about their political or religious beliefs, or any theory they believe in.
- There are many people in lower income communities who do not use busses for reasons such as not knowing how (sometimes this is a language barrier, sometimes it's just difficult). Sadly, some parents don't feel the busses are safe places for students and won't allow them to ride. I hope that Lawrence learns from other communities (such as the street car in KCMO) with more ridership, some strategies they use for keeping public transportation safe, clean, etc. Some cities such as Seattle, have very user-friendly trip planning apps. When I travelled there, I didn't know anything about their bus system but was told to go to the app, enter my starting point and destination. Google Maps works but a person needs to be taught how to plan a bus trip on it. I feel sometimes that there is a gap between those who plan the system and those who ride. I feel strongly that people in lower income areas could utilize our system much more than they do, and I don't think many understand how they could utilize it, unfortunately.
- There is not enough public transport in rural areas.
- Threshold be pull off locations for bus stops so that through traffic is not impacted
- To provide public transportation stops with shelter coverings and benches for people to sit at
- Too many empty seats on too many buses
- Transportation on sundays
- Unless you ride the bus every day, tracking it is impossible
- Use small electric buses. Fix the streets.
- Wages for bus drivers and paratransit drivers should be competitive and livable as these resources are very important to many in Lawrence.
- Transportation options for seniors are very limited. Days, times, and accessibility prevent

seniors from using transportation to interact with the community or go to appointments.

- Young teens cannot access Parks and Rec classes that are not centrally located without spending an inordinate amount of time on buses. The night line buses are a questionable option for night classes at the Art Center. The description of night line implies adult use line to/from work.
- We have spent too much money on the bus system compared to the ridership.
- We like to go out to downtown a lot, and we live about 1/2 mile away from it, sometimes we will want to use public transportation on our way back home.
- We need some sort of bus system for Baldwin City to Lawrence for the general public. It doesn't need to be constant stream throughout the day. We only need stops in 1-2 places in Baldwin and 2-3 spots in Lawrence 3-4 times a day.
- We need to focus on the human and less on car centric ideals. The car infrastructure makes depressing landscapes. What's wrong with biking or walking or sharing a bus.
- People need to wear their mask more in transportation
- Wish more people would use transit system.
- Would love to see bus options continue and improve. Better bus stop seating and shelter and frequent scheduling. Bike safety is cool too.
- I would like the bus routes to extend to the county line.
- You can't move from one section of town to the other without changing buses at least once
- Bus prices are crazy, it's why I dont drive as much
- Bus route info
- Bus schedules are insufficient, and bus routes should be expanded. Buses should be free universally, not just for KU.
- Bus schedules are ridiculously limited. Evenings especially. Weekends. It's all or nothing. Either I take the bus or I don't. If there's even 1 day where I can't take the bus because the schedule (for example) can get

me to work but not get me home, then I won't take the bus ever. I moved here from a city with robust public transportation and my kid and I used it regularly. I like it, despite its drawbacks. Was happy to see Lawrence has busses but upon reading the schedule booklet, I was so disappointed. Stupid.

I'm exactly the kind of person/family who would use the bus if it was feasible but the schedule is way too limited and so we don't. I'm not alone.

- Bus stops should have covered shelter to provide relief from weather conditions.
- Bus takes too long to to where I want .
- Buses coming more frequently, I either have to get up hours before school or be late.
- Busses should coordinate with special needs programs.
- Can we start thinking of mass transit to KCI or KCMO, i.e. lightrail
- I like bus system routes as it is now
- I love the bus system in Lawrence.
- I still like the idea of having some express buses that can get people to work very quickly in the morning. Like bigger cities have. Thank you for asking us our thoughts about the transit system.
- I think the bus system is good, needs more routes
- I think the T Lift system is really important to our community. I am pleased with the services provided to the people that need it.
- I volunteer at the New Life pantry behind Sonic (Tues afternoon, Wed morning) and we often get people coming through who need food, but are walking, or pulling a wagon... and often they need more food that we could give them, than what they can carry... I have given rides home to a few if we weren't too busy... it would really help people if they could get a ride to go get food.
- I was thinking that smaller busses would make sense as the large ones always seem empty - half full
- I would like to feel capable and confident using the bus routes to go out to the shopping area from downtown, to save gas.

But I don't know where to start when using the bus system.

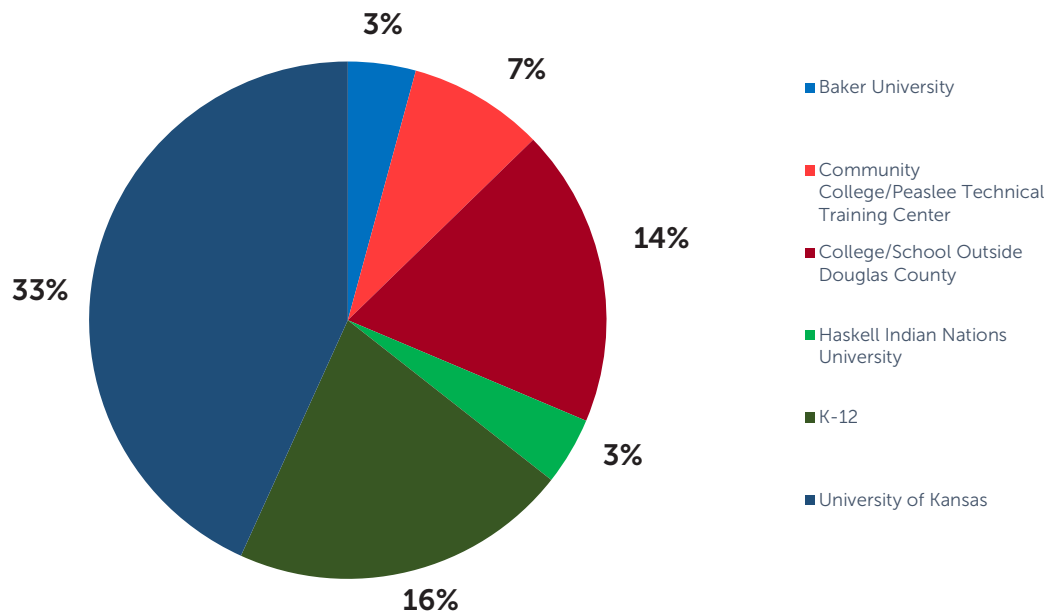
- I would like to see any bus going downtown from KU stop at the community building at 9th and Vermont.
- I would like to see the restoration of the KU trolley line of the former streetcar system which ended service in 1933. Some tracks are still in place under the asphalt. KU students and tourists would use it. Kansas City is continuing to expand its streetcar system.
- I would love an expanded public transit system in Lawrence. With the size/scale of the city, I think the best way to do this is to expand the bus system. I also very much like the idea of a car-free downtown.
- I would love to use public transit more often but the schedules for pick up just don't work out.
- I would reiterate that we could better use the public transit funds in Lawrence. Having the large busses is ridiculous, as I rarely see more than 2-3 people on them at any one time. There has to be a much better way to provide public transportation at a much lower cost. The money saved could be used to complete the bike trails, improve roads, and build/repair sidewalks, which would have a bigger and more positive impact on more people in Lawrence than the very limited bus ridership.
- I'd like to use the bus more often, but I'm unsure about how to use the transit app.
- Masks should still be required on busses.
- No parking in downtown Lawrence, so I avoid that area of town. With all the restaurants taking parking spaces for outside dining it is a mess! People who work downtown do not have parking available either! Need more handicapped parking downtown too. No public transportation from Baldwin to Lawrence at all!
- Nope, Lawrence busses are awesome
- Not all bus stops have landing pads and I have trouble stepping off of them - the clearance between the bus and the sidewalk is too much for me.
- Why are bus stops so far apart? I think the bus should stop, on request, at any intersection where it is safe.
- Intercity services limited; survey as to what the public thinks regarding what is available today on the one Amtrak east/west route and limited Greyhound Services
- Taxi services are non-existent currently--UBER/LYFT erratic--difficult to have full access to the city/area without these services being consistently available.
- More rapid transit (less than 15 min wait)
- Support public transportation and electrify our bus fleet, support the electrification of transportation by building and promoting charging stations, electric trains and buses, electricity storage infrastructure, and wind/photovoltaic/geothermal/tidal/hydroelectric electricity generation
- HASKELL FREE TRANSIT
- Hot tubs in the bus
- Try running the buses for a longer time throughout the night for people that work later in the night. Maybe have a work transportation specifically for businesses that have graveyard shifts.
- Easily obtainable & accessible information of how routes & schedules work
- Need more routes to KC, KCMO
- Add more benches & covered bus stops
- More bus routes to external cities (Topeka, Kansas City) More than twice per day M-F. Many people like myself work weekends in the cities but live in Lawrence
- More bus stops
- More busses in west Lawrence. Easier to plan routes.
- Need more buses and routes
- Need more information about routes, times, ways to access transportation other than buses
- Need public transport on sundays and later than 7:30pm
- Not everyone is as privileged as I am. Safe, reliable public transportation is so important to Lawrence.
-

Other (21)

- More housing options
- Tired of the city and county trying to raise taxes to pay for stupid projects. Like the Mass street parking fiasco a year and half ago. When is the city going to remove the make-shift patios taking up parking on mass street
- Really difficult to get to the app on time when I was unable to drive
- Again, weekends and evenings.
- City/county should concentrate on infrastructure to things such as supermarkets and needed retail outlets for transportation other than automobiles.
- Cleanliness is a must
- Douglas County (politically/projects) does not value the residents outside of Lawrence.
- Gas prices prohibitive
- I doubt majority cares about anything more than catering to cars
- I haven't used it much.
- I live a convenient walking distance from good shopping variety, but it is illegal to leave my dog outside. I understand that unattended dogs can be a problem, but some arrangement would be welcome and helpful, Lawrence is a very doggytown
- I love the freedom of driving myself where I want to go and when I want to go. Mobility issues mean other transportation options won't work for me.
- I want to make driving more difficult, slower, with less parking and, more expensive.
- Legalize cannabis and tell Lawrence police department and the sheriff department the war has just began and nobody are about the united state of american government
- Let's make Massachusetts street in downtown Lawrence car-free permanently. Such a nice environment to enjoy without cars during the temporary car ban for the Final Four. A car-free pedestrian mall on Massachusetts would be a great asset to the community! See State street in Madison, WI for the positive impacts a car-free street has on a major university town's economy and well-being.
- Many of these questions are auto-driven.
- More repair.
- People need your help
- Priority should be the car as it is the most used transportation mode for the area and preferred by most people I believe. Alternatives modes are nice and should be an option but not at the expense of making driving yourself more difficult.
- 19th and Harper Lawrence
- Why do the police not enforce muffler laws? Lawrence is full of obviously broken mufflers or also obviously illegal, too large, too loud, pollution-control bypassed mufflers. I hear cars/trucks/motorcycles drive by my house and can hear them as they drive miles away. It's yet another aggressive behavior by a small set of pathetic males against all other citizens

When asked "If you are a student, select all that apply." Respondents indicated:

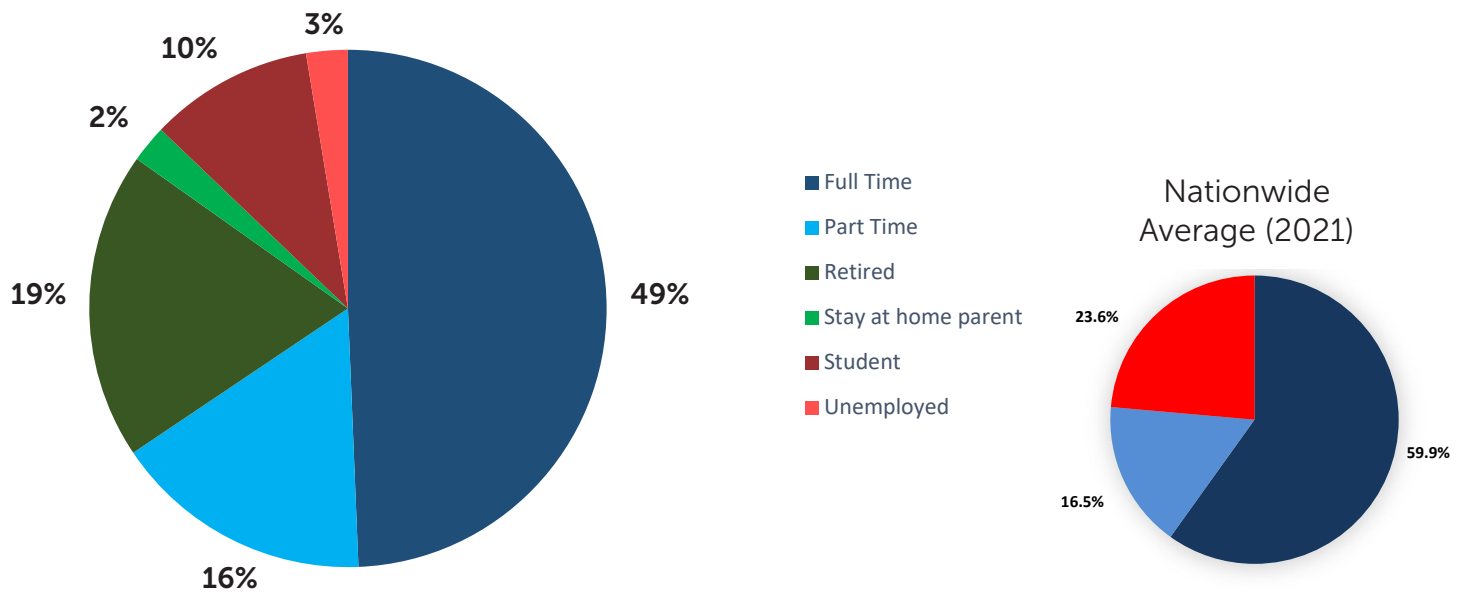
Figure B.1 - School of Attendance



Total Number of Responses - 67

When asked "What best describes your employment status? (Select all that apply)" Respondents indicated"

Figure B.2 - Employment Status

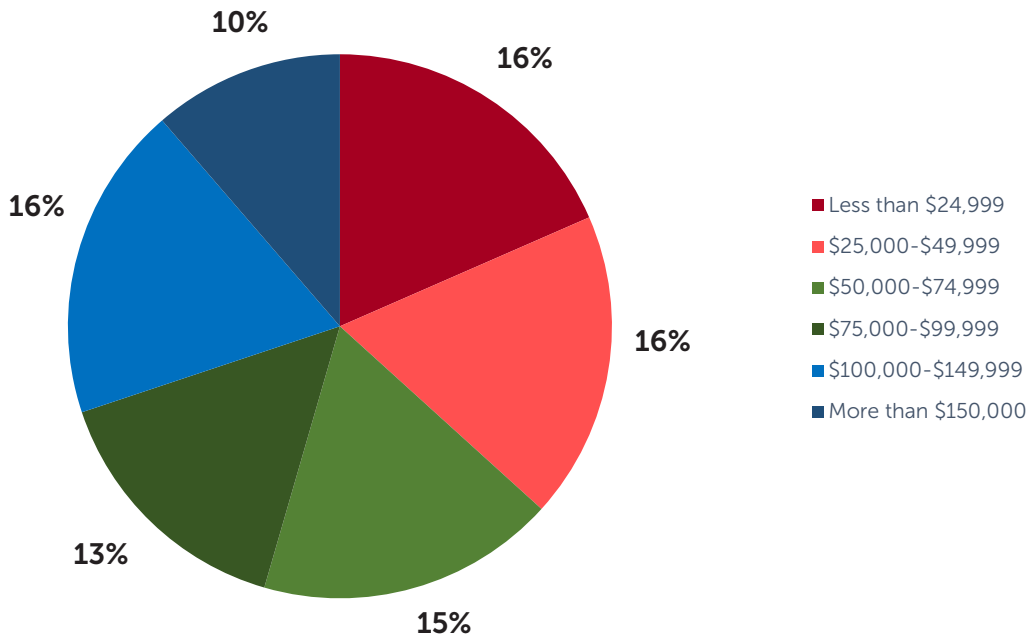


Source: American Community Survey 2021

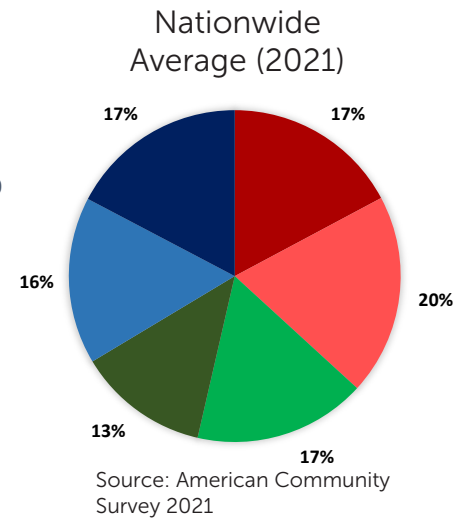
Total number of responses - 770

When asked “What is your approximate household income? (Select one)” Respondents indicated:

Figure B.3 - Household Income

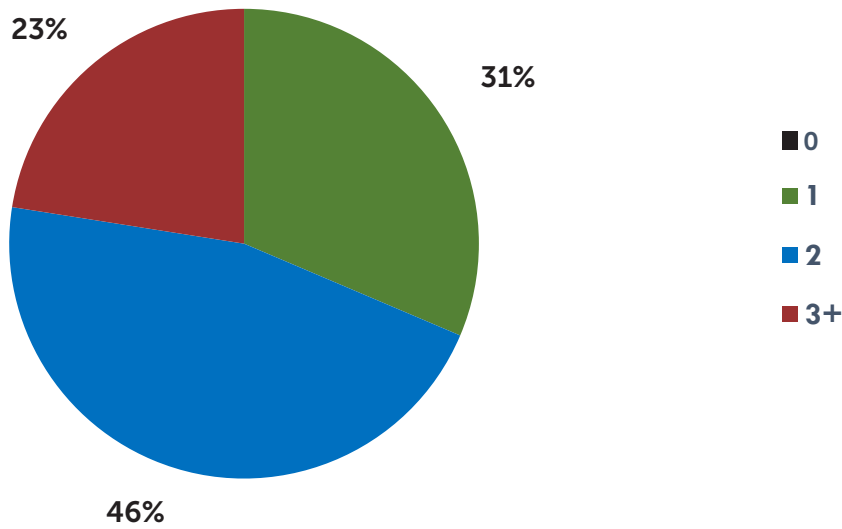


Total number of responses - 592

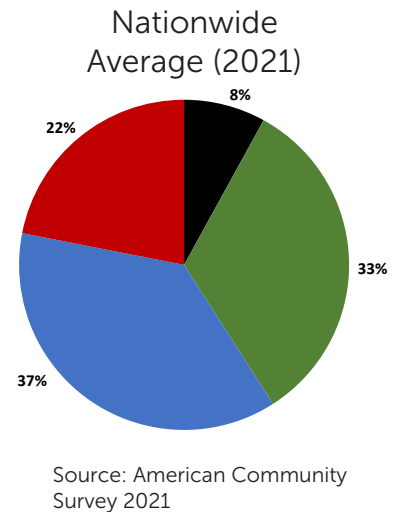


When asked “How many vehicles are in your household including motorcycles and electric vehicles?” Respondents indicated:

Figure B.4 - Number of Vehicles

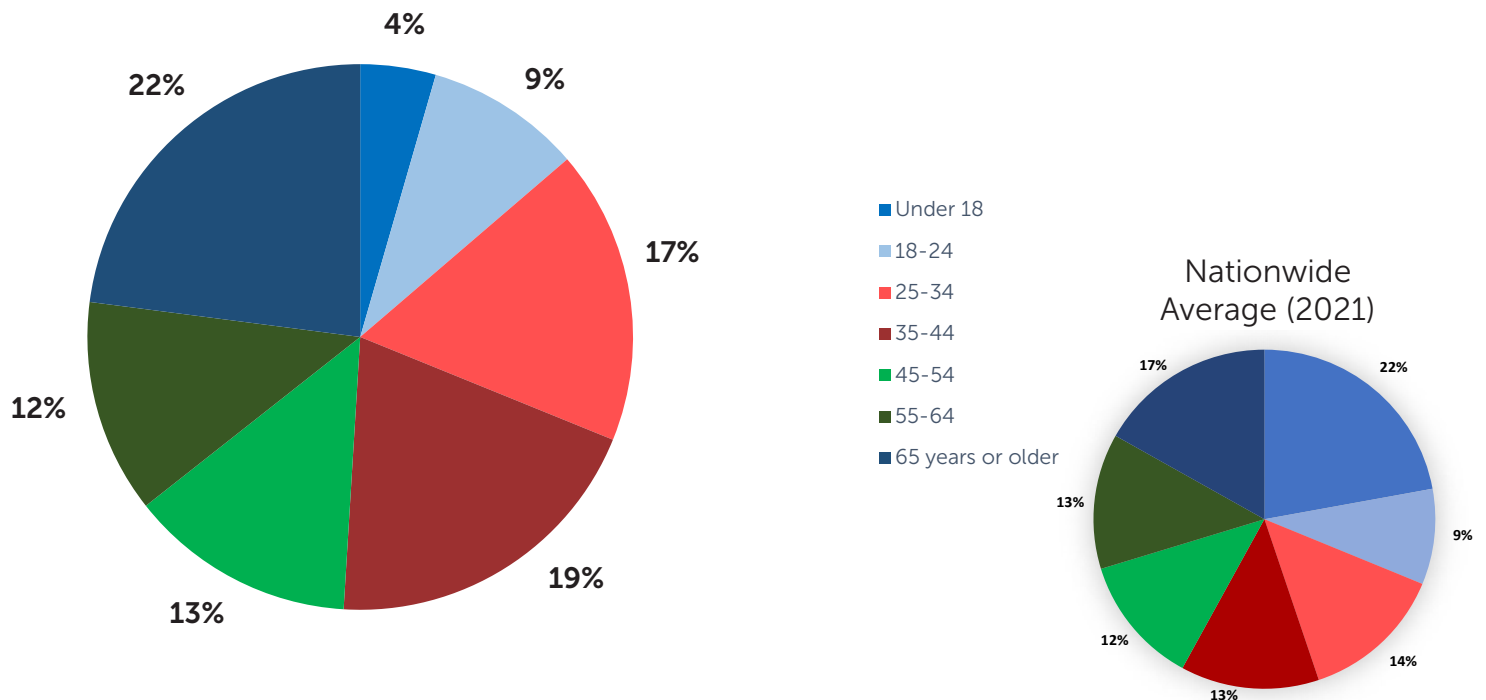


Total number of responses - 653



When asked "What is your age? (Select one)" Respondents indicated:

Figure B.5 - Age

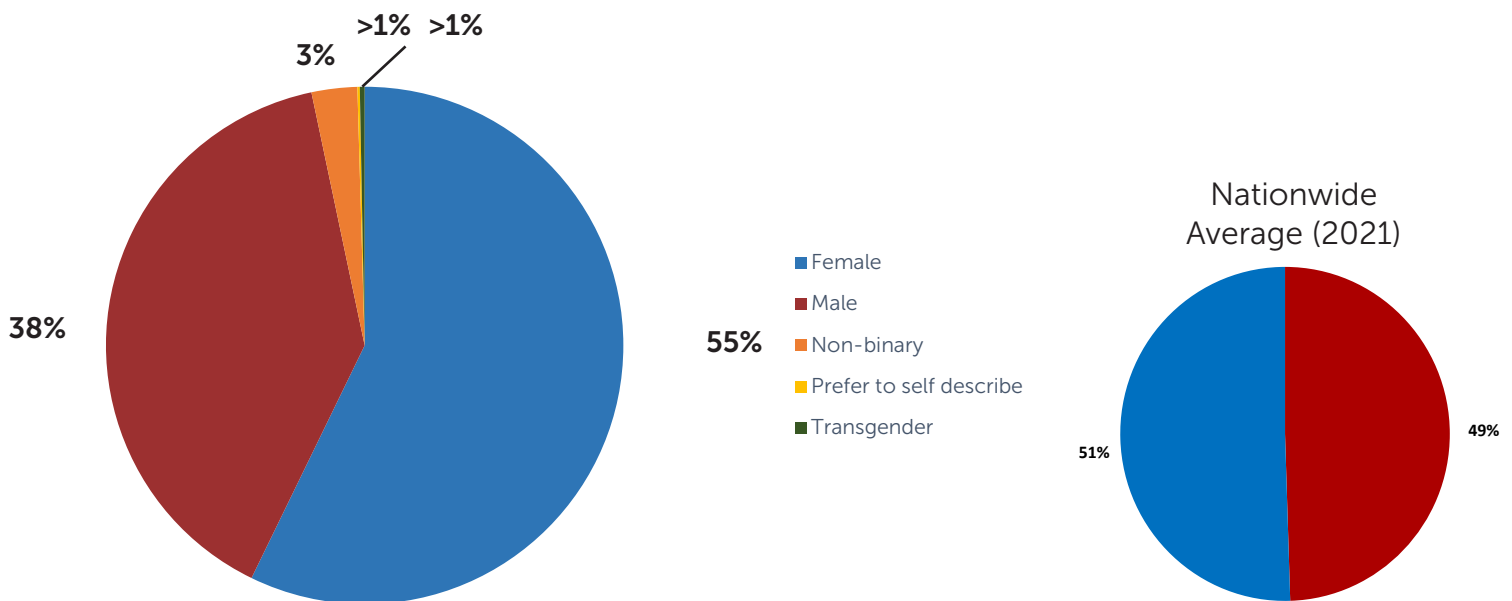


Total number of responses - 671

Source: American Community Survey 2021

When asked "Which of the following most accurately describes you? (Select one)" Respondents indicated:

Figure B.6 - Gender Identity

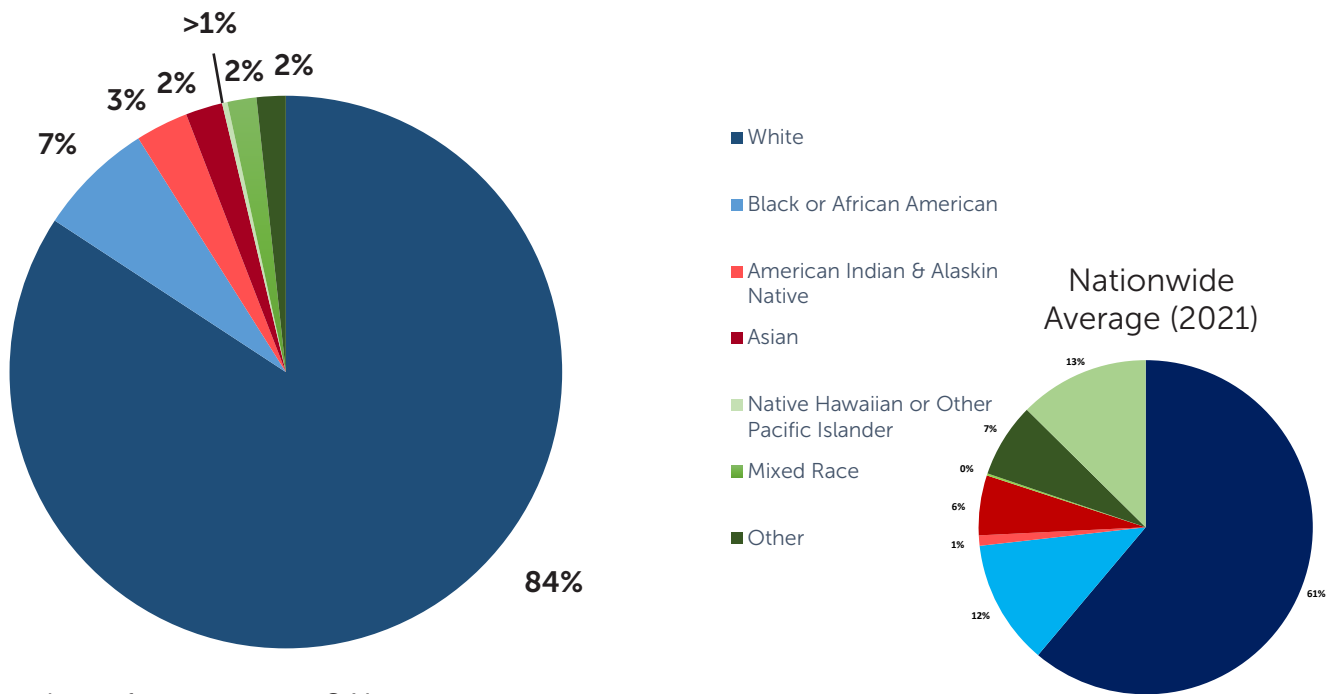


Total number of responses - 666

Source: American Community Survey 2021

When asked “Which race/ethnicity best describes you? (Select all that apply)” Respondents indicated:

Figure B.7 - Race

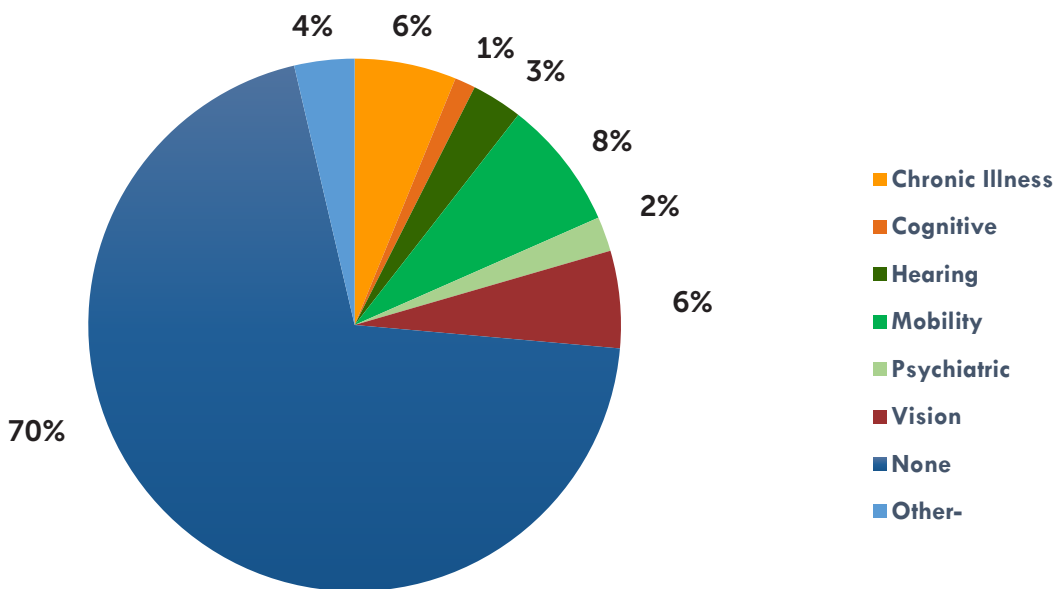


Total number of responses - 641

Source: American Community Survey 2021

When asked “Do you experience any health conditions or limitations that affect your access to transportation? (Select all that apply)” Respondents indicated:

Figure B.8 - Health Condiitons



Total number of responses - 712

Stakeholder Interview Responses

1. How do we know when our transportation systems are working? What factors would you use to evaluate our system?

Access/Connectivity (5)

- Success is: "When barriers to access have been eliminated"
- When students or others without cars have full access to all of town
- Connections and mobility options.
- When lower income people have access to groceries, food, services, etc.
- Movement of freight, products reaching markets efficiently.

Bicycle/Pedestrian (11)

- When people and goods are able to move about to get where they need to be
- Safety of people walking and biking
- When there are safe bike lanes and pedestrian needs are met
- Transportation systems are working when they are being utilized, such as mode share of people traveling by bicycle.
- Bike lanes (Lawrence loop) - They are seen being used by walkers, joggers, biking. They feel safe and comfortable to use. The amount of use it gets (wear and tear it takes), and friendliness of using.
- It's working when they work for everyone. When accommodations are provided prior to community members are having to request accommodations. Ensuring sidewalks are wide enough. Making sure sidewalks are on at least one side of the street, preferably both.

Crash Rate (3)

- Amount of crashes
- By the number of crashes
- Crash rates on types of facilities.

Efficiency/Reliability (5)

- Reliability of travel.
- Getting people around where they need to go efficiently and cost effectively (single occupant vehicles are not efficient or cost effective)
- Resiliency, is the system built to be reliant?
- Reliability.

Environmental (2)

- When transportation is carbon neutral
- Can measure by climate impact.

Traffic/Congestion (6)

- Free flow of highways rather than congestion (2)
- Amount of congestion
- Congestion – Causes pollution and safety issues.

- Traffic appears to move smooth and in a timely fashion. We do not experience significant traffic delays. Factors include: time delays, social media/ public protest/comments/complaints. Amount of traffic related accidents. We have a low number of traffic incidents which would indicate that our travel network is working mostly well. Desperate people do desperate things; some people are calling 911/emergency services when they are unable to get food, etc but we are experiencing a reduction in inappropriate usage of 911.
- Free flow speed.

Other (4)

- Data
- Performance measures in various plans and strategic plans
- Frequency and volume of use.
- Pavement/asset conditions.

Safety (3)

- Safety.
- Safety & equity
- It's working when people stop dying, would like to see Vision Zero. Need to reprioritize to make safety first.

Transit (9)

- Factors: we need to be a 30 minute commute time town for public transportation. Makes life easier for everyone. Keeps up to date on Route redesign since staff use it daily.
- They have had interactions with T LIFT and transit a lot. 250+ rides/week. If it wasn't working they would say so. They did promoting to ensure the tax that funds transit would be continued.
- There may be a lack of service to and from County addresses. When school is not in session or you don't live in Lawrence, there aren't enough agencies to provide trips that are required in the DGCO area. We would use denials to see when, where, and why rides are not being fulfilled. Comparing services being offered outside of the KU and high school semester. Looking at how many riders are using KU passes vs privately bought or donated passes.
- In regard to buses, the biggest thing is the negative connotation about riding buses. They look friendly, approachable.
- We can look at an uptick in public transportation use. We can look at numbers of kids getting to school. Tracking with front desk personnel in regard to people missing appointments, and determining whether it's caused by lack of transportation.
- When our customers can effectively use our means of transportation. We strategically position facilities around the bus routes because their clients usually use public transportation. About 25% use it .
- They're working when people get to their destination on time and where they want to be.
- I've noticed people have more access to new bus shelters and the apps are really useful. Bus routes are getting better and night line is getting easier to use. I keep bus passes and people are also able to get off and on sidewalks easier without having to jump a curb. Witnessed a guy faceplant on Iowa jumping a curb once.
- Making sure buses can accommodate different disabilities etc.

User Feedback (6)

- Are there complaints? We shouldn't assume people have adequate transportation or are reaching out to City Hall if they don't.
- Customer feedback.
- Complaints
- Public input, through surveys and public comments
- Through public outreach
- Success should be determined through stakeholder engagement and not just not hearing from "normal" voices

2. What transportation improvements have been most impactful over the last 5 years? These could be physical infrastructure or a policy or program.

Bicycle/Pedestrian (13)

- Mass Street bike lanes and narrowed travel lanes.
- Increase the number of bikeways and creating safer bikeways, including additional signage
- Commitment to safe walking and biking routes
- Bike trail improvements
- Walkability improvements, such as Burrough's Creek trail
- Pedestrian Plan
- Sidewalk program
- KU bikes going away is a positive because of the way they were handled. the change of sidewalk policy has improved the overall state of the sidewalk network.
- Adding bike racks has been very beneficial for their constituents/clients. Physical bus shelters have been a great addition to keep people safe from the elements
- Lawrence Loop (2)
- The Lawrence Loop has been significant. Started by biking through neighborhoods and now can use it to get to all around town.
- 21st Street bike blvd, especially crossings at 21st & Mass St and 21st & Louisiana. These improvements are impactful because they are more visible than "sharrows", which drivers don't notice.

Engagement (2)

- Planning process has improved and more people have opportunity for input
- Creation of Multimodal Transportation Commission was good but need to collaborate more with Planning Commission to provide technical expertise

Funding/Costs (3)

- Recent IJJA Legislation will add funding
- IKE funding: added funding for transit, local governments, South Lawrence Trafficway, funding for vulnerable road users, bike/ped, Safe Routes to Schools, and carbon emissions reduction
- Rails to trails grant

Neighborhoods (3)

- Reducing speeds on residential streets

- Neighborhood traffic management program
- Reduce residential speed limits to 25 MPH

Transit (12)

- Moving our office next to a bus stop is a big benefit for people we serve
- Hybrid buses (plus their extra visibility is important)
- City bus route changes
- Availability of accessible buses (not just paratransit) and understanding that disabled can use regular buses.
- Transit transfer facility
- Electric buses
- Passenger rail
- Expansion of the SLT is the most impactful. Makes it easier for both private and public transportation to use various routes to increase efficiency for everyone.
- The biggest impact was the shift from the former operators/managers of the bus company to the current management. Had to push how important it was to work with their consumers especially the public. Had some barriers with first transit at first but they have all come a long way and now understand each other better. would like a more person centered approach. Have had some service issues with T Lift possibly caused by high demand and limited vehicles/staff.
- Changes in bus stop locations have made a big difference as well
- See #1. The addition of the Mobility Manager is a good sign that we are taking these issues seriously. The discussion of Fare free has been amazing. Route redesign is promising as well. Affordability and timing of the buses have improved. It used to be difficult to obtain any public transportation services for employees who worked overnight, now they can use the Night Line.
- Bus stop signs with more information have made a big difference.

Road Improvements (16)

- Improvements to existing infrastructure, such as 19th Street
- Arterial roadway improvements
- Brick street improvements
- Roundabouts
- Adding turn lanes
- SLT west leg. K-10 Lawrence to KC needs added capacity after west leg completed.
- K-10 between Lawrence and I-435 needs added capacity, especially after widening of SLT completed
- The roundabouts. Some have been amazing and some could have been better considered. Syncing the stoplights has helped in many places but not in all places. Traffic sensors help as well. The new stoplight in Eudora has helped a lot.
- Closing the access from Kasold to K-10 has been a major benefit.
- The KU youth sports complex intersection needs reevaluated. The highway going through Baldwin is a lot better.
- Lawrence took on some of old highway between Eudora and Lawrence but has never improved it or barely maintained it. Possibly a policy regarding minor traffic infractions i.e. tail lights out and you can get the part fixed and bring a receipt to get the ticket waived.
- Infrastructure - the remodeling of the library has provided lots of uses of transportation via accessing it from different roads (Vermont and Kentucky) plus being able to navigate the

building internally via elevators etc.

- Kasold
- The process of reviewing ROW closures
- South Lawrence Trafficway

Safe Routes to Schools (2)

- Safe routes to school was a very strong project that informed the sidewalk plan. Lawrence is great at layering research. The SLT is used by lots of people and we have elected officials who are open to the idea of change.

Signage (2)

- Increased bike signage
- Message Boards on west side of K-10

Other (3)

- Upgrade of website (KANDRIVE) about road conditions, alerts tailored to user's routes
- KDOT ITS unit updated ATMS software to be more function with field equipment
- Most impactful improvement have been things that encourage behaviour modification.

3. What three transportation improvements are most needed over the next five years?

Bicycle (13)

- Need behaviour modification by changing mindsets that biking is not just for recreation but can be a form of transportation that can be done at any time, any weather, etc.
- Bicycle wayfinding
- Parking for bikes in Lecompton
- Need protected bike lanes rather than sharrows or painted bike lanes
- More city funding for bicycle and pedestrian improvements (currently only 1% of transportation funding and should be at least 10%)
- Higher funding commitment to bike/ped projects
- Complete priority bicycle network
- Build at least one protected bike lane
- Build infrastructure to meet people where they are. Address from bicycle user perspective.
- More bike lanes city wide. In some places in western Kansas, some police/fire units give away ice cream coupons to kids wearing helmets. Hosting Helmet fairs for children or general public would help with bike safety
- Rails and/to trails

Connectivity (5)

- Walkability
- cross regional transportation - people are unable to leave Lawrence/Douglas County if they lack private modes of transportation. Adding one more FTE to the MPO would do a lot of good. Better transportation to KC for medical appointments. Working collaboratively to make that happen.
- around KU, finding ways to transport people who are unable to walk long distance\
- increased access to the juvenile treatment facility and the jail. lots of parents and family

members say they have trouble affording getting to those locations due to costs of transportation.

Engagement/Discussion (3)

- Outreach and education are critical, such as the interaction of bicycles, pedestrians, and e-bikes
- Need more discussion prior to implementing transportation projects
- Live updates of street closure

Environmental (3)

- Need more initiatives to drive attention of the environmental impacts of transportation.
- KDOT electric vehicle initiative, charging stations
- Need to address transportation revenues as people shift to EVs

Transit (16)

- Bus routes that serve grocery stores and human service providers with direct access without transfers and stops near the destination
- Improving access to transit by making it readily available and accessible. Taking the bus is not for everyone and can be difficult (e.g. financial barriers, difficulty of getting bus passes, difficulty making it to bus stops on time, etc)
- Need transit access to/from smaller communities (Eudora, Baldwin City)
- Better bus routes (eg from campus to downtown) that connect students to larger Lawrence community.
- Bus stops need benches
- Eliminate transit fares
- More frequent buses
- New Multimodal Transfer Facility
- Reliability and consistency with T Lift, the bypass has been very helpful in getting around the area due to their location.
- More bus routes to the west side that connect to the downtown area; connecting bus routes to small towns i.e. Lecompton, Eudora, Baldwin
- Figuring out a way to have electrical outlet access on bus stops for plugging in phones, wheelchairs, etc. could be a collaborative effort between public locations. Fix the SLT and the exit with the youth sports complex fixed as well.
- We need a bus stop/shelter at the Kasold curve on 31st. Some type of rest/bathroom areas along the trail system.
- More Sunday access. No way to get to Barry Plastics for weekend shifts
- More info on Night Line and how to access it
- Safe ride produces lots of complaints from students, so figuring out a way to possibly train the drivers or increase rider satisfaction and community comfort using the service. More bus shelters at bus stops Potentially heated bus shelters.

Roadway Improvement (13)

- Widening of K-10 west leg
- Widening of 40 HWY to add shoulders from Big Springs to 6th St
- Modernize roadways to current safety standards. Complete K-10 widening
- Projects to alleviate congestion (e.g. K-10)

- More crosswalks
- Improve shared use path street crossings, especially right turns
- Brick street rehab
- Completing K-10 bypass, particularly the 27th/Wakurusa intersection
- Careful planning of road expansions beyond K-10
- Need to have street standards adopted into code
- Expansion of the SLT and more automation of the public transportation system such as mono rail etc
- Continued preservation and maintenance of roads and bridges.
- Expansion of broadband in ROW for connected vehicles

Sidewalk (5)

- Sidewalks to bus stops .
- Completion of sidewalks in Lecompton
- Completion of sidewalk program
- Continuing to improve sidewalks. Am very thankful for the flashing crosswalk on 31st Street. Next Step is also nearby and uses it a lot. It took 7.5 years to get the cross light installed but now they are very happy about it. Road construction impacts them a lot.
- Poor sidewalk conditions; when it snows, sidewalks don't get cleared off, and city sidewalks often don't get cleared off on Clinton Parkway for days. Enact some system to ensure sidewalks are getting cleared.

Signage (2)

- Additional signage with the bus schedules at the bus stops.
- Signage on campus is lacking and doesn't help people trying to navigate. Signage also does not assist those with visual impairments or those who speak other languages.

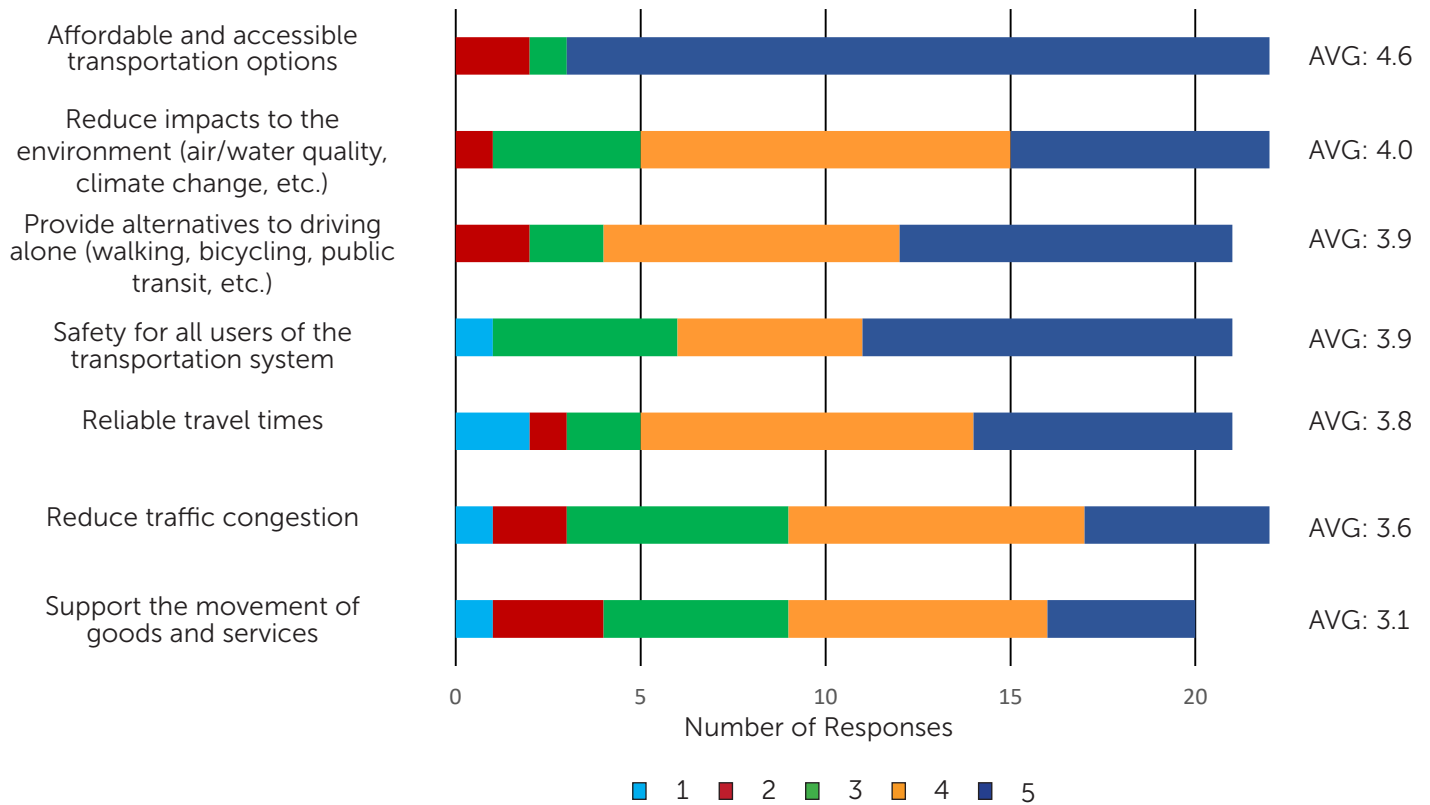
Traffic/Enforcement (4)

- Traffic calming in neighborhoods
- Lower residential speed limits to 20 MPH
- Need law enforcement to enforce speed limits and not ticketing people biking for rolling through stop signs.
- Integration with connected vehicle technology

Other (4)

- Integration with connected vehicle technology
- Land use code update should ensure development serves all modes
- Finish transition to cashless tolling on Turnpike.
- E-Scooters are incredible and would be a great addition.

4. How important should the following factors be for the Lawrence-Douglas County region on a scale of 1-5, with 1 being a low priority and 5 being a high priority.” Respondents indicated:



Interviews with Represented Groups - 22

5. How can we make it easier to travel within your city?

Bicycle (8)

- Focus on behaviour modification. For example, get more kids to walk and bike to school.
- Fund more bike and pedestrian improvements
- Build protected bike lanes
- Make bike/ped/transit improvements
- Protected bike lanes
- Free bike/bike lock program? More bike fix stations.
- Bike lanes, more education on the signaled pedestrian crosswalks, left turn signals can be confusing in the area. Pot holes. Shared bikes are needed but opposed to scooters.
- Free bike/bike lock program? More bike fix stations.

Pedestrian (4)

- Car travel is easy enough but improvements are needed to some intersections for pedestrians, such as 11th and Haskell.
- Need better sidewalks to get to transit stops
- Eudora: we need more sidewalks. Theyre working on it but need more. Baldwin: has done a lot of improvements - lots of good crosswalks and sidewalks. They could do some more

improvements but with current traffic conditions its not usually an issue.

- Mass street being a pedestrian path instead of a road. Improvements to the parkmobile for downtown parking.

Traffic (9)

- Better signal coordination
- Look at traffic patterns when KU students are here and during gamedays and events
- Better coordination to minimize congestion caused by construction
- Slow vehicles speeds; use road diets and other counter measures to make travel by other modes more feasible
- Better timing of lights, particularly 6th Street
- SLT but also because SLT relieved 23rd street traffic we need to reimagine what 23rd street is. Reimagined as a TRUE blvd with roundabouts, housing, to keep the area beautiful and reduce urban sprawl
- A better way to cross K-10 to get to the schools. Policy wise all educational facilities need 2 ways in and out of their facility. There is no way for a firetruck to get in and out during heavy traffic days i.e. during school football games, plus its all fields and a ditch. similar to the lawrence sports complex. There is only one way in and one way out if a major incident were to happen
- They could do some more improvements but with current traffic conditions its not usually an issue
- Traffic flow through the city takes so long at times.

Transit (12)

- Provide alternative ways to get around such as transit and non-motorized options
- Better access to groceries and services by bus
- Remove barriers to accessing the bus
- Many people don't have time to use the bus
- Need live updates of bus arrivals on displays at bus stops and app.
- Move people around university with more transit
- More shared ride options similar to T Lift
- Address the lack of awareness about transit (how to use, if it's worth using) as people need to know why should they should use it
- Keeping the social media presence and increasing that to increase ridership. Reduce inattentive drivers and educate the public about transportation. Social media will help with accessibility. Look at different marketing strategies to increase ridership. LED signage that advertises public transportation. Park and ride options during game days.
- Transit/rideshare
- The bus routes have a good schedule but actual traffic flow can be time consuming.
- Ensuring bus routes are available during differetn times of the day. More affordable and accessible.

Other (5)

- Don't think you can make it any easier
- Already in progress, just waiting to implement.
- It's easy if you own a car. Not everyone has a car though, and with price of gas up, not

everyone has finances to drive everywhere. Need more safe mobility options, especially with aging population

- Through collaboration between agencies/departments (e.g. traffic light preemption for emergency responders)
- Lecompton: they do the upkeep they do but they need someone to help with grants to be able to do what they want and need to do.
- Auto qualifying for T Lift if already on medicaid

6. How can we make it easier to travel throughout the region?

Bicycle/Pedestrian (3)

- More bike trails and lanes accessible to all neighborhoods
- Need focus on biking as transportation and not recreation.
- Regional trails to connect to Ottawa, Topeka, etc.

Road Improvements (6)

- Continue to add wide shoulders to county roads
- Add shoulders to rural roads to accommodate bikes
- Expand K-10 bypass
- Complete the SLT
- Non paid toll route to the smaller towns. Additional routes/ alternatives to the primary highways.
- Completing the SLT would be very helpful as well. More information about the K-10 connector

Transit (16)

- More public transportation options such as buses or trains and rideshare. More opportunities to link modes from Lawrence to Baldwin City or out of Douglas County. Practical ways to get to Kansas City are for shopping or museums.
- Bus routes to Eudora, Baldwin City, Lecompton to Lawrence so people have access to services.
- More bus routes to Kansas City and Topeka
- Bus access between Eudora and Lawrence
- More frequent passenger train service than what's provided by Amtrak (hours of service make connections to Kansas City infeasible)
- Transit between Topeka & Lawrence that runs regularly
- Light rail.
- More options, such as passenger rail, more bike/ped options infrastructure, more transit.
- Need intercity transit outside of county, relying on non-profit/donations is going to break down with aging population
- More bus connectivity. Need K-10 to connect on weekends, connections to Topeka.
- Transit connections to Topeka & KC for medical
- Free fares, interagency operability to cross boundaries,
- Can transit and transportation meet people where they're at i.e. go to senior/low income living facilities? Members say they can't make it to bus stops or public meetings.
- Making a regional bus route from Lawrence to Johnson County that goes once a day.
- K-10 connector like bus route would be neat. A rail system would be good too but expensive. More private transportation/ride sharing options. Some type of route to connect the smaller areas to Lawrence and to KU Med/VA.

- Adding some stops or bus that can not only go from JCCC to Lawrence but stops in between. Maybe adding Amtrak stops. A program that can be developed between the communities of Eudora, Baldwin City and Lecompton to provide transportation.

Other (7)

- Carpool needs to be expanded and universally available.
- Douglas, Johnson, and Shawnee counties need to create committee to discuss trail projects between region. Governments don't communicate enough on how to connect entire region.
- Politicians just say yes! We need a Manhattan Topeka Lawrence KC corridor
- We need either a new org that focuses only on out of town trips.
- Nothing other than implement existing plans
- Continual investment to address shortfalls and needs
- Maintain what we have

7. How can we make it easier to make connections between different forms of transportation?

Bicycle/Pedestrian (5)

- Good sidewalks so people can walk to the bus.
- Transferring between modes – would help to have locked bike boxes/ bike lockers or at least safe ways to lock up bike.
- What is walkable – had been within 1/2 mile of destination. Changing to 1/4 mile more realistic
- Bike share or scooter share
- Improve crosswalks, especially near bus stops

Education/Engagement (8)

- Good marketing so people know what transportation options exist
- Centralized source for information coordinated by MPO or City, easy to access portal for public
- More education so people know what their options are.
- Need an easy to understand system, especially as population ages.
- Increase participation with the city and public transportation as people tech is. Also more media about options.
- More information about how to travel on buses with your bike
- The apps are always useful for people who have access to smart phones. Easier access to the T Lift. The application process is difficult and confusing.
- Providing information through social media/media to highlight the options.

Government (3)

- The way to make it easier is to get the elected officials to make it easier to share information and services. i.e. K-10 connector. Why is it so political? Possibly a grant that will increase connectivity for an extended period of time so everyone can relax and see the benefit instead of focusing on the dollars.
- Need governmental groups to communicate.
- Make sure we have all the players involved. Quarterly meetings with the other transportation providers to "huddle."

Transit (10)

- Maintain park & ride lots at turnpike entrances and perhaps include more signage for park & ride
- Need transit to for commuters to Topeka & Kansas City
- Lifestyle shift is needed to shift trips public transportaiton.
- Buses need to have bike racks (only space for 2).
- Increase frequencies of transit.
- Microtransit to get to mainline transit stops
- Accessible bus stops, bike racks at stops and buses
- Amenities at bus stops, shade, water
- By getting out of the transit silo. Building housing for people to ride transit near transit stops. Transit oriented development instead of transit for transit sake.
- Regular published schedules that take into account interconnectedness. Consider where employment hubs and shopping are located and offer practical solutions for people to use public transit. This can help increase demand to drive more investment. The fare free Kansas City Streetcar is a successful example to look at driving demand.

Other (2)

- Understanding needs and analyzing what investments would improve.
- Not sure

8. Where are you getting your information about the transportation system?

App/Website (7)

- Lawrence Transit app on phone
- Lawrence Transit website
- Personal experience
- Social Media
- Google maps
- Wayze App
- Through social media, press releases, kdot,

Data/Documents (3)

- Data that our organization (KTA) maintainsa along with involvement with communities, counties, KDOT.
- Reading planning documents
- Looking at examples from other communities online

Email (2)

- Emails from MPO
- City of lawrence transportation emails (for road closures), police scanner facebook pages, radio or newspaper, The Lawrence Times, social media. If you aren't using one of those, you are in a vacuum.

Meetings (2)

- Multimodal Transportation Commission meetings
- Public meetings

News (6)

- Newspaper
- City newsletters
- Traditional news media
- Message Boards on roadway
- City Hall
- We need a more public newsletter? Working with popular fb pages to spread information. The radio is one of the one remaining sources of news that everyone can access, even those who cannot use technology very well. SRC has their own radio station and can have guests

Observation (8)

- By talking to other cyclists about best routes to take
- What I see and hear from the people we serve
- From families we serve or stakeholders
- Listening to people
- Direct interactions with public transportation, the city, and media and the chamber
- Word of mouth from clients.
- I've lived in Lawrence for 38 years so gets information just from living here.
- Most from the clients themselves, from other service agencies and or bus employees. Sometimes road work signs.

Other (3)

- Education campaigns
- BikeWalk KC
- Public works staff

9. How can we best communicate with you?

- Make sure email use links instead of attachments
- Keep doing what you're doing. Can't overinform.
- Social media
- Communicate through different organizations such as Justice Matters
- A lecture at the library on public transportation
- News releases
- MPO annual update to city commission and at chamber event
- Email (7)
- Social media then email
- Having a newsletter would be great. Especially one that connects well with local nonprofits who work directly with clients. Social media is good but they have to actively follow first.

10. Is there anything these questions have not covered today that you would like to tell us about the transportation system?

Bicycle/Pedestrian (6)

- Wish there were more ways to regularly participate in conversations about biking and walking
- As subdivision regulations are update need to include bicycle facilities, require cycle tracks on all arterial & collector roadways)
- Would like to see annual increase in bike/ped funding until a more equitable level is reached

(currently only 1% of transportation spending)

- Green pavement marking on all bikeways
- Need bicycle wayfinding (what if streets have no names for drivers?)
- Sidewalks closed for construction need to be better planned for. Wish there was more conversation with people impacted.

Environmental (3)

- Transition city fleet to all EV
- We are in a climate crisis and need specific goals to reduced VMT.
- Baldwin City would like to get EV supercharger, looking at transition PD vehicles to EV

Multi Transportation Commision (2)

- MMTC should review annexations
- MMTC should have position on MPO policy board

Transit (3)

- Would like T Lift fares to be cheaper
- As a parent, public transportation doesn't work well when trying to shuttle kids to different events all over town
- Need to convince people not to drive personal vehicles and use transit

Traffic (3)

- MPO/City should support revising Kansas statutes to allow municipalities to set speed limits under 20mph
- Look at where traffic deaths have occurred and address these areas
- One issue she sees in closing multiple major collectors at the same time. Making sure that traffic constuction and projects are not displacing people and cutting them off from the rest of the city.

Other (5)

- As a recent retiree, I'm concerned about number of people aging, what happens when people can't or shouldn't drive. Concerned about how to stay engaged in community as people age.
- Need to consider allocation of resources and equity. There should be a focus on transportation disadvantaged populations as they use biking, walking, transit more than others.
- knowing more about policy more would help out a lot for spreading to clients.
- Concerned whether kids will have safe access to school once some close down. we are in a college town and people drink a lot downtown. we need a public service to help drunk people get home. it needs to be safer, more accessible. we need better lighting as well. some emergency call system like on campus (with the blue lights). the purple street lights are a safety concern due to lack of visibility. shes has witnessed people get in accidents due to not clearing off their windshields.
- There needs to be a partnership that makes accomodations for folks who are mandated to have child in need of care cases, court hearings, etc. People are mandated to show up or be somewhere but arent being support in actually getting to said space. The debates on in person or virtual are going to lead to more no shows since people are lacking transportation, which penallizes people for not showing up, which further hinders their ability to thrive.

Survey 2 Responses

When asked to review the Transportation Choices Goal, Objectives, and Strategies respondents commented:

- "I don't understand why the bus shelters the city used to have were removed a few years back, unless it was just to be hostile to unhoused people who might occasionally sleep in them. In any case, bus shelters should come back, and their design should be friendly, not hostile. If you don't know what that means, you can Google it."
- "Specific transportation options in rural towns."
- "Strategy 2 should be 1 with the intent to bring self-conveyance to the forefront of any change in transportation in Lawrence and Douglas County."
- "The current Lawrence Bike Plan has no planned protected bike lanes identified in it. To build out an all ages and abilities connected bike infrastructure, we need protected bike lanes on key corridors."
- "#5 -- Private options for scooter / bike / car share have not been successful here so would only pursue that if significant changes to previous programs were made."
- "Please make bus available on Sunday"
- "I think planning for some kind of large use bike/scooter/go cart, etc path between Eudora and Lawrence could be beneficial. As both cities continue to expand towards each other, if it's already accounted for in the build process, it will make it easier to access as a whole. And May promote/allow small business along the developing path to flourish, both with passing traffic and delivery services, if they can't invest in a larger vehicle just yet. I think planning for a bus stop for Eudora/Lawrence may have benefits too, allowing otherwise landlocked residents (due to lack of transportation options) the absolute to get better paying jobs, or access to better amenities/care."
- "I think these are good goals and strategies. Definitely needed. Good ADA accessibility and more benches at bus stops for comfort."
- "For transportation, I think working on creating more efficient routes through Lawrence and commuting to other cities in Kansas would be nice."

When asked to review the Shared Prosperity Goal, Objectives, and Strategies respondents commented:

- "I really don't understand what the goal statement means - "supports prosperity". Sure I can read further into the supporting objectives, but what are you really saying? This shared prosperity requires a lot of further reading to have any idea of what it means. Therefore, it is meaningless. Also, how are you going to measure success? "
- "This list looks good. Would love to see more regional transportation options into KC (other than a car trip.)"
- "Good."
- "I think this is a good forward thinking plan."
- "Definitely make sure to distribute equitable transportation in lower income neighborhoods. I think point #. Though I think Iowa needs to work."
- "I think a late night bus would beneficial."

When asked to review the Safety & Security Goal, Objectives, and Strategies respondents commented:

- "You have three parts of the goal. 1 and 3 are results of 2. Therefore, 2 is the goal, i.e. crashes are avoided. Do you really think terrorism is the second most important? This is a low probability event. Objective 3 doesn't address the goal. If you say that goods and goods are safe and secure meaning that the infrastructure is not susceptible to crime, then maybe. There seems to be a lack of focus. Are we keeping pedestrian, bike, challenged folk transportation safe from interference with mechanized transport? Isn't that the original focus. Or are you now adding in all the normal community goals that dilute the focus?"
- "Safer intersection design is badly needed at many intersections around town. Ban Right Turn on Red. More design interventions to create safer streets."
- "That's a tall order, and recent traffic planning decisions don't seem to confirm to 3."
- "No." (nothing is missing)
- "Don't think so." (nothing is missing)
- "Plain and simple, I think an increase in street lamps would be a nice addition to Lawrence."

When asked to review the Sustainability Goal, Objectives, and Strategies respondents commented:

- "This appears to largely focus on greenhouse gas reduction with water/land use as an after thought. Is this the intent?"
- "No." (nothing is missing)
- "I think an increase in moving to electric busses would be nice. They also reduce noise pollution which I appreciate."

When asked to review the Operations & Maintenance Goal, Objectives, and Strategies respondents commented:

- "How are you going to measure "return on investment"? Maximize useful life while minimizing "investment" and "operating" cost implies an objective function as these work against each other..(The " " in this sentence aren't quoting your statement). What will be the objective function? Time value of money implying a rate of return? But, this is a cost. How are you going to measure profit or some type of savings? The devil is always in the details, but statements that are vague with no real path seen are doomed to failure. 1, 2, and 4 of strategies appear to apply to mechanized transportation making this the most important."
- "Pedestrian signal prioritization is needed at many intersections. "
- "No." (nothing is missing)
- "I think better road management is important. A lot of side roads in Lawrence need repairing. "

When asked to review the proposed changes to the Major Thoroughfares street classifications map respondents commented:

- "This isn't clear enough to read. "
- "Too small to read and the zoom doesn't help."
- "Ah, what is termed here as "Major Thoroughfares," I refer to as "car sewers." These are auto-dominant roads that are extremely hostile to cyclists and pedestrians. "
- "Would love to comment, but map isn't interactive so I can't truly see the key and the streets at the same time. This should link off to another version for clarity."
- "No." (nothing is missing)
- "This is all but impossible to see on a phone screen ."

When asked "Do you have any additional comments about transportation in Lawrence, Eudora, Baldwin City, Lecompton and/or unincorporated Douglas County?" Respondents commented:

- **"We need integrated public transit for the rural towns to connect to Lawrence."**
- **"Prioritize biking and walking as much as driving in transportation planning decisions."**
- **"Not as high level comments: Consider transforming Mass Street to a car-free corridor; finish 19th St equipping with bike lanes from Louisiana to Mass-so nice from Iowa tunnel but I avoid it since the bike lane ends and not safe to ride on such a busy road in the lane with cars which is a shame since so much investment has gone into it; develop river area with ped/bike bridges and greater access along river for walking/biking/boating; enforce sidewalk maintenance in neighborhoods that have continuous sidewalk networks, e.g. East Lawrence."**
- **"We want safer streets for pedestrians and cyclists, and a complete bike network. Protected bike lanes please! Pedestrian prioritization signals please! Ban Right Turn on Red please! "**
- **"No." (nothing is missing)**
- **"A safe biking path from both sides of K10 in Eudora is critically important. So many job, shopping, and entertainment opportunities would open up to Eudora residents who don't or cannot drive."**
- **"21st Street bicycle boulevard is a disaster, the curbs are not mountable for bicyclists and therefore in the case of human error there is no where to escape, for safety these bottlenecks are not safe for bicyclists. Speed tables are preferred. Louisiana traffic calming bottlenecks cause the same safety concerns. If a driver makes a misjudgement and the bicyclist can't escape."**

D. 30 Day Public Comment Peroid

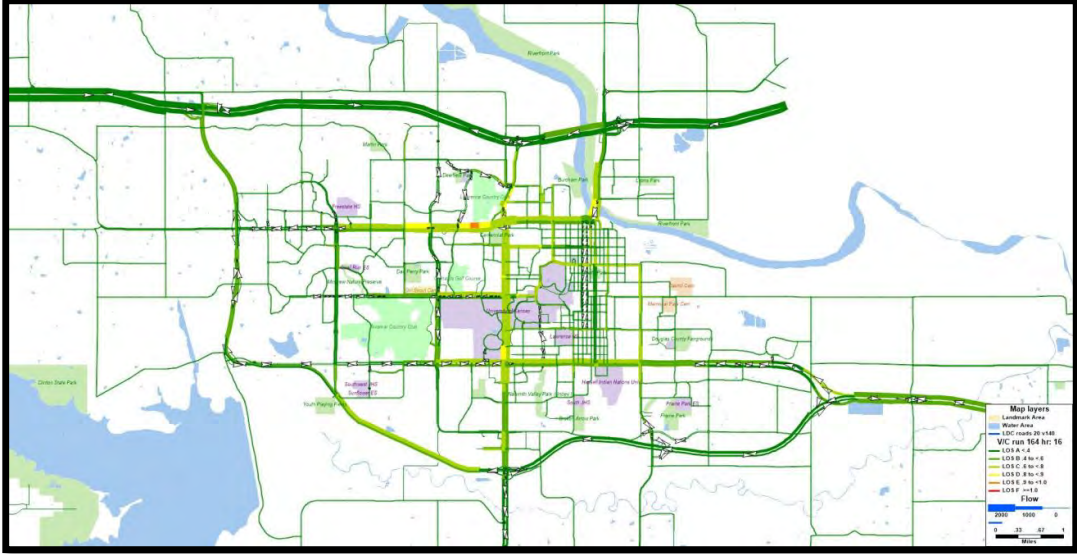
A draft of the T2050 was released and a public comment period was held from January 23 through February 22, 2023. Below you will find the comments received and staff responses.

Issue	Staff Action	Notes
All forms of transit and economic development go hand in hand. What I have seen over the last nineteen years that I have live here is retail and residential development. There has been little in the way of commercial development. Hopefully that will change with the battery plant at DeSoto.	No Change	Comment received
As to the widening of K-10 from the turnpike interchange to South Iowa. If I understood you the Kansas Highway department is in the planning stage for an interchange at West 27th Street. A realignment of the bridge over Clinton Parkway to lessen the curve and with that traffic would flow unimpeded for the next thirty years. I say that based on the growth I have seen in the population of Lawrence.	No Change	Modeling done by both KDOT and in this plan (ch 6) indicate need for widening of K-10 from 2 to 4 lanes.
Sidewalks are an important part of any neighbor. Some neighbors have uncompleted sidewalks or no sidewalks. In old west Lawrence there are many brick sidewalks which add to the character of the neighbor but are difficult to maintain. There are three ways to deal with that. One would be to rebuild the sidewalks using concrete and sell the bricks to help finance the project. The second would be to build a concrete base to hold the brick in place. The last is of course to just relay the bricks. If the second method were to be used the sidewalks would last longer and require less maintenance and easier to remove snow. A concerted effort needs to be made to replace damaged sidewalks and to complete and or build new ones where they don't exist.	No Change	The plan recommends City of Lawrence should Establish Brick Sidewalk and Street Standards (ch 6).
There is a tendency for motorists to think the road is theirs and cyclists have the same idea. In every community I have lived in automobiles have the right of way and cyclists have to yield to them. In many case I have seen cyclist pull out in front of autos with a disregard for on coming traffic or traffic wanting to turn. The city must determine who has the right of way and make all resident aware of road courtesies though notices in the local newspaper and online.	No Change	Educational efforts are included in the City of Lawrence's Neighborhood Traffic Management Program: https://lawrenceks.org/mso/safer-speeds/ .
Lawrence has the best bus service in the state. But as always there is room for improvement. In Appendix B there were several mentions of bus service to Eudora, Topeka, Kansas City and into the county. It is my understanding that to be able to provide such services it would require the charter under which the transit systems operate to be changed. This needs to be done. As Lawrence grows there will be more residential and commercial developments. The city must require that when the plans for such development is requested that it include a transit plan. Is some European countries that is required before a development can be approved. Thus a developer must sit down with the transit system manager and staff to develop a plan that will satisfactory to both parties.	No Change	Expansion of intercity and commuter service is a strategy recommended in Ch 6
Streets are always a major topic when it comes to transportation planning. I am personally not a fan of four way stops and roundabouts. Both present challenges for motorist. For emergency equipment roundabouts slow their response time. In the public input section potholes were mentioned often. And justly so. There is a pothole number to report potholes (785-832-3456). Instead of complaining about potholes residents need to do their part by calling so they can be repaired. Damaged or poorly maintained streets due to snow, ice, salt and heavy use takes a toll on the transit system. Buses may not be able to operate on certain routes, cause damage to the buses and gave a poor ride. It will cause motorist to change their route which would then put more traffic on other streets.	No Change	Comment received
I would like to mention Mass Street. It has been suggested that Mass Street be turned into a mall. That idea has worked in other cities. They is some support from some local business owners for such an idea. It was suggested by one that a trolley operate on Mass Street. A parking garage would need to be built in the parking lot #3 which is on Vermont. The trolley would make stops at the parking garages then travel Mass Street and drop off and pick up passengers along the way.	No Change	Comment received
Amtrak has indicted it would like to extend the Missouri River Runner to Topeka. That service would require an on going financial comment of Kansas to fund it. It does not fill the need for commuter or interurban rial service from Topeka to Kansas City. Residents that I have spoken with are interested in such service and would use it. Such service would help the economic and population growth of Eudora. The T has a route that has been routed by the Amtrak station for commuter service. The BNSF line from Topeka to Kansas City would need to be upgraded. I would suggest that Kansas pay for material and BNSF pay for the installation of rail, concrete ties and ballast.	No Change	Comment received
There is much more but I realize your time is limited. The things I did bring up as you of all people would know requires a great sum of money. It also requires residents to understand the needs for such projects that I have mentioned. There are residents that feel that the money being spent on transit, bike paths and the like is wasted. Lawrence and Douglas county are headed in the right direction. Residents need to understand that what you are doing will make Lawrence a better community safety wise as well as environmentally better. There are resident that believe climate change is not real. I would suggest they ask residents of Miami or San Francisco or Charleston, South Carolina how they feel. Their cities floor every time there is a king tide. My point is that as you work on future plans you will be battling ignorance and stupidity. I have seen that in the public comments section. Continue what you have started.	No Change	Comment received
Please prioritize clean energy infrastructure to prepare for the pivot to renewable energy use in transportation. Maintaining wildlife areas rather than building new roads should also be a priority. A prime example is the Wakarusa extension being considered by Douglas County. This road should never be built.	No Change	The sustainability section of Chapter 6 includes recommendations on increasing low carbon transportation options and planning for electric vehicles (charging, fleets, etc.). Sensitive lands (which includes wildlife areas) are mapped in the plan. Chapter 7 includes a section on environmental mitigation and maps on projects in relation to environmental features. It is up to local governments to evaluate impacts on a project by project basis.
Public transit in (as opposed to Ride-KC) Lawrence plainly has two major components that are quite different: KU on Wheels and Lawrence Transit. I've observed (while driving!) tha full-size buses for some years. Mainly, they transport AIR from one location to another. There plainly is a need within the community for general public transportation, BUT that need would be far better met with 15-passenger vans serving more neighborhood routes. Full size buses can't navigate that type of route. You could buy 5 such vans for the price of one bus. YES, driver jobs would have to increase. But the purchase/maintenance saving from full size buses ought to handle the increase. In the table on Draft p-57, Lawrence Transit data needs to be uncoupled from KU on Wheels to get an accurate picture of hours and passengers. The table on p-37 indicates conclusively that the population really can't be served with a fixed-route "giant bus" service. Travel times/destinations/reasons are simply too diverse. Public transportation HERE is a niche benefit-- IMPORTANT to those who need it, but still a niche and best served with 15-passenger vans. The availability of federal funds doesn't justify WASTING those funds by transporting air around town. Smaller modules (vans); more diverse routes integrated into neighborhoods; increased ability for passengers to schedule pickup/return on set routes via phone app. Those things are, for openers, way more important to success than the present model using full-size buses.	No Change	Because bus size cannot change dynamically in the middle of a route, bus size needs are based on the size of bus needed during its busiest time of day or busiest portion of a route. As an example, some routes may carry 5 or fewer people for one portion of a route, then more than 30 people through a busier portion of a route. Different times of day also demonstrate different ridership trends. Using buses that are too small to accommodate the max number of riders mean that people are unable to reach their destinations

Issue	Staff Action	Notes
<p>I live in Lawrence and am very interested in planting street trees in front of my house as a way to cool the adjacent sidewalk and street, and for aesthetic reasons. I believe this is an issue that fits into the city's overall plans for building streets and sidewalks.</p> <p>Several months ago, I called City Hall and was referred to someone whose name I don't recall but I believe he was from the city urban forestry department. The man came to my house and was very polite but said he wouldn't be willing to approve planting trees in the right-of-way between the sidewalk and curb. The utility lines at the front of my house don't run through the right-of-way; they run through the utility easement between the sidewalk and the front of the house. I told him I'm more than willing to plant trees that wouldn't be likely to be a nuisance to people using the sidewalk or street, and that have the kind of root system that goes down rather than along the surface.</p> <p>The man said the city wouldn't approve putting trees in the right-of-way because then the city would be responsible for them, which is silly. I seed, fertilize and mow the grass between the sidewalk and curb. I pay someone to edge and trim that area. When it snows, I shovel the walk. As the regulation is now, if the sidewalk has to be replaced I am responsible for paying for it. I pay for homeowners liability insurance in the event someone is injured anywhere in my front yard, including the sidewalk and right-of-way. In the meantime, I haven't been able to get the city to replace spalled concrete at the end of my driveway since I moved in, in September 2018. I was told that it wouldn't be repaired until 2025. The city of Lawrence does nothing to maintain the right-of-way. True street trees, planted along the street in the right-of-way, would do a lot to address heat islands caused by concrete driveways, sidewalks, and paved streets. I have trees in my front yard, between the sidewalk and the front of my house, that are in the utility easement and that seem to be called "street trees" when in fact they are not. I grew up in a city that planted trees between sidewalks and curbs--true street trees--after Dutch Elm disease wiped out trees in entire neighborhoods. I'm not asking the city to pay to plant trees in the right-of-way, just to allow me to do so. Please amend any relevant ordinance, if there is any, that would allow me to plant trees in the right-of-way.</p>	No Change	Street trees are recommended in the plan but cities set regulations regarding placement, type, etc. MPO staff recommended the commenter submit these comments to the Lawrence land development code update steering committee
Please refrain from using the term "bike" in favor of "bicycle" in all instances.	Change	Changed bike to bicycle in most instances
Thank you! for using the term "motor vehicle" rather than just "vehicle".	Change	Additional references to vehicle were updated to motor vehicle
Types of Bikeways (digital p. 48): the draft has redundant listings for "shared lane marking", "shared use path", and "signed bike route". Missing from the list are "bicycle track", and "bicycle climbing lane". Types of Bikeways: the category of "bike lane" implies the unsafe and therefore underutilized "white stripe bicycle lane". Please call it "white stripe bicycle lane", and make the recommendation that it should be phased out in favor of physically separated bicycle lanes. It's a waste of labor and pavement for a facility that is used by only about 3% of potential bicyclists. Types of Bikeways: Please include as a distinct category "Buffered Bicycle Lanes" and "Protected Bicycle Lanes" (not just as a footnote for your "Bike Lanes".)	Change	Updated to include three categories of bikeways with examples of each: major separation, minor separation and shared streets. Also updated types of bikeways. Specific recommendations on type of separation are included in Lawrence Bikes Plan and Countywide Bike Plan
Typical Street Cross Section (digital p. 49): Please change that illustration to be a 38 foot wide collector street with 2) 5 foot bicycle lanes, 2) 3 foot buffers, and 2) 11 foot motor vehicle lanes (eliminate the option for white stripe bicycle lanes).	No Change	Typical cross section is derived from the City of Lawrence Street Design Standards
Default bikeway design: In keeping with bikeway design best practices, we propose that bikeways be physically separated from walkways, as well as be separated from motor vehicles, as the default design.	No Change	Recommendations on type of separation are included in Lawrence Bikes Plan and Countywide Bike Plan
Safety (digital p. 49): Emphasize that motorist routinely meander into white stripe bicycle lanes because 6 inches of paint is no protection. (otherwise, this is a well written paragraph)	Change	Updated paragraph to reference level of separation.
Bicycle Parking (digital p. 138 & 162): Somewhere add an entire section on enclosed and secured bicycle parking lockers. After the number one reason that people decline to bicycle, that being lack of safety, the number two reason is lack of parking that is secured from theft. Bicycle lockers should be required at transit stops (beyond the Transit Hub), at all major civic centers (government and recreation), and at all major destinations where people would spend a lengthy period of time.	No Change	End-of-trip amenities and bicycle parking is included as a strategy in Chapter 6 and also further addressed in the Lawrence Bikes Plan and Countywide Bike Plan
Transit (Transportation Options, digital p. 140): Implement a 15 minute circulating jitney service along 6th St. (Mass. St. to Wakarusa Dr.), 23rd St. (Harper to Kasold), and Massachusetts St. (Locust & 2nd St. to Indian Ave.)	No Change	Specific transit route decisions are beyond the scope of this plan. T2050 recommends implementing service per the Transit Route Redesign planning process.
Green pavement markings for bikeways (digital p. 138): Whenever buffered bicycle lanes, protected bicycle lanes, bicycle tracks, or shared use paths are to be constructed or handled as a maintenance update, it shall be standard practice that at any juncture where these bikeways cross an intersection or major commercial driveway, green pavement markings shall be installed across the intersections or commercial driveways.	No Change	Recommendations on use of green paint are included in Lawrence Bikes Plan and Countywide Bike Plan. "FHWA's interim approval for green color is, however, limited explicitly to exclusive on-street bikeways, bicycle lanes, extensions of bicycle lanes through intersections, and other bicycle traffic conflict areas. The interim approval does not address shared-use paths or shared-use path crossings of roadways, though it stands to reason that the limitations preclude this use." Alta Planning & Design 11/12/21 memo
Bikeway Benefit District Ordinance: Just as sidewalks are funded by land developers any time they build a subdivision by means of a Special Assessment Benefit District, require developers to build physically protected bikeways on all new Arterials and Collectors to be funded by a Special Assessment Benefit District on all properties in the subdivision. Legally, this would be part of the Subdivision Regulations. Build bikeways at the outset so expensive retrofits aren't needed after the fact.	No Change	Comment received
Local (residential) Street Speed Limit: Reduce the speed limit on all local streets to 20 MPH, effectively, if not physically, making them Bicycle Boulevards. Do this at the same time as removing those meaningless and worthless little green "Bike Route" signs.	No Change	Comment received
Brick Sidewalks (digital p. 160 etc.) Thank you! for this information.	No Change	Comment received
Wakarusa Extension (digital p. 179): Delete from Table 6.4, item #106, Wakarusa Drive Extension	No Change	Comment received
Pg. 39 – Households Without Vehicles: It'd be nice to know the percentage of overall households in the MPA with one to no access to a vehicle.	Change	Updated text to state that 6% of Douglas County households have no vehicles
Chapter 2 Discussion of Transit – Perhaps it may be referenced in later chapters, but this section would be good to discuss 23 CFR 450.324(f)(8).	No Change	Strategies around intercity transit are included in Ch. 6
Pg. 79 Bridge Condition, Sentence 1 – There should be a comma after "2022". Also, "bridge" should be plural.	Change	Updated
Pg. 79 Bridge Condition, Paragraph 2, Sentence 2 and 3 – There should be a comma after "2022" and comma after "law"	Change	Updated
Pg. 92 Last Paragraph – What exact environmental and economic impacts are you mentioning? Also, are these areas commercial and/or part of connecting Downtown corridors that are contributing to the issue? It'd just be helpful to expand slightly to avoid questions.	Change	Edited section for overall clarity and deleted reference to economic and environmental impacts of congestion
Pg. 97 First Paragraph – Where did the city of Lawrence energy goal come from? Is there a plan available to link its strategies?	Change	Added link to Ordinance 9744 which set goal (and updated year to 2035, not 2030)
Pg. 97 First Paragraph, Sentence 4 – Replace "as" with "provides an"	Change	Updated
Pg. 101 – It'd also be good to see a map that has the EJ areas overlaid with the rail tracks.	Change	Added
Pg. 109 – It'd also be good to see a map of the EJ areas overlaid with the crashes.	No Change	Not feasibly cartographically but upcoming Vision Zero Plan will likely include more detailed map with ability to show EJ zones.
Pg. 122 Paragraph 1, Sentence 1 – Is this sentence incomplete? It is confusing.	Change	Sentence was correct but paragraphs were out of order so the context made it confusing. Updated.
Pg. 153 – How does Baldwin City have a planned amount if no financial information was provided for projections?	Change	Updated table 5.8 to show Baldwin City 5 year average expenditures
In light of some of the financial shortfalls for certain jurisdictions within the MPA, has there been exploration of strategies for potential new funding sources (23 CFR 450.324 (f)(11)(iii))??	Change	Sentence added about potential new funding sources that cities could explore
Pg. 172 Paragraph 4, Sentence 4 – Should "an" be "and"?	Change	Updated

Issue	Staff Action	Notes
Pg. 179 – Lecompton has O&M shortfall even during the first 4 year timeband. Do you know how they plan to address this?	Change	Lecompton indicated expenditures will be cut to match revenue, so tables were adjusted to reflect the expenditure reduction in the first band.
Pg. 184 – The table looks great, but it may be advantageous to note an overall percentage of all programmed project funds that will be going to projects within the EJ areas.	Change	Added text about percent of funds spent in EJ.
Pg. 187 – Are Figures 7.1 & 7.2 copies of each other?	Change	Yes; deleted duplicate.
Other Changes	Change	
Remove project 135 from Figure 6.10; Table 7.1; Table 7.3; Figure 7.7; Figure 7.8; Figure 7.9 Project was inadvertently included and has already been completed	Change	
Transportation Demand Model Maps were updated to match existing map style but content unchanged	Change	
Table of Contents updated	Change	
In Chapter 5 updated the range of years in financial projections from 2023-2025 and 2026-2030 to 2023-2026 and 2027-2030	Change	

Lawrence – Douglas County MPO Transportation and Land Use Model



Methodology Report

March 8, 2023



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Appendix C Model Development

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Chapter 1 Introduction

The Lawrence - Douglas County Metropolitan Planning Organization (the MPO) has primary responsibility for technical studies about the area's roadway system. A regional travel demand forecasting model helps with that process. It allows the agency to understand how transportation system or land use changes would affect travel flow and the location and severity of traffic congestion.

In 2022, the MPO sought outside consulting assistance to revise and update its transportation model. The revisions would include the introduction of a mode choice routine, distinct hourly assignments (instead of a single daily assignment), and revised zone boundaries to distinguish some distinctive land uses, to conform with census geographic layers, and to allow for smaller zones in expected growth areas and within the University of Kansas. Model updates would also account for the population, employment, and transportation system conditions in 2019. Later data was available—including the 2020 census—but the impact of COVID-19 on travel patterns suggested that it would be more appropriate to validate the model to pre-pandemic conditions. Other model changes since the previous MPO model update in 2015 included revised model procedures and parameters to match observed traffic volumes and, where needed, to be consistent with good modeling practices.

The model changes also included the development of a new, user-friendly interface to run the model and manage transportation and land use scenarios. This removes all the hard-coded parameters and file references from the earlier the MPO model. It also allows easier assessment of the impacts--volume/capacity and level of service--in response to changing transportation or land use conditions. The model use of 24 separate hourly assignments (before aggregating to daily flows). This allows a clearer sense of AM and PM peak hour conditions, and can show the number of hours during the day when a particular corridor or link operates at poor level of service (LOS) conditions.

Warner Transportation Consulting, Inc. has now completed the model changes. Following this introduction, the report is in four parts:

- Model revisions
- Updated model inputs
- Model validation to 2019 conditions
- Future scenarios and results

The updated model inputs and revised TransCAD model code are also available electronically.

Summary of Major Model Elements

<i>Study area</i>	Douglas County, divided into 454 internal Transportation Analysis Zones, and 26 additional TAZs at boundary of modeled region.
<i>Base period</i>	Average weekdays, 2019
<i>Model type</i>	Regional transportation and land use model <ul style="list-style-type: none"> - four-step approach - stochastic user equilibrium - three iteration feedback loop from assignment back to trip distribution
<i>Model program</i>	TransCAD
<i>Data element</i>	<u>Primary Sources</u>
<i>Trip generation</i>	<ul style="list-style-type: none"> - 2020 census at block level, with adjustments for City of Lawrence undercount, and factoring to 2019 ACS data at block level. - Income groups (from census bureau for census tracts adjusted to TAZ level based on earning data reported by 2019 Quarterly Workforce Indicators)
<i>Demographic data</i>	
<i>Employment data</i>	<ul style="list-style-type: none"> - employment built from parcel-level data checked with Quarterly Workforce Indicator / Longitudinal Employee Household Dynamics (3rd quarter 2019) with adjustments for non-salary, non-wage employment.
<i>Lodging data</i>	<ul style="list-style-type: none"> - Google search for Douglas County lodging)
<i>Trip rates</i>	<ul style="list-style-type: none"> - Rates calibrated from NCHRP 365 adjusted for college trip purposes
<i>Vehicle occupancy and hourly distribution</i>	<ul style="list-style-type: none"> - NCHRP reports 712 and 365.
<i>Trip distribution</i>	<ul style="list-style-type: none"> - NCHRP report 712
<i>Gravity model impedance curves and K-factors by trip purpose</i>	<ul style="list-style-type: none"> - K-factors (other than 1) used only for flows involving externals. Through-travel determined by Modlin method and modified for unusual character of Douglas County.
<i>Mode choice</i>	<ul style="list-style-type: none"> - Coefficients based on Lincoln MPO mode choice routine, with further adjustments to match observed boardings.
<i>Assignment</i>	<ul style="list-style-type: none"> - MPO road database for each road's functional class, number of lanes, and area type.
<i>Road classification and performance function</i>	<ul style="list-style-type: none"> - HPMS Field Manual approach for determining free-flow speeds and hourly link capacities.

Chapter 2 Methodology

This chapter provides details of the travel demand forecasting methodology. It begins with an overview of the regional transportation model, and then describes individual procedures and data inputs.

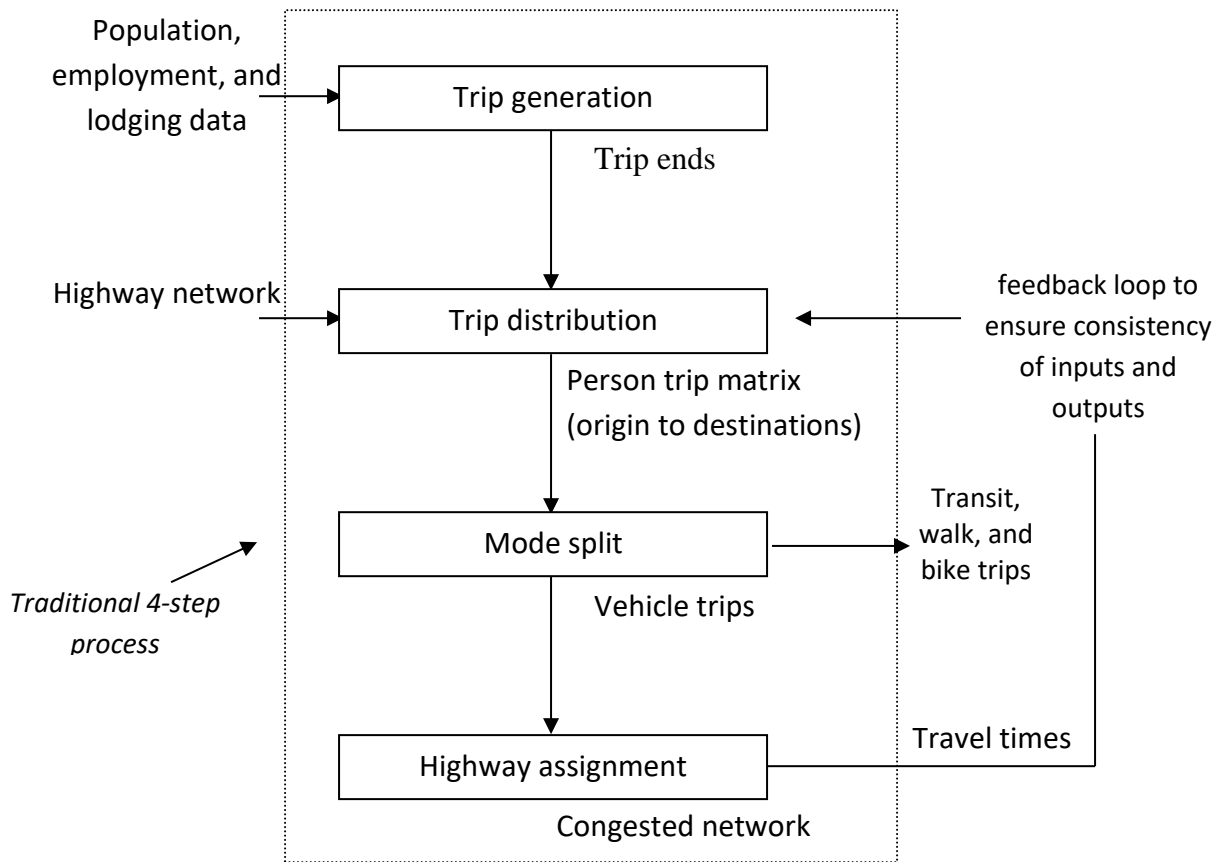
Overview of the Model

The analysis of proposed transportation options relies on a comprehensive, detailed, and systematic process for representing land use and travel in the 474 square miles of the MPO region—i.e., Douglas County. The computer model uses demographic, employment, and other land use data as well as a detailed representation of the transportation network to derive vehicle trips and travel paths throughout the modeled region.

The model takes on the task of representing the travel decisions of tens of thousands of individual travelers in and through the area. The model does this by methodically examining the underlying elements that contribute to those travel choices. The model deals with the following types of questions:

- For what purposes will people make trips? → e.g., for commutes, to shop, to visit friends or for recreational opportunities.
- Where would they start their trips? → Their homes, KU dormitories, hotel rooms, or in some cases their worksites.
- Where are the trips headed? → Worksites, stores and restaurants, medical facilities, colleges and schools, recreational destinations, or other activity centers.
- What mode would they use? → Private motor vehicle, transit, walk, or bicycle.
- What would determine a motorists choice of route? → Travel times (including free-flow speeds and traffic delays created by vehicle volumes relative to roadway capacity)

The model, outlined in its basic form in the exhibit on the next page, applies a logical analysis to each of these questions. By properly calibrating the model, the result is a close match to average annual traffic conditions in the area. The validated model—with traffic flow results estimated for each hour under average annual conditions--can then forecast travel flows in any future year in response to expected changes in population and land use, or to changes in road way facilities and policies.

Basic model structure

Trip generation is the first step in the model process. The model uses demographic, employment, and lodging data to estimate the number of person trips produced from or attracted to specific geographic subareas (transportation analysis zones--TAZs) within the region. The model divides the region into 454 internal TAZs.

The second step in the process, trip distribution, estimates trip interchanges for individual trip purposes between every pair of TAZs. The approach to this uses a gravity model that accounts for the size of each zone and the distance that separates each pair. Bigger zones produce or attract more trips. Longer travel times between zones tend to lead to a drop in trips between them. Past surveys and prior model experience in other regions define the gravity formulas and parameters that go into the trip distribution process, with reasonable adjustments to account for dormitories and student housing around the University of Kansas, and Baker and Haskell Universities.

The mode split converts person trips into vehicle trips. The trips that go by foot, bicycle, or public transit would not add cars to the road network. The mode split step isolates these trips and then adjusts the remaining person trips to account for vehicle occupancies greater than 1.

Highway assignment determines which routes the auto travelers would take between each of the zone pairs. It assigns auto trips to individual roads (links) on the highway network. This leads to new estimates of highway speeds (including the effect of congestion) on individual links, and consequently results in revised travel times on the paths between each zone pair. Because travel times influence trip distribution, the model reruns the trip distribution step and then takes these results for a revised traffic assignment. This cycle repeats three times, with each cycle yielding smaller changes.

This is a general overview of the model structure. The following sections and the outline on page 8 present more details about the particular inputs and procedures used in the new MPO model.

Introduction of a new model structure and processes

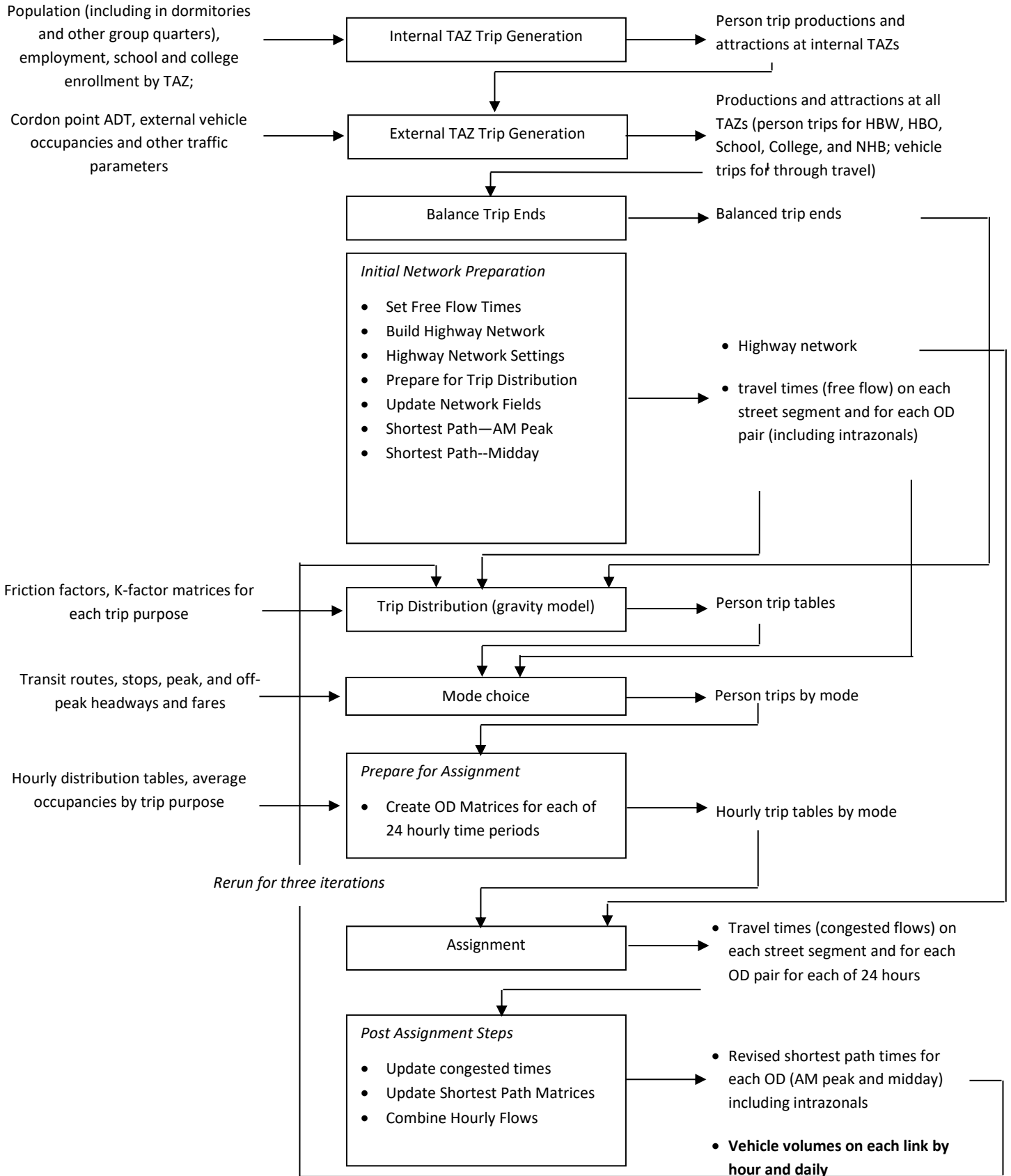
While the MPO already had a regional transportation and land use model, the changes to the model system introduced in 2022 involved more than just revisions to the TAZ boundaries, and to the base year transportation and land use inputs. Warner Transportation Consulting also revised the model structure. These changes included the implementation of a full mode choice routine. This was an interest of the MPO, and was also suitable given the significant share of trips by transit, particularly to destinations around KU.

Other changes to the model structure and processes aimed to improve the model's ability to represent observed travel flows. The standard measure of the existing model's overall goodness of fit (percent root mean squared error --RMSE) of 47.62 percent was well above the industry standard; it should be below 40 percent. The existing model predictions of travel flows at many of the region's major roads also deviated beyond acceptable limits from the observed daily counts. These results suggested the need for a more comprehensive check of the model procedures and formulas, and for model revisions where warranted. The core changes we made to the old model included the following:

- Proper conversion between *person* trips and *vehicle* trips. In the 2016 model, the trip generation step estimated person trips, but subsequent model steps did not adjust these trips to account for non-motorized modes or for vehicle occupancies greater than one. The updated model introduces a full mode split including trips by transit, walk and bicycle, and accounts for vehicle occupancy rates when converting the remaining person trips into vehicle trips.
- Estimates of through trips (external-external or X-X flows) derived within the model, and not assigned exogenously.
- Revised accounting for college trips
- Hourly assignments instead of a single daily assignment
- Complete new user interface.

The sections below, organized by model step, provide further details about these changes and the formulas used.

L-DC Model Flow Chart



Trip generation

Trip generation is the first step in the model process, and refers to the number of trips by trip purpose that begin or end at each TAZ. The model derives trips for the following discrete trip purposes:

- **HBW:** Home-based work--commute trips
- **HBSch:** Home-based school
- **HBO:** Home-based other--shopping and other non-work, non-school trips that originate from the home (or area lodging)
- **HBC:** Home-based college--trips made to or from the college or university by enrolled students
- **NHB:** Non-home based--trips--including truck trips--that originate from work sites or other non-home or lodging locations

These are the same trip purposes used in the 2015 model version.

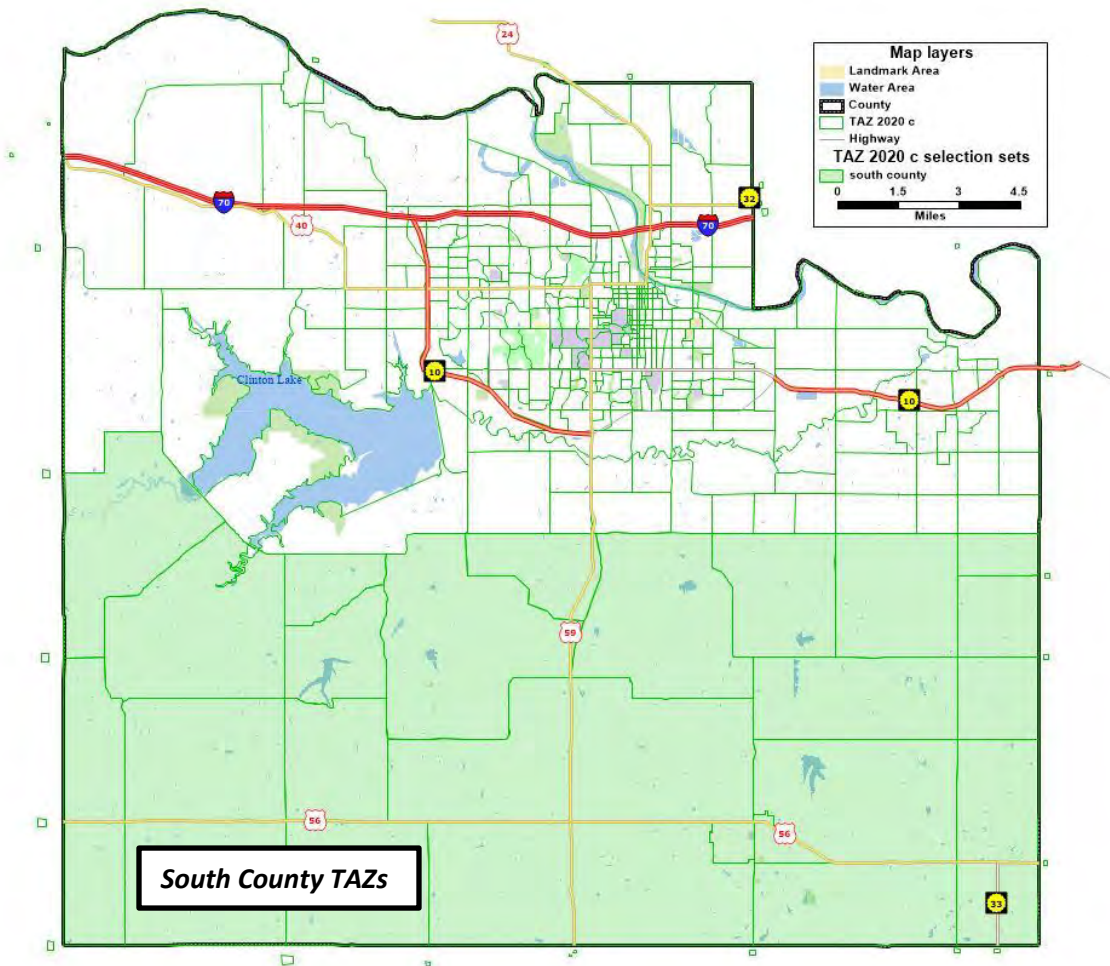
For each trip purpose, the model calculates trip productions and trip attractions. These generate different total trips, and the model then balances the total production and attractions based on whichever data source is the most reliable.

Trip productions at internal zones

The model applies several rates and calculation in the derivation of the daily person trip productions for each internal TAZ based. The primary set of rates applies to four trip purposes as a function of household size and number of household vehicles, as shown in the table at right.

The table also shows a distinct set of HBO and NHB trip production rates for zones in the south part of the county. (The geographic division between the north and south of the county is shown in the map on the next page.) The point of this distinction is to reflect trip production rates for these more discretionary trip purposes that are about 20 percent lower than for the zones in the south part of the county. This approach of applying the lower rates to the more rural parts of the county provided a much better fit for the observed traffic counts.

Person trip production rates		household vehicles			
purpose	HH size	0	1	2	3+
HBW	1	0.3	1.25	1.49	1.49
	2	1.05	1.47	1.95	2.86
	3	1.5	1.79	2.99	3.15
	4+	1.5	2.55	2.99	3.15
HBSch	1	0.01	0.01	0.01	0.01
	2	0.18	0.18	0.18	0.18
	3	1.46	1.46	1.46	1.46
	4+	1.46	1.46	1.46	1.46
HBO--north county	1	1.62	2.85	3.58	4.53
	2	4.09	4.27	4.8	5.62
	3	5.62	5.84	6.64	9.29
	4+	6.63	8.12	9.38	11.12
NHB--north county	1	1.01	2.08	2.44	2.74
	2	1.34	2.08	2.79	3.22
	3	2.04	2.77	2.96	4.32
	4+	2.04	2.77	2.96	4.32
HBO--south county	1	1.30	2.28	2.86	3.62
	2	3.27	3.42	3.84	4.50
	3	4.50	4.67	5.31	7.43
	4+	5.30	6.50	7.50	8.90
NHB--south county	1	0.81	1.66	1.95	2.19
	2	1.07	1.66	2.23	2.58
	3	1.63	2.22	2.37	3.46
	4+	1.63	2.22	2.37	3.46



Note that the model accounts separately for trip productions by people staying in **hotels and motels**. The production rate is 8.17 trips per occupied room. This is the daily rate documented in the ITE Trip Generation Manual, 9th Edition. The model adds these for the respective TAZ to the HBO trip purpose.

Douglas County has 8,414 **college students living in group quarters (dormitories)**. Most of these (7,121) are at KU; 801 are at Haskell, and 492 are at Baker University. The model does not use the household-based trip production rates described above, but rather adds the following person trip productions for each college dormitory's respective TAZ:

- HBW no added trip productions
- HBSch no added trip productions
- HBO 4.09 * population in college dormitory
- NHB 1.34 * population in college dormitory

None of these are for trips by college students to their respective college or university. Those are the **Home-Based KU** (college trips to University of Kansas) trips, with the person trip productions by TAZ calculated as follows:

- $COLL_{KU} = 1.2 * \text{population in KU college dormitories} + .3 * \text{KU non-dorm students in each zone}$

KU was able to provide us with aggregated number of non-dorm students by zone.

- $COLL_{oth} \text{ (Haskell and Baker)}$
 $= 1.2 * \text{population in respective college dormitories}$

Trip attractions at internal zones

The estimate of trip attractions for three main purposes in each internal zone comes from the following formula:

- HBW attractions $1.611 * BE + 1.565 * RE + 1.565 * (SE + EEc + EEnc) + 2.086 * HCE$
- HBSch attractions $1.3 * (SchEnE + SchEnM + SchEnH)$
- HBO attractions $.941 * HH + 9.0 * RE + 2.91 * (SE + EEc + EEnc) + 3.88 * HCE$
- NHB attractions $.8 * HH + 3.743 * BE + 7.6 * RE + 2.56 * (SE + EEc + EEnc) + 3.43 * HCE$
- COLL $1.1 * \text{college enrollment}$

Where:

BE	=	Basic employment
RE	=	Retail employment
SE	=	Service employment
EEc	=	Education employment—college
EEnc	=	Education employment—non-college
HCE	=	Health care employment
SchEnE	=	Enrollment—elementary school
SchEnM	=	Enrollment—middle school
SchEnH	=	Enrollment—high school
HH	=	Households

"Retail" includes stores, and food and accommodation establishments.

The trip attraction rates are those used for the Flint Hills MPO model, and are generally consistent with the rates documented in NCHRP 365, Table 8. A deviation from this table is the distinct accounting for health care employment. This adjustment is consistent with other models in other areas (e.g., Humboldt

County) that used health care employment in the calculation of trip attractions. The adjustment also seems justified by the consequent model results. The earlier Lawrence MPO model only disaggregated employment as retail and non-retail.

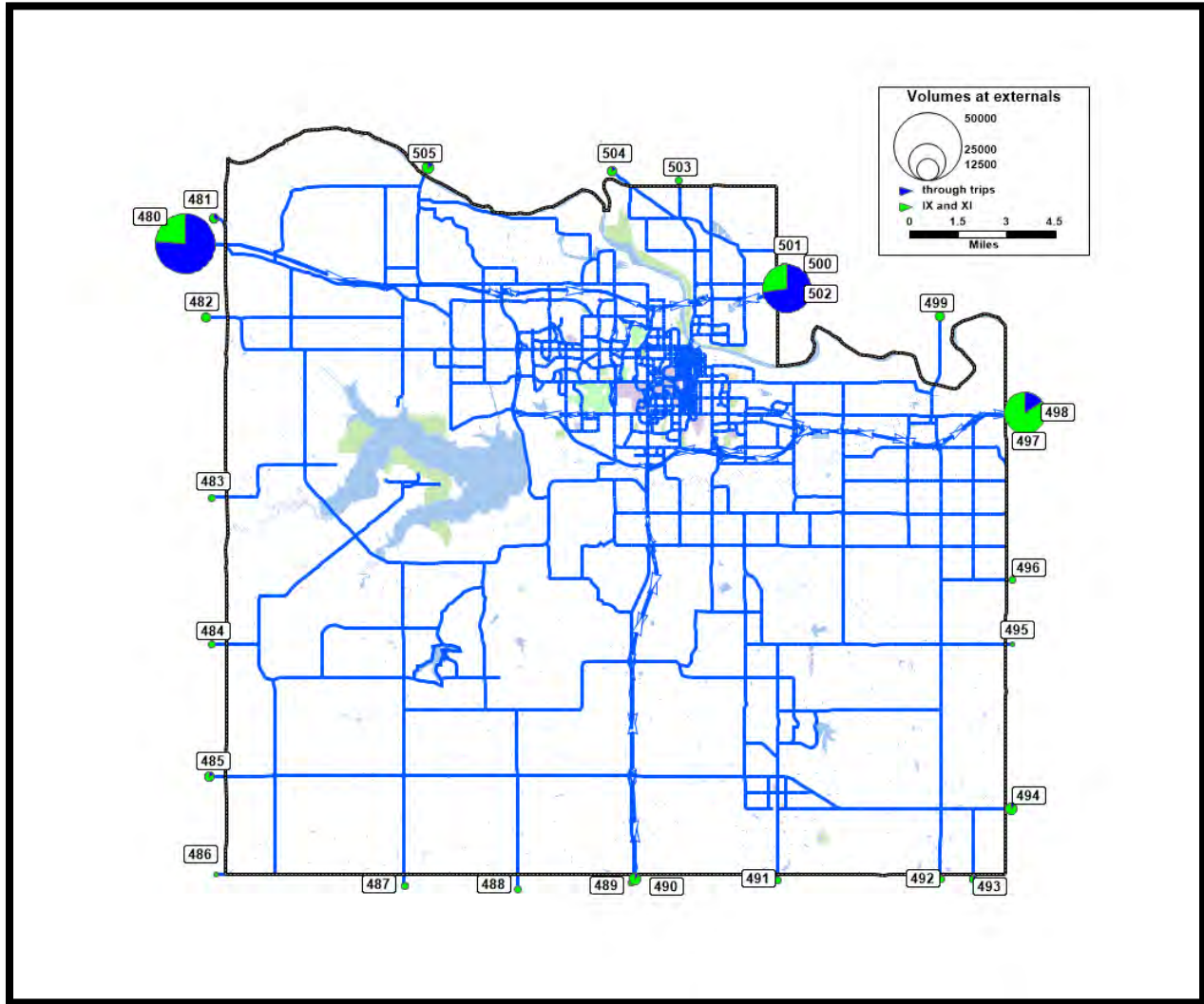
Trip ends at external zones

A significant number of trips will have one end within the modeled region, and another outside of it. Many other vehicles on area roads will be “through-trips,” i.e., passing through the region without *any* trip end within the modeled area. The model needs to account for both of these types of flows.

Ideally we would have had data based on surveys at the regional cordon points, from a calibrated state-wide transportation model, or estimated based on cell tower data. We identified no such surveys, and Kansas does not maintain a state-wide model on which to estimate inter-regional flows. Cell tower data was also not obtained for this study.

Given this, we account for travelers crossing in or out of the region by making and testing reasonable guesses. The model first estimates through-traffic as a function of road classification and traffic volumes at the cordon line. NCHRP 365, chapter 5, describes this approach (Modlin) with formulas derived from analyses of several other metropolitan regions.

We adjusted the NCHRP formula based on professional judgment and as needed to match observed flows. The map below shows the assumed distribution of base-year vehicle flows at the cordon points. The size of the pies represents the observed vehicle volume in both directions. The blue wedge is the share of that traffic that makes a through-trip across the region. (Note that the volume and share of through trips on I-70 and K-10 increases in the 2050 forecast.)



The external stations are as follows:

480	I-70, Kansas Tnpk west end of county	493	KS 33 (Virginia Rd)
481	US 40 west end of county	494	US 56 east end of county
482	SE 45th St	495	CR 460
483	CR 458	496	N 900 Rd
484	CR 460	497	N 1400 Rd
485	US 56 west end of county	498	KS-10 east end of county
486	N 1 Rd west end of county	499	E 2200 north end of county
487	E 550	500	N 1800 (Linwood Rd)
488	E 900	501	US 40 east
489	CR 1045	502	I-70, Kansas Tnpk east end of county
490	US 59	503	E 1400
491	CR 1055	504	US 24
492	E 2200 south end of county	505	Eisenhower Mem Dr

The model distributes the through-traffic in proportion to the vehicle volumes at each cordon point, and after adjustments for illogical traffic flows. Motorists, for example, would not enter the modeled region on K-10 at the east end of the county (external station 498) and then turn around and exit the region on N 1400 Rd (external station 497). The table below shows the vehicle through trips between cordon points as estimated by the model in the 2019 base year. The shaded area is for external stations 480 and 502, representing I-70, Kansas Turnpike, on the west and east ends of the county.

	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	total	
480	384	0	0	0	0	162	0	0	0	0	221	0	0	160	195	0	0	0	2371	0	109	346	12462	0	259	303	16972	
481	384	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	5	0	0	1	50	0	1	1	445	
482	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
483	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
484	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
485	162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	21	0	0	1	187	
486	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
487	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
488	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
489	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
490	221	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	29	0	1	1	257	
491	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
492	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
493	160	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	21	0	0	1	183	
494	195	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	25	0	1	1	223	
495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
497	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
498	2371	5	0	0	0	2	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	2387	
499	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
500	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	111	
501	346	1	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	352	
502	12462	50	0	0	0	21	0	0	0	0	29	0	0	21	25	0	0	0	0	0	0	0	0	0	0	34	39	12680
503	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
504	259	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	3	0	0	1	34	0	0	0	300	
505	303	1	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	4	0	0	1	39	0	0	0	351	
total	16972	445	0	0	0	187	0	0	0	0	257	0	0	183	223	0	0	0	2387	0	111	352	12680	0	300	351		

The remaining vehicle volumes at these points would have a trip end among the modeled region's internal TAZs. The model assigns these non-through trips to the various other trip purposes, as follows:

$$X_{p,cp} = ADT_{cp} * (1-XXPct_{cp}/100) * X_{locc} * (1 - XA) * X_{Pct_p}$$

Where,

$X_{p,cp}$ = Person trips for trip purpose p in vehicles entering the region at cordon point cp and bound for a destination inside the region (i.e., eXternal -Internal traffic)

ADT_{cp} = average daily traffic at the cordon point

$XXPct_{cp}$ = the percent of traffic entering the region at cordon point cp that is bound for a destination outside the region (i.e., through-traffic or eXternal-eXternal traffic)

X_{locc} = Average occupancy of vehicles entering the region bound for internal destinations. The rate is set to 1.154.

XA = share of flows at externals with attractions outside the MPO area. This establishes

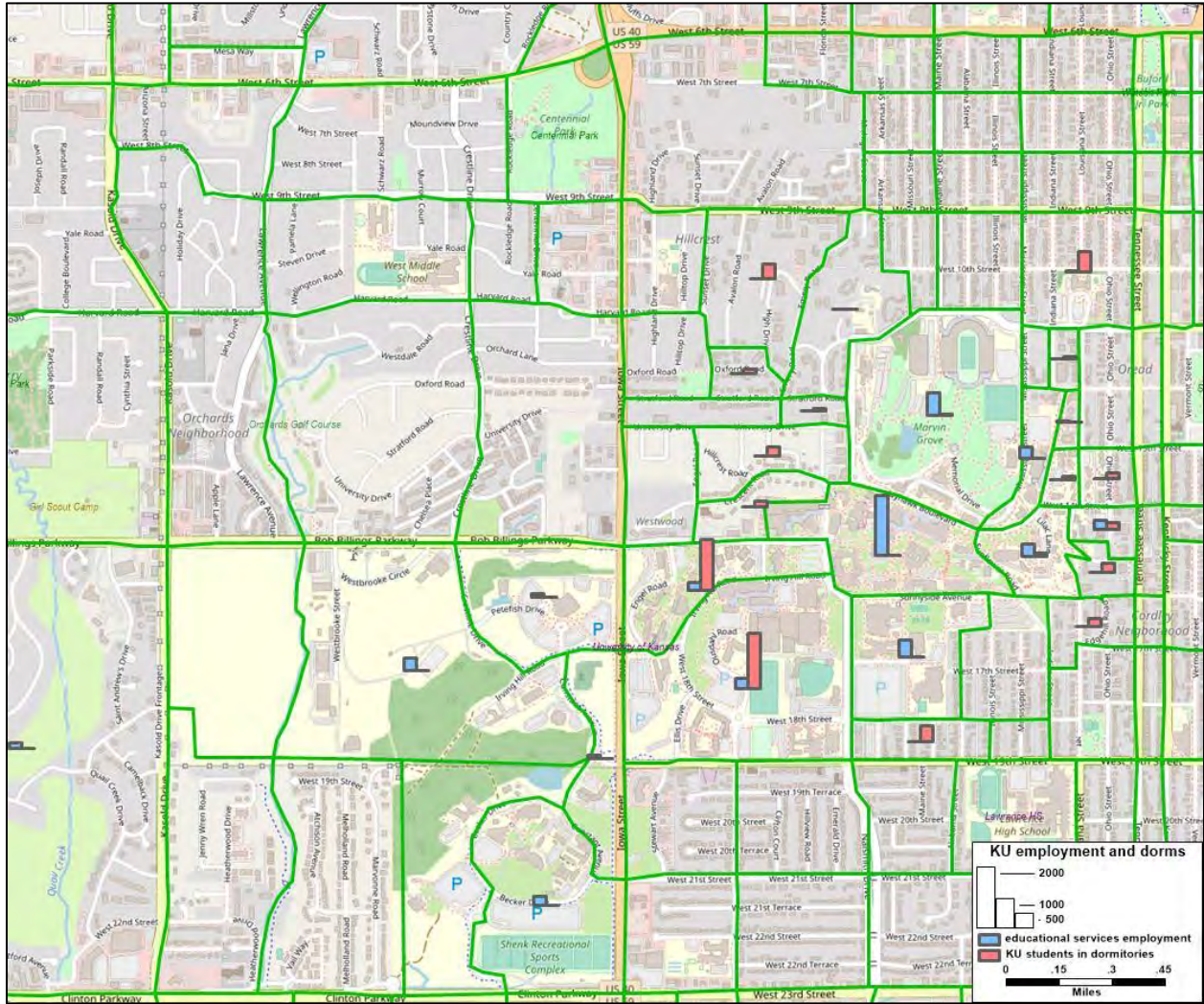
if the flows are bound for internal or external attractions. A rate of .5 means that the number of the MPO region travelers going to attractions outside of the region is equal to the number of external area travelers going to attractions in the MPO region. A rate greater than .5 means that the MPO region is more of a production than an attraction end for non-through trips at the cordon points. The rate for XA in the model is set to **.72**. This rate comes from an assessment of hourly counts of traffic at I-70 on the west end of Douglas County, which suggests that XI trips are mostly headed to attraction ends outside of the county. The model applies this rate uniformly for all trip purposes and at all cordon points.

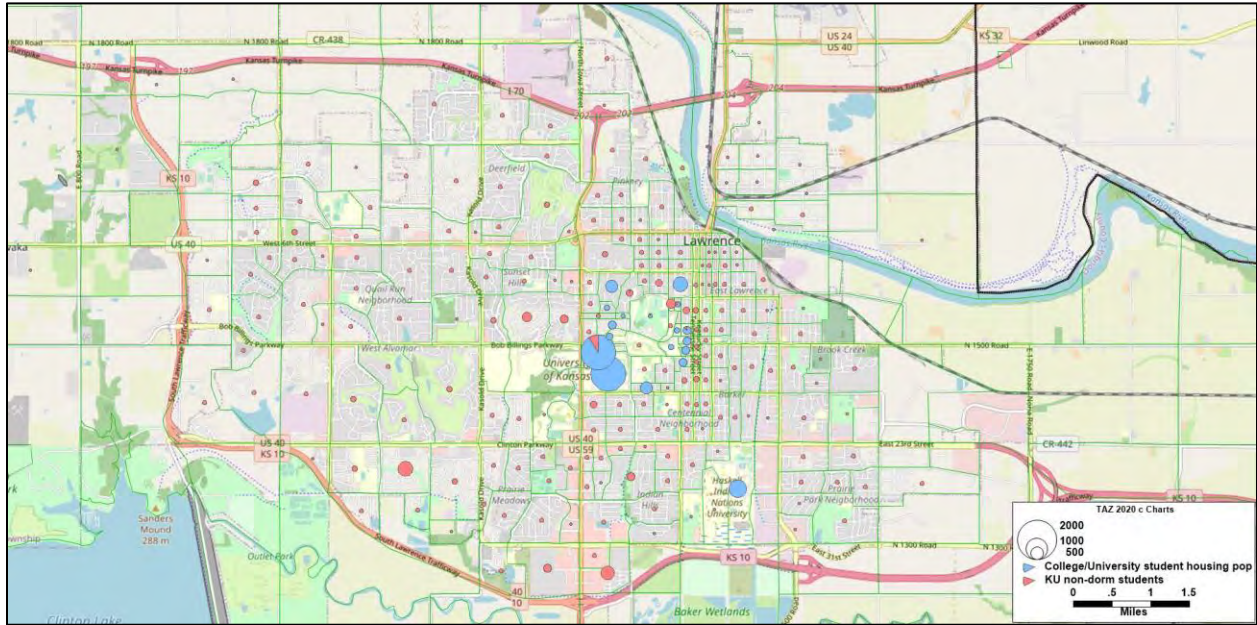
$XPct_p$ = the share of IX or XI travelers at the cordon points assigned to trip purpose p :

HBW	.3227
HBO	.3249
NHB	.3424
COLL	.01

These shares fit with reasonable expectations and observed traffic counts approaching the University of Kansas.

The same formula applies for determining $IX_{p,cp}$ (person trips for trip purpose p in vehicles originating an internal zone and bound for some external destination).





Balancing trip ends

The table at right shows the method used to balance the trip ends calculated separately for each trip purpose’s productions and attractions. This step ensures that the number of trips produced for all TAZs and external stations in the modeled region is an exact match for the number of trips attracted by all TAZs and external stations. The balancing relies on the calculation that seems most reliable, where the calculation not used for balancing still determines the distribution either produced or attracted by each TAZ.

Unbalanced trip productions and attractions			% of total balanced trips
	balance to:	balance	
HBW	production	116,306	17%
HB sch	attraction	18,885	3%
HBO	production	334,224	48%
NHB	production	161,858	23%
KU	attraction	23,100	3%
Oth coll	attraction	2,265	0%
EE	NA	34,449	5%
total trips		691,088	100%

The full balancing step yields a total of 691,088 daily person trips within the MPO modeled region (exclusive of purely internal --and unmodeled--trips such as student trips within the same zone at KU).

Trip distribution

Trip distribution connects the trip ends. It takes the number of trips that start at each TAZ and estimates the share of those trips that end *at every other* TAZ. The model does this for the using a gravity model with a doubly-constrained gamma formula. Here, the flow between TAZs depends on the size of the two zones and the travel time between their centroids. Bigger zones produce or attract more trips. Longer

travel times between zones lead to a drop in trips between them. The process applies the process through several iterations in a way that maintains the total trip ends at each zone.

The parameters in the gravity model appear below. The rates for HBW, HBO, and NHB are from NCHRP 365, table 14. The rates for school and college trips are based on the model for Flint Hills. A check of average and distributed trip times suggests that these rates are also reasonable for the MPO region.

The rate for the college trip purpose only applies for students heading to Baker and Haskell Universities. For student trips to the University of Kansas, the model uses the addresses in the fall of 2019 for dormitories and for the homes of students living off-campus, aggregated up to the TAZ.

Gamma function coefficients for friction factors			
trip purpose	a	b	c
HBW	28507	-0.02	-0.123
HBO	139173	-1.285	-0.094
NHB	219113	-1.332	-0.1
SCH	220000	-1.6	-0.15
Coll	150000	-1.5	-0.15

The gravity model formula is

$$F_{ij} = a * t_{ij}^b * e^{c*t_{ij}}$$

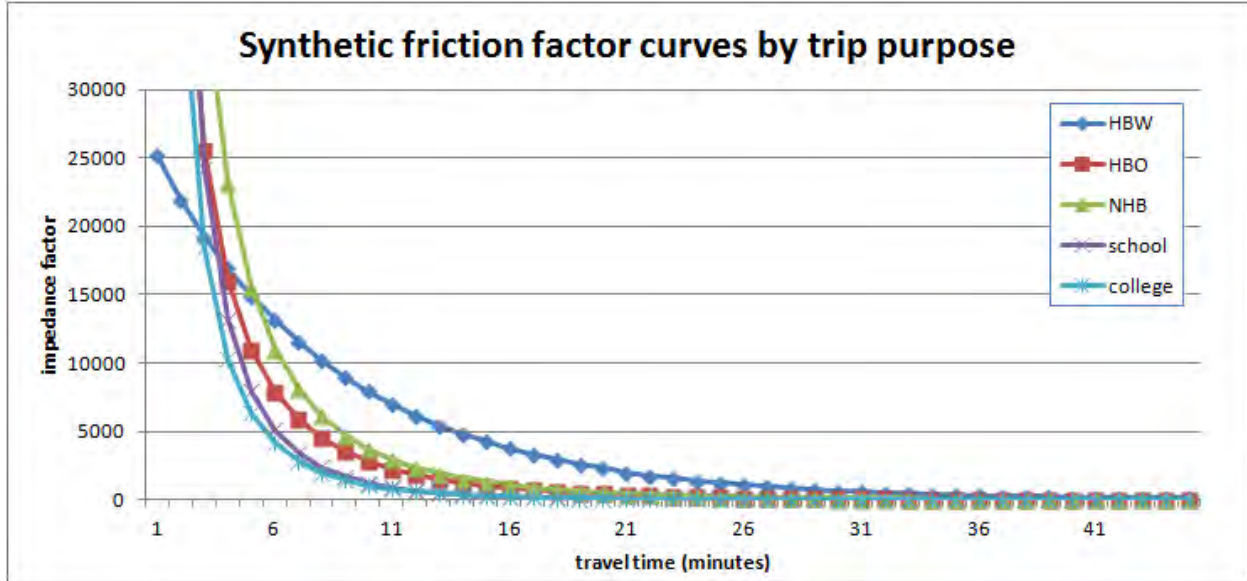
Where:

F_{ij} = Impedance or “friction” between zone *i* and zone *j*

t_{ij} = travel time between zone *i* and zone *j*

a, b, c constants

The gamma function coefficients listed above generate the friction factor curves shown below for travel times up to 45 minutes.



The friction factor curve for external-external (through trips) is a straight horizontal line, meaning that travel time across the region for these trips do not matter. The distribution between the cordon points for these trips is purely on a proportional basis to the total vehicle counted at each point after removing the illogical flows from consideration.

Note that the model initially sets the travel times based on free-flow (non-congested) conditions. In subsequent iterations, the model replaces these times with congested travel times estimated by the model during a particular time of day. Home-based work (HBW) and school trips use the 7 to 8 AM travel time; other trip purposes use the noon to 1 PM travel times.

The new model does apply **k-factors**, exogenously defined factors to account for impedances or travel constraints between zone pairs beyond what the travel times would suggest. Motorists, for example, would not enter the modeled region on K-10 at the east end of the county (external station 498) and then turn around and exit the region on N 1400 Rd (external station 497). K-factors set to 0 for the particular zone pair preclude these illogical flows.

Transportation modelers may also use k-factors whenever it is the only avenue left to account for apparent anomalies in travel flows. A factor less than 1 (but greater than 0), for example, could account for a river or a ridge that some people perceive as a barrier for travel flows, or for different jurisdictional tax rates that influence the choice of shopping trip destinations.

Other than to preclude illogical movements between pairs of external stations, the MPO model only uses k-factors other than 1 to increase the share of trips between zones in the southeast part of the County around Baldwin City and the four nearby external stations (491 to 494). The k-factors for these pairs are set to 2. These factors improve model conformance with observed traffic counts. We applied these

factors in the trip distribution step only after extensively testing other factors to improve the model fit with the observed travel flows.

Preparing for Vehicle Assignment

Prior to assignment, the program must convert the daily person trip tables into hourly vehicle trip tables. This involves a mode split to remove the share of trips that would go by non-auto modes, and the application of a set of occupancy rates and the disaggregation of daily trips into shares in each of 24 hours.

Mode split

The new model incorporates a mode split routine to divide person trips among various modes: car (or truck), transit, walk, and bike. It does this by calculating a “utility” for each mode based on key characteristics of the mode and of the particular travel market. The coefficients used in these calculations are shown on the next page, and come from the mode choice model used by Lincoln, NE (a similarly sized MPO with a major university), with some adjustments to match the observed bus ridership data in Lawrence. After calculating the utilities for each mode and TAZ pair, the model applies a multi-nomial logit formula to determine the travel shares by each mode. The logit formula and nesting are as follows:

For non-university trips by income group

$$\begin{aligned} \text{Logsum}(nm) &= \log(e^{U_w} + e^{U_b}) \\ P(d) &= e^{U_d} / (e^{U_d} + e^{U_t} + e^{\text{Logsum}(nm) + \alpha_{nm}}) \\ P(t) &= e^{U_t} / (e^{U_d} + e^{U_t} + e^{\text{Logsum}(nm) + \alpha_{nm}}) \\ P(w) &= [(\theta_{nm} * e^{\text{Logsum}(nm) + \alpha_{nm}}) / (e^{U_d} + e^{U_t} + \theta_{nm} * e^{\text{Logsum}(nm) + \alpha_{nm}})] * (e^{U_w} / (e^{U_w} + e^{U_b})) \\ P(b) &= [(\theta_{nm} * e^{\text{Logsum}(nm) + \alpha_{nm}}) / (e^{U_d} + e^{U_t} + \theta_{nm} * e^{\text{Logsum}(nm) + \alpha_{nm}})] * (e^{U_b} / (e^{U_w} + e^{U_b})) \end{aligned}$$

For University of Kansas trips to/from the university

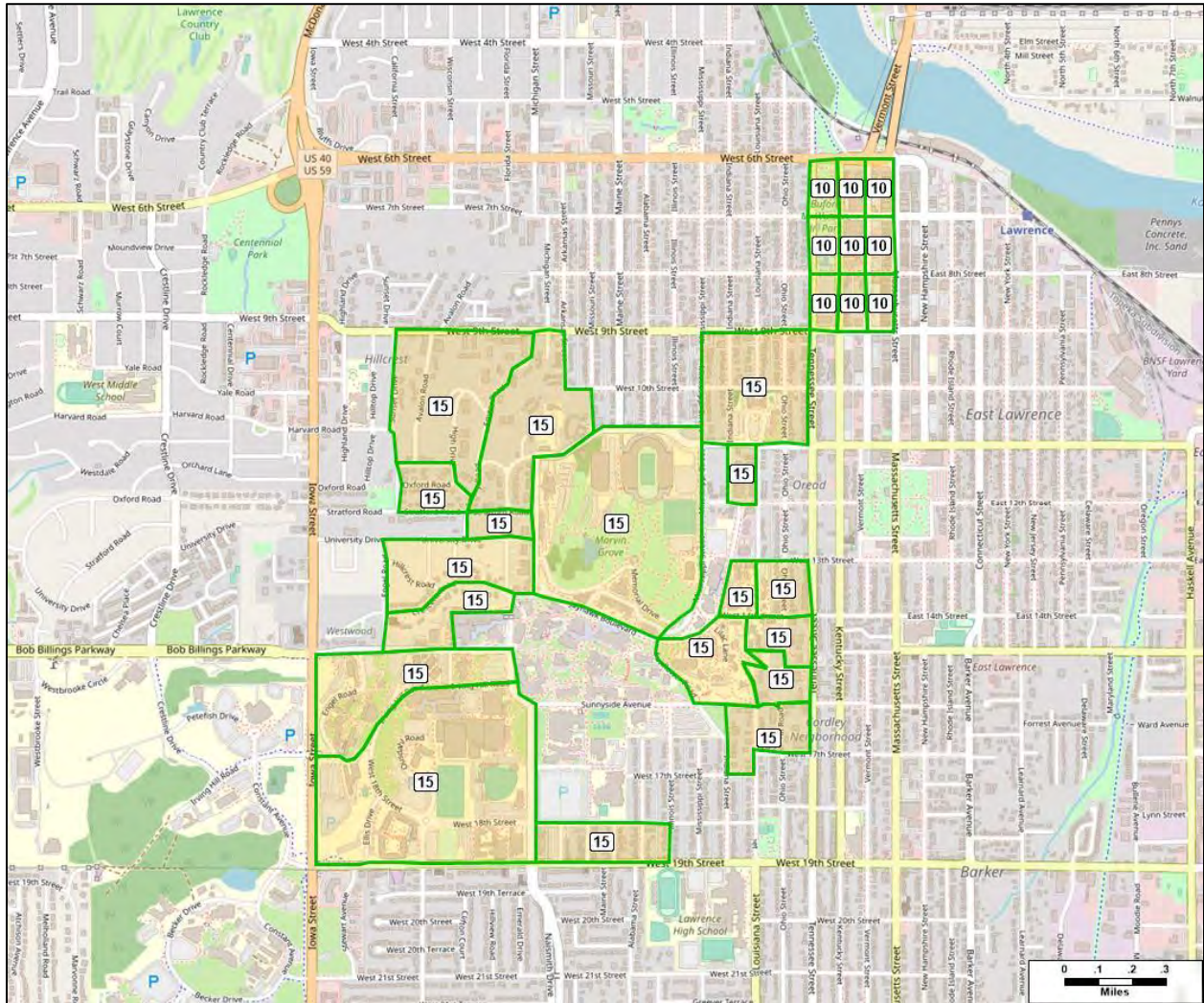
$$\begin{aligned} P(d) &= e^{U_d} / (e^{U_d} + e^{U_t} + e^{\text{Logsum}(nm) + \alpha_{nmKU}}) \\ P(t) &= e^{U_t} / (e^{U_d} + e^{U_t} + e^{\text{Logsum}(nm) + \alpha_{nmKU}}) \\ P(w) &= [(\theta_{nm} * e^{\text{Logsum}(nm) + \alpha_{nm}}) / (e^{U_d} + e^{U_t} + \theta_{nm} * e^{\text{Logsum}(nm) + \alpha_{nmKU}})] * (e^{U_w} / (e^{U_w} + e^{U_b})) \\ P(b) &= [(\theta_{nm} * e^{\text{Logsum}(nm) + \alpha_{nm}}) / (e^{U_d} + e^{U_t} + \theta_{nm} * e^{\text{Logsum}(nm) + \alpha_{nmKU}})] * (e^{U_b} / (e^{U_w} + e^{U_b})) \end{aligned}$$

CPM	=	cost per mile (drive modes)	=	0.133
α_{nm}	=	constant for non-motorized modes	=	-1
α_{nmKU}	=	constant for non-motorized modes—KU	=	4
θ_{nm}	=	constant for logsum of non-motorized modes	=	0.5

Here are the formulas for calculating the utilities for each mode:

Utility equations									
	α_1 (transit)	α_2 (bike)	β_1 (ivtt)	β_2 (ovtt)	β_3 (lwait)	β_4 (KU student)	β_5 (cost low inc)	β_6 (cost med inc)	β_7 (cost high inc)
Mode	-4	-3	-.025	-.05	-.0125	8	-.15	-.075	-.05
Transit— KU	1	0	Time on bus	Access walk time + egress walk time + transfer wait time + transfer walk time	Max(initial wait – 7.5, 0)	1			
Transit— low income	1	0	Time on bus	Access walk time + egress walk time + transfer wait time + transfer walk time	Max(initial wait – 7.5, 0)	0	Fare		
Transit— med income	1	0	Time on bus	Access walk time + egress walk time + transfer wait time + transfer walk time	Max(initial wait – 7.5, 0)	0		Fare	
Transit— med income	1	0	Time on bus	Access walk time + egress walk time + transfer wait time + transfer walk time	Max(initial wait – 7.5, 0)	0			Fare
Drive— low inc	0	0	Time in car	Terminal time		0	CPM * miles		
Drive— med inc	0	0	Time in car	Terminal time		0		CPM * miles	
Drive— high inc	0	0	Time in car	Terminal time		0			CPM * miles
Walk	0	0		Walk time (assumes 3 mph)					
Bike	0	1		Bike time (assumes 12 mph)					

TAZs with terminal times



Vehicle occupancies

For remaining motorists, the model also applies a set of vehicle occupancy rates, distinct for each trip purpose. The table below shows the rates used. These rates come from NCHRP, 716, table 4.16.

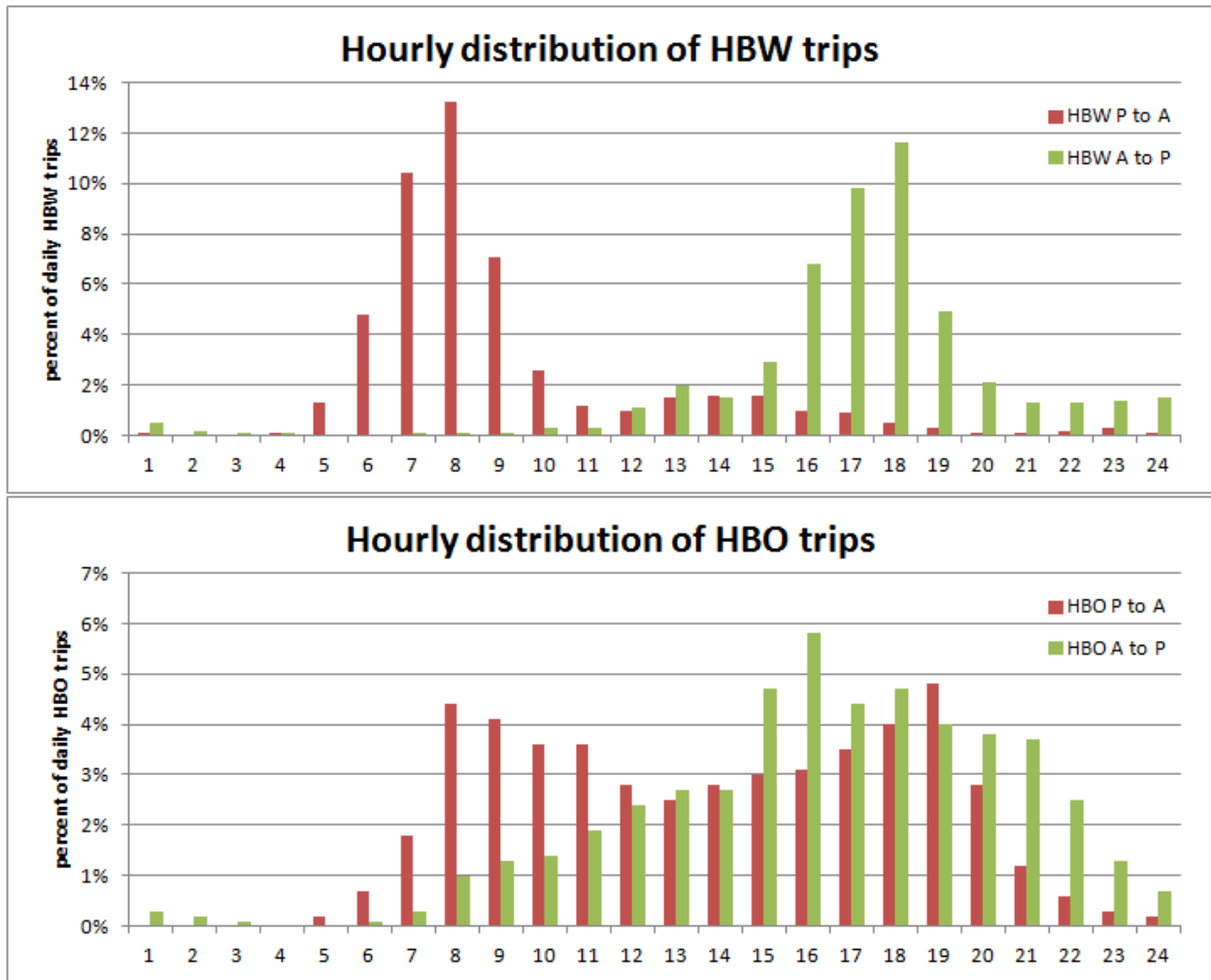
Average vehicle occupancy	
HBW	1.05
HBO	1.231
NHB	1.2
School	1.89
College	1.031

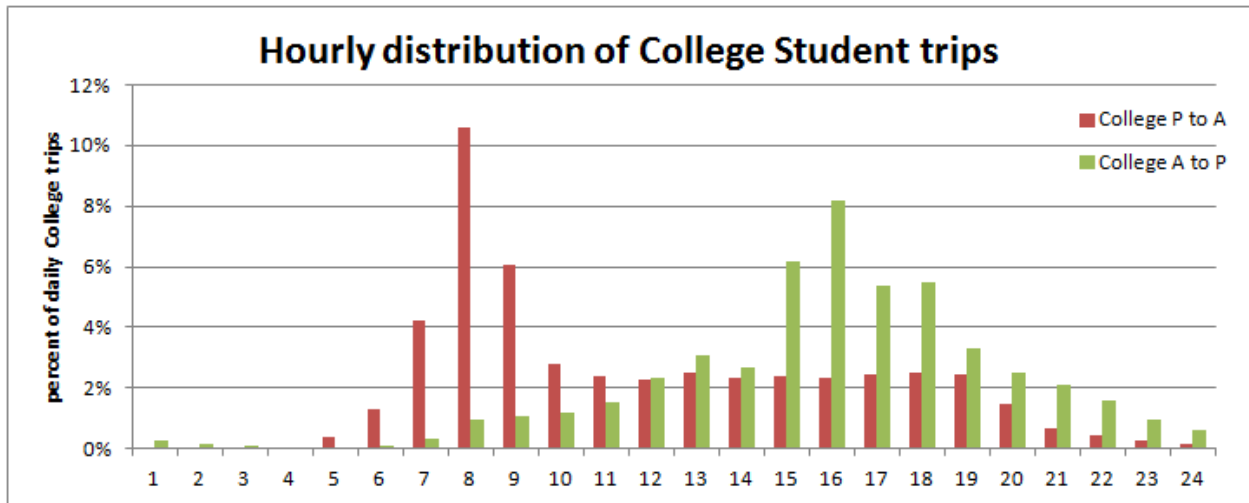
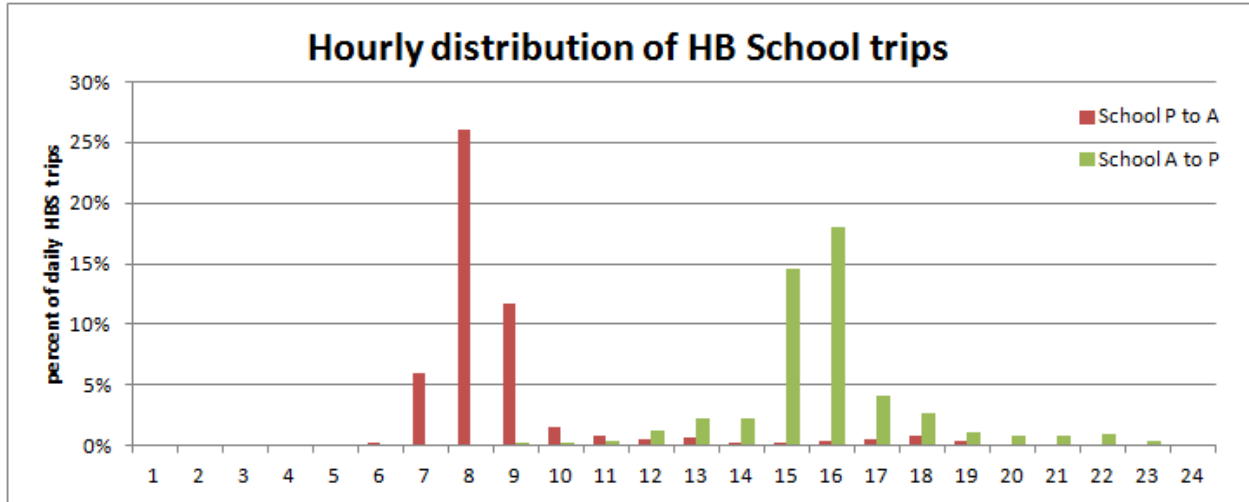
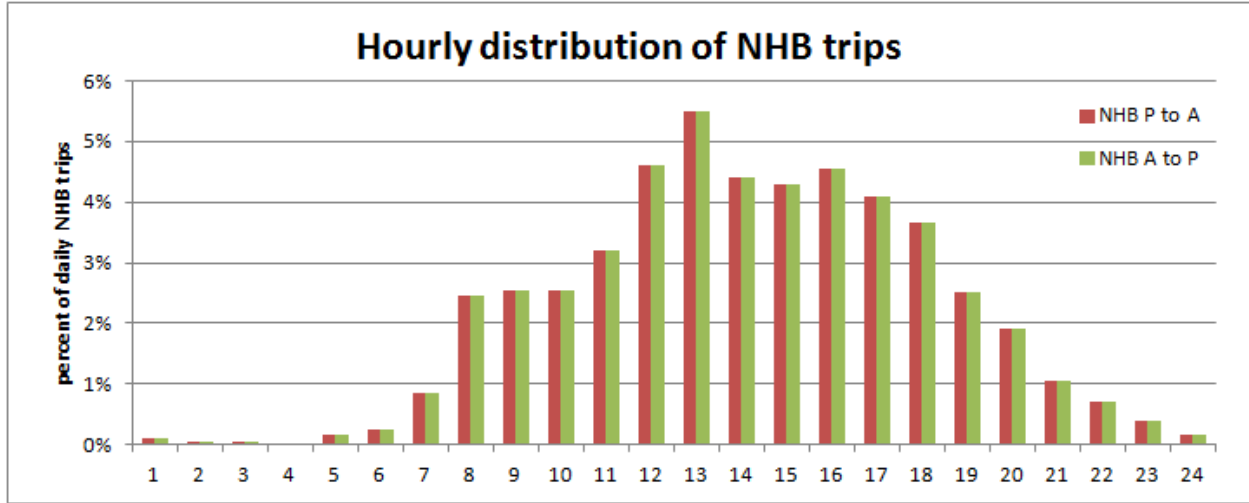
Through-trips (Ext-Ext) are already in terms of vehicle trips and do not need further conversion.

Distribution of trips by hour

Hourly traffic assignments offer a more realistic presentation of flows than the single, daily assignment performed in the 2016 model. The distribution of trips by hour accounts for the trip purpose and the direction of the travel. For example, a commute trip (home-based work, HBW) tends to go from the home (production) to the work site (attraction) in the morning, and then back from the work site to the home in the afternoon.

The charts below show the hourly distributions used in the model. The HBW, HBO, NHB, and HB-School shares come from NCHRP716, table C.11. The time-of-day distribution for student trips to and from colleges is based on the Wasatch Front Regional Council modeling of home-based college trips and the survey of students at Utah State University.

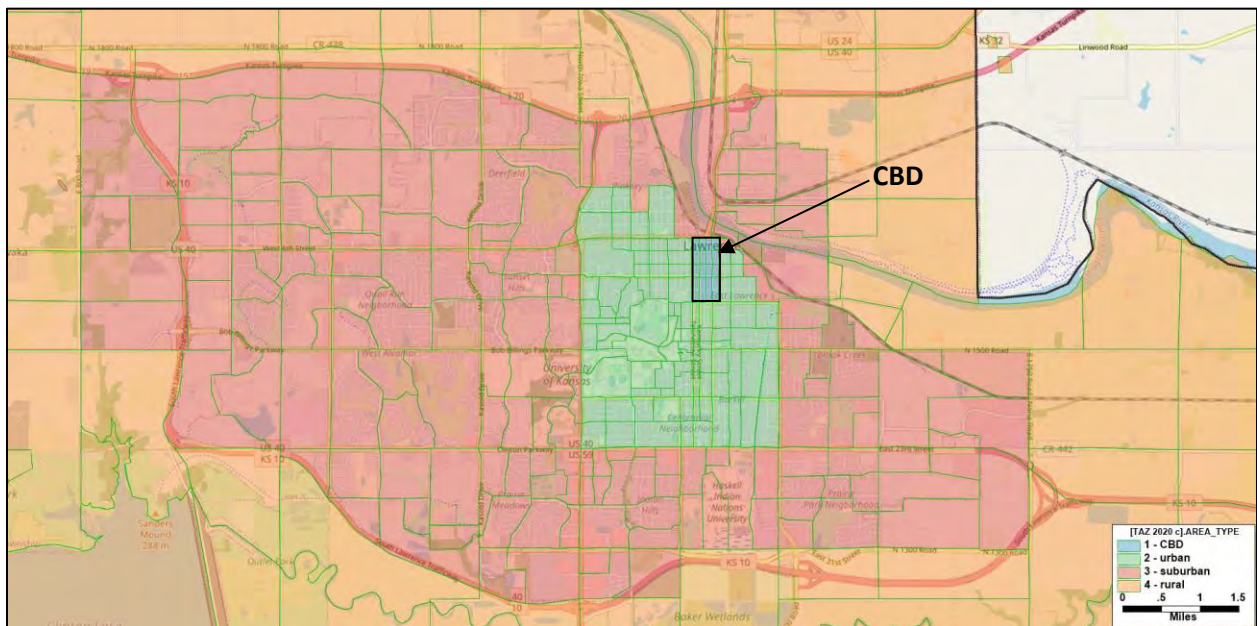


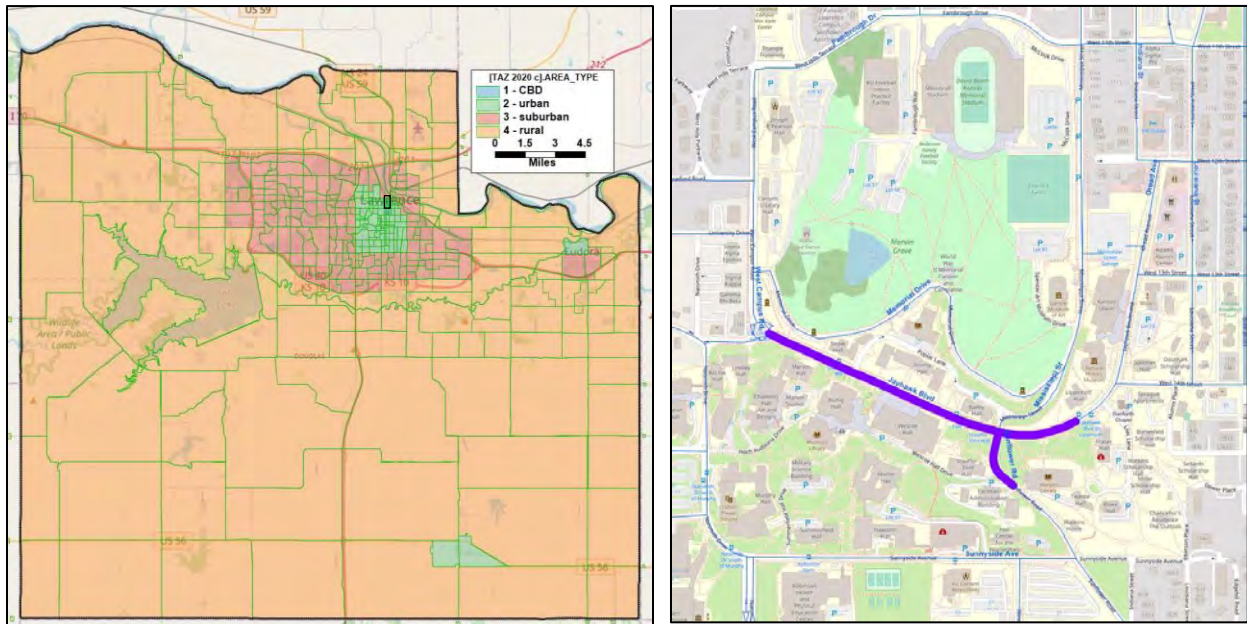


Assignment

The model aggregates the trip tables for all trip purposes by hour and then assigns these flows to the network. Each of the 24 hourly assignments applies a Stochastic User Equilibrium approach. Unlike the traditional User Equilibrium approach, Stochastic User Equilibrium does not assume that travelers have perfect knowledge of all path alternatives and that they perceive travel costs in the same way. A more realistic assumption is that some travelers would still use a path even if the travel time is not absolutely the fastest. Slower paths will have a lower assigned flow, but it would not have a zero flow as it would under the deterministic User Equilibrium approach.

The road performance function uses a standard BPR formula with the parameters set according to the functional classification, the type of median strip, and the general location within the modeled area. The type of median strip refers to the presence of a physical median (other than just a yellow line) or of a continuous central left-turn lane. The general location, shown as the area type for the Lawrence area and for all of Douglas County in the maps on the next page, is a proxy for the density of intersections curb cuts, and traffic controls that affect road performance.





The map on the right shows one other adjustment to the standard application of capacity and free-flow speed. The highlighted roads: Jayhawk Boulevard and part of Sunflower Road are closed to vehicle traffic (except for buses) on weekdays from 8 AM to 5 PM.

The table on the next page shows the general capacity and free-flow speeds used in the model. These rates apply for all time periods, and note that not all FCCs are in all area types. The model makes a further adjustment to the capacity calculation to account for center turn lanes or roads with a clear central median. For continuous center turn lanes, the model adds .125 lanes per direction.

Capacity and free-flow lookup tables

The model assigns capacity and the free-flow speed (ambient speed in the absence of any traffic congestion) based on each road segment's functional class and area type. The lookup tables appear below.

functional class	Capacity (vehicles per lane per hour) by area type				Free-flow speed (mph) by area type			
	1 CBD	2 urban	3 suburban	4 rural	1 CBD	2 urban	3 suburban	4 rural
1 Interstate	2000	2000	2000	1900	50	60	70	70
2 Expressway	1100	1150	1200	1200	45	55	55	60
3 Major Arterial	837	837	837	972	30	30	35	50
4 Minor Arterial	666	774	774	810	30	30	34	45
5 Major Collector	700	740	740	740	25	30	30	40
6 Minor Collector	504	639	666	666	25	25	25	50
7 Local	520	660	690	690	20	25	25	31
8 Ramp	990	1080	1170	1170	25	25	25	25
9 Turnaround	500	500	500	500	15	15	15	15
10 KU private	560	710	740	740	25	30	30	40
11 county paved	560	710	740	740	28	30	34	42
12 county gravel	300	300	300	300	35	35	35	35
20 Connector	1800	1800	1800	4000	20	20	20	20

Note that the capacity is in vehicles per lane *per hour*. This differs from the capacity lookup table used in the earlier (2016) model which defined capacity per lane for per day. The use of hourly capacity accounts for the irregular distribution of traffic flows by time-of-day, and is more meaningful than capacity for the full 24 hours. The rates used in the new model, however, is largely a function—9 percent—of the daily capacity per lane used in the 2016 study, with some adjustments following discussions with staff at KDOT. The free-flow speeds are unchanged from the earlier, 2016 model revision.

The alpha and beta factors for each type of roadway appears in the table at right. These factors are part of the BPR equation that relates travel time as a function of vehicle volume and road capacity. The new model generally uses the same alpha and beta values as in the 2016 MPO model, and these are consistent with the average rates in NCHRP 716, table 4.26.

functional class	Alpha	Beta
1 Interstate	0.15	8.8
2 Expressway	0.25	7.5
3 Major Arterial	0.75	8
4 Minor Arterial	0.75	8
5 Major Collector	0.4	5.5
6 Minor Collector	0.4	5.5
7 Local	0.15	4
8 Ramp	0	1.1
9 Turnaround	0	1.1
10 KU private	0.4	5.5
11 county paved	0.4	5.5
12 county gravel	0.15	4
20 Connector	0	1.1

Equilibration and Development of a Final Trip Table

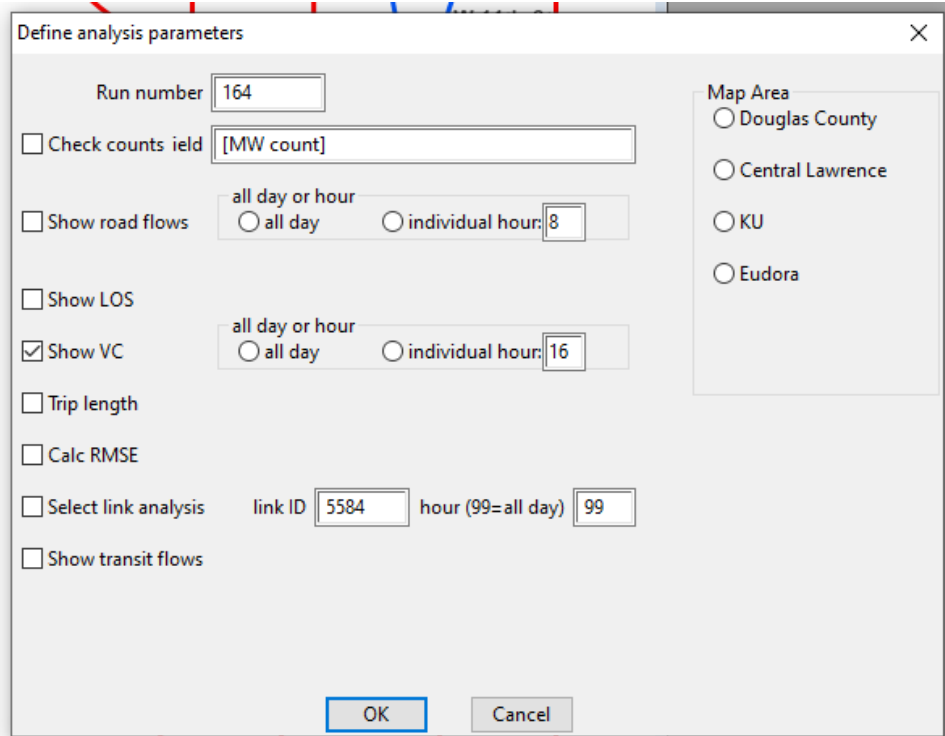
The hourly traffic assignments are capacity constrained, meaning that increasing traffic volumes raise traffic times, and then some travelers will consequently shift to alternative routes. The model goes through several iterations of assigning traffic, calculating travel times between each zone pair, and mathematically calculating the share of trips to assign to alternative routes in subsequent iteration. The end result, equilibrium, occurs when no travelers can find a perceived faster route through a unilateral change of routes. In practice, the highway assignment routine ends when the parameter (δ) that measures the average absolute difference in flows is less than 0.98 for three iterations in a row.

The model also includes a broader feedback loop from highway assignment back to the step for trip distribution. This occurs because the assignment revises the travel times on the paths between each zone pair. The revised travel times would then affect the trip distribution. To deal with this, the model reruns the trip distribution step and then takes these results for a revised traffic assignment. This cycle repeats three times, with each cycle yielding smaller changes. After the third cycle, the trip table is stable; this becomes the final trip table used for all reported results.

New user interface

Finally, the model introduces a user interface to allow for easy running of the model, keeping track of inputs and changes, and conducting analyses of model results. It removes all the hard-coded file references in the earlier the MPO model. Screen shots of the "New Run" and "Analysis" dialog boxes appear below.

The model keeps a log of all model runs with the files and descriptions used in each.



The new user interface also allows for simplified tools for developing new networks and other file inputs.

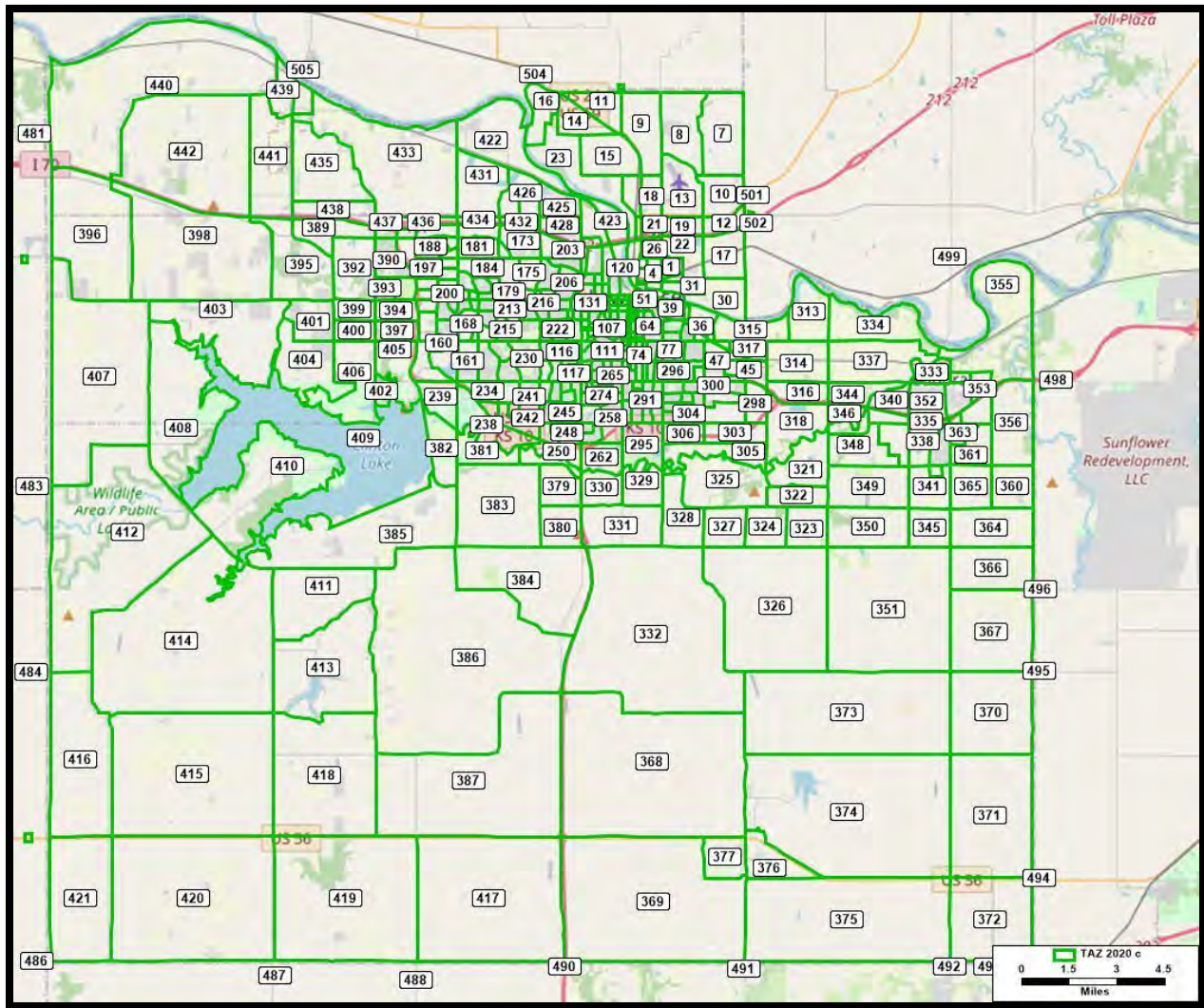
Chapter 3 Data

Transportation Analysis Zones

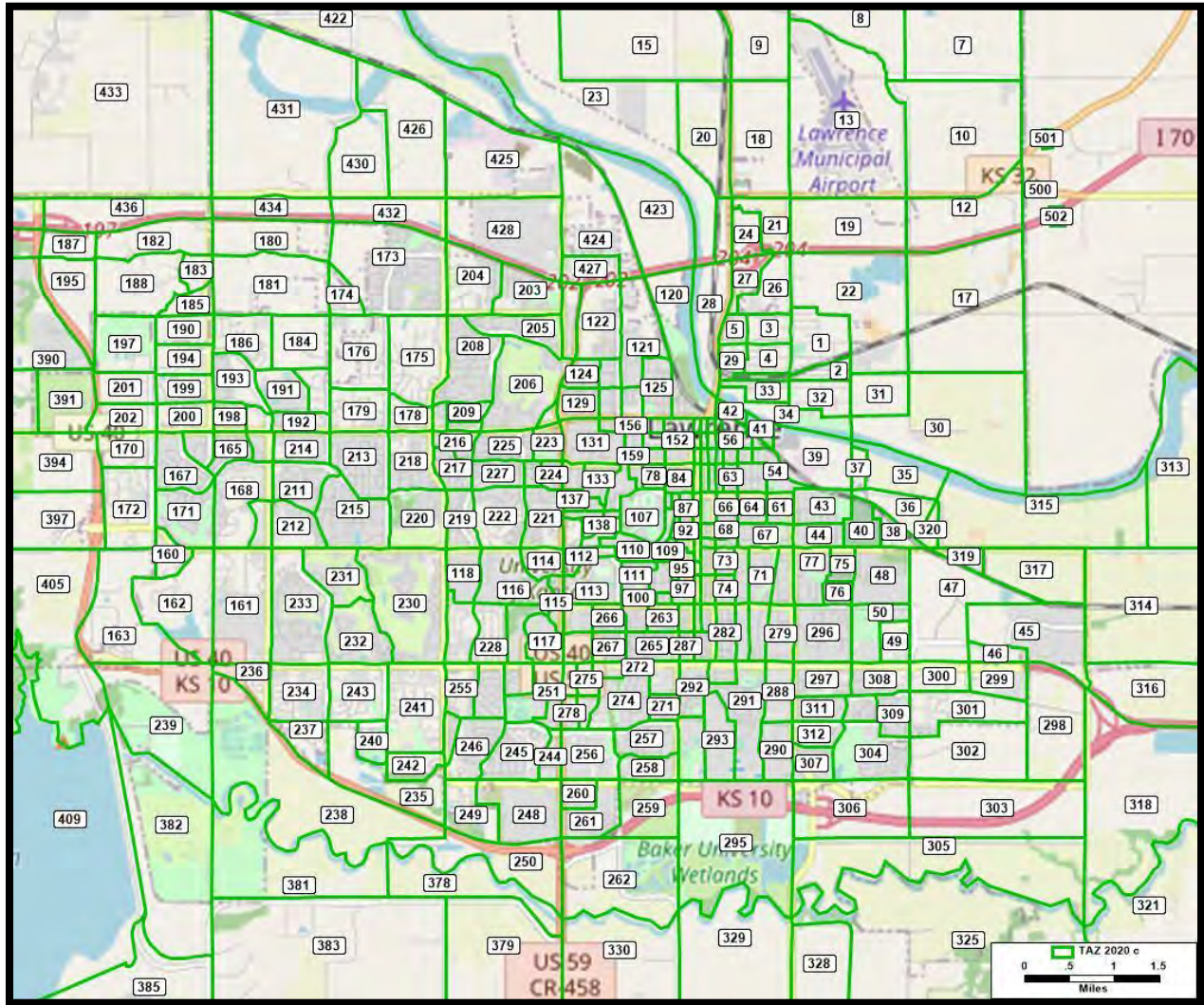
Transportation models do not consider individual travelers or addresses, but rather work with travelers and land uses aggregated to the geographic Transportation Analysis Zone (TAZ) level. The model assumes that all trips begin and end at a central location (the "centroid") of the respective TAZs.

Internal TAZs

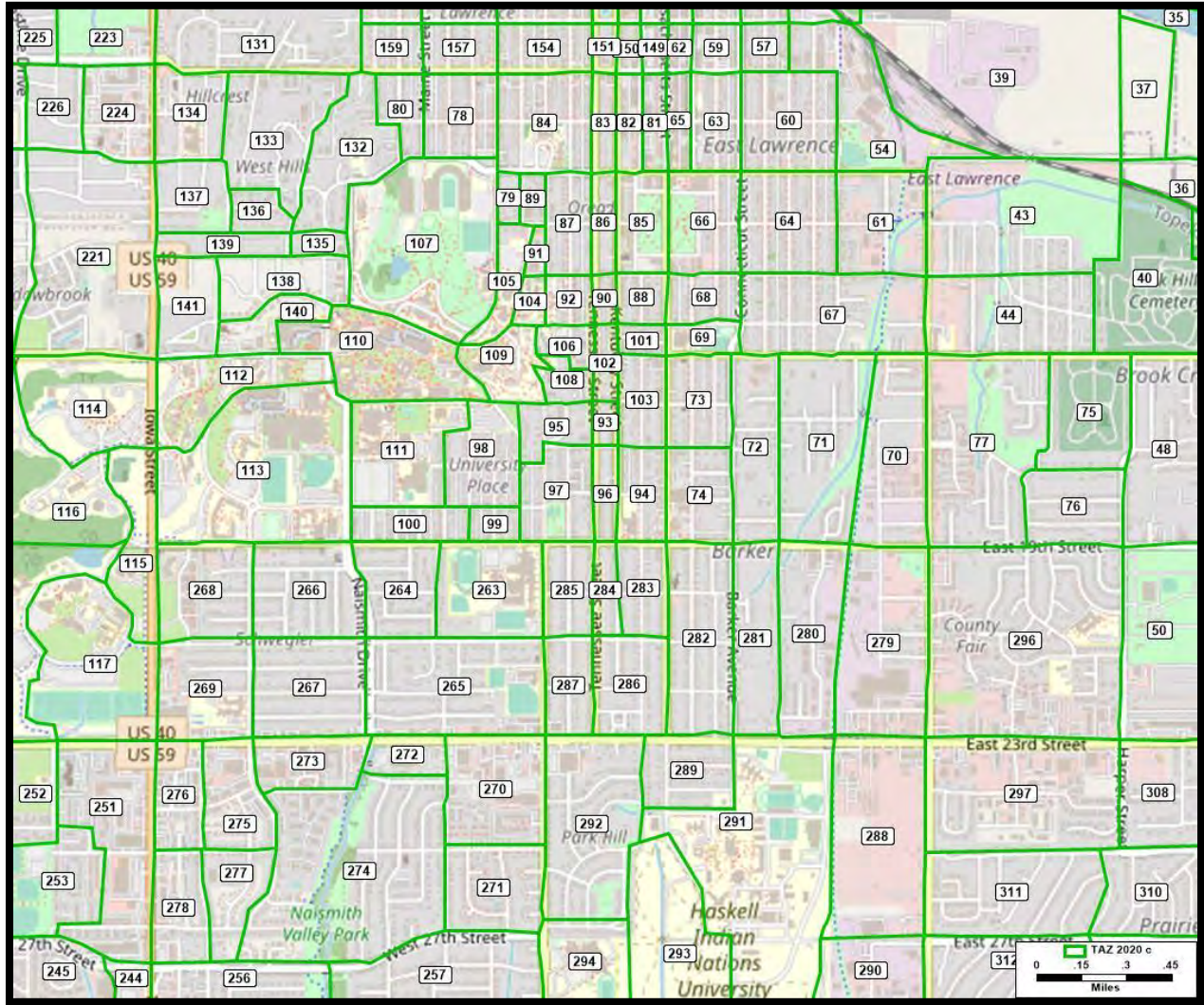
The model uses 442 internal TAZs, as shown on the map below and on subsequent pages.



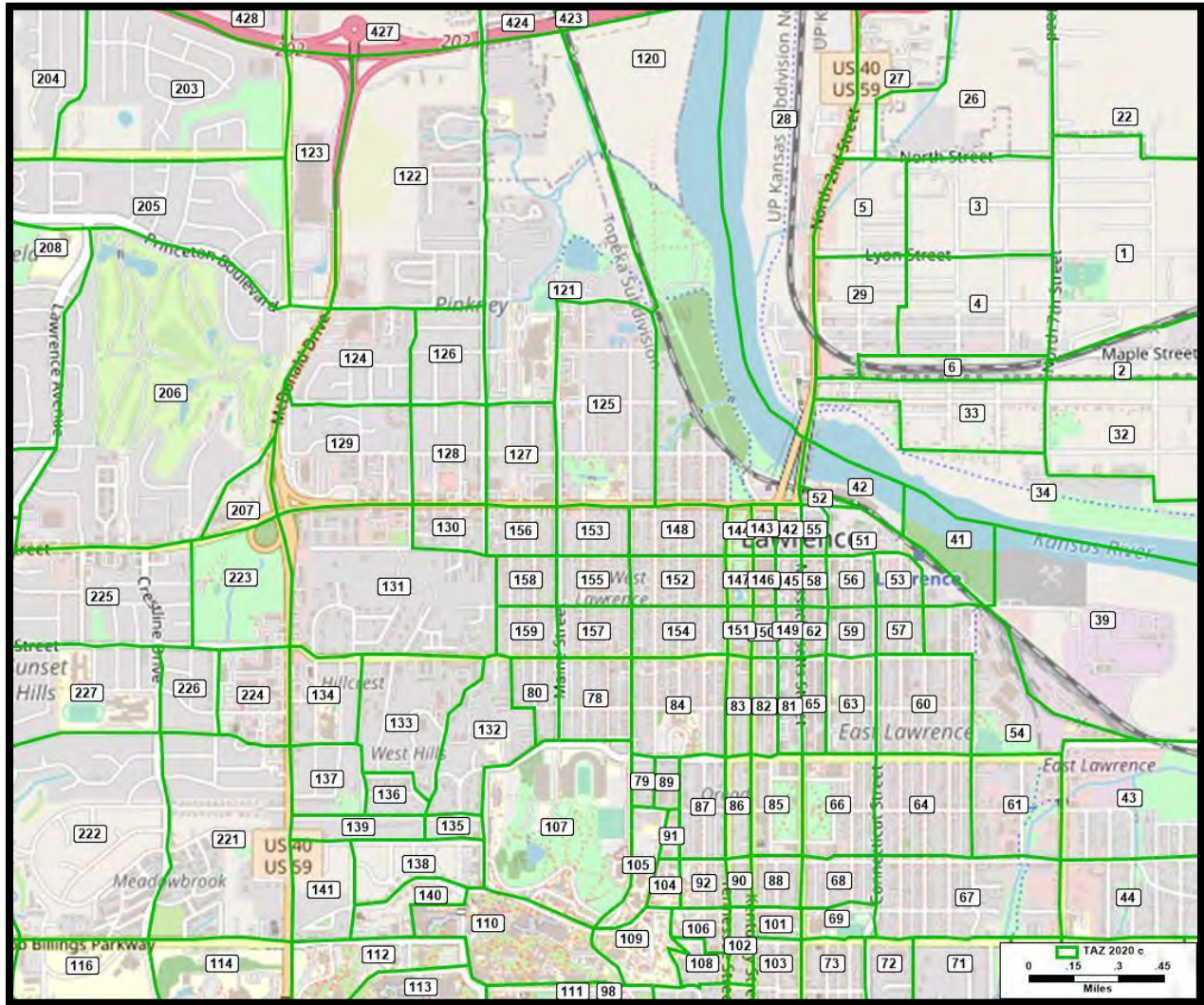
TAZs— Lawrence area



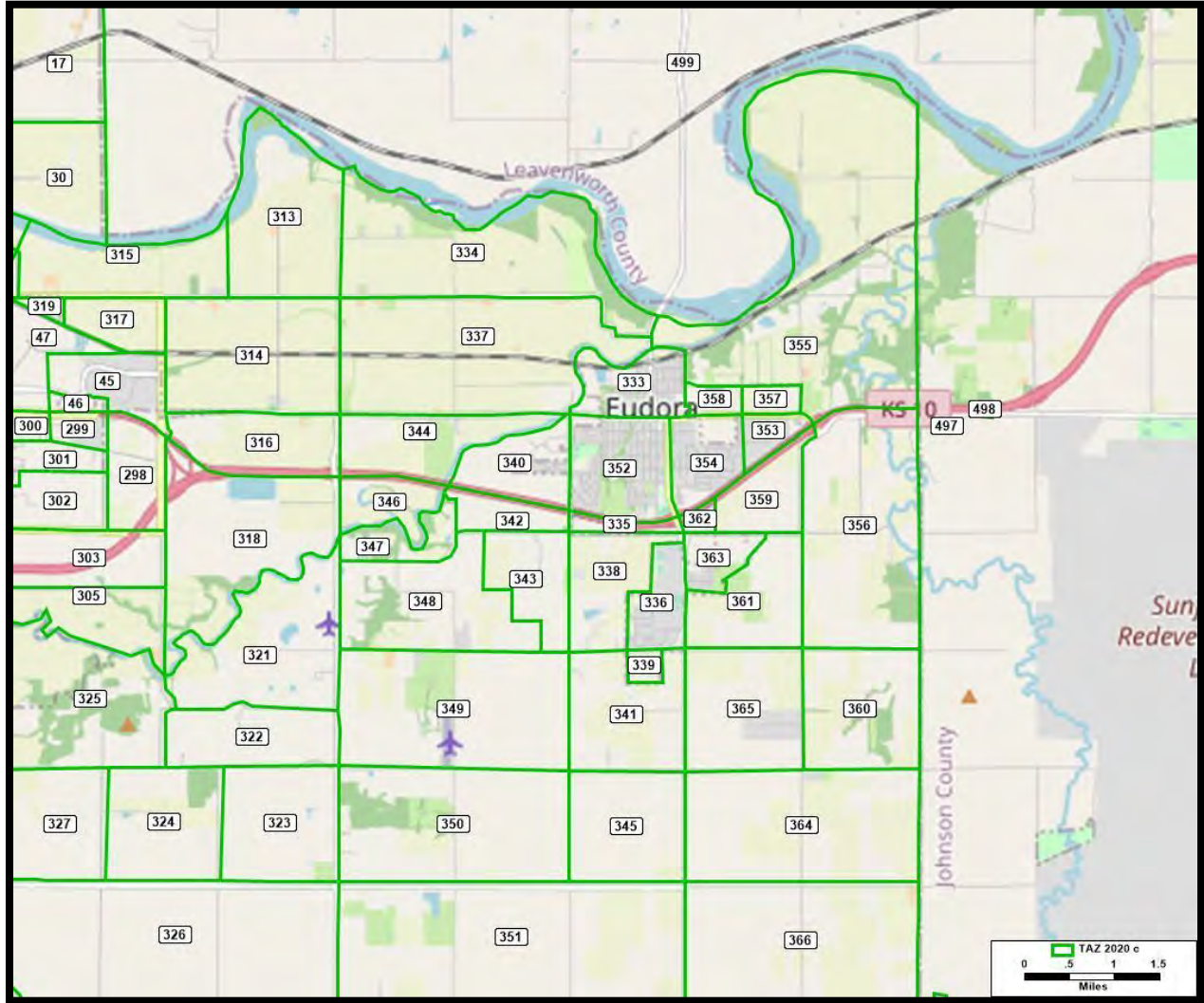
TAZs—Central Lawrence



TAZs—Downtown Lawrence area

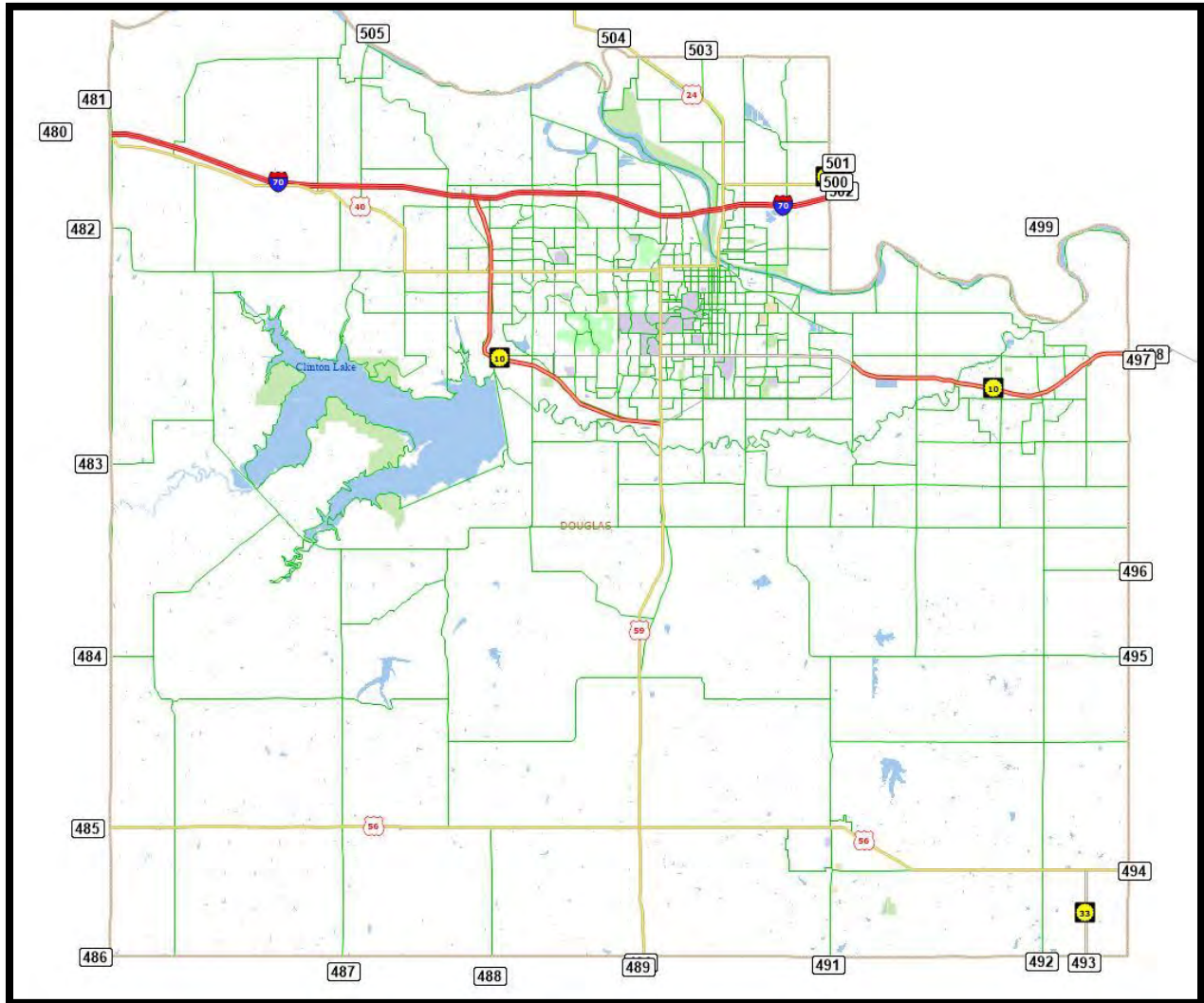


TAZs—Eudora area



External TAZs

The model uses 26 "external stations" as shown in the map below. These are the points where travelers and vehicles enter or exit the modeled region. These trips will either have one end in the modeled region (i.e., they are internal-external or external-internal trips), or they are trips passing through the region (external-external) without a stop in the model's internal TAZs. Many of the trips on I-70 are through trips between external stations 480 and 502.



external station	type	ADT	% trucks	% vans	% ext-ext
480 I-70, Kansas Tnpk west	interstate	44,868	12	3	76
481 US 40 west	principal	2,689	6	3	33
482 SE 45 th St	principal	2,870	6	3	0
483 CR 458	minor	336	0	0	0
484 CR 460	minor	170	0	0	0
485 US 56 west	principal	2,074	6	3	18
486 N 1 Rd west	minor	31	0	0	0
487 E 550	minor	490	0	0	0
488 E 900	minor	200	0	0	0
489 CR 1045	minor	245	0	0	0
490 US 59	principal	5,690	6	3	9
491 CR 1055	minor	855	0	0	0
492 E 2200 south	minor	805	0	0	0
493 KS 33 (Virginia Rd)	principal	2,030	6	3	18
494 US 56 east	principal	4,949	6	3	9
495 CR 460	minor	100	0	0	0
496 N 900 Rd	minor	1,300	0	0	0
497 N 1400 Rd	minor	480	0	0	0
498 KS-10	principal	29,700	6	3	16
499 E 2200 north	principal	3,545	6	3	0
500 N 1800 (Linwood Rd)	principal	2,012	6	3	11
501 US 40 east	principal	3,897	6	3	18
502 I-70, Kansas Tnpk east	interstate	34,580	12	3	73
503 E 1400	minor	323	0	0	0
504 US 24	principal	3,321	6	3	18
505 Eisenhower Mem Dr	principal	4,110	6	3	17

Modeled Transportation Network

The 2016 model used a transportation network consisting of all highways, arterials, collectors, ramps, and city and county roads that carried traffic to more than just the immediate local neighborhood. The updated model used a similar approach, and added roads built since 2015 (e.g., Entrada Drive), and other roads that served traffic beyond the neighborhood but were not part of the 2015 model network (e.g., Becker Drive at KU, and E 31st Street). We also fixed some road alignment issues, including dividing roads as appropriate (e.g., Peterson Blvd).

In addition to the geographic shape of the road, the modeled information about each road segment includes the following:

- road name

- functional class (e.g., Interstate, major collector, local road)
- number of lanes in each direction
- area type (e.g., CBD, urban, suburban, rural)
- whether the road is divided or has a center turn lane
- traffic count data where recent counts have occurred
- various other characteristics of the road

Warner Transportation Consulting did a thorough check of network connectivity and proper coding of lanes, classifications, one-way roads, and intersections.

Centroids and connectors

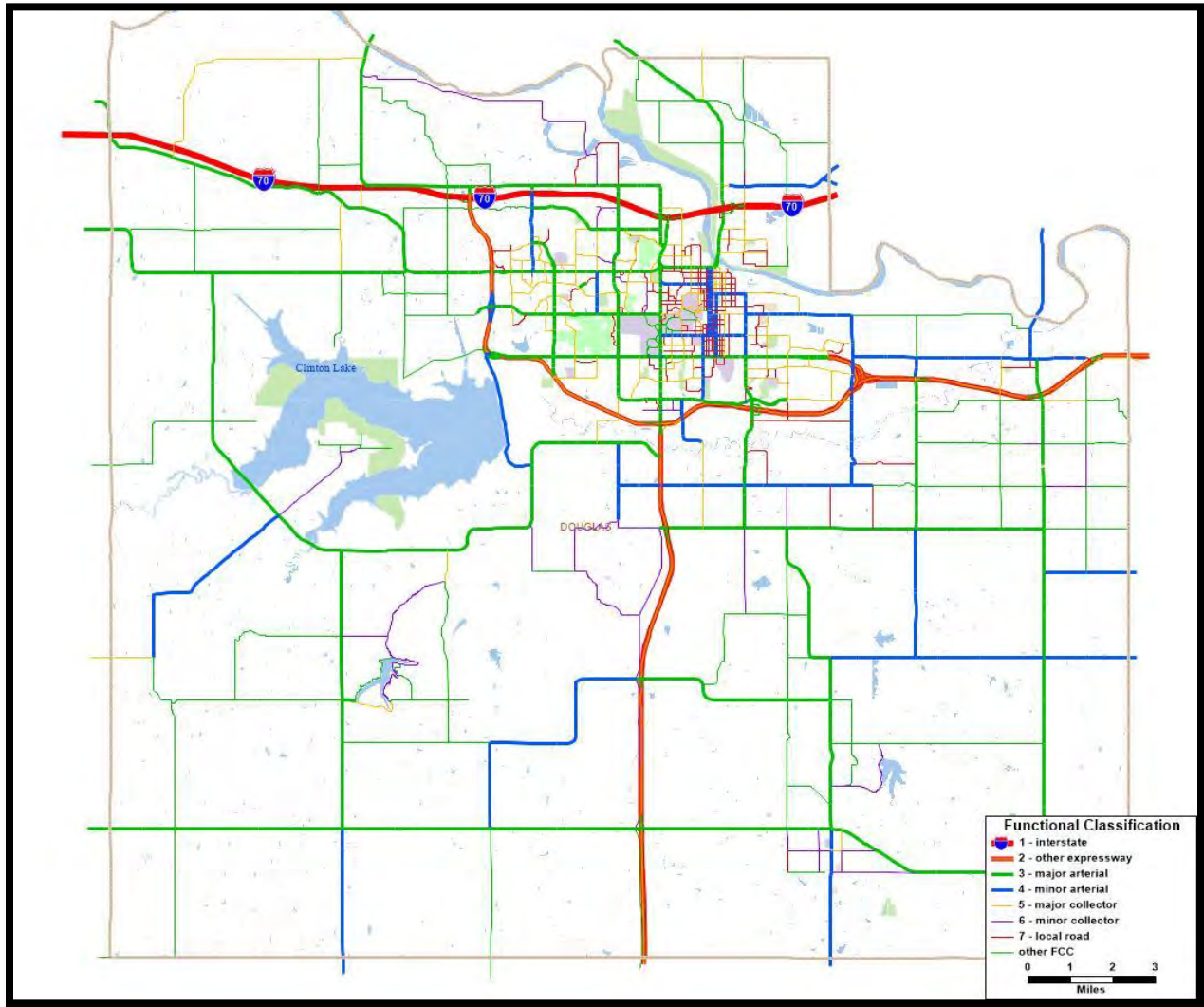
Centroids are the set of distinct points that represent the location of trips produced and attracted within each TAZ. It is usually at the geographic center of the zone, but may be at a different spot in the zone if the center is not the key point of trip production or attraction. TAZ 118, for example, includes the big golf course at the Lawrence Country Club, but the centroid is moved closer to the Dillons and the Tuckaway Apartments in the southwest part of the zone.

The "connectors" are the set of contrived links that connect the centroid to the modeled network of real roads. We developed a full new set of connectors, and reviewed the alignments to ensure that none connected to a highway, a highway ramp, or to a one-way street without also having access to a parallel street in the opposite direction. We subsequently modified a few connector alignments where appropriate to represent the location of particularly large parking lots.

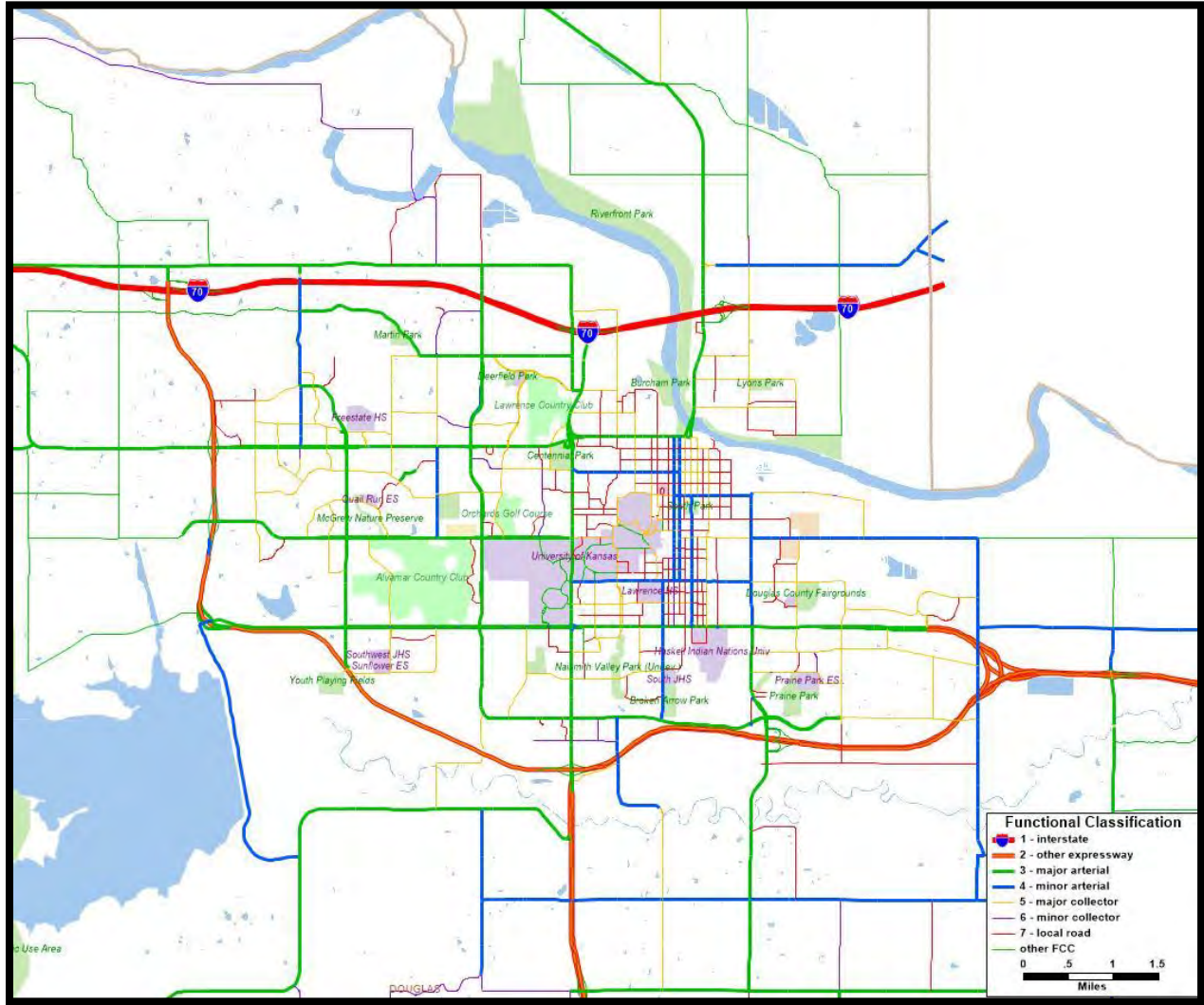
Maps of key road network characteristics

The maps below show the functional class, number of lanes, area type, and free-flow speeds for the modeled road network.

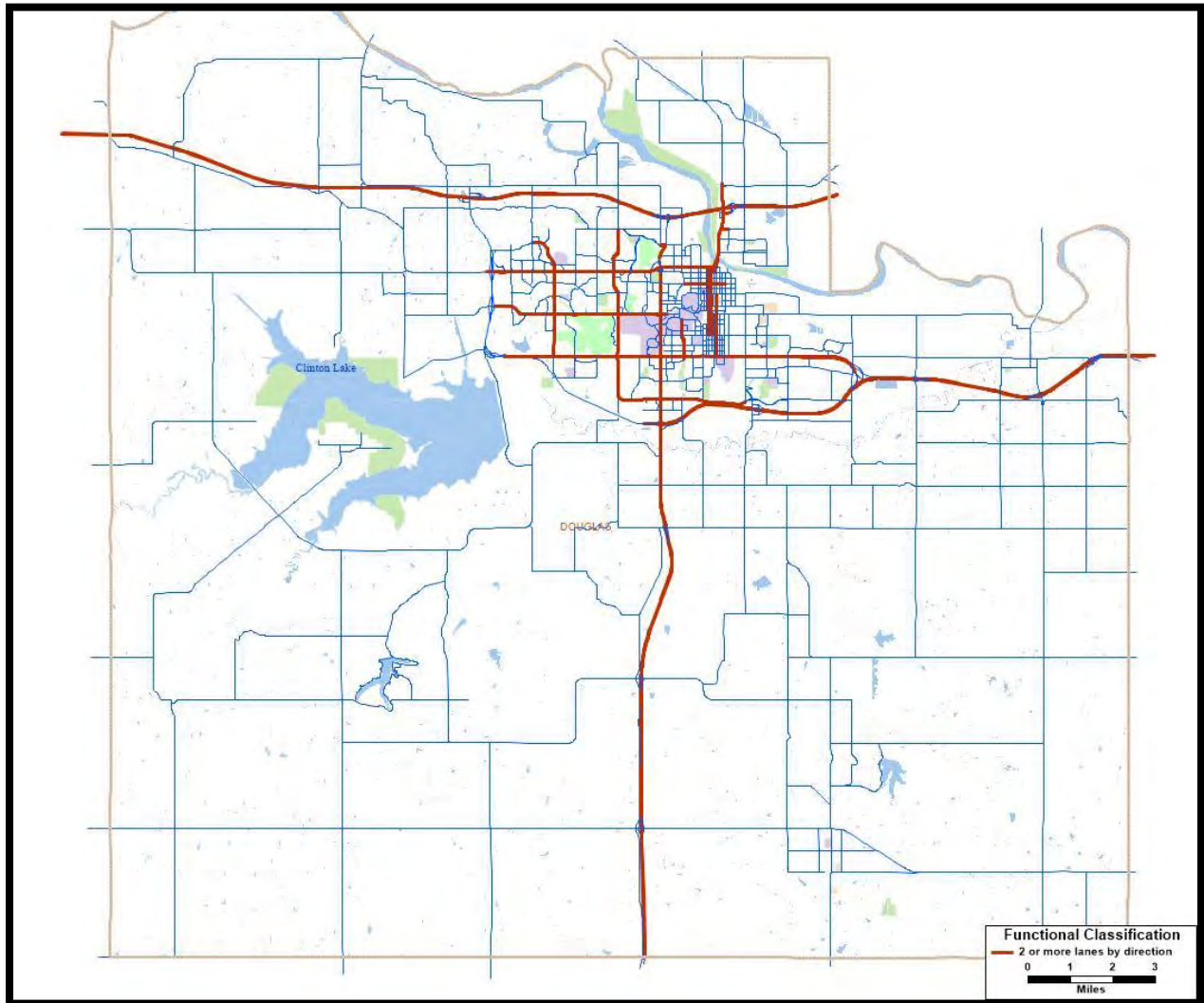
Modeled road network showing functional classification—Douglas County



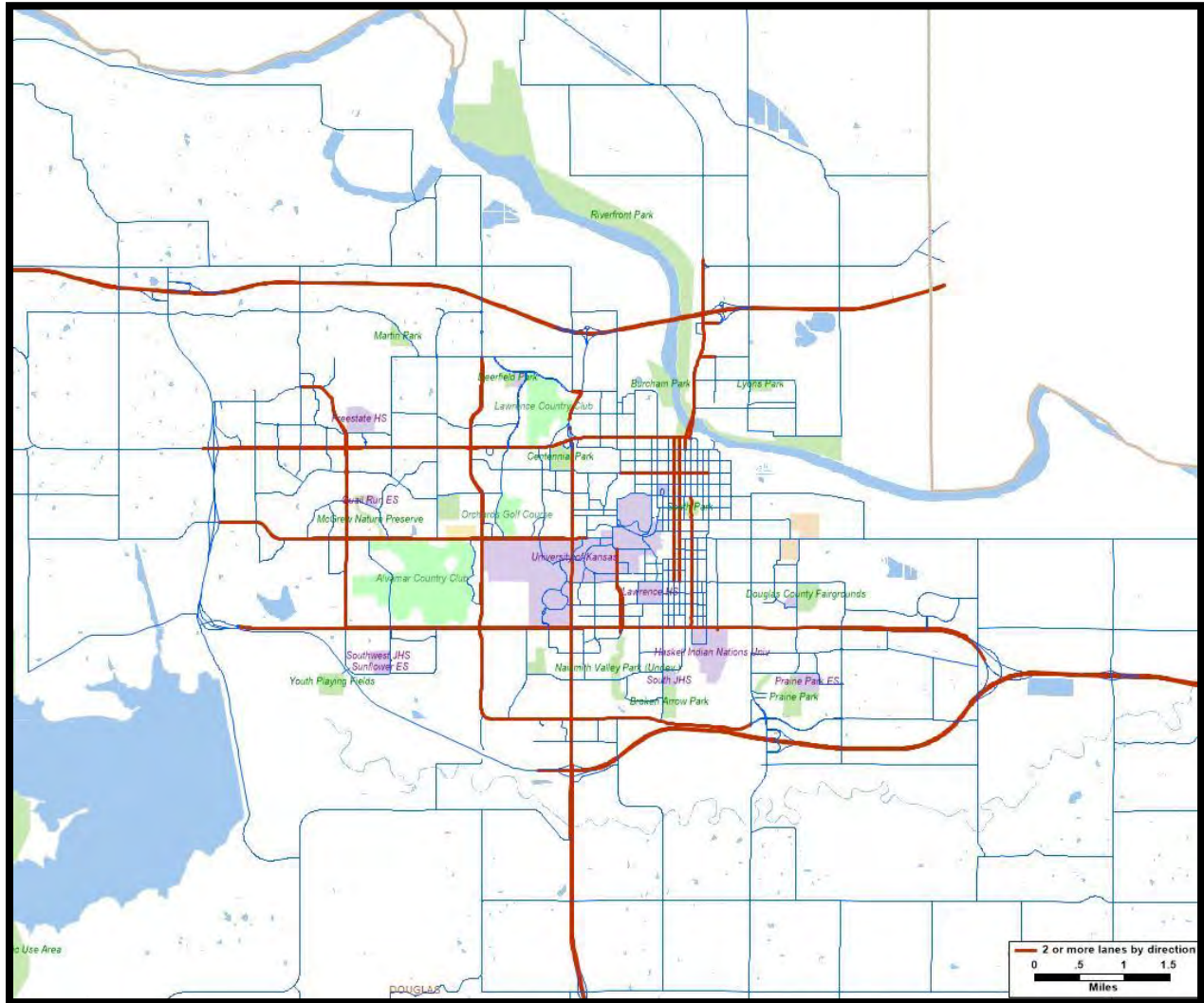
Modeled road network showing functional classification—Lawrence area



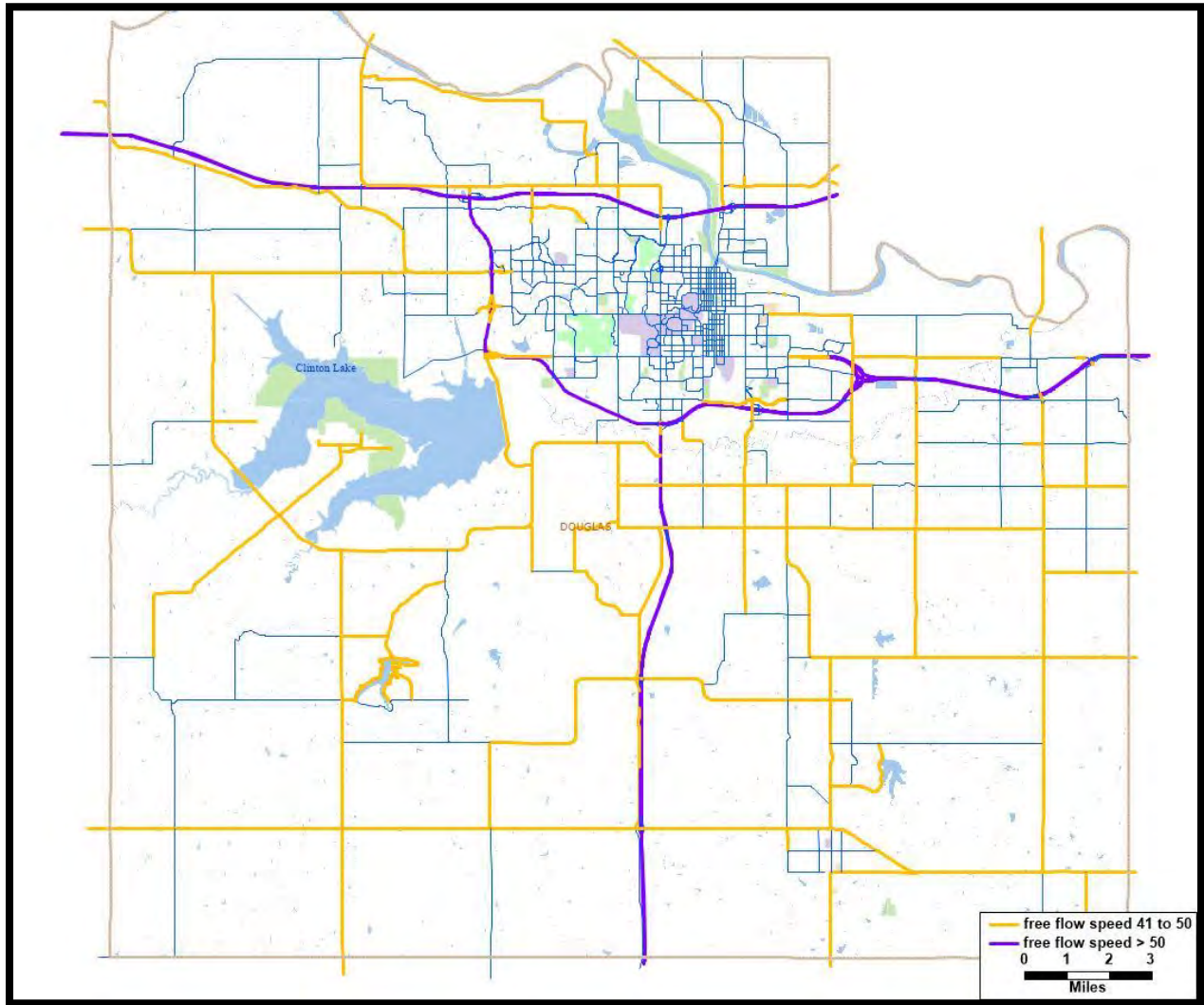
Modeled network showing roads with more than two travel lanes (both directions)—Douglas County



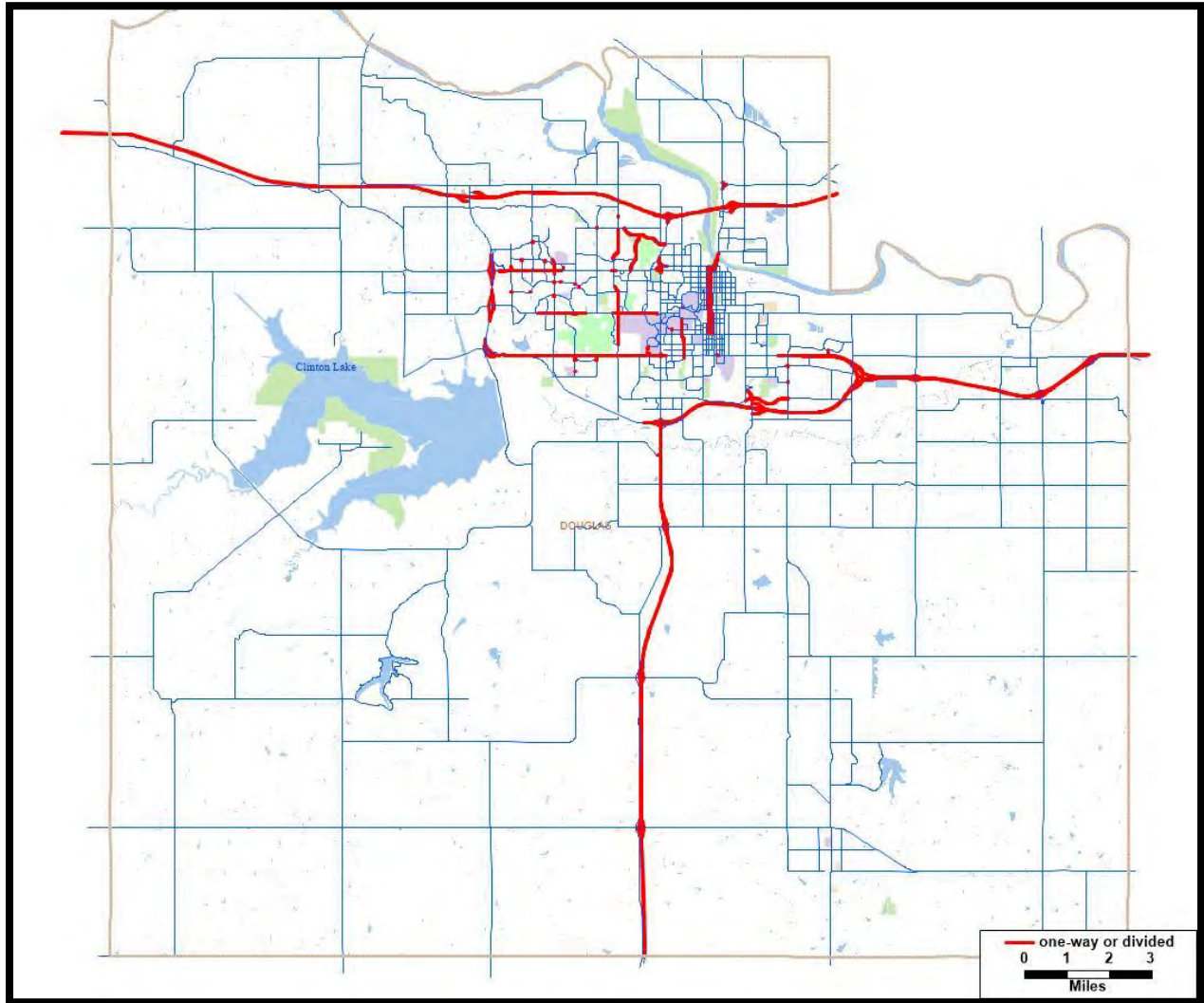
Modeled network showing roads with more than two travel lanes (both directions)—Lawrence area



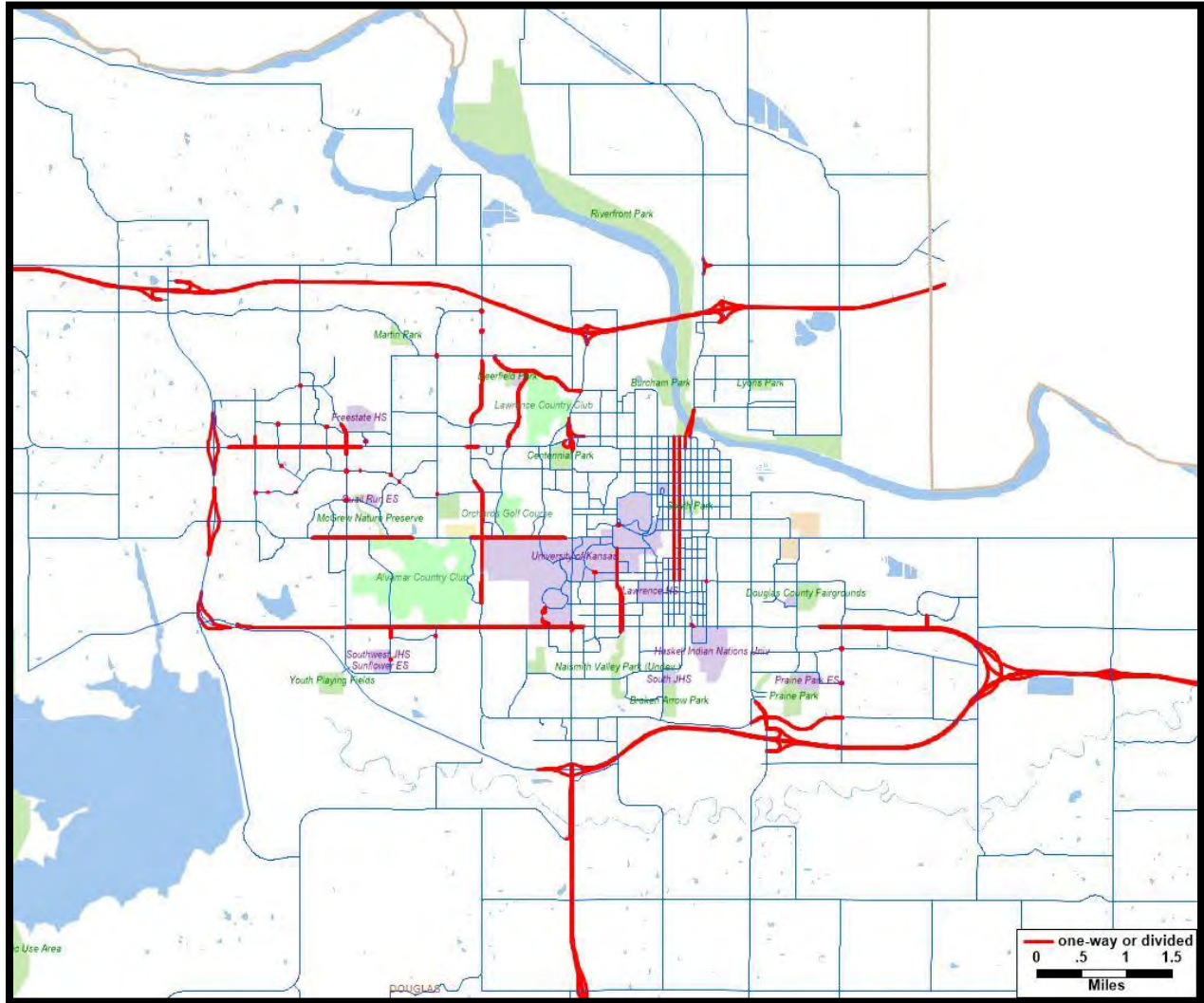
Modeled network roads with free-flow speeds greater than 40 mph—Douglas County



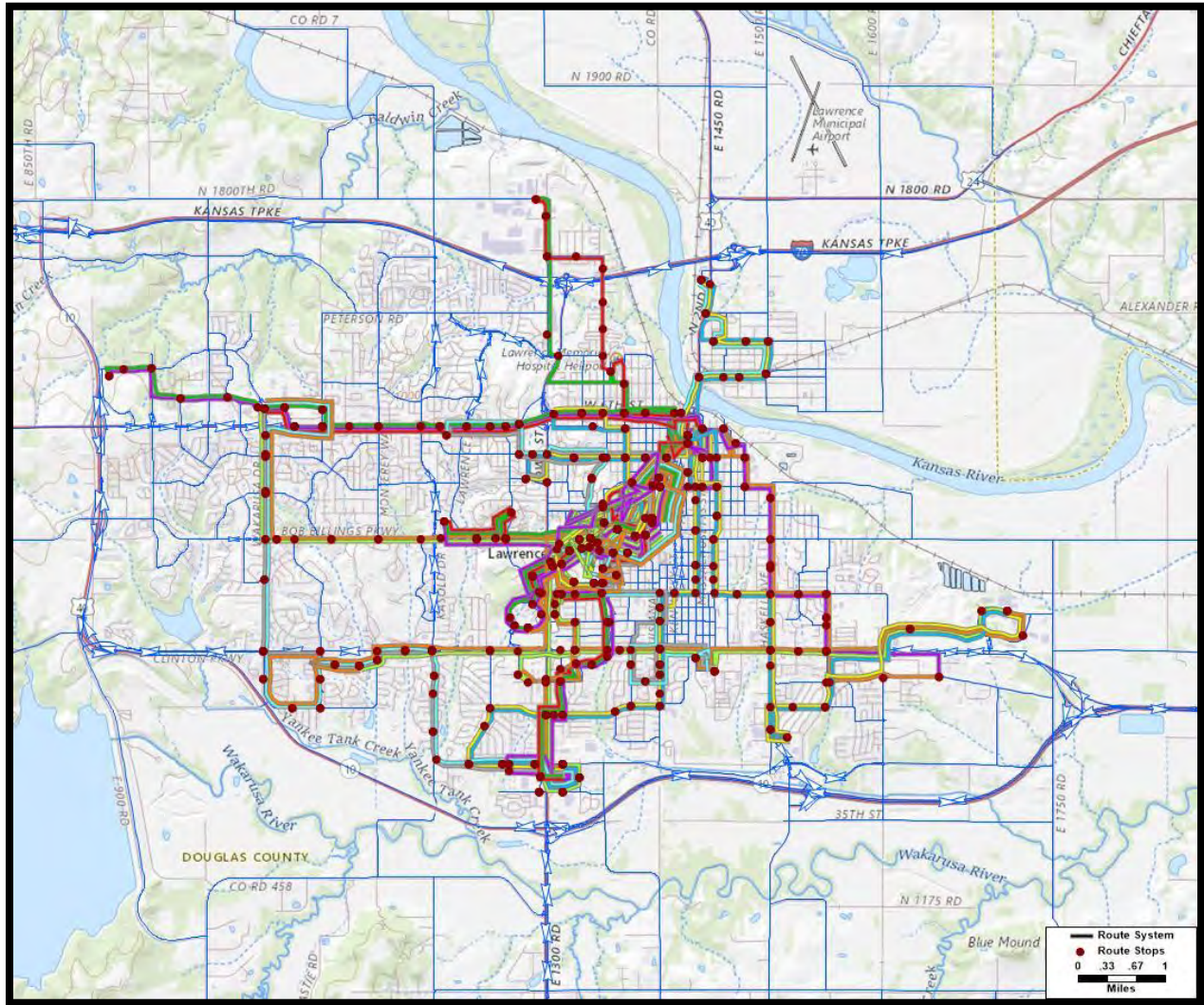
Modeled road network showing divided roads—Douglas County



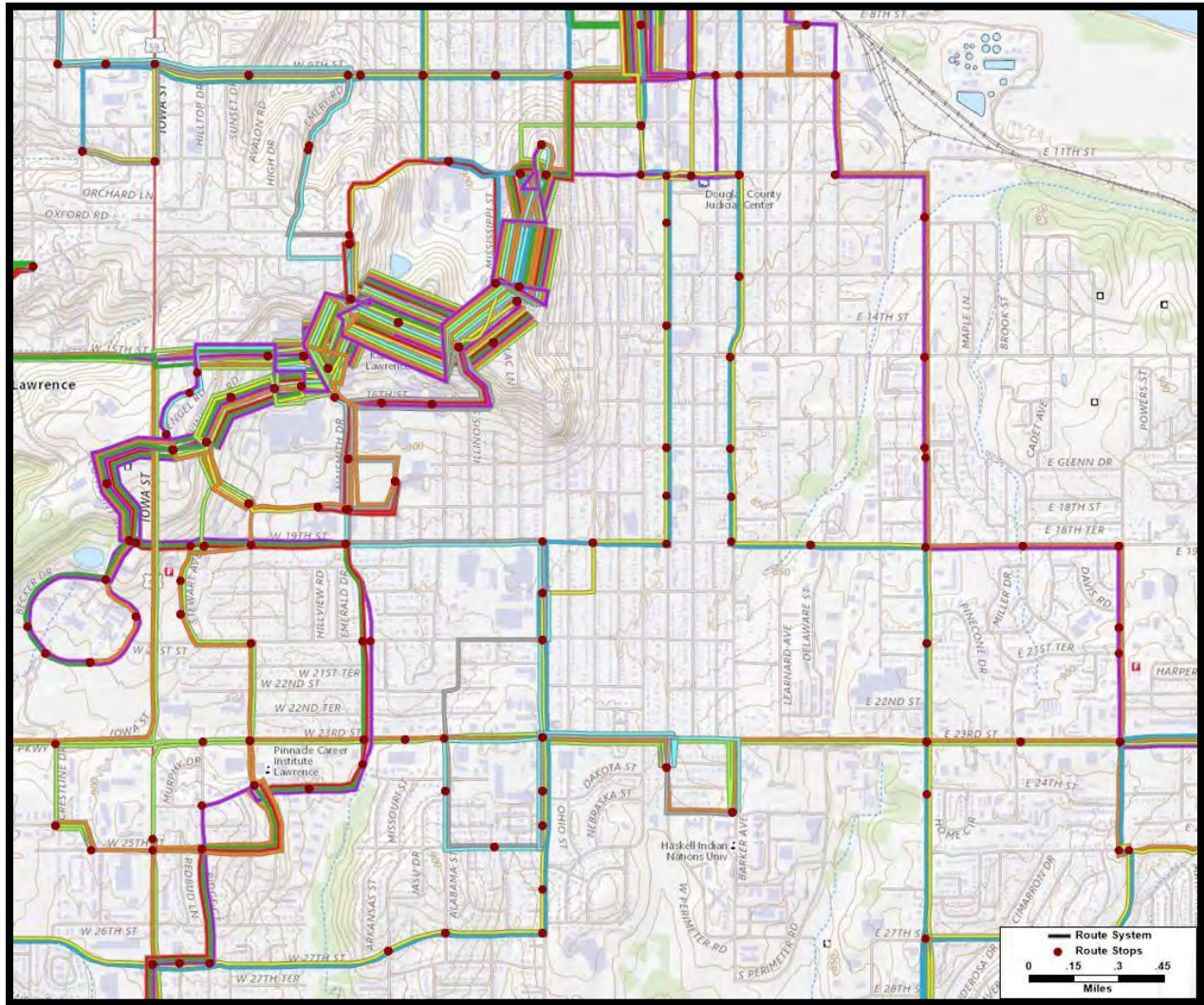
Modeled road network showing divided roads—Lawrence area



Base year (2019) transit network



Base year (2019) transit network—KU area



Route	route name	peak headway	off-peak headway	general fare	KU fare
1	East Lawrence / Downtown	30	30	1.00	0
3	Lakeview Road / Downtown	30	30	1.00	0
4	North Lawrence / 9th & Iowa	60	60	1.00	0
5	South Iowa / 23rd / K-10	30	30	1.00	0
6	6th & Wakarusa / Downtown - via 6th	30	30	1.00	0
7	South Iowa / Downtown	30	30	1.00	0
9	South Iowa / 6th & Wakarusa	60	60	1.00	0
10	6th & Wakarusa / Downtown - via Bob Bill	30	30	1.00	0
11	South Iowa / KU / Downtown	30	32	1.00	0
15	Downtown / Peaslee / East Hills	60	60	1.00	0
27	HINU / 23rd & Louisiana / KU	40	40	1.00	0
29	27th & Wakarusa / KU	16	22	1.00	0
30	Bob Billings & Kasold / KU	20	23	1.00	0
34	W 7th St / KU	30	30	1.00	0
36	6th via Emery / KU	20	24	1.00	0
38	25th & Melrose / KU	25	30	1.00	0
41	Yellow Campus Circulator	10	10	1.00	0
42	Blue Campus Circulator	8	8	1.00	0
43	Red Campus Circulator	7	7	1.00	0
44	Evening Campus Circulator	999	30	1.00	0

Land Use Activity

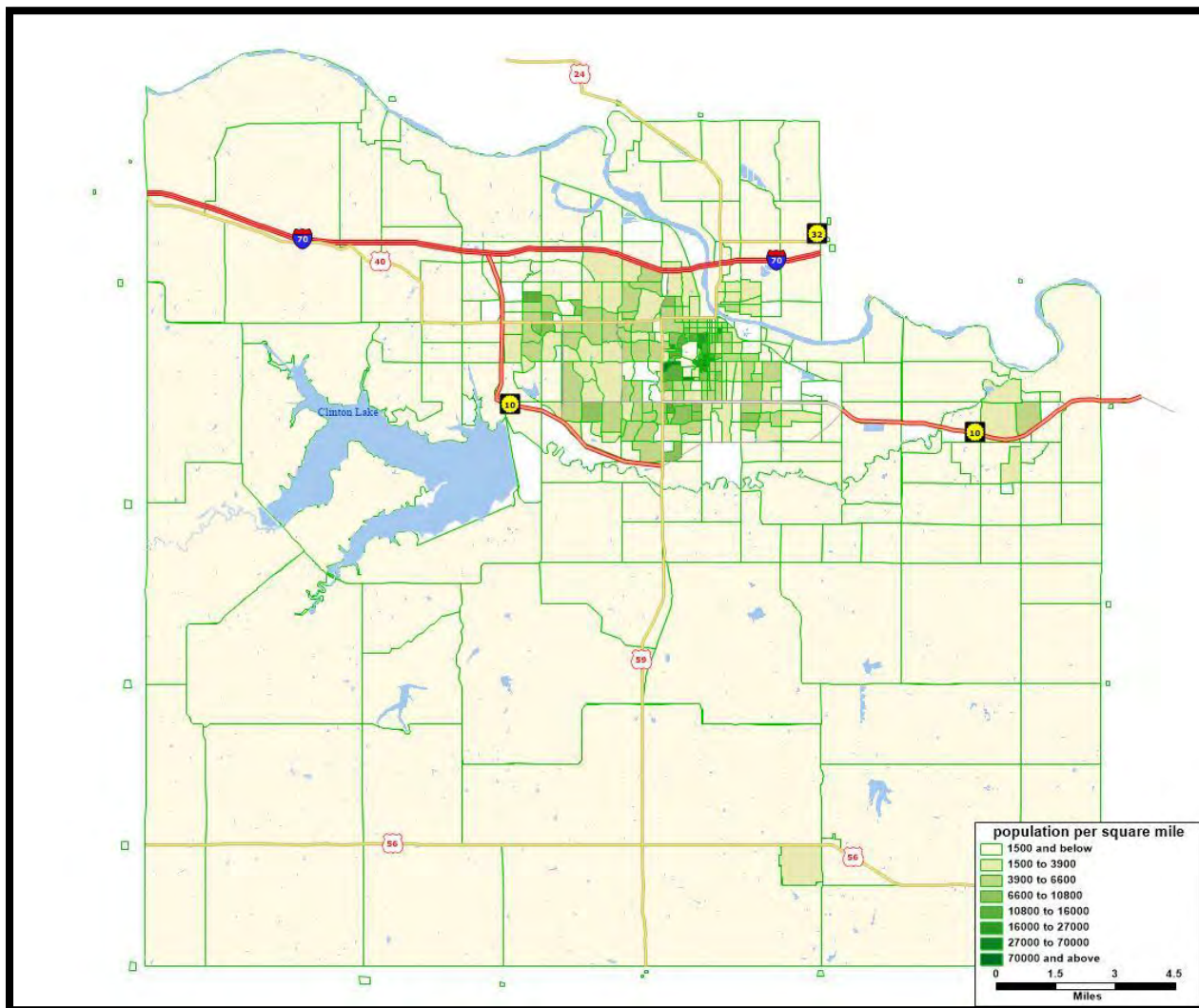
The table below shows the base year (2019) population and employment data used in the model

2019			
	City of Lawrence	rest of Douglas County	modeled region
population	102,980	24,647	127,627
pop in households	94,054	24,155	118,209
students in dormitories	7,922	492	8,414
other group quarters pop	1,004	-	1,004
occupied households	42,812	9,150	51,962
total jobs	46,023	5,660	51,683
basic (manuf, farming)	6,702	2,160	8,862
retail and food service	11,869	577	12,446
health care	6,399	429	6,828
educ svcs non-coll	3,031	882	3,913
educ svcs coll	6,153	737	6,890
other services	11,899	875	12,774
lodging rooms	1,040	75	1,115

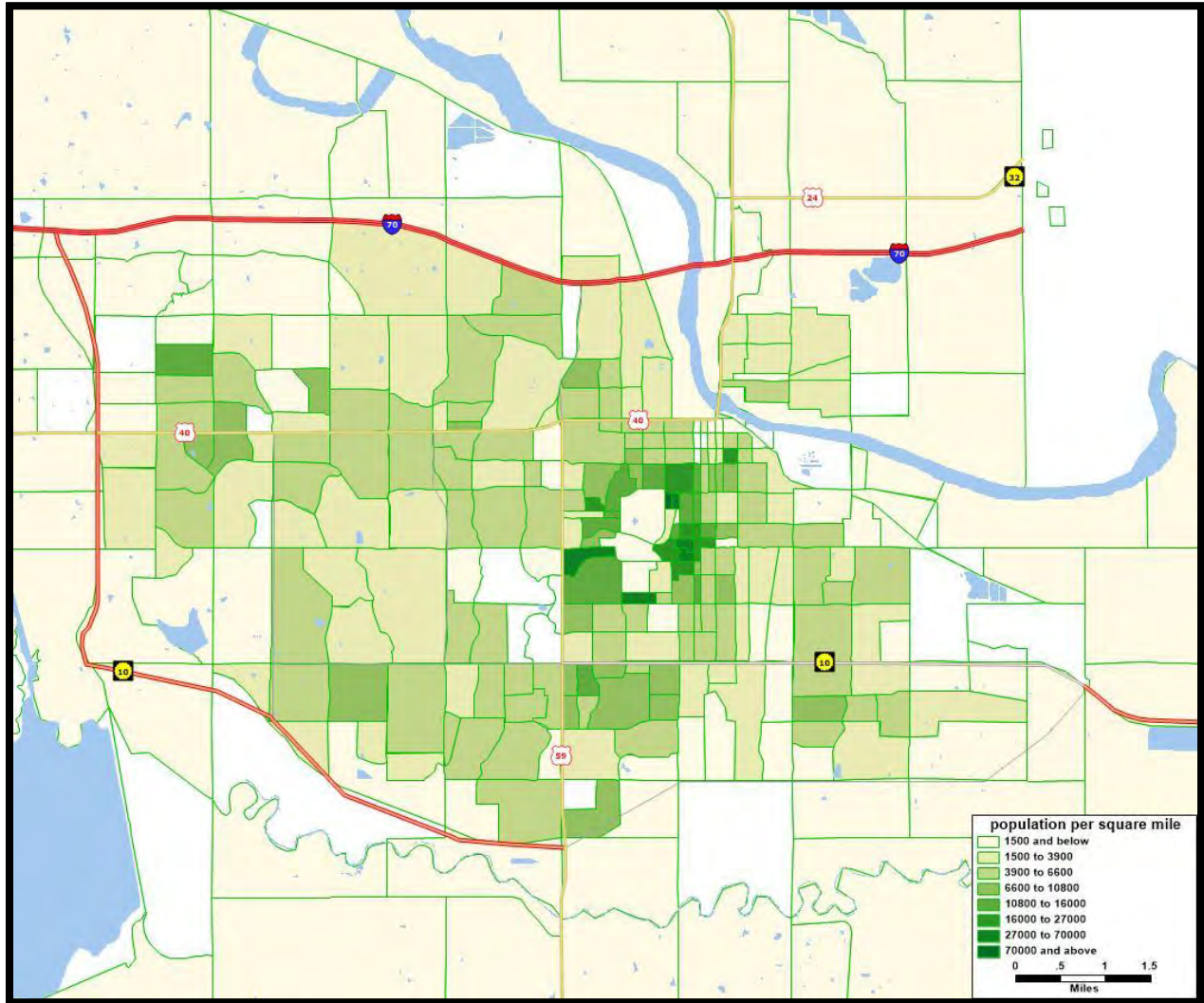
Population and households

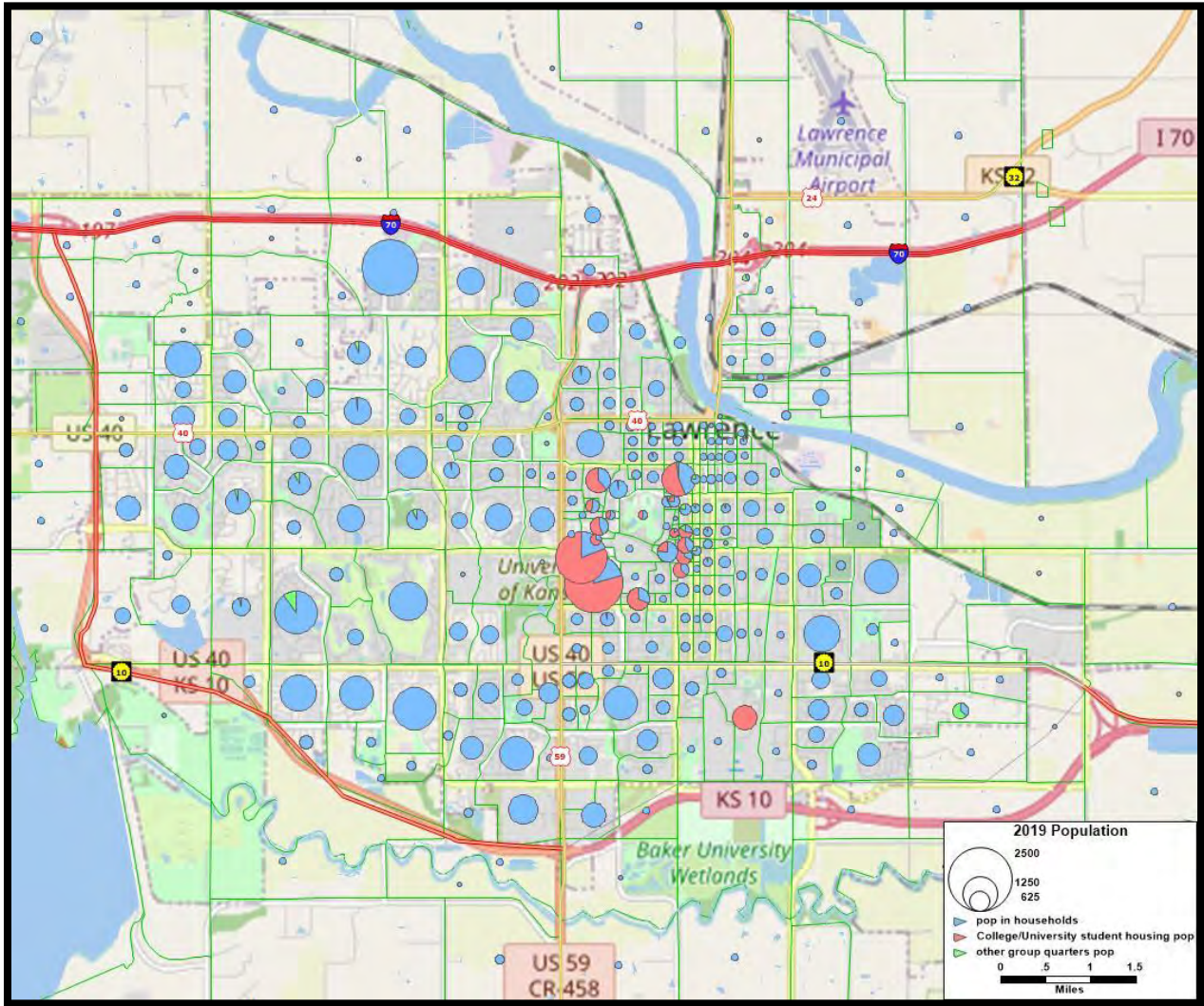
The population data for the City of Lawrence comes from the 2020 census data adjusted for what the City considers to be an undercount, particularly of student population, due to Covid, and then further factored back to 2019. The population for the rest of Douglas County is the Census estimate for this area.

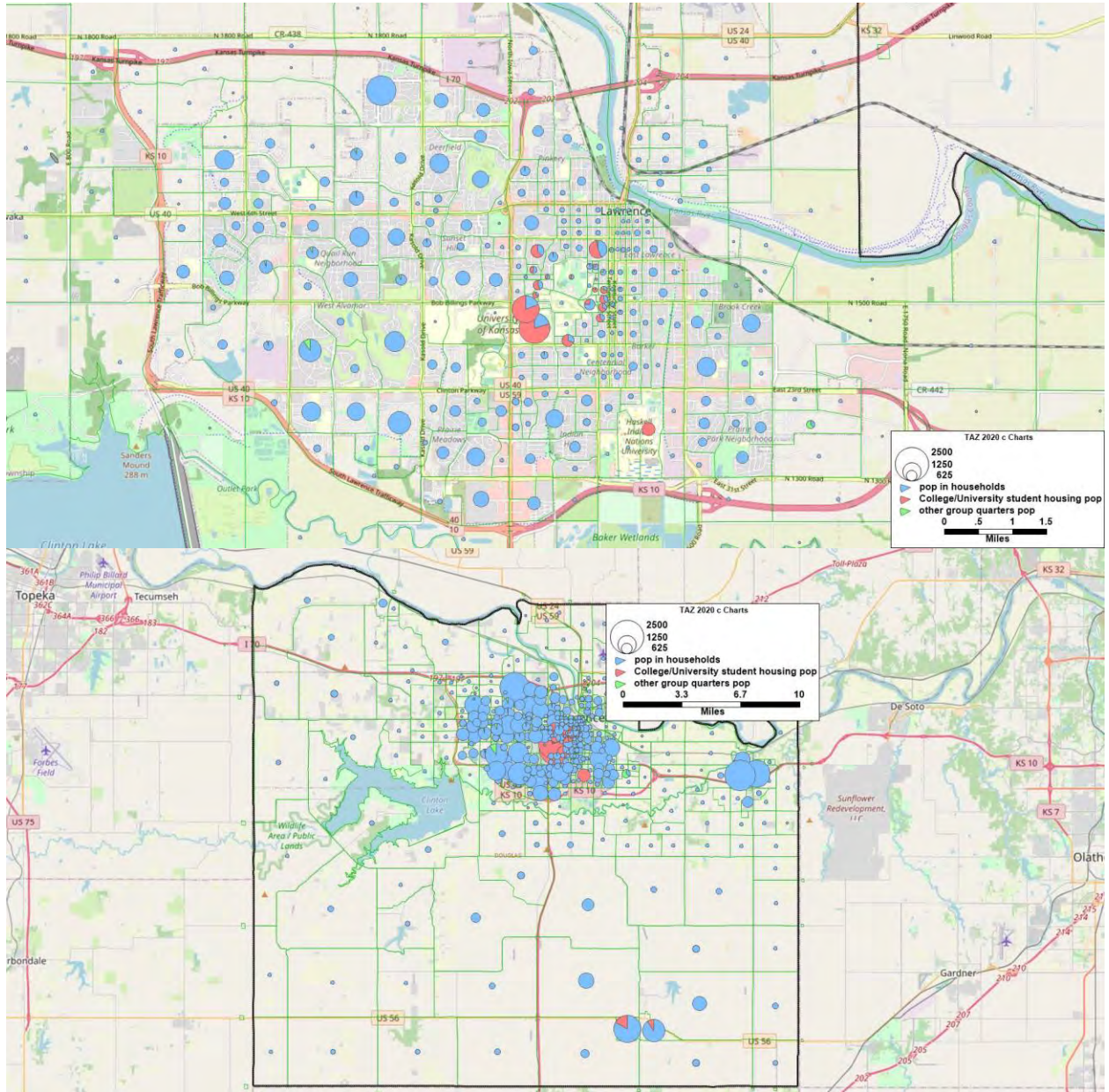
2019 population density by TAZ—Douglas County

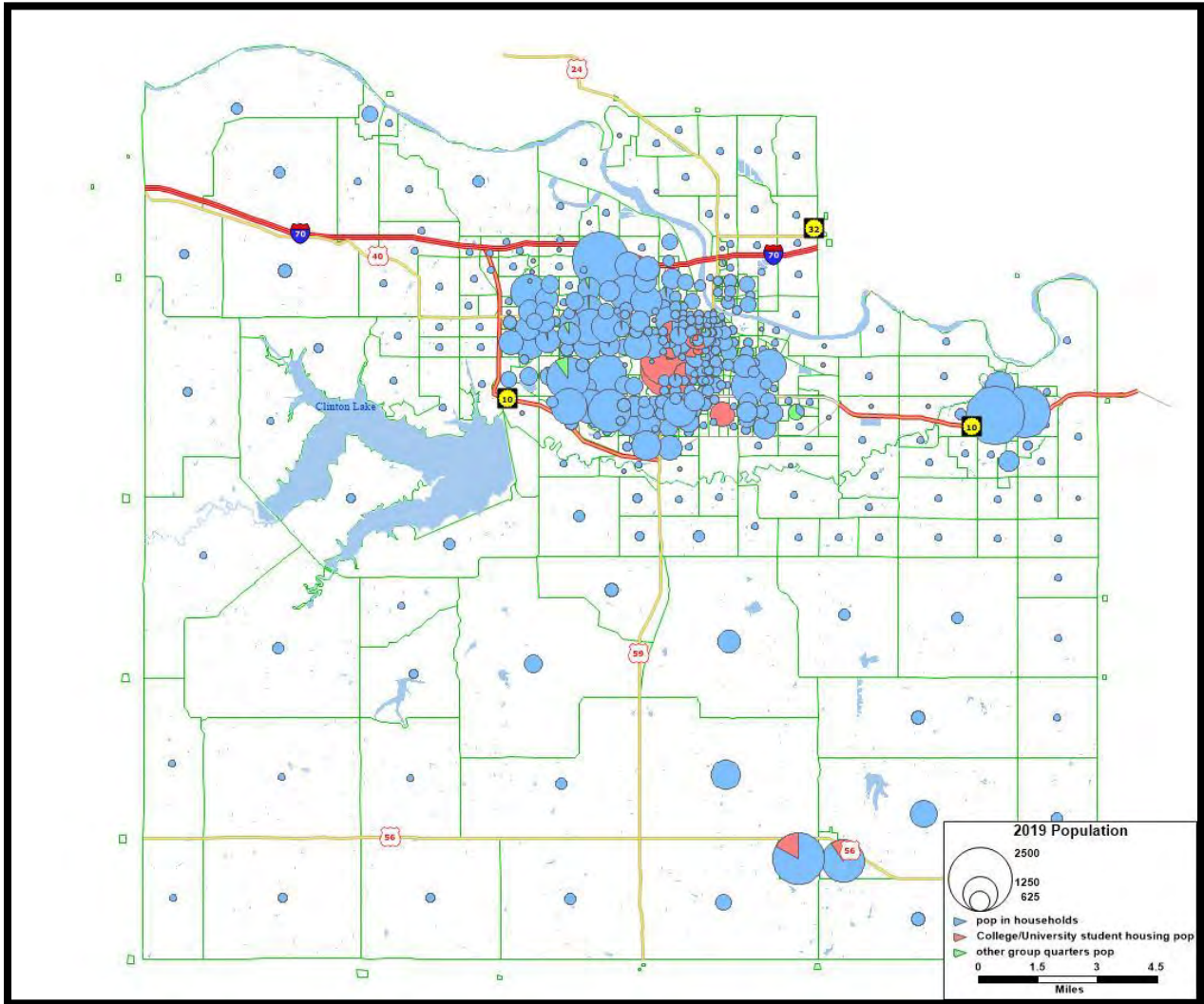


2019 population density by TAZ—Lawrence area









Employment

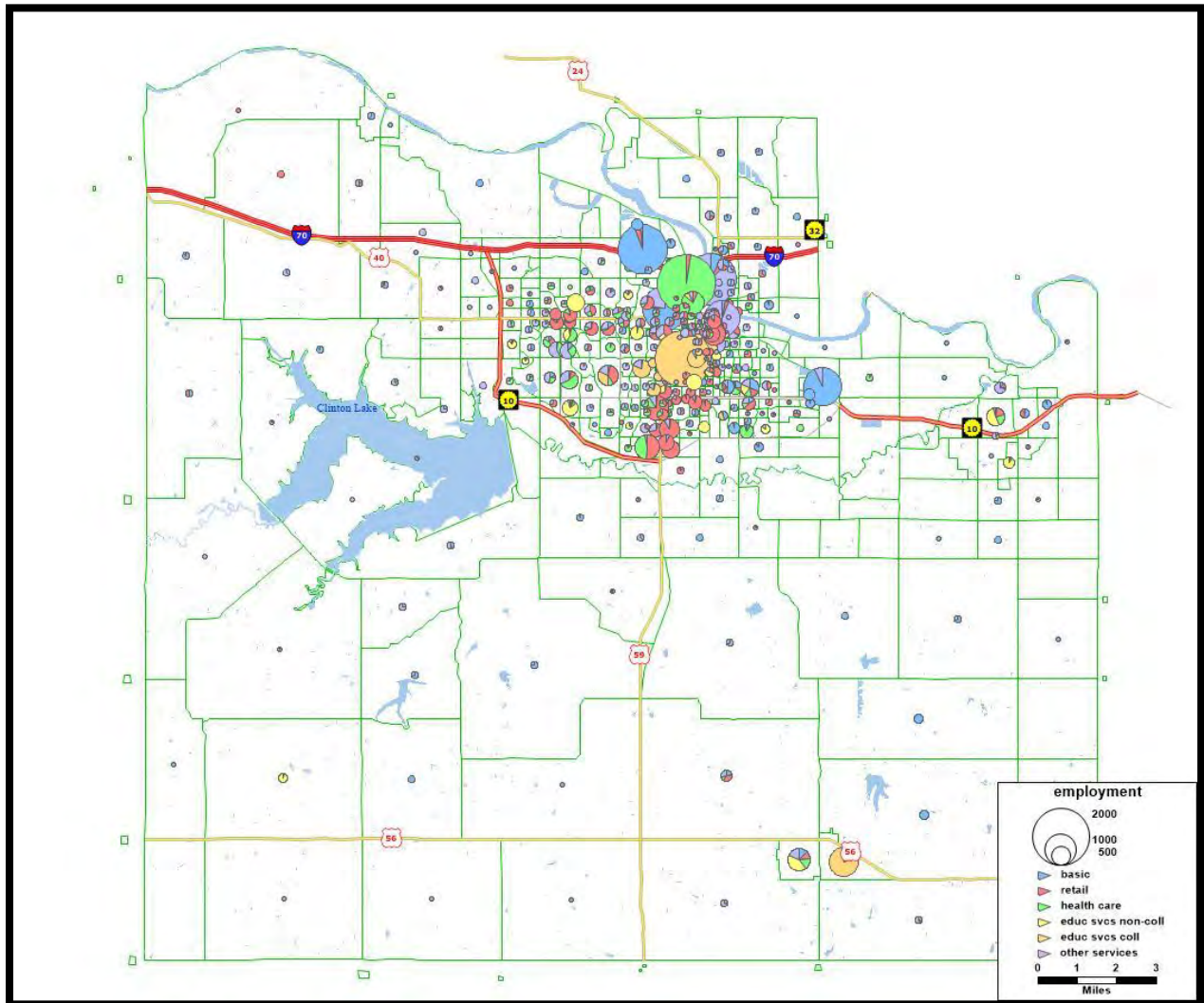
The model works with employment data by type for each TAZ with information based on the 2019 4th quarter LODS 7 employment data. This is data prepared jointly by the census bureau and state departments of labor and unemployment insurance. We made various adjustments to disaggregate employment among multiple worksites for the region’s major employers reporting at a single administrative address. This included University of Kansas, where the employment was allocated to specific buildings based on information provided by the university. We also divided the LODS 7 reported employment for the City of Lawrence public schools, and between the two Wal-marts in Lawrence.

Note in any case that the total number of jobs from these sources is irrelevant in the model's calculation of commute trips. Because the model balances trip ends to production (the home end), the only employment data that matters is the *distribution* of where those jobs occur. This is appropriate, because

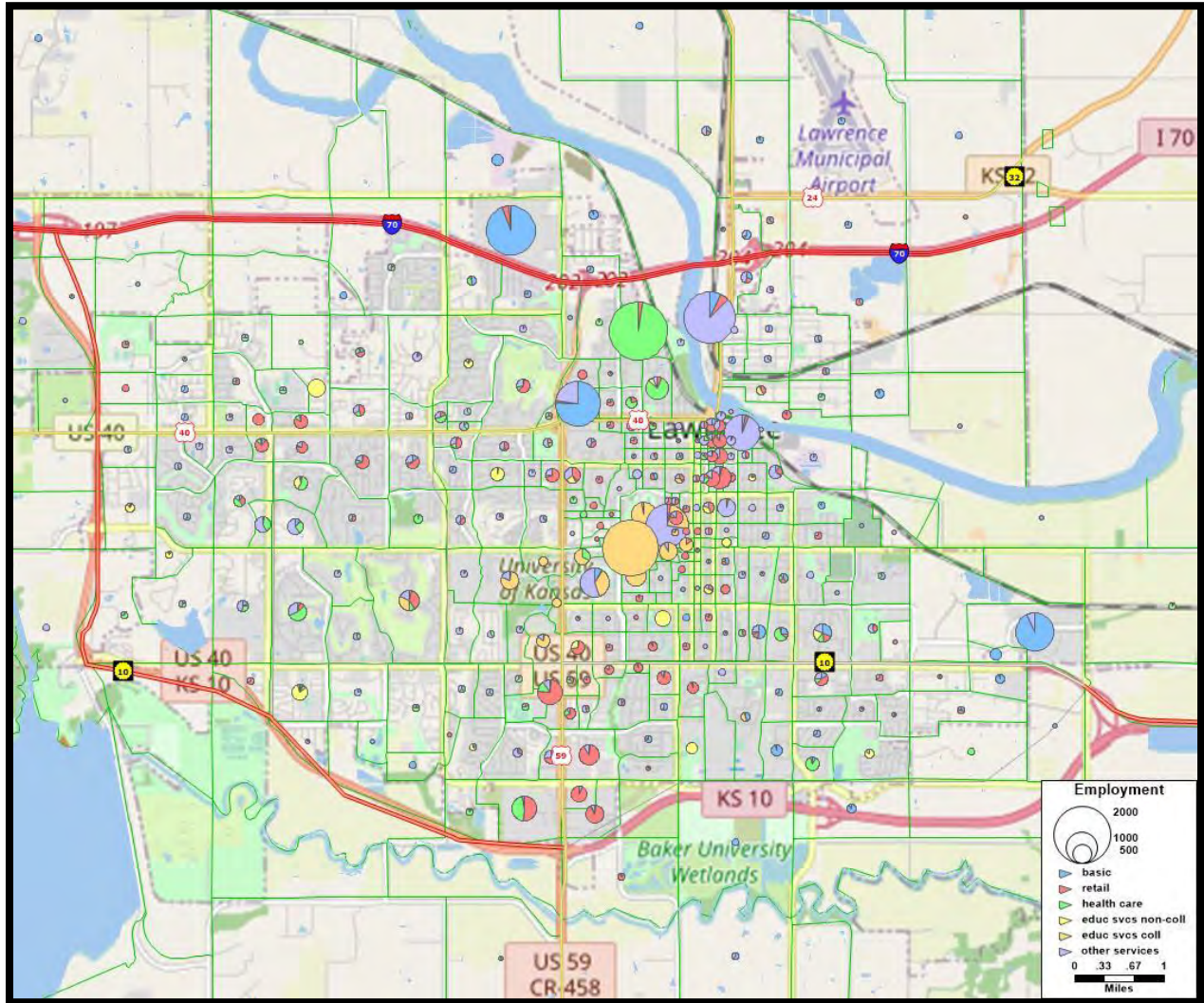
we can be more confident about the total number of workers in the area (as based on population data) than we can be about the total number of jobs in the area (as based on employer reporting).

The maps below show the distribution of jobs classified as retail, basic (manufacturing, construction, mining, and agriculture), service (including education), and health care employment.

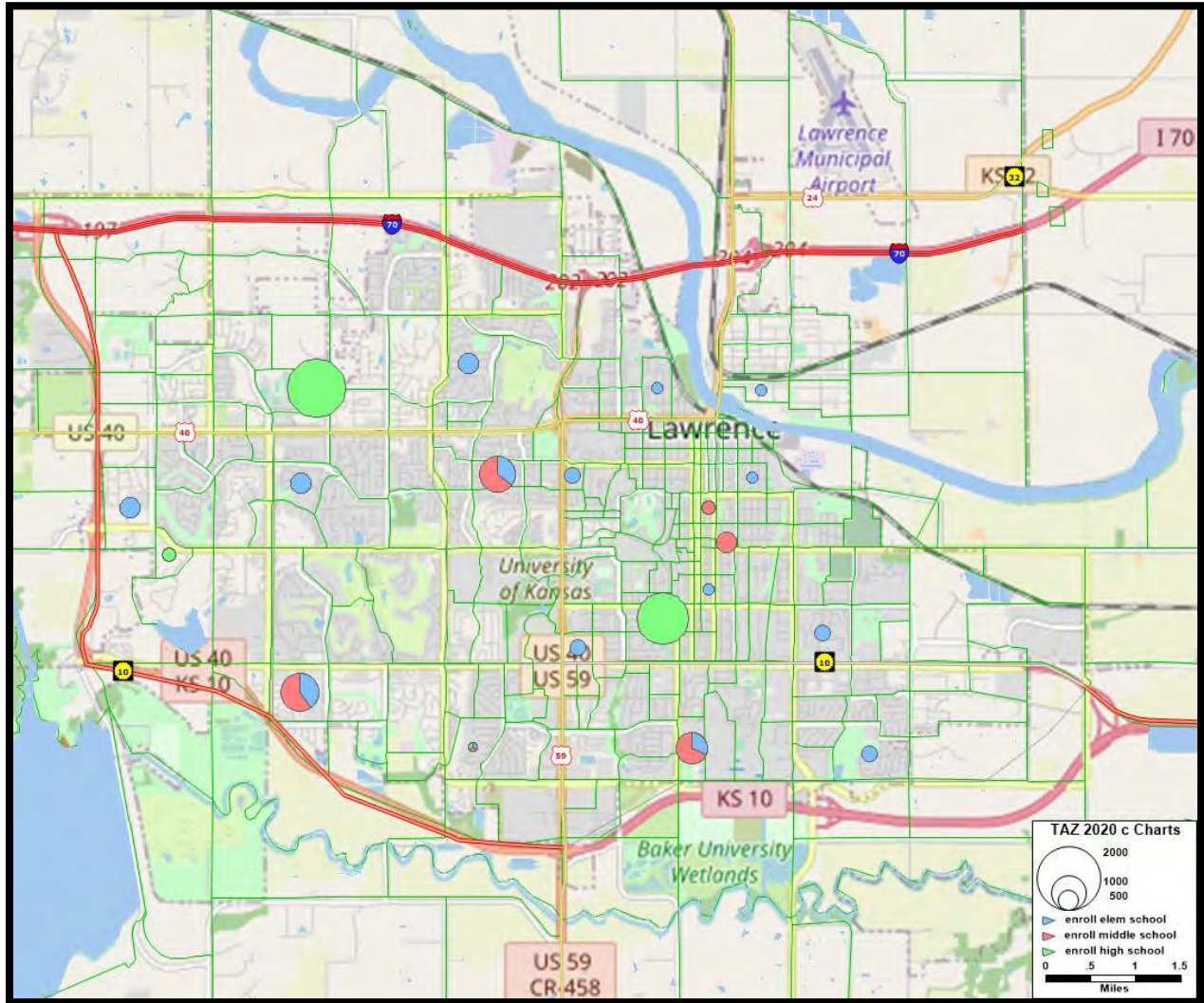
Major sector employment by TAZ—Douglas County



Major sector employment by TAZ--Lawrence area



School enrollment by TAZ--Lawrence area



College enrollment

The University of Kansas is by far the area's dominant educational institution with an enrollment of 21,000 in 2019. The model also includes 1,331 enrolled students at Baker University and 728 enrolled students at Haskell Indian Nations University.

Lodging

The model includes the following hotels and motels. The room occupancy was estimated.

lodge	address	city	TAZ	avg room occ
SpringHill Suites Marriott Lawrence Downtown	1 Riverfront Plaza	Lawrence	28	150
Towne Place Suites Lawrence Downtown	900 New Hampshire St.	Lawrence	63	150
The Oread: Olivia Collection	1200 Oread Ave.	Lawrence	89	150
The Eldridge	701 Massachusetts St.	Lawrence	145	100
The Eldridge Extended	201 W. 8th St.	Lawrence	150	40
TRU by Hilton - University of Kansas	510 Wakarusa Dr.	Lawrence	192	150
Best Western Plus West Lawrence	6101 Rock Chalk Dr.	Lawrence	201	150
Econo Lodge-Lawrence	2525 W. 6th St.	Lawrence	207	75
Super 8 Lawrence KU	801 Iowa St.	Lawrence	223	75
The Lodge Motel of Baldwin City	502 Ames St.	Baldwin City	376	75

Special generators

The table below shows four land uses that do not fit the model's generally applied formulas for trip generation. The numbers of trips are estimates and not based on any particular observation.

special generator	TAZ	vehicle trips
youth sports complex	238	300
Mutt Run	239	200
Lawrence main library	146	300
Aquatic center	147	100

Chapter 4 Validation

This section presents various measures to establish that the model provides a good representation of area traffic conditions. The 202 traffic counts used in the comparison are from the Kansas DOT database. The comparison uses the 2019 AADT counts. This includes counts on state roads that are adjusted for seasonality to represent average annual daily traffic (AADT), and counts on non-state highways that are from 2019, but without any indication of the month the count occurred, or whether there was any adjustment for seasonal variations in travel flows. Note that the counts within Central Lawrence would likely have significant seasonal variation because the area's primary traffic generator—University of Kansas—is not in session three months a year. The counts provided are nonetheless the best data of actual travel flows, and are a reasonable basis for validating the model results.

Comparison of traffic counts overall and by functional class and volume group

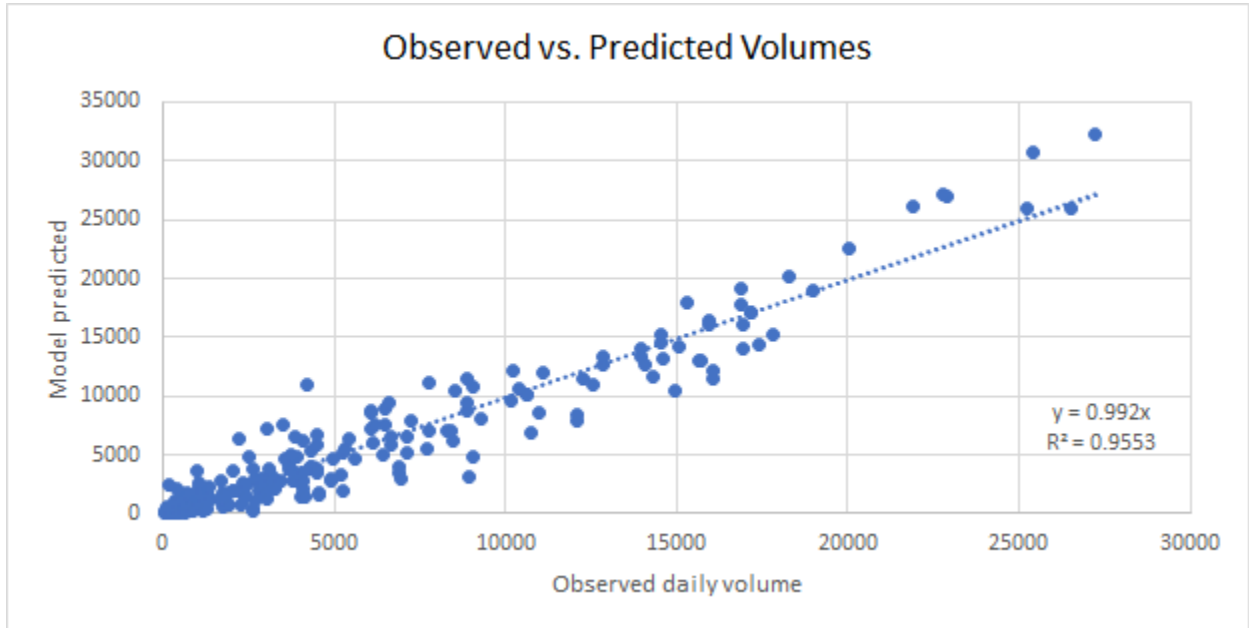
Here is a summary of the model daily volumes as a percent difference from the observed daily counts.

Functional classification	number of counts	sum of count volumes	sum of model volumes	% difference	FHWA target
interstate	6	100,000	103,740	3.7%	+/- 10%
other freeway	14	168,320	167,506	-0.5%	+/- 10%
major arterial	66	612,697	609,024	-0.6%	+/- 10%
minor arterial	36	184,016	170,031	-7.6%	+/- 15%
collector	69	218,275	201,261	-7.8%	+/- 25%
other functional class	11	5,455	4,309	-21.0%	N/A
All counts	202	1,288,763	1,255,871	-2.6%	+/- 10%

The rates for interstates, other freeways, arterials, and collectors are all well within the FHWA targets (which are in any case general guidelines, and not tied to regulations).

Comparisons on individual links

In addition to having a close comparison with overall traffic counts, the model should yield a low level of error on individual links. The plot on the next page demonstrates the model's ability to match the individual traffic counts. The resulting R^2 value of the regression for the full set of links is .96, and this exceeds the industry standard of 0.88. R^2 is a standard measure of "goodness of fit." An R^2 of 1.0 would be a perfect fit.



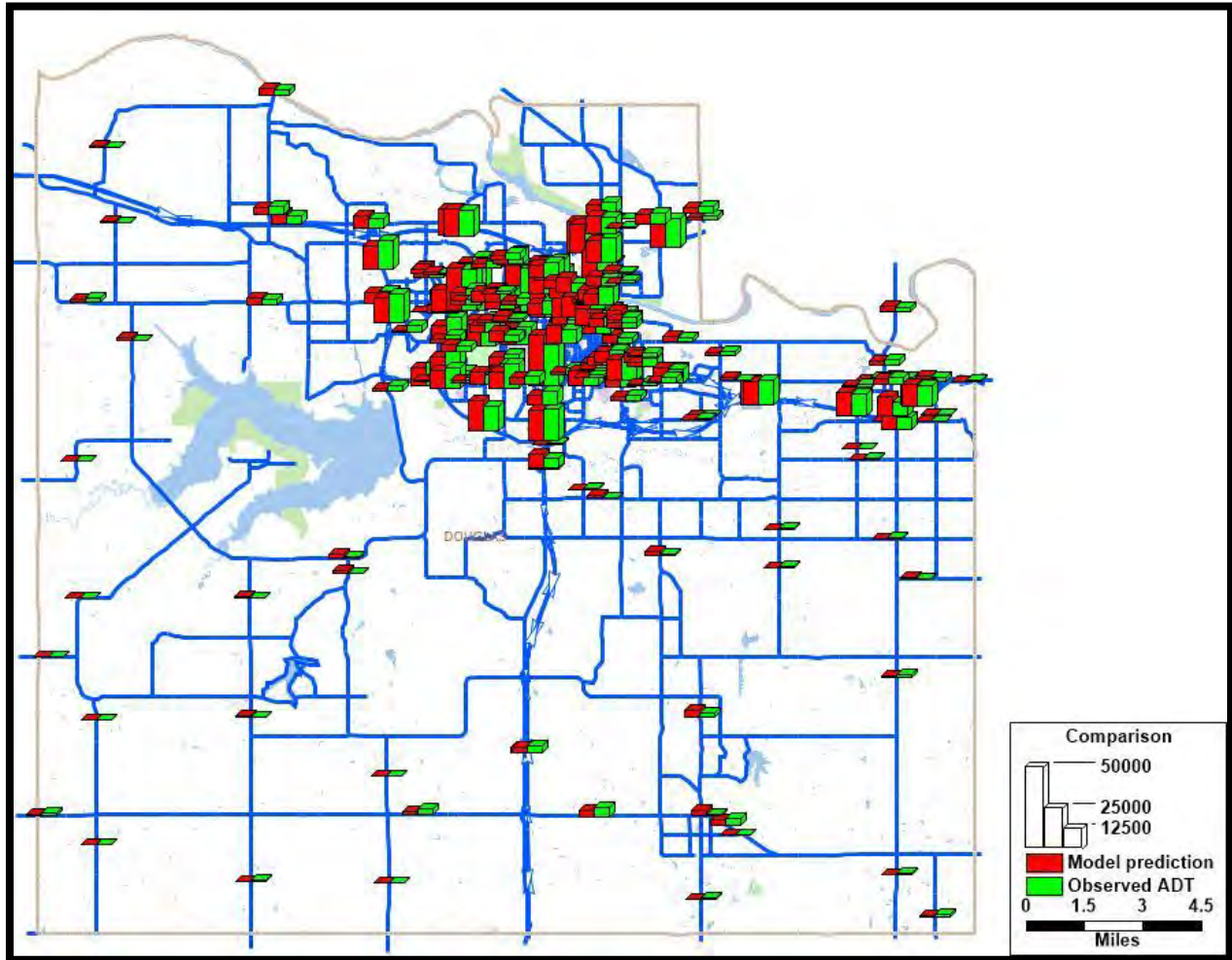
Root Mean Square Error measures the differences between the volumes predicted by the model and the observed volumes. The calculated MPO model RMSE of **29.9** percent is within the expected range for US models. The table below shows the RMSE for roads of different functional classification.

Functional classification	observations	% RMSE	Target
Interstates	6	6.1	<30%
Other Expressway	14	14.6	<30%
Major Arterial	66	24.3	<40%
Minor Arterial	36	42.3	<40%
Collector	69	51.0	N/A
Other FC	11	107.3	N/A
All counts	202	29.9	<40%

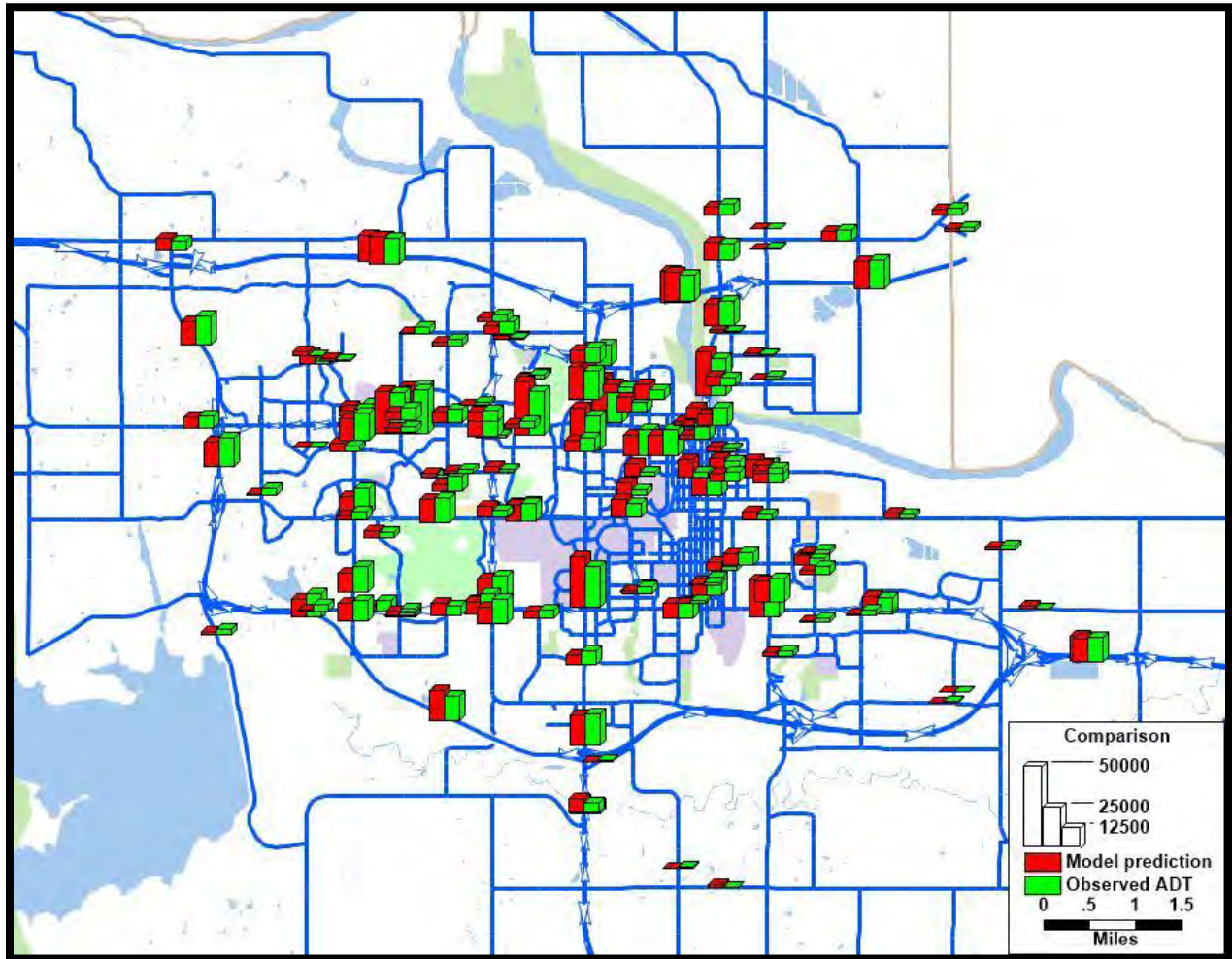
Traffic count maps

The following maps show the daily traffic volumes as predicted by the model (red bar) and observed counts (green) for 2019. Note that counts on I-70, parts of KS-10, and on other divided roads show the comparison in pairs of parallel bars by direction. The bars may be overlapping on the map. You can see that the model does do a good job in matching the observed traffic flows.

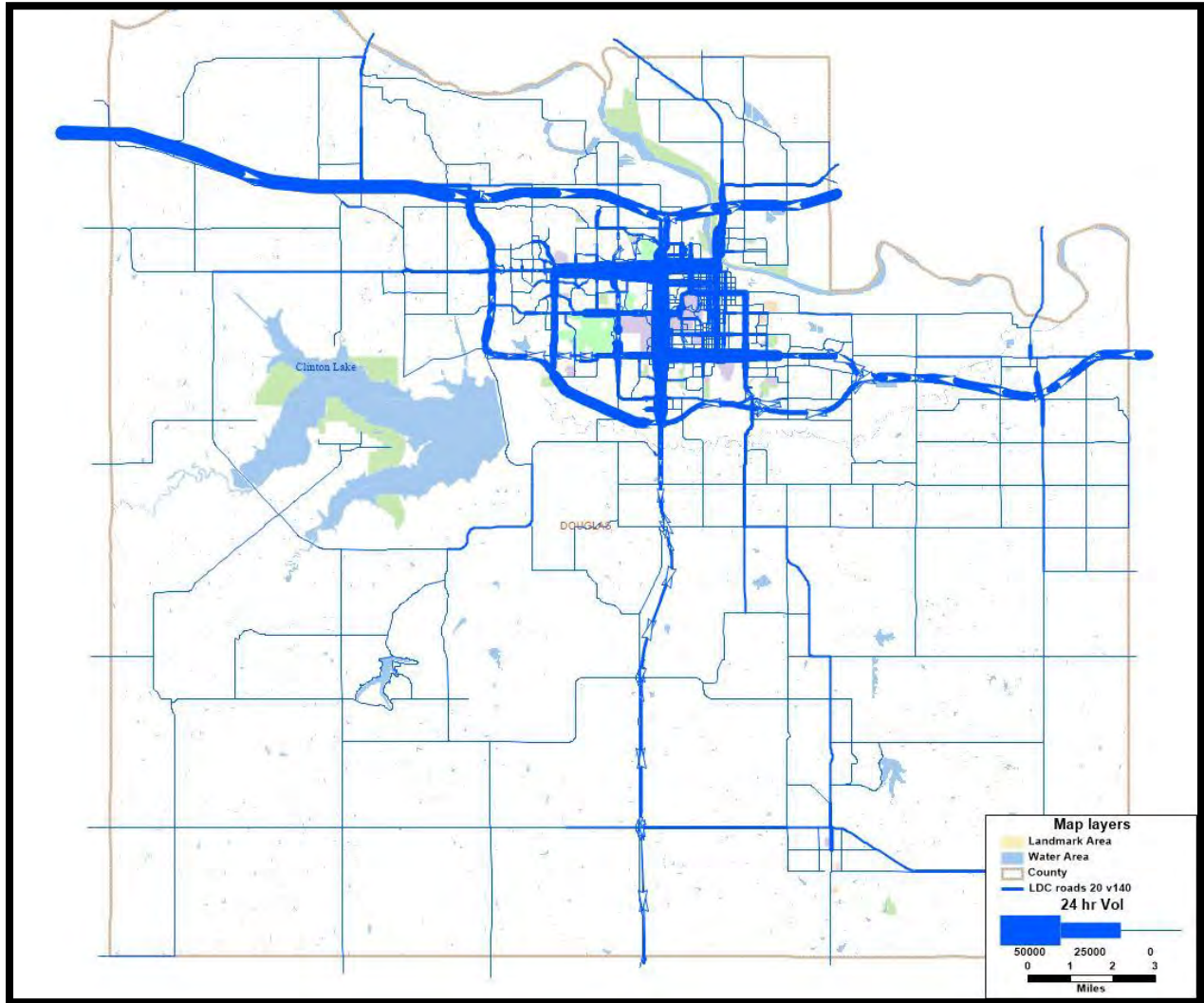
Traffic count locations as observed (2019) and as output from the model –Douglas County



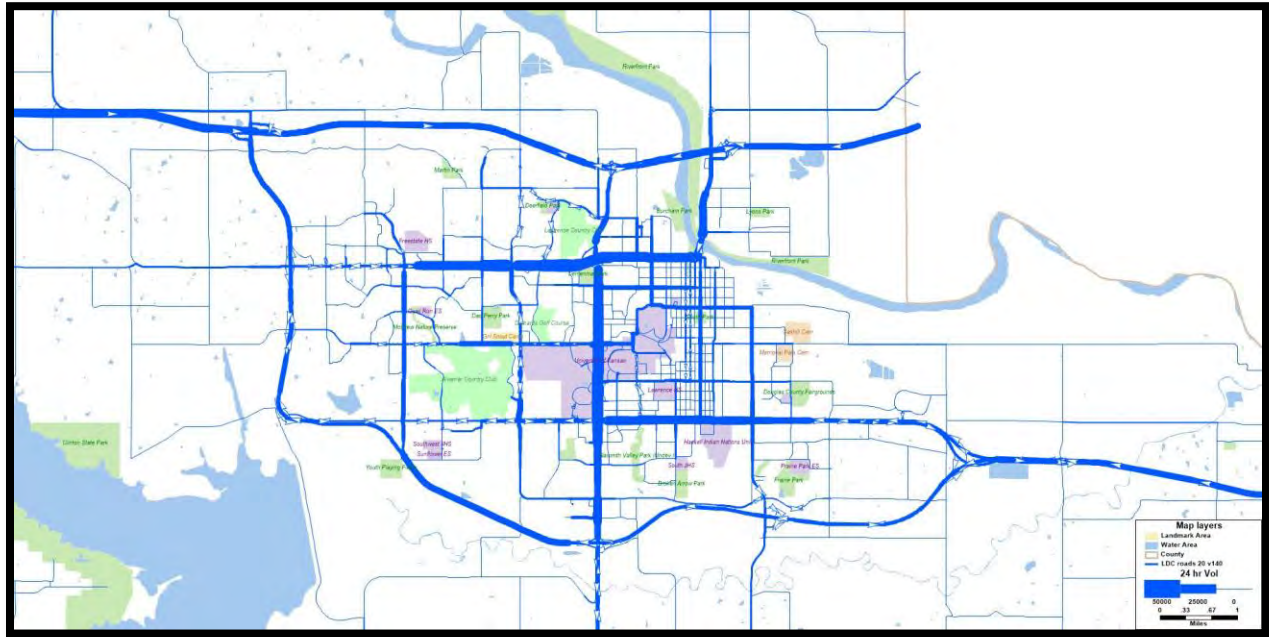
Traffic count locations as observed (2019) and as output from the model --Lawrence area



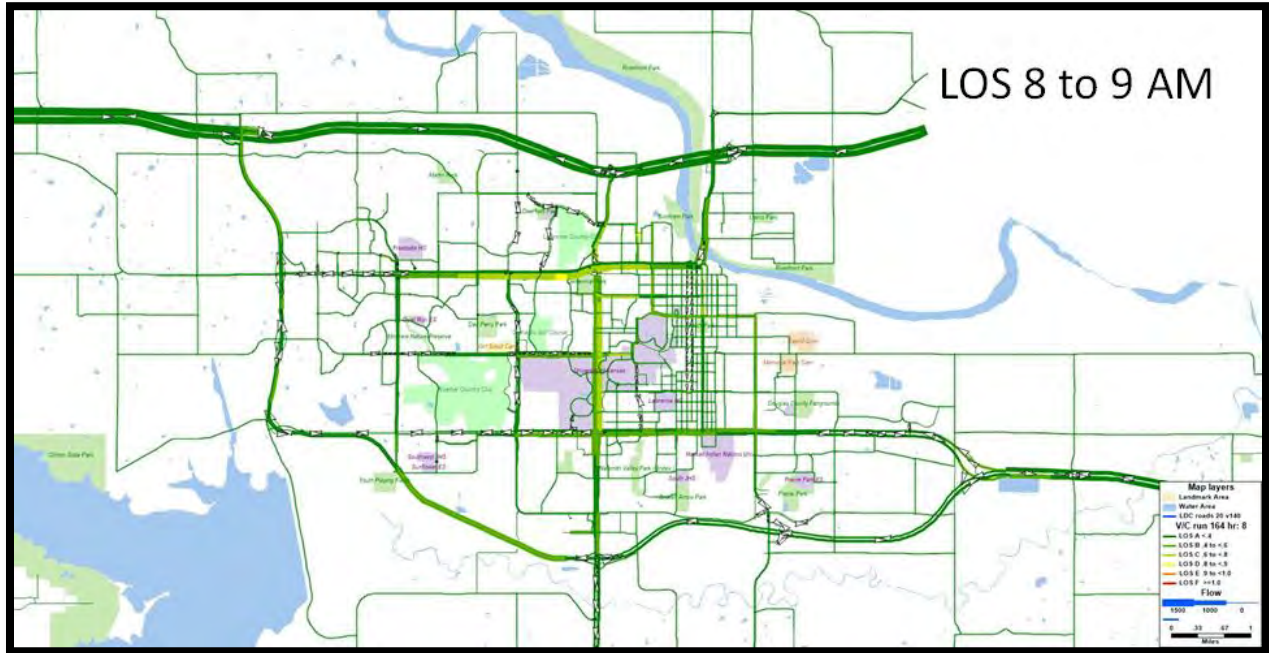
Daily vehicle flows as output by the model—Douglas County



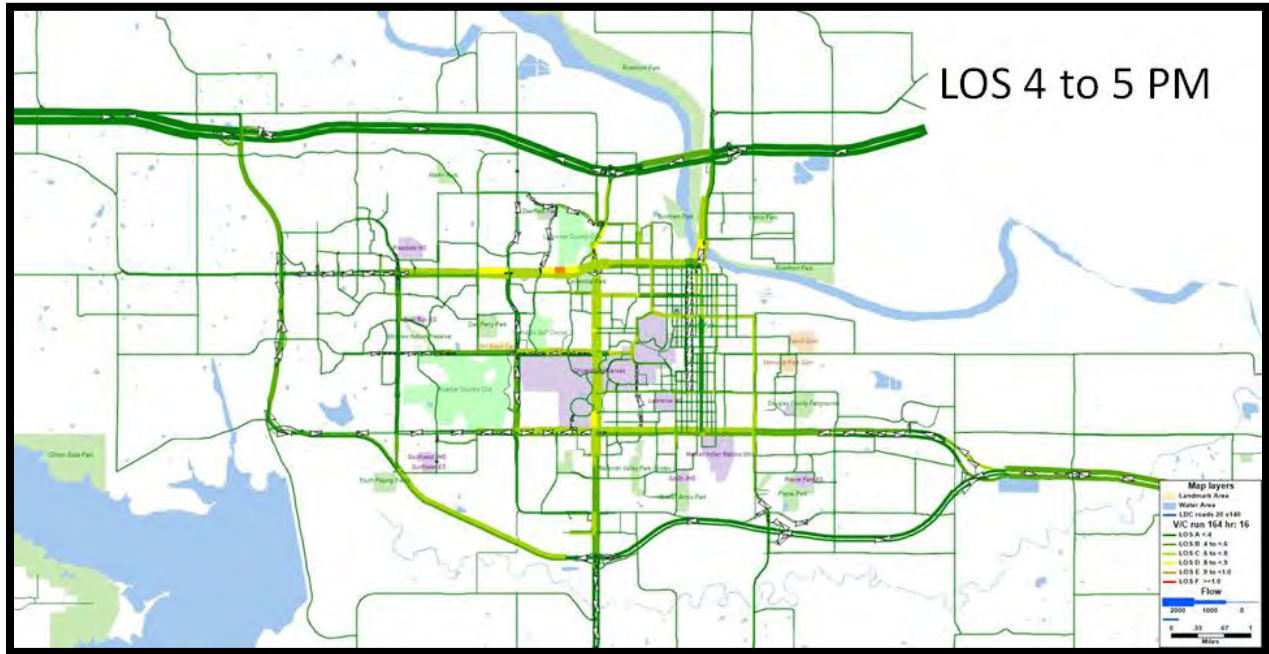
Daily vehicle flows as output by the model--Lawrence area



Hourly vehicle flows relative to capacity--8 to 9 AM, Lawrence area



Hourly vehicle flows relative to capacity--4 to 5 PM, Lawrence area



Other model results

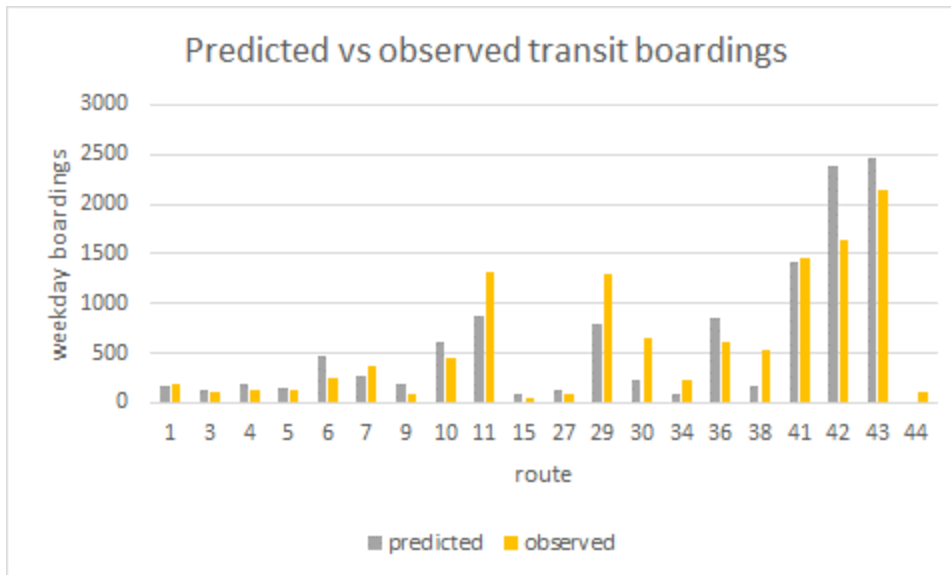
The following tables show that the base-year model is generally consistent with data from other sources.

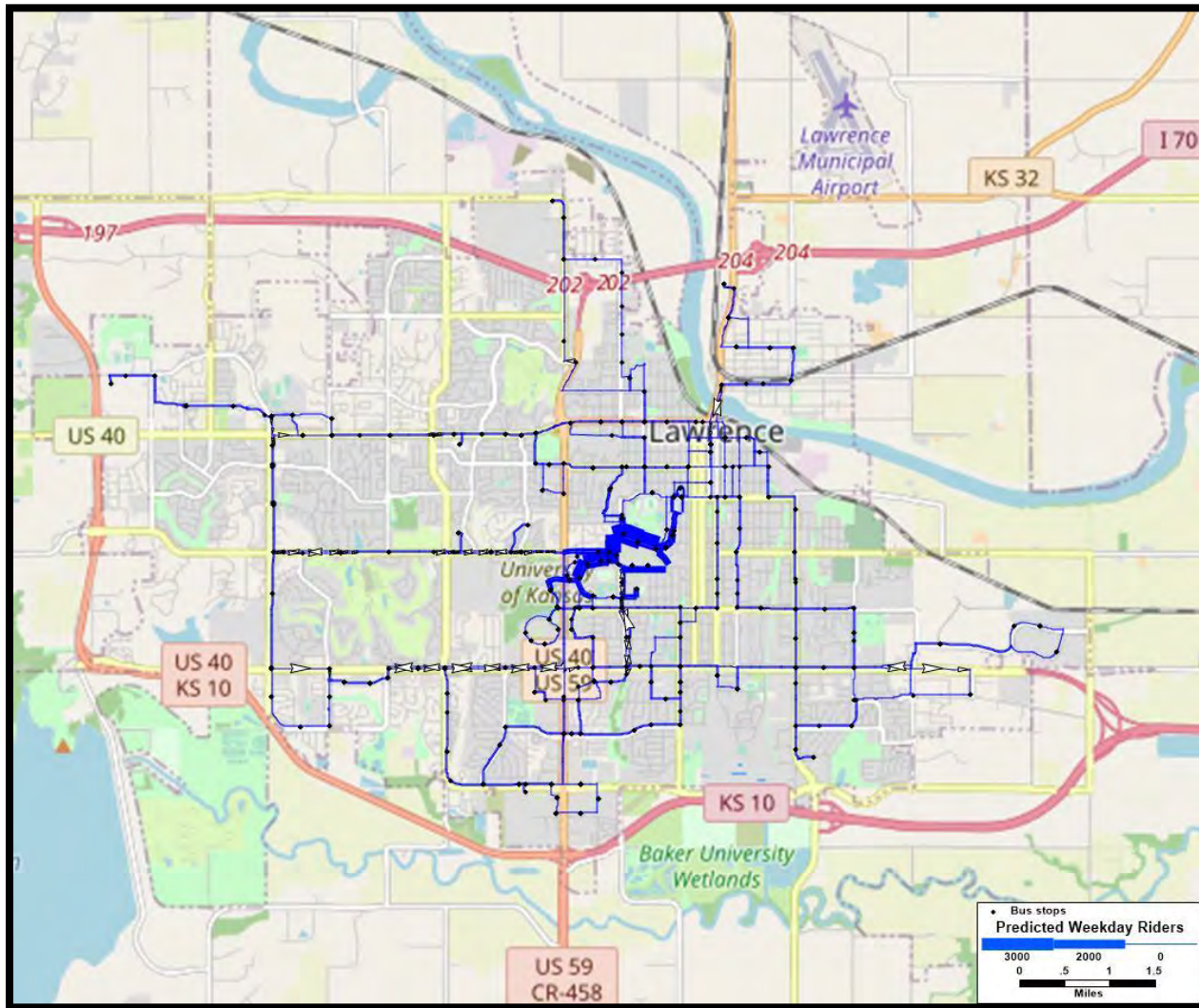
trip purpose	person trips	share of non-Ext- Ext trips	combined share of non-Ext-Ext trips	person trips per household--NHTS 2009
HBW	110,768	20%	20%	15%
HBsch	9,992	2%	56%	53%
HB College	24,602	4%		
HBO	272,238	49%	24%	32%
NHB	134,882	24%		
Ext Ext	34,449			
total	586,931	100%	100%	100%

Note that a round trip is counted as two one-way trips. For example, an individual who goes from home to work and then from work back to home would have made two HBW person trips.

mode	model (all trips)	census (journey to work)
drive	92.8%	91.3%
transit	2.0%	2.2%
bike	0.6%	1.3%
walk	4.6%	5.2%

ACS 2021 (5-year data) Means of transportation to work (Table B08006)--
Douglas County, KS; excludes work from home





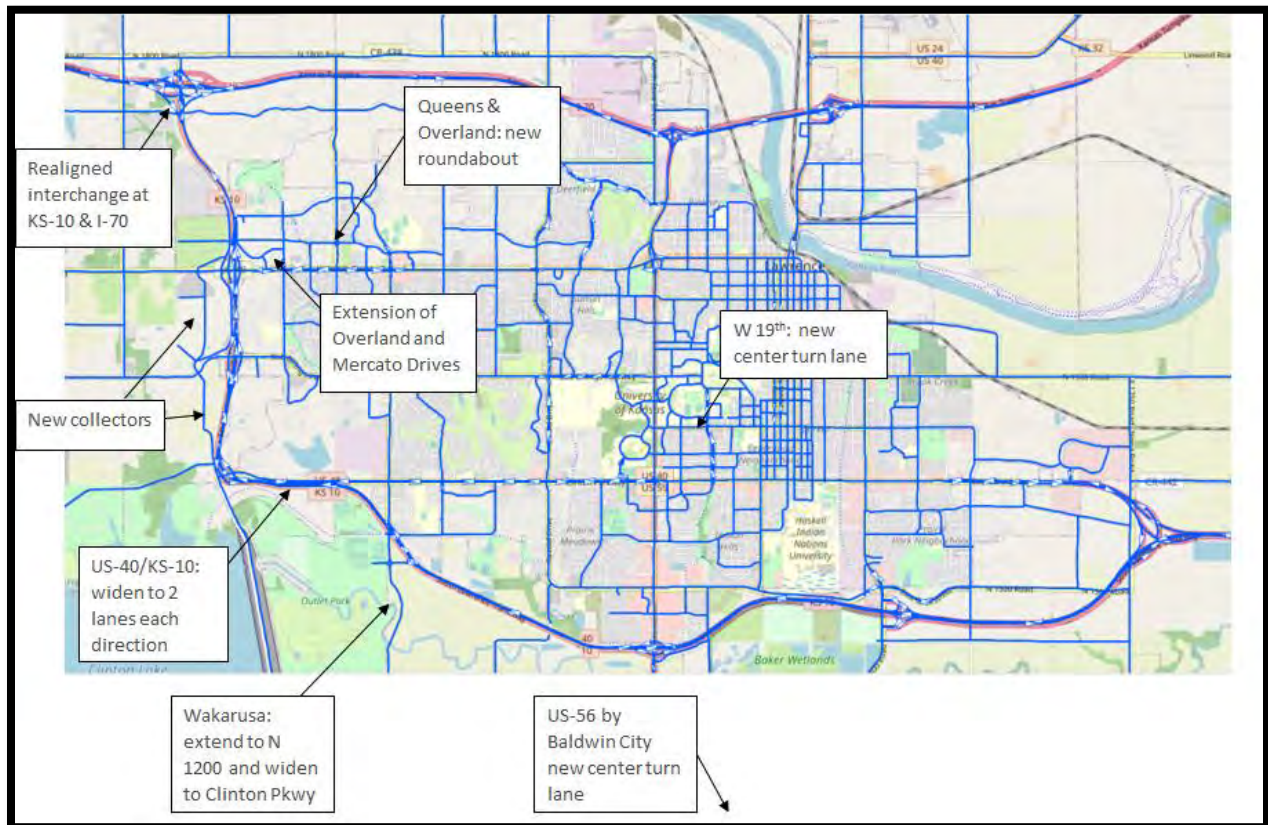
Chapter 5 Future Scenarios and results

The effectiveness of the model in replicating base year travel flows in response to the base year transportation network and land use conditions, means that we can now use the model to forecast future travel flows in response to future year transportation and land use conditions. This section projects the transportation systems and land use characteristics to 2050 and shows the model results about traffic flows under these conditions.

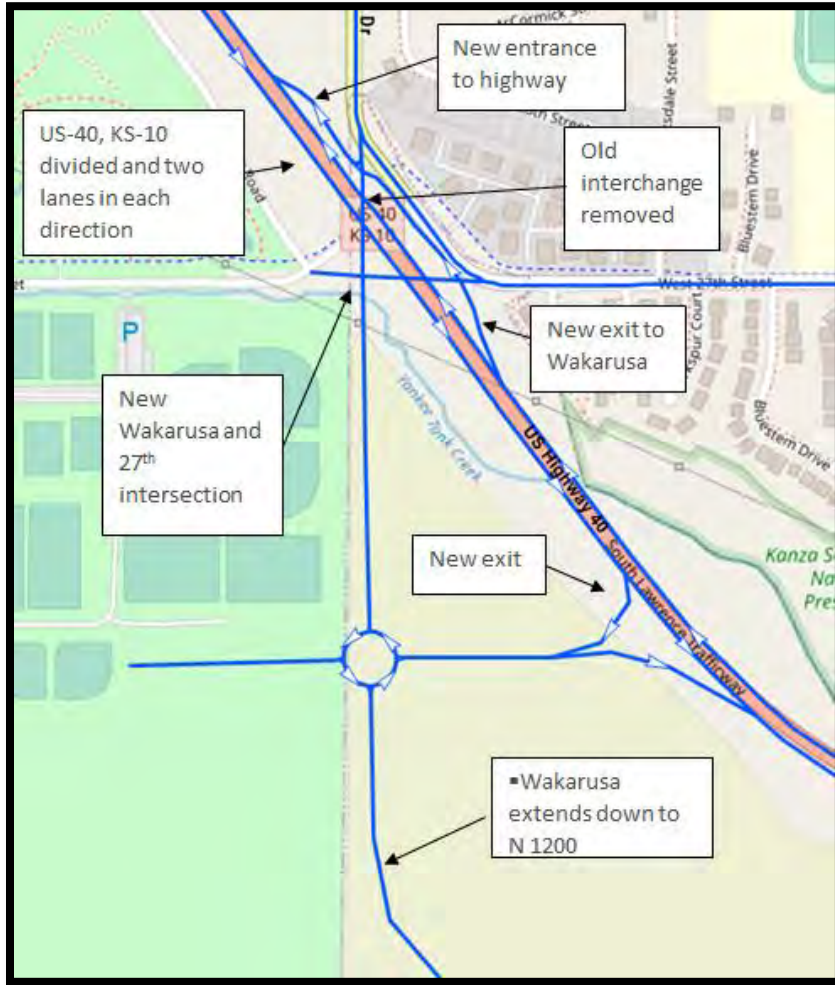
It is important to note that while the future scenarios represent changes in Douglas County population, employment, or the area's roads or transit services, the scenarios do not consider changes in the fundamental nature of travel behavior. The model (and consequent results) assumes that Douglas County residents and visitors in 2050 will still travel at rates similar to what they did in the model base year (2019). It is of course possible that technology, laws, economics, and lifestyles would lead to far fewer actual trips than today; perhaps we will just send our avatars to virtual chat rooms. The future here is full of uncertainty, and given this uncertainty, the Federal Highway Administration and other regulatory agencies have suggested that metropolitan planning models continue to assume the continuation of underlying travel behavior.

Transportation system changes

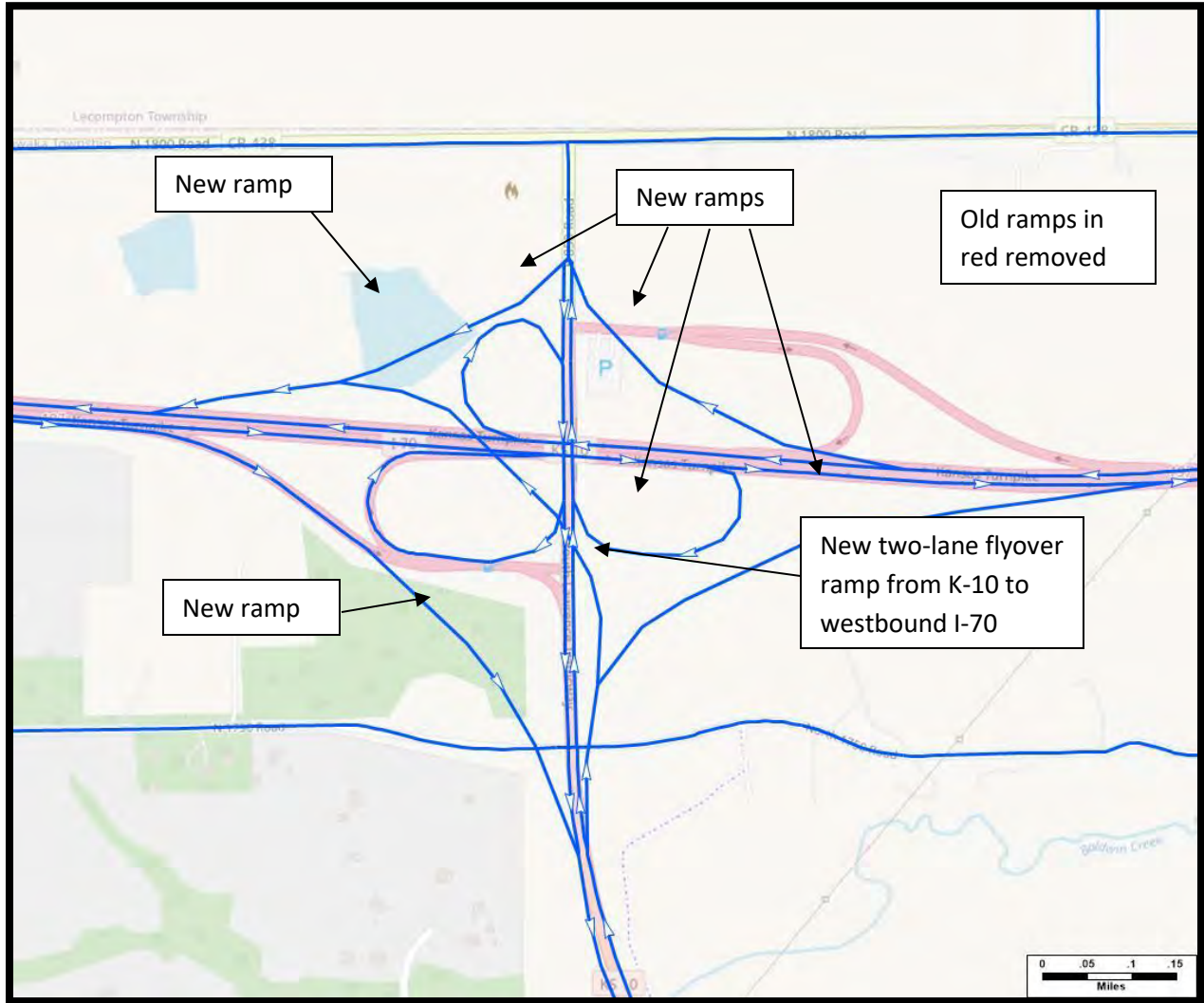
The Lawrence - Douglas County MPO has identified a set of committed transportation system changes, as shown on the next few pages.



Details of road changes by Wakarusa and K-10



Realigned interchange at I-70 and K-10



Population and employment changes

The table below shows population and employment by sector for Douglas County in 2019 and for the forecast year of 2050.

Douglas County				
	2019	2050	change	% change
population	127,627	158,524	30,897	24%
pop in households	118,209	148,778	30,569	26%
students in dormitories	8,414	8,650	236	3%
other group quarters pop	1,004	1,096	92	9%
occupied households	51,962	63,984	12,022	23%
total jobs	51,683	61,487	9,804	19%
basic (manuf, farming)	8,862	9,579	717	8%
retail and food service	12,446	14,851	2,405	19%
health care	6,828	7,311	483	7%
educ svcs non-coll	3,913	4,942	1,029	26%
educ svcs coll	6,890	8,681	1,791	26%
other services	12,774	16,123	3,349	26%
lodging rooms	1,115	1,733	618	55%

The 24 percent increase in population between 2019 and 2050 for all of Douglas County represents a growth of 0.7 percent per year. This is slightly above the 0.63 percent annual increase forecast for Douglas County population made by the national economic research firm, Woods & Poole, but it is well-below the 1.14 percent growth rate for Douglas County population predicted by the Kansas-based Center for Economic Development and Business Research (CEDBR). The CEDBR forecast, however, is from 2014, has not been updated, and was not consistent with the 2019 census (American Community Survey) estimate for Douglas County. The Woods & Poole forecast, from 2022, is consistent with the ACS. The adjusted population growth rate applied by the MPO accounts for utility expansion and consequent development opportunities west of K-10 and expected regional growth in response to development plans at the former Sunflower Ammunition Site just east of the county.

The MPO has defined two scenarios for the distribution of population and economic activity out to 2050 at the TAZ level. The first (“base scenario”) accounts for development trends and planned utility and road expansion. This suggests that the County’s greatest concentration of growth would be in the TAZs just west of K-10 and between Clinton Lake and US-40. TAZs around Eudora—particularly south of K-10—would also have significant growth.

The second (“densification scenario”) assumes that much of the growth forecast in the base scenario for the TAZs west of K-10 go instead to zones within the City of Lawrence between K-10 and I-70. This scenario would entail more growth in population and employment by sector in the TAZs with the appropriate zoning and with available land to support added growth.

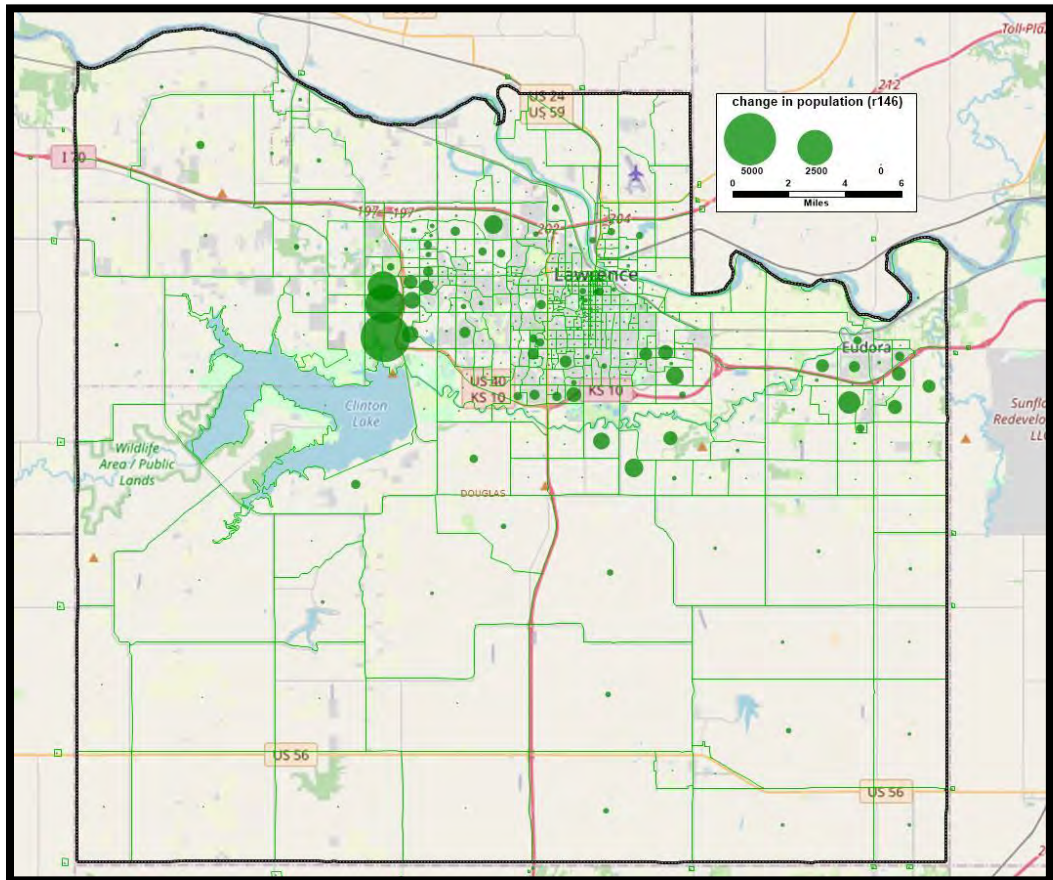
The table below shows the population and employment for the City of Lawrence (current boundaries) under the two scenarios.

	City of Lawrence (current boundaries) base scenario				City of Lawrence (current boundaries) densification scenario			
	2019	2050	change	% change	2019	2050	change	% change
population	102,980	112,274	9,294	9%	102,980	116,385	13,405	13%
pop in households	94,054	103,024	8,970	10%	94,054	107,160	13,106	14%
students in dormitories	7,922	8,154	232	3%	7,922	8,154	232	3%
other group quarters pop	1,004	1,096	92	9%	1,004	1,096	92	9%
occupied households	42,812	47,173	4,361	10%	42,812	49,085	6,273	15%
total jobs	46,023	52,599	6,576	14%	46,023	53,515	7,492	16%
basic (manuf, farming)	6,702	7,233	531	8%	6,702	7,235	533	8%
retail and food service	11,869	12,923	1,054	9%	11,869	13,478	1,609	14%
health care	6,399	6,852	453	7%	6,399	6,858	459	7%
educ svcs non-coll	3,031	3,828	797	26%	3,031	3,828	797	26%
educ svcs coll	6,153	7,537	1,384	22%	6,153	7,832	1,679	27%
other services	11,899	14,226	2,327	20%	11,899	14,284	2,385	20%
lodging rooms	1,040	1,490	450	43%	1,040	1,490	450	43%

The maps on the next page show this for the two scenarios.

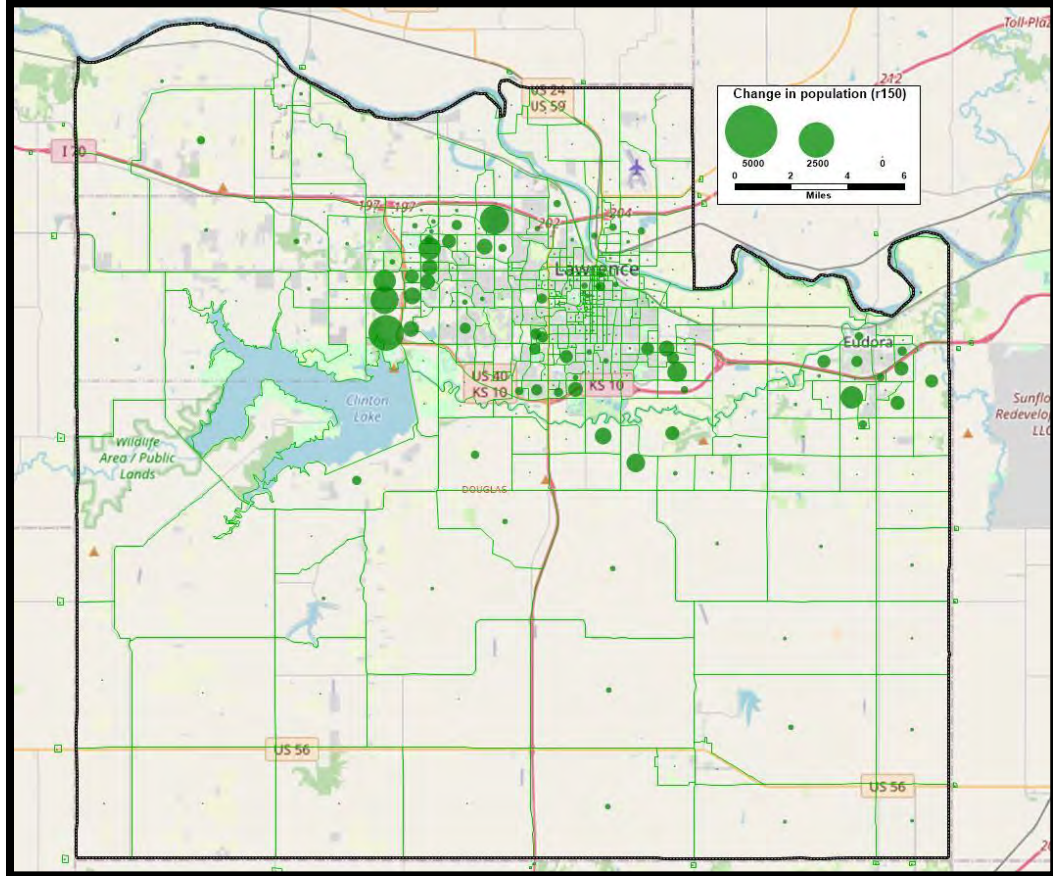
Change in population (2050–2019)

Base
scenario

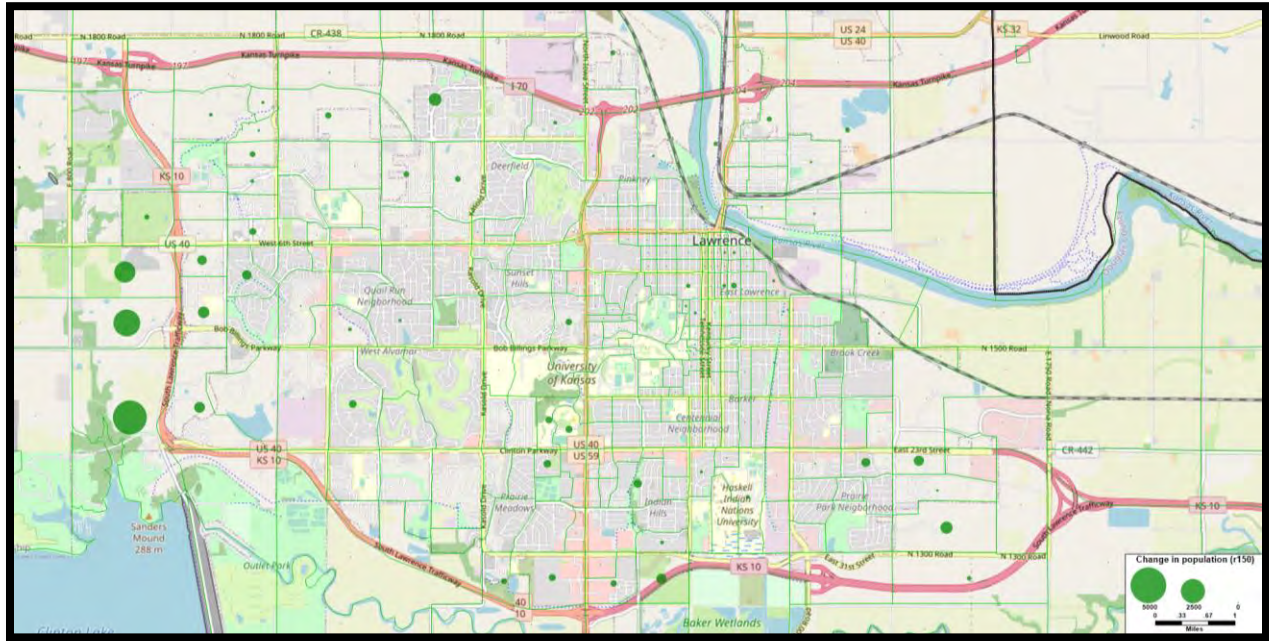


Change in population (2050–2019)

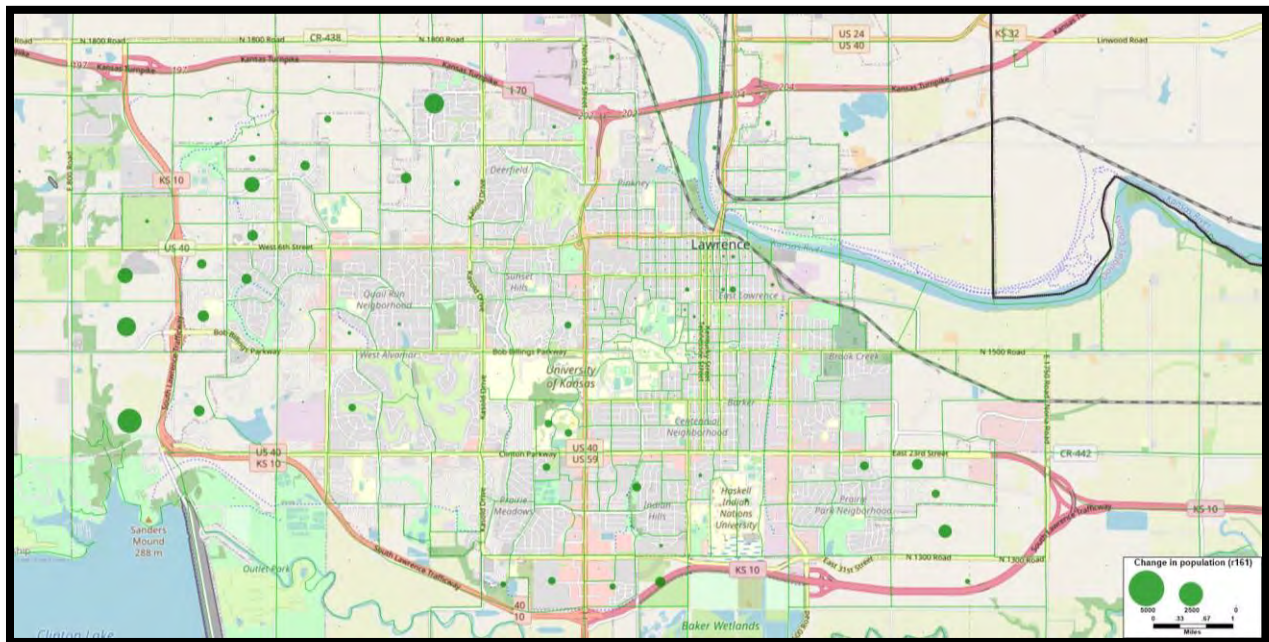
Densification
scenario



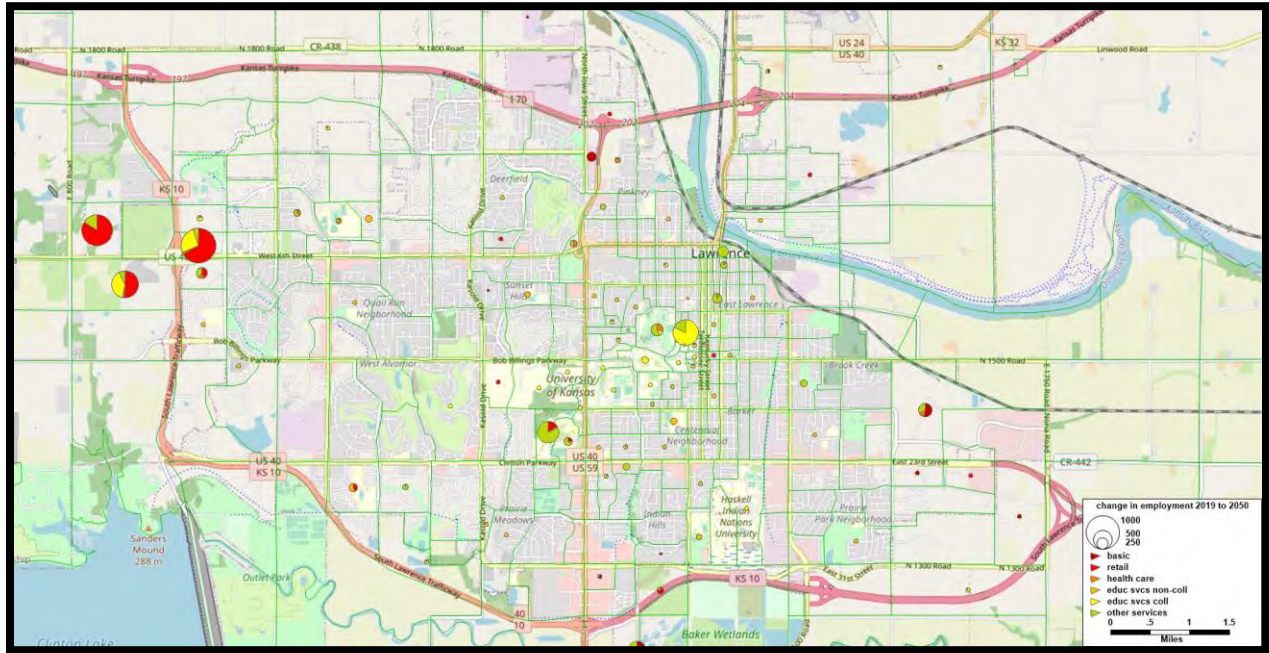
Change in population (2050–2019)--Base scenario



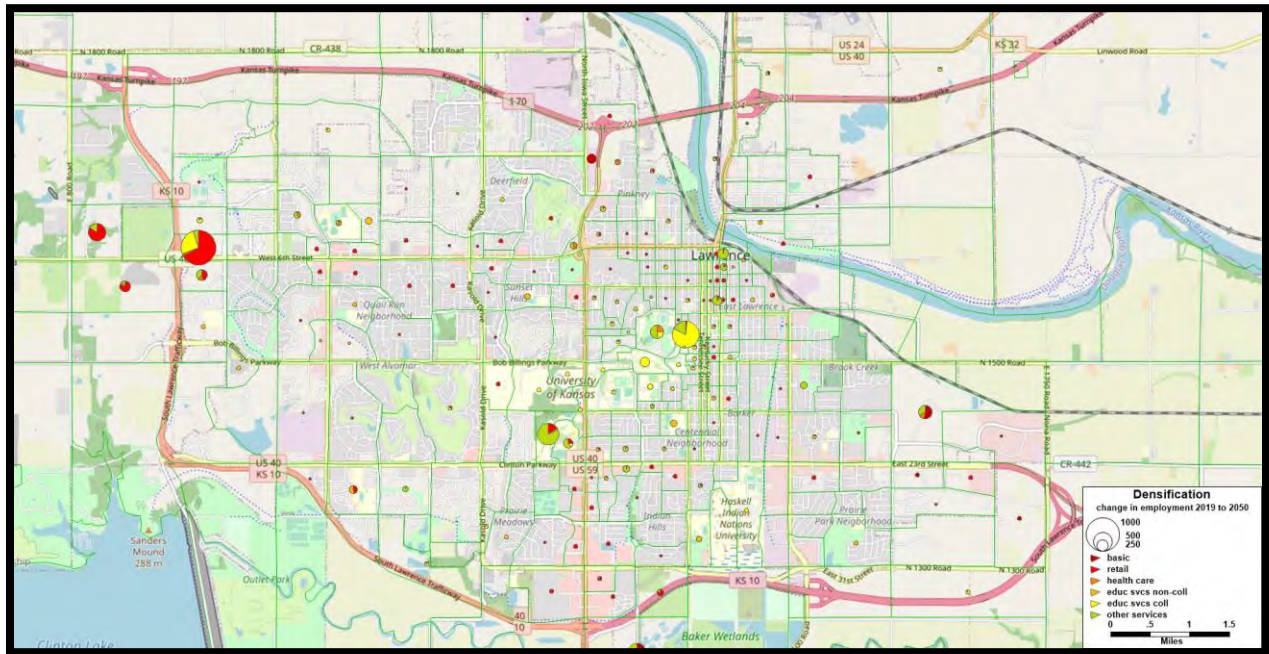
Change in population (2050–2019)--Densification scenario



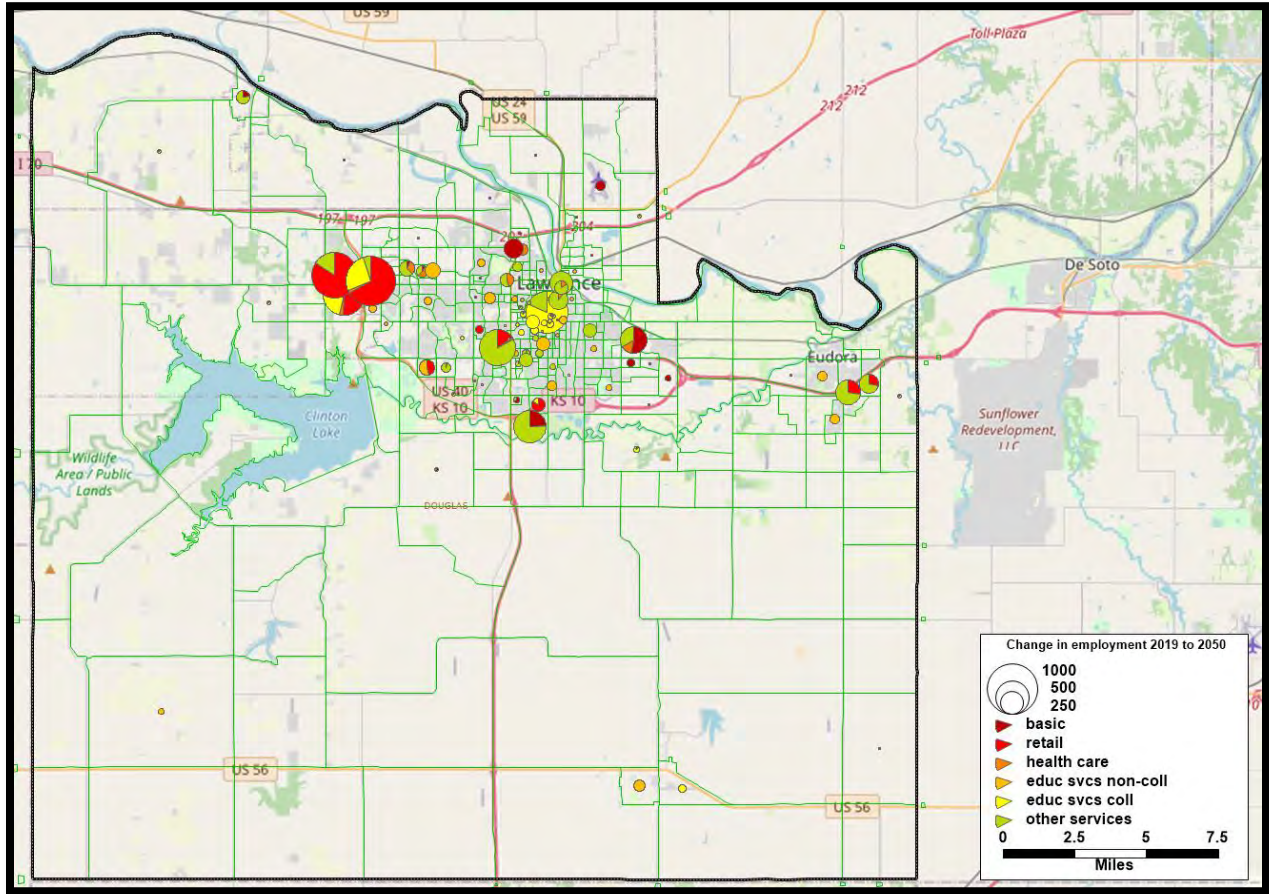
Change in employment (2050–2019)--Base scenario



Change in employment (2050–2019)--Densification scenario



Change in employment (2050–2019)--Base scenario showing full county



Note that the distribution of 2050 employment outside the Lawrence area is the same in the Base and
 Densification Scenarios.

Traffic at externals--2050

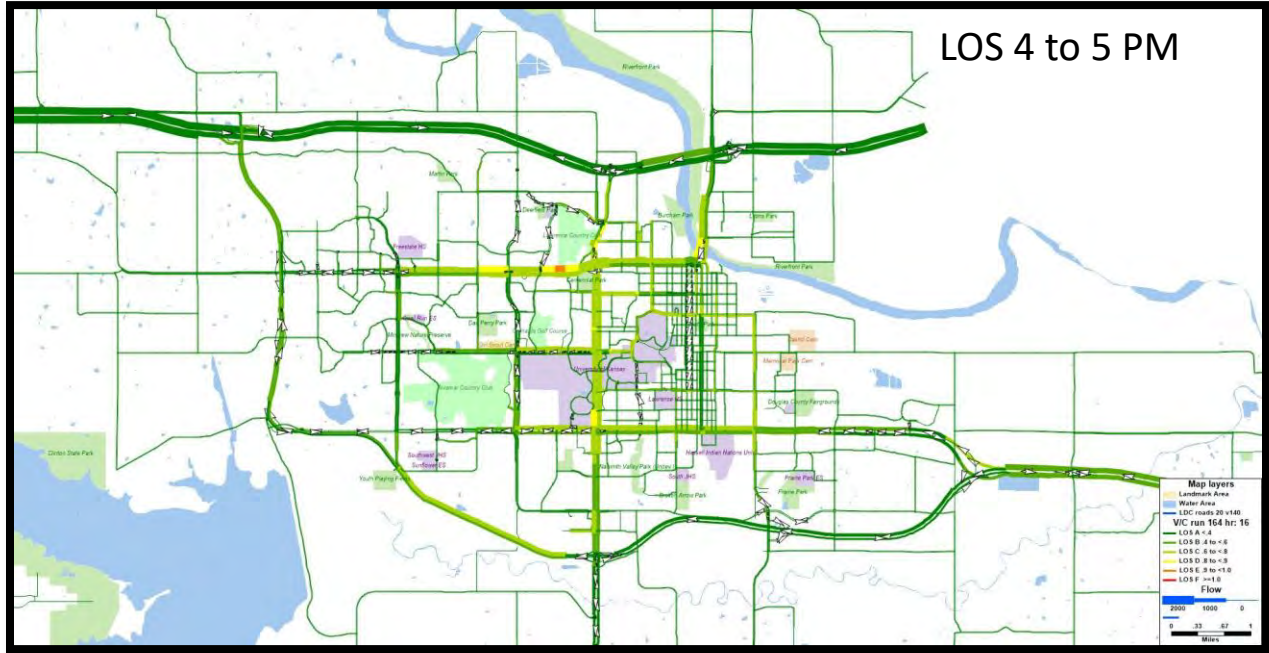
In the base year, traffic on the roads crossing into Douglas County are evident from observed traffic counts. These are not available for future years, and the model has no direct way to estimate trips with one or both ends outside Douglas County. For the 2050 scenarios, we have thus based the traffic counts at the 26 external stations based on discussions with transportation planning staff at Kansas DOT. They have forecast significant increases in weekday traffic, particularly on I-70 and K-10 at the edges of Douglas County. The table below shows the 2050 ADT and the percent of that traffic that is through traffic (“external – external”) across the county.

external station	type	2019		2050	
		ADT	% ext-ext	ADT	% ext-ext
480 I-70, Kansas Tnpk west	interstate	44,868	76	73,391	79
481 US 40 west	principal	2,689	33	3,128	12
482 SE 45 th St	principal	2,870	0	3,248	0
483 CR 458	minor	336	0	366	0
484 CR 460	minor	170	0	185	0
485 US 56 west	principal	2,074	18	3,262	21
486 N 1 Rd west	minor	31	0	34	0
487 E 550	minor	490	0	534	0
488 E 900	minor	200	0	218	0
489 CR 1045	minor	245	0	267	0
490 US 59	principal	5,690	9	8,703	9
491 CR 1055	minor	855	0	932	0
492 E 2200 south	minor	805	0	877	0
493 KS 33 (Virginia Rd)	principal	2,030	18	3,529	34
494 US 56 east	principal	4,949	9	8,567	20
495 CR 460	minor	100	0	150	0
496 N 900 Rd	minor	1,300	0	1,944	0
497 N 1400 Rd	minor	480	0	718	0
498 KS-10	principal	29,700	16	47,120	26
499 E 2200 north	principal	3,545	0	4,267	0
500 N 1800 (Linwood Rd)	principal	2,012	11	2,568	0
501 US 40 east	principal	3,897	18	5,454	10
502 I-70, Kansas Tnpk east	interstate	34,580	73	50,824	74
503 E 1400	minor	323	0	483	0
504 US 24	principal	3,321	18	4,123	8
505 Eisenhower Mem Dr	principal	4,110	17	5,462	7

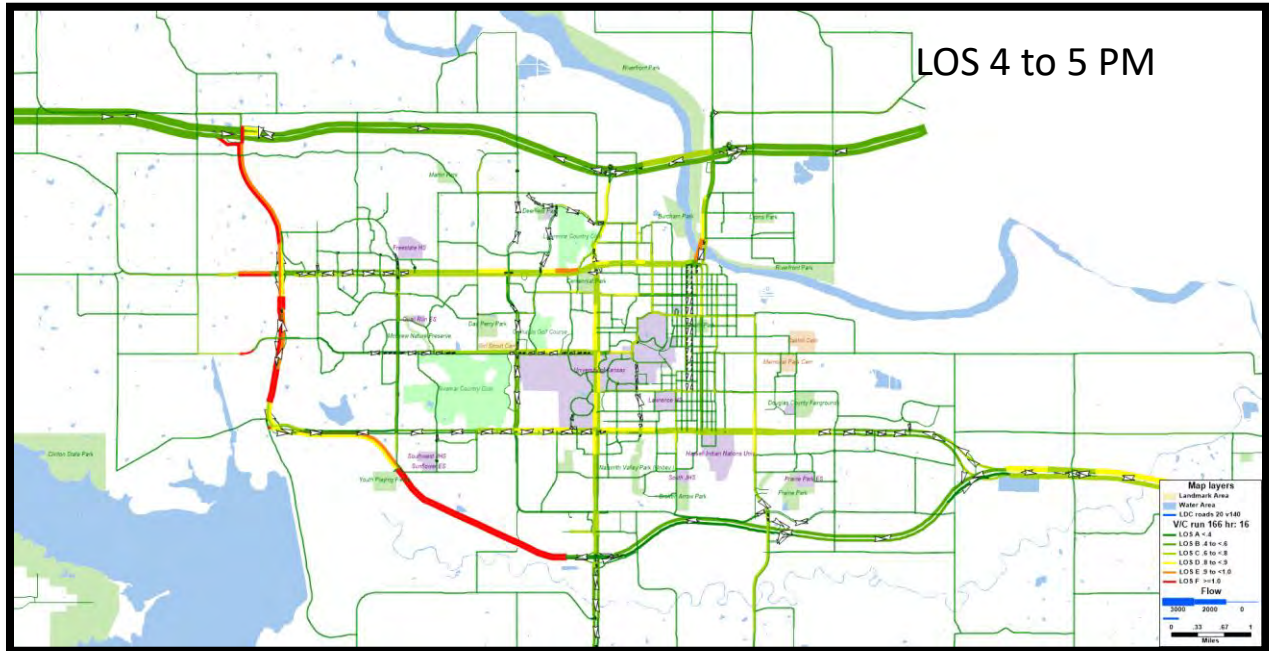
The model applies the modlin method to distribute the through trips between each OD pair.

Forecast results

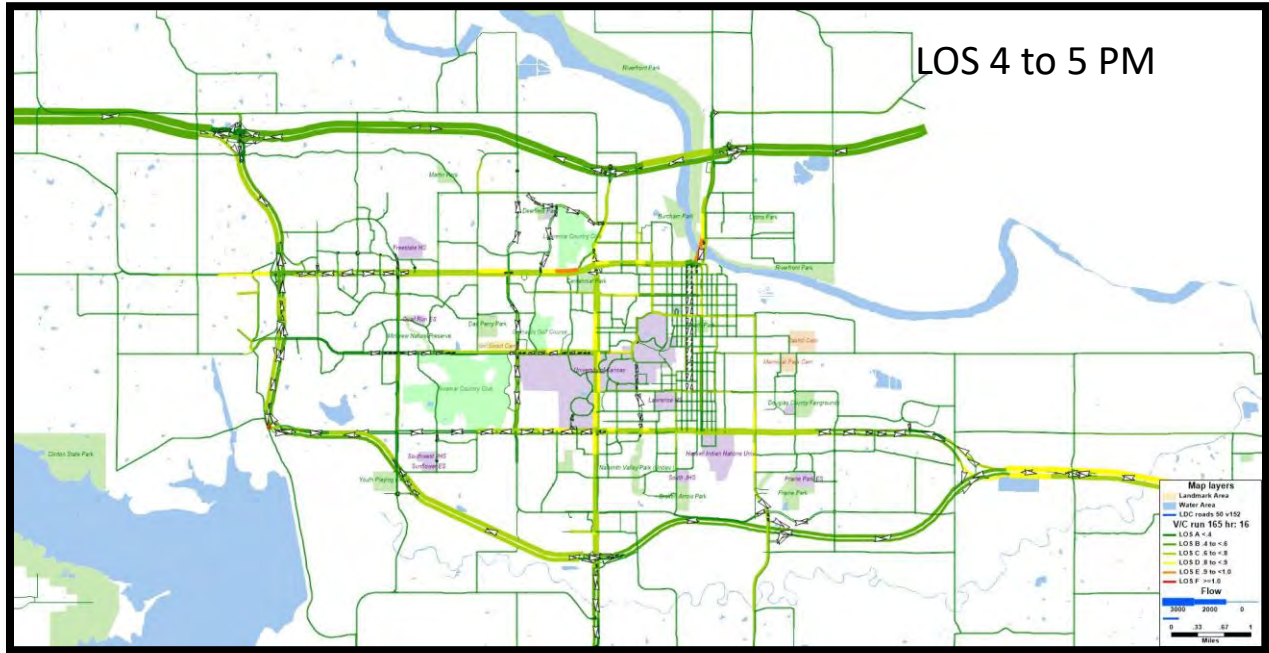
Base year (2019) flow on current roads (r164)



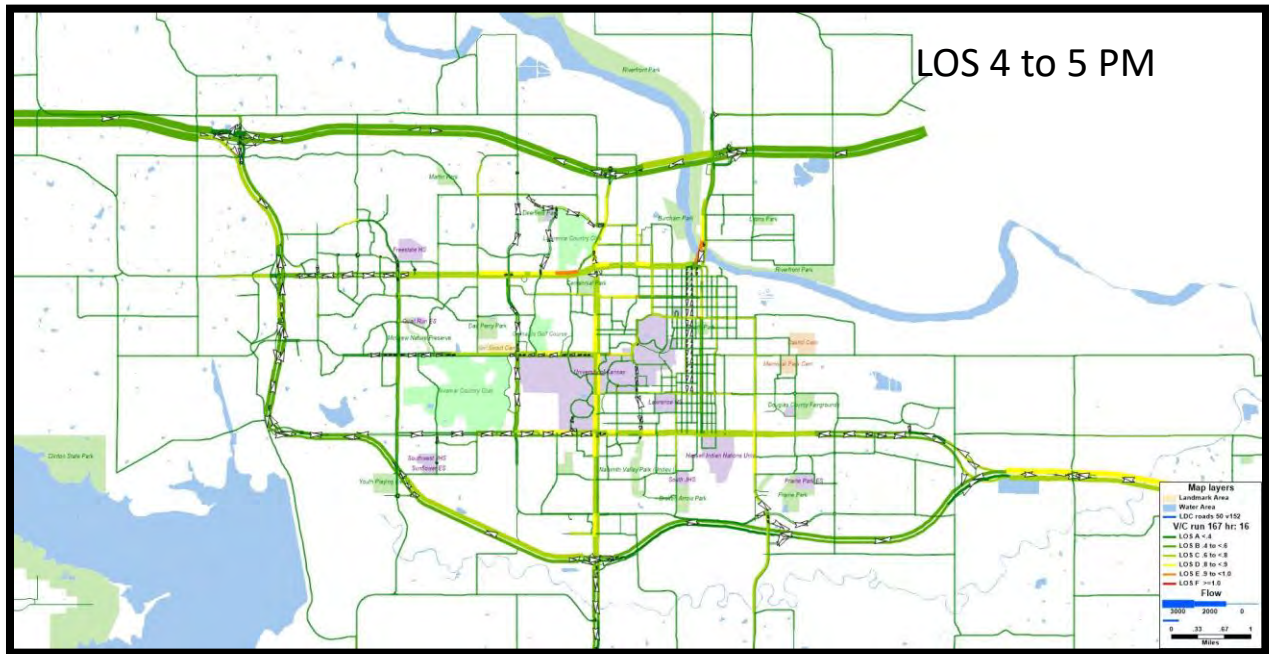
2050 flow if no road changes (r166)—base scenario



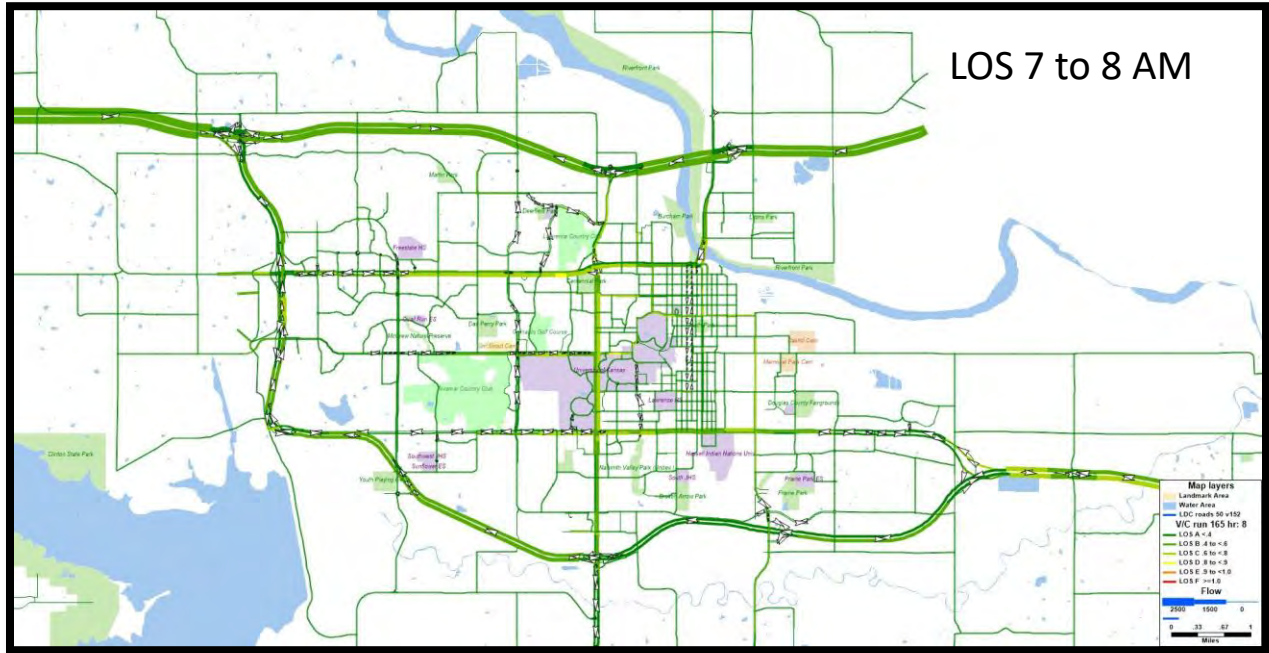
2050 flow with committed projects (r165)—base scenario



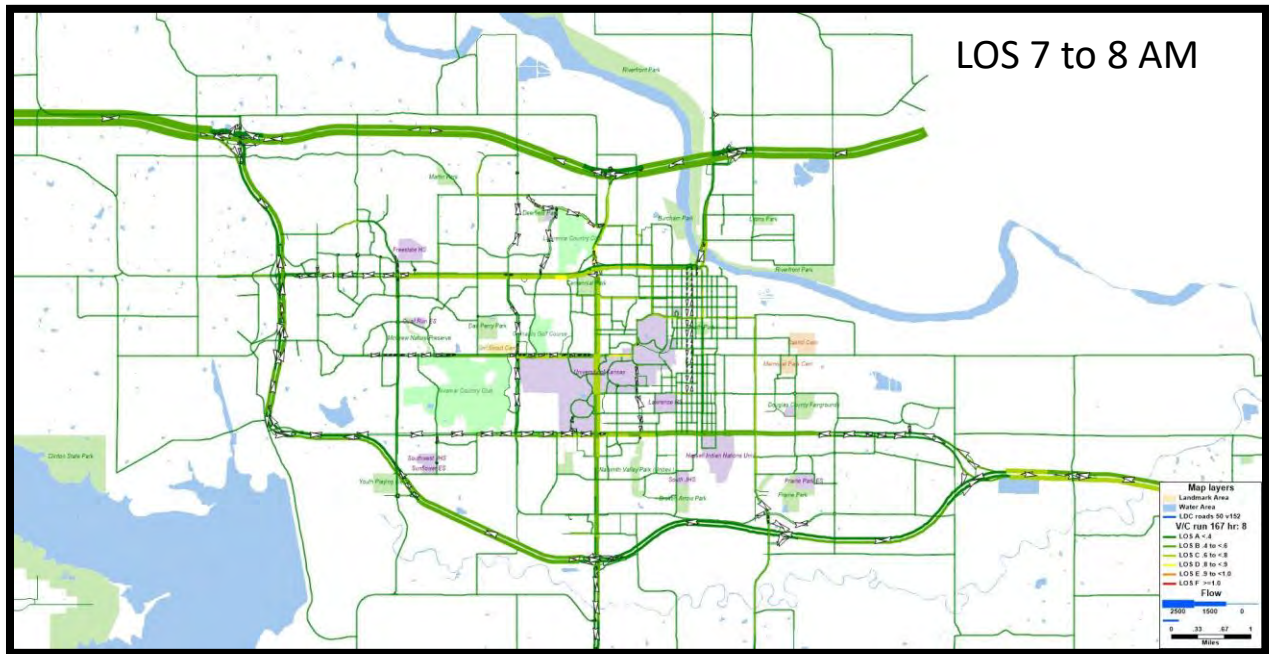
2050 flow with committed projects (r167)—densification scenario



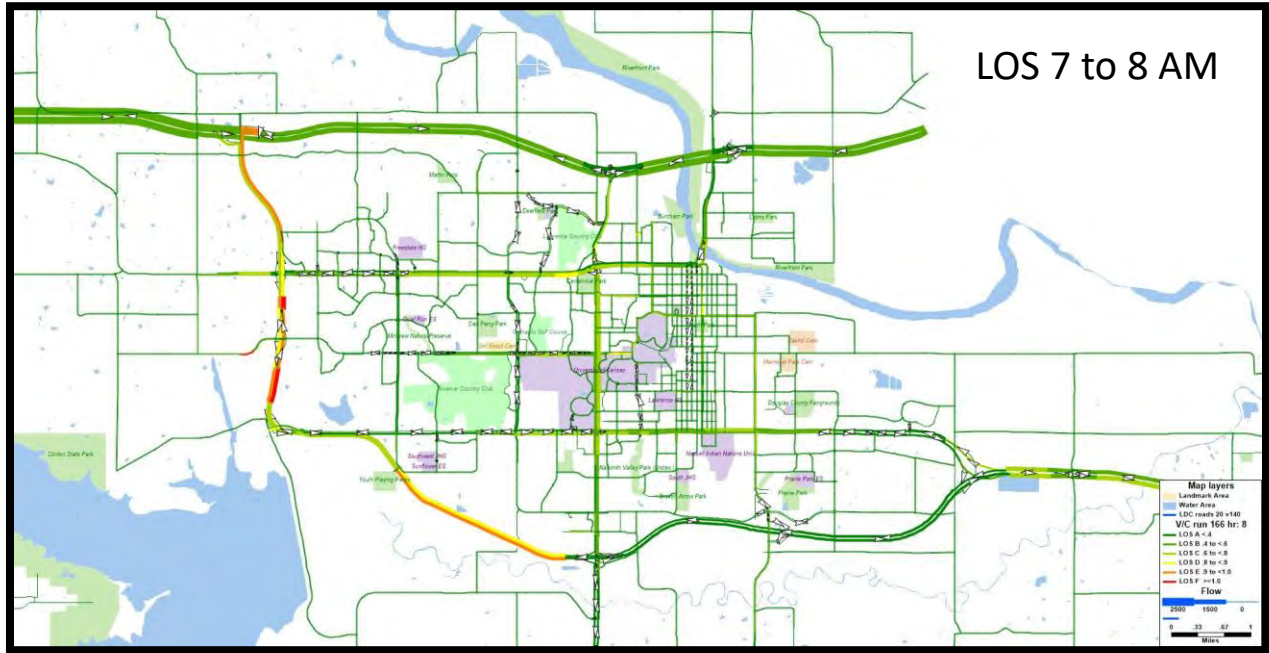
2050 flow with committed projects (r165)—base scenario



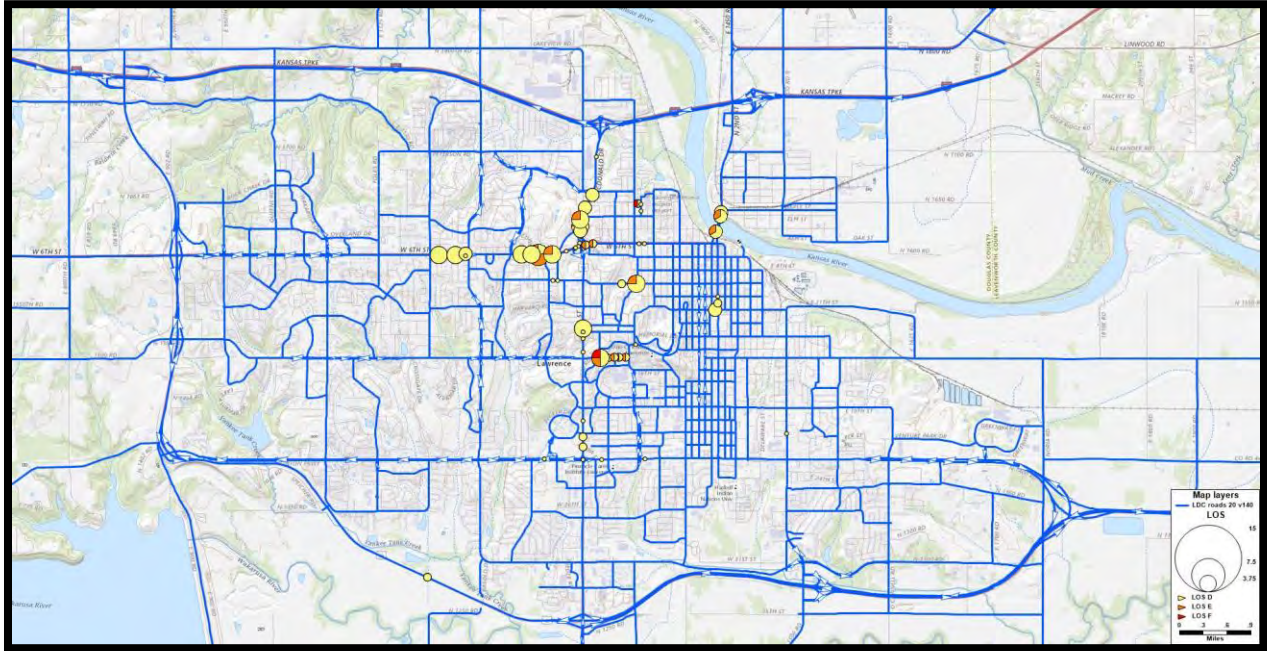
2050 flow with committed projects (r167)—densification scenario



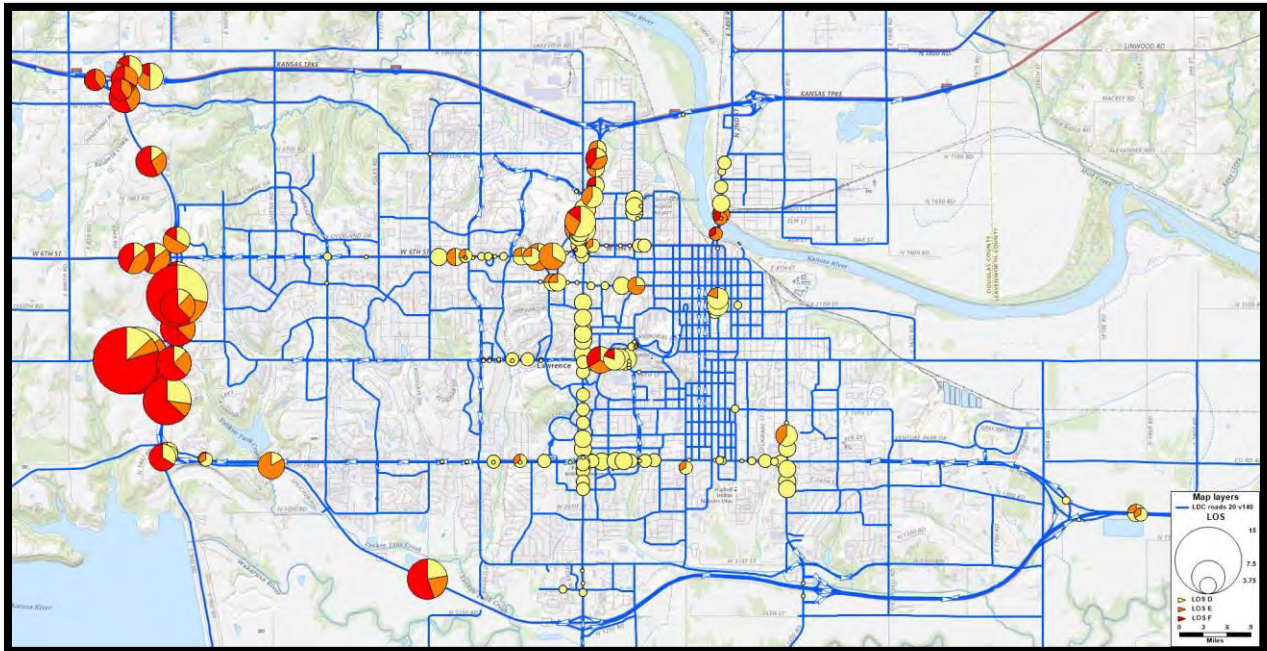
2050 flow if no road changes (r166)—base scenario



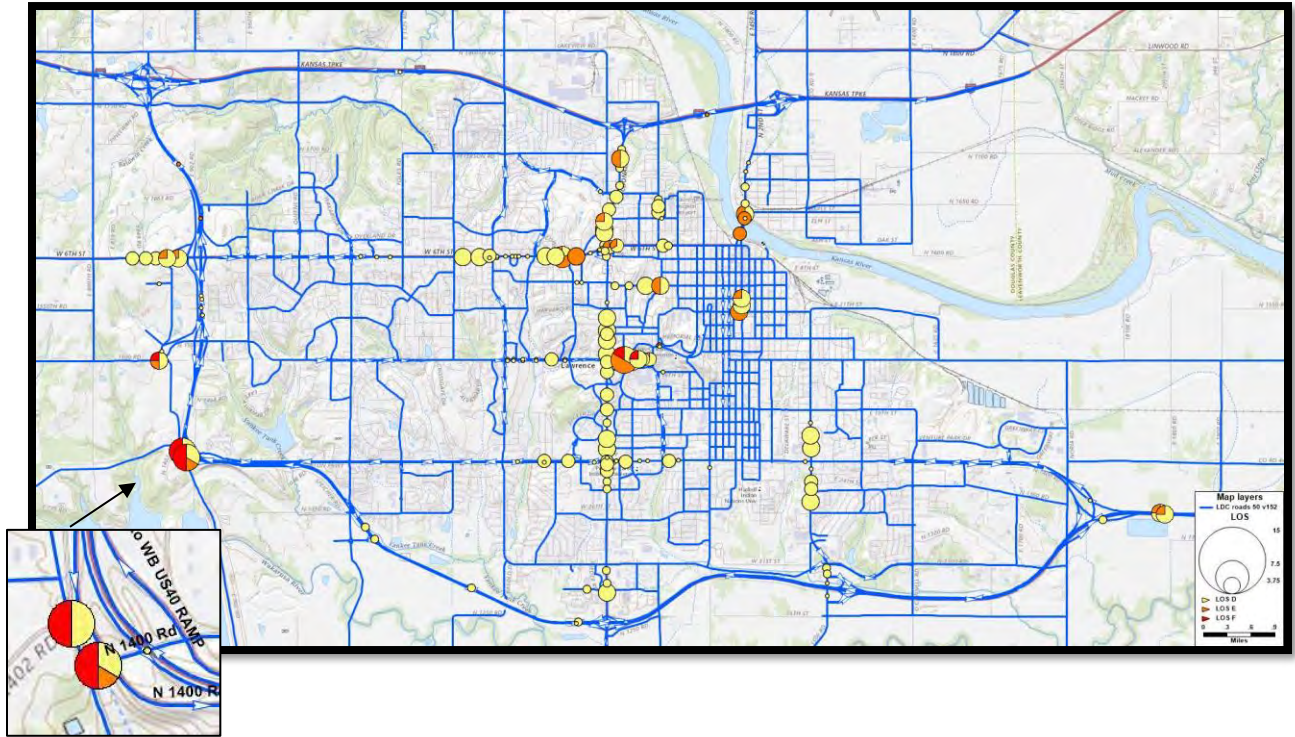
Base year (2019) LOS hours on current roads (r164)



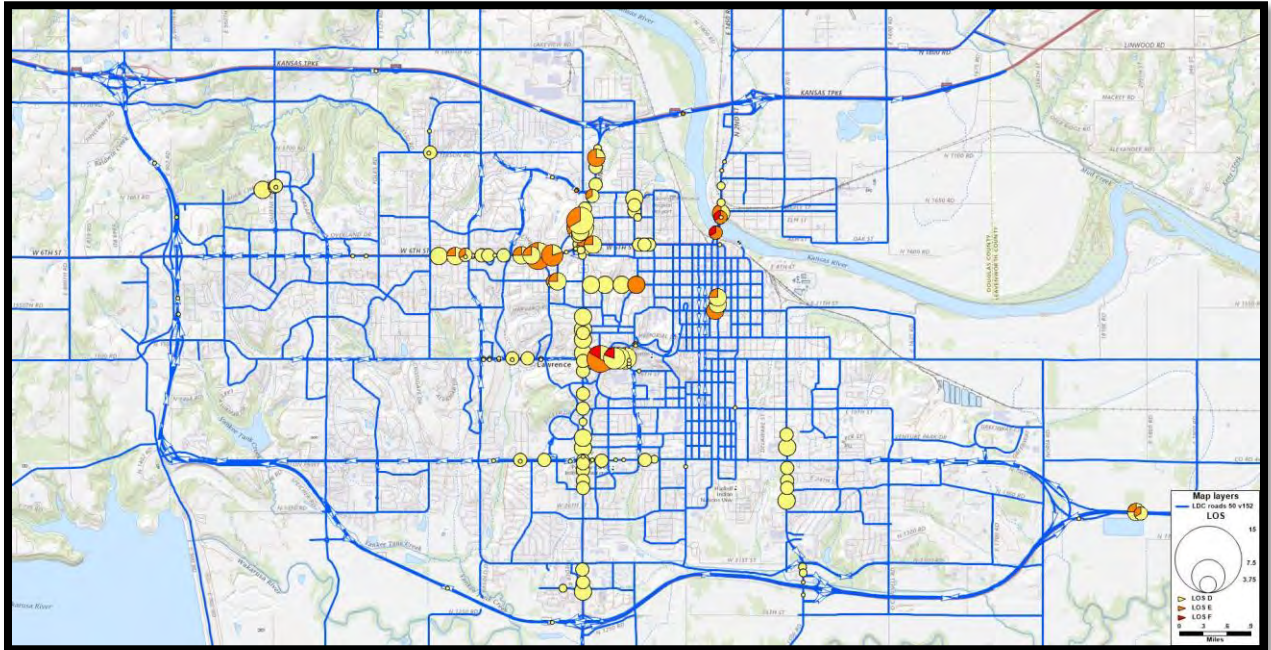
2050 LOS hours on current roads (r166)—base scenario



2050 LOS hours with committed roads (r165)—base scenario



2050 LOS hours with committed projects (r167)--densification scenario





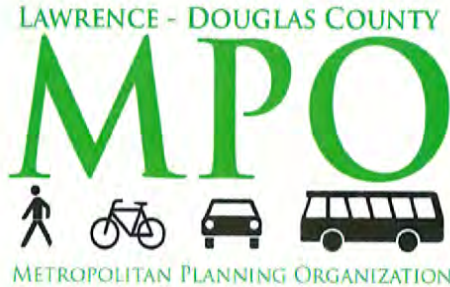
Appendix D

Approval Resolution

Appendix D. Approval Resolution

A. Lawrence-Douglas County MPO Policy Board

2023 MTP Approval



RESOLUTION 2023-01

WHEREAS, the Lawrence-Douglas County Metropolitan Planning Organization (L-DC MPO) is designated as the Metropolitan Planning Organization (MPO) to carry out the Continuing, Cooperative and Comprehensive (3C) planning program, including transportation planning for the Lawrence-Douglas County Metropolitan Planning Area (MPA); and,

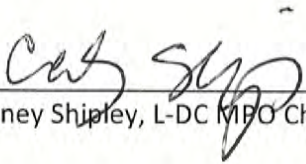
WHEREAS, the Metropolitan Transportation Plan (MTP) is one of the required MPO documents that must be updated for our region every five years and is a document that can also be amended as needed; and,

WHEREAS, the MTP is a long range plan for the multimodal transportation system in the Metropolitan Planning Area and is the MPO policy document that sets the vision for the future improvements to that multimodal system; and,

WHEREAS, the MTP reflects national transportation planning goals and addresses federal planning regulations related to MPO documents and their approval process; and,

WHEREAS, the MPO has conducted a public participation program over the past year for gaining public input and comments about this new MTP update.

NOW, THEREFORE BE IT RESOLVED that the Lawrence-Douglas County Metropolitan Planning Organization hereby approves this Metropolitan Transportation Plan update called the Transportation 2050 (2023) to replace Transportation 2040 (2018 edition) as presented for approval at the MPO Meeting held on this 16th day of March 2023.



Courtney Shipley, L-DC MPO Chairperson



Jeff Crick, L-DC MPO Secretary



S I T Y O F K A N S A S

14FT 7IN



Appendix E
System Performance Report

Appendix E

System Performance Report

Measure	Type of Measure	Frequency of Data Update	Data Source	Page	
Safety					
9	Number of Fatalities (All Public Roads)	Federal	1-year	KDOT	E.2
10	Rate of Fatalities Per 100 Million VMT (All Public Roads)	Federal	1-year	KDOT	E.3
11	Number of Serious Injuries (All Public Roads)	Federal	1-year	KDOT	E.4
12	Rate of Serious Injuries Per 100 Million VMT (All Public Roads)	Federal	1-year	KDOT	E.5
13	Number of Non-Motorized Fatalities and Serious Injuries (All Public Roads)	Federal	1-year	KDOT	E.6
Pavement & Bridge					
14	% of NHS Bridges by Deck Area Classified as in Good & Poor Condition	Federal	5-years	KDOT	E.7
15	% of Non-NHS Bridges by Deck Area Classified as in Good & Poor Condition	Local	5-years	KDOT	E.9
18	% of Pavements of the Interstate System in Good & Poor Condition	Federal	5-years	KDOT	E.11
19	% of Pavements of the Non-Interstate NHS in Good & Poor Condition	Federal	5-years	KDOT	E.13
20	% of Pavement of Non-NHS Major Roads (Collector and Above) in Good & Poor Condition	Local	2-years	Lawrence, DGCO, Eudora	E.15
System Performance					
6	Percent of the Person-Miles Traveled on the Interstate & Non-Interstate NHS that are Reliable	Federal	5-years	NPMRDS - https://nprmrs.ritis.org	E.17
7	Average Travel Time to Work (Minutes)	Local	1-year	ACS 5-Year Estimates (S0801)	E.19
8	Truck Travel Time Reliability (TTTR) Index on the Interstate system	Federal	5-years	NPMRDS - https://nprmrs.ritis.org	E.20
23	Daily Vehicles Miles Traveled (VMT) per Capita	Local	1-year	KDOT & US Census	E.21
Transit					
4	Unlinked Passenger Trips per Vehicle Revenue Hour for Demand Response & Fixed Route Service	Local	1-year	Lawrence Transit & KU on Wheels	E.22
5	% of Population With Access Within a ¼ Mile To a Bus Stop for Fixed Route Transit	Local	1-year	Population Estimate & Lawrence Transit Stops	E.23
16	% of Non-Revenue and Revenue Vehicles Met or Exceeded Their Useful Life Benchmark (ULB)	Federal	4-years	Lawrence Transit, KU on Wheels, & Others	E.24
17	% of Assets with a Condition Rating Below 3 on the FTA Transit Economic Requirements Model (Term) Scale	Federal	When necessary	N/A	E.25
27	Transit Safety Performance	Federal	1-year	Lawrence Transit	E.26
Bicycle & Pedestrian					
1	% of people who have access within a ¼ mile to the Level of Comfort 3 or below bikeway network	Local	1-year	Population Estimate & Bikeway Network	E.27
2	% of Public Streets with Sidewalks on at Least One Side	Local	1-year	Lawrence, Eudora, Baldwin City, Lecompton	E.28
3	% of Public Streets with Bikeway Network	Local	1-year	L-DC GIS (Road Centerline & Bikeway Network)	E.29
Miscellaneous					
21	Density of Urban Area	Local	1-year	L-DC GIS	E.30
22	Average Cost of Transportation per Household	Local	2-years	https://htaindex.cnt.org/total-driving-costs	E.31
24	% of Sensitive Lands Allocated Within Public Rights-of-Way	Local	1-year	L-DC GIS	E.32
25	% of Single Occupancy Vehicles	Local	1-year	ACS 5-Year Estimates (S0801)	E.33
26	Percentage of Mode Choice	Local	1-year	ACS 5-Year Estimates (S0801)	E.34

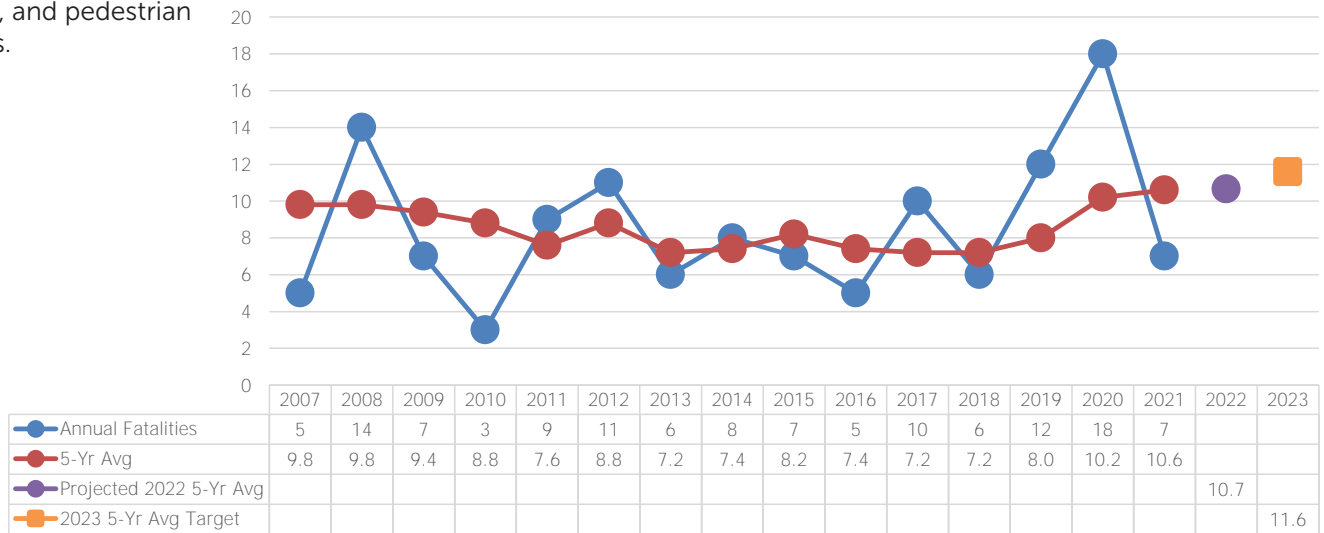
Safety

Performance Measure 9: Number of Fatalities (all public roads)

This measure includes the total number of persons suffering fatal injuries in crashes during a calendar year using five-year rolling averages. Law enforcement provides crash information to the Kansas Department of Transportation (KDOT) for compiling and KDOT dispenses the data to the MPO. The MPO desires improved safety beyond the target; however, the target reflects rolling averages with projections based on historical trends. Rolling average information is shown for the entity which maintains the road the crash occurred on. View the road maintenance map on page 7. The total Douglas County rolling average for the five year period is the official measure and MPO target.

Rolling Averages	Total Douglas County	Crash on Road Maintained by	2012-2016	2013-2017	2014-2018	2015-2019	2016-2020	2017-2021
2007-2011	7.6	City of Lawrence	1.6	1.8	1.2	1.4	2.2	2.4
2008-2012	8.8	Douglas County	2.4	2.0	2.2	2.0	2.4	2.2
2009-2013	7.2	Kansas Department of Transportation	1.2	1.2	1.4	2.0	3.8	4.4
2010-2014	7.4	Kansas Turnpike Authority	0.8	0.6	0.8	0.8	0.6	0.6
2011-2015	8.2	Private (Unincorporated)	0.2	0.0	0.0	0.0	0.0	0.0
2012-2016	7.4	Townships	1.0	1.4	1.4	1.6	1.0	0.8
2013-2017	7.2	Total Mapped*	7.2	7.0	7.0	7.8	10.0	10.4
2014-2018	7.2	KDOT Douglas County Traffic Fatalities	7.4	7.2	7.2	8.0	10.2	11.5
2015-2019	8.0	<small>*Some crashes don't have mappable data</small>						
2016-2020	10.2							
2017-2021	11.5							

Note: Includes vehicle, bicycle, and pedestrian crashes.



Source: Kansas Department of Transportation

Anticipated Update: Yearly

Target Set by MPO Policy Board: [November 17, 2022](#)

2023 Target

11.6

Safety

Performance Measure 10:

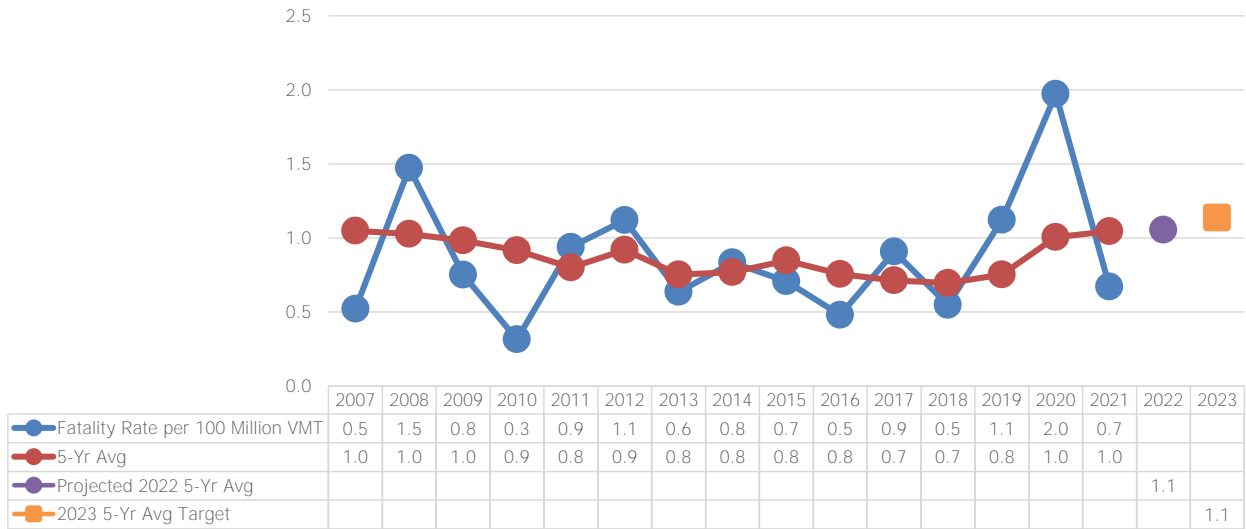
Rate of Fatalities per 100 million VMT (all public roads)

This measure includes the ratio of total number of fatalities to the number of vehicle miles traveled (VMT, in 100 Million VMT) in a calendar year using five-year rolling averages. Law enforcement provides crash information to the Kansas Department of Transportation (KDOT) for compiling and KDOT dispenses the data to the MPO. The MPO desires improved safety beyond the target; however, the target reflects rolling averages with projections based on historical trends. The total Douglas County rolling average for the five year period is the official measure and MPO target.

Rolling Averages	Total Douglas County
2007-2011	0.8
2008-2012	0.9
2009-2013	0.8
2010-2014	0.8
2011-2015	0.8
2012-2016	0.8
2013-2017	0.7
2014-2018	0.7
2015-2019	0.8
2016-2020	1.0
2017-2021	1.1

Fatality crashes are shown by the entity who owns and maintains the road the crash occurred on in Performance Measure 9 (the prior page). However, the Vehicle Miles Traveled (VMT) information provided by KDOT is not split into the specific entities crashes occurred on (e.g. township roads). Thus, only the total Douglas County rate is shown here. To see the per entity crashes go to Performance Measure 9.

Note: Includes vehicle, bicycle, and pedestrian crashes.



Source: Kansas Department of Transportation

Anticipated Update: Yearly

Target Set by MPO Policy Board: [November 17, 2022](#)

2023 Target
1.1

Safety

Performance Measure 11:

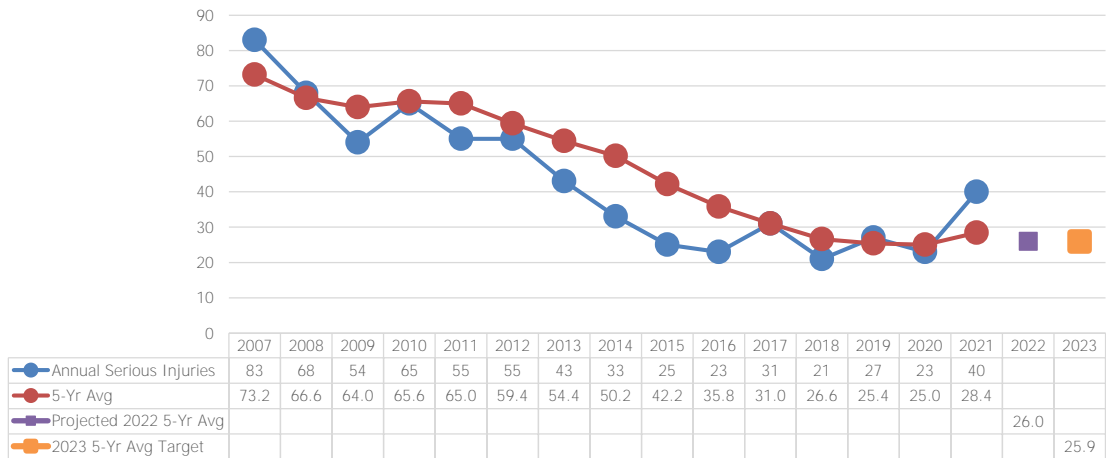
Number of Serious Injuries (all public roads)

This measure includes the total number of persons suffering at least one serious injury in a crash during a calendar year using five-year rolling averages. Law enforcement provides crash information to the Kansas Department of Transportation (KDOT) for compiling and KDOT dispenses the data to the MPO. KDOT changed to the national definition of serious injuries on January 1, 2019 (see the last page for the definitions). The MPO desires improved safety beyond the target; however, the target reflects rolling averages with projections based on historical trends. Rolling average information is shown for the entity which maintains the road the crash occurred on. View the road maintenance map on page 7. The total Douglas County rolling average for the five year period is the official measure and MPO target.

Rolling Averages	Total Douglas County	Crash on Road Maintained by	2012-2016	2013-2017	2014-2018	2015-2019	2016-2020	2017-2021
2007-2011	65.0	Army Corps of Engineers	0.2	0.0	0.0	0.0	0.0	0.0
2008-2012	59.4	City of Baldwin City	0.2	0.0	0.0	0.0	0.0	0.4
2009-2013	54.4	City of Eudora	0.2	0.0	0.0	0.0	0.0	0.0
2010-2014	50.2	City of Lawrence	18.2	16.4	14.0	12.2	12.0	10.8
2011-2015	42.2	Douglas County	4.2	3.6	3.4	3.8	3.2	4.4
2012-2016	35.8	Kansas Department of Transportation	5.0	3.6	2.8	3.6	4.4	6.4
2013-2017	31.0	KS Dept of Wildlife, Parks, & Tourism	0.0	0.0	0.0	0.2	0.2	0.2
2014-2018	26.6	Kansas Turnpike Authority	4.6	4.4	3.6	3.2	2.6	2.8
2015-2019	25.4	Private (Lawrence)	0.4	0.2	0.2	0.2	0.2	0.2
2016-2020	25.0	University of Kansas	1.0	0.6	0.4	0.4	0.4	0.4
2017-2021	25.5	Total Mapped*	34.0	28.8	24.4	23.6	23.0	25.8

Note: Includes vehicle, bicycle, and pedestrian crashes.

KDOT Douglas County Traffic-Related Serious Injuries
 *Some crashes don't have mappable data



Source: Kansas Department of Transportation

Anticipated Update: Yearly

Target Set by MPO Policy Board: [November 17, 2022](#)

2023 Target
25.9

Safety

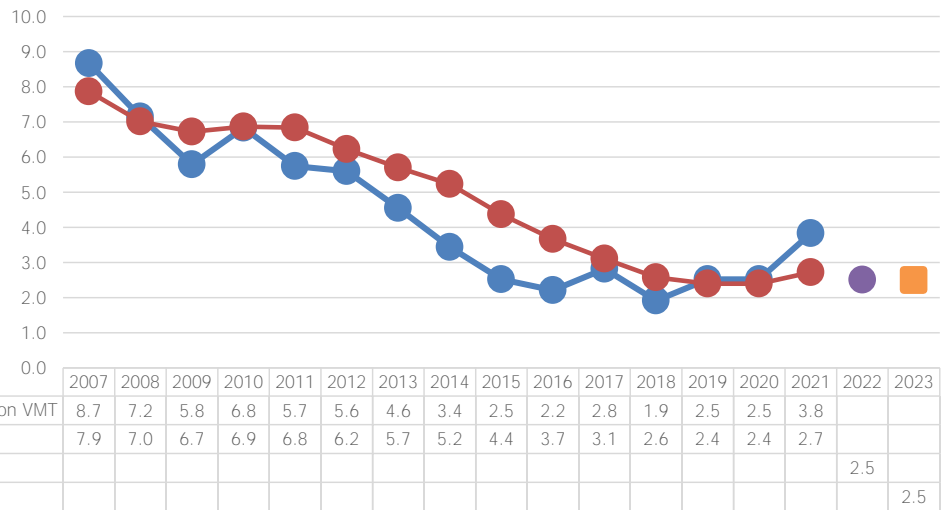
Performance Measure 12: Rate of Serious Injuries per 100 million VMT (all public roads)

This measure includes the ratio of total number of serious injuries to the number of vehicle miles traveled (VMT, in 100 Million VMT) in a calendar year using five-year rolling averages. Law enforcement provides crash information to the Kansas Department of Transportation (KDOT) for compiling and KDOT dispenses the data to the MPO. KDOT changed to the national definition of serious injuries on January 1, 2019 (see the last page for the definitions). The MPO desires improved safety beyond the target; however, the target reflects rolling averages with projections based on historical trends. Data is shown by jurisdiction, but the total Douglas County number is our official measure and MPO target.

Rolling Averages	Total Douglas County
2007-2011	6.8
2008-2012	6.2
2009-2013	5.7
2010-2014	5.2
2011-2015	4.4
2012-2016	3.6
2013-2017	3.1
2014-2018	2.6
2015-2019	2.4
2016-2020	2.4
2017-2021	2.5

Serious injury crashes are shown by the entity who owns and maintains the road the crash occurred on in Performance Measure 11 (the prior page). However, the Vehicle Miles Traveled (VMT) information provided by KDOT is not split into the specific entities crashes occurred on (e.g. township roads). Thus, only the total Douglas County rate is shown here. To see the per entity crashes go to Performance Measure 11.

Note: Includes vehicle, bicycle, and pedestrian crashes.



Source: Kansas Department of Transportation
 Anticipated Update: Yearly
 Target Set by MPO Policy Board: [November 17, 2022](#)

2023 Target
2.5

Safety

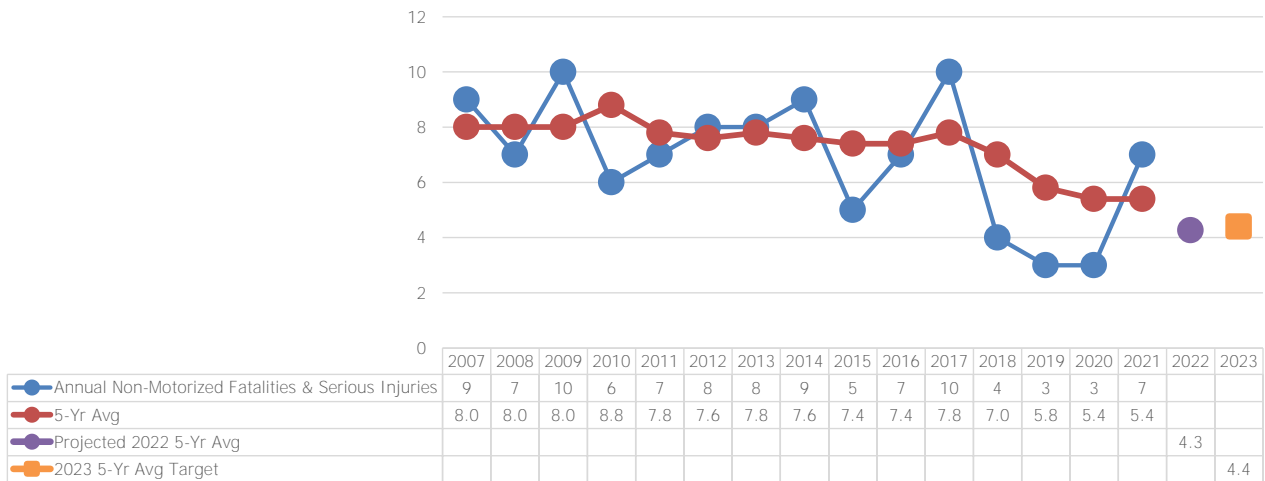
Performance Measure 13:

Number of Non-Motorized Fatalities & Serious Injuries (all public roads)

This measure includes the combined total number of non-motorized fatalities and non-motorized serious injuries involving a motor vehicle during a calendar year using five-year rolling averages. KDOT changed to the national definition of serious injuries on January 1, 2019. The MPO desires improved safety beyond the target; however, the target reflects rolling averages with projections based on historical trends. Rolling average information is shown for the entity which maintains the road the crash occurred on. View the road maintenance map on page 7. The total Douglas County rolling average for the five year period is the official measure and MPO target.

Rolling Averages	Total Douglas County	Crash on Road Maintained by	2012-2016	2013-2017	2014-2018	2015-2019	2016-2020	2017-2021
2007-2011	7.8	City of Baldwin City	0.0	0.0	0.0	0.0	0.0	0.0
2008-2012	7.6	City of Lawrence	5.6	5.4	5.0	4.0	3.8	3.4
2009-2013	7.8	Douglas County	0.4	0.4	0.4	0.2	0.2	0.2
2010-2014	7.6	Kansas Department of Transportation	0.0	0.2	0.2	0.2	0.2	0.2
2011-2015	7.4	Kansas Turnpike Authority	0.2	0.2	0.2	0.2	0.0	0.0
2012-2016	7.4	Private (Lawrence)	0.2	0.2	0.2	0.2	0.2	0.0
2013-2017	7.8	University of Kansas	0.8	0.6	0.4	0.4	0.4	0.2
2014-2018	7.0	Wakarusa Township	0.2	0.2	0.0	0.0	0.0	0.0
2015-2019	5.8	Total Mapped*	7.4	7.2	6.4	5.2	4.8	4.0
2016-2020	5.4	KDOT Douglas County Non-Motorized Fatal and Serious Injuries	7.4	7.8	7.0	5.8	5.4	4.6
2017-2021	4.6							

*Some crashes don't have mappable data



Source: Kansas Department of Transportation

Anticipated Update: Yearly

Target Set by MPO Policy Board: [November 17, 2022](#)

2023 Target
4.4

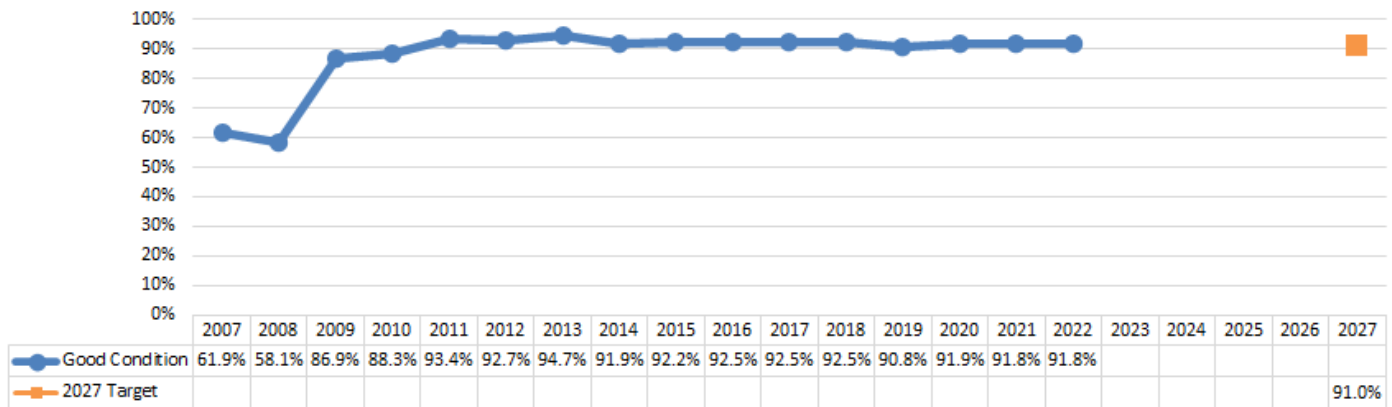
Pavement & Bridge

Performance Measure 14:

Percentage of NHS Bridges by Deck Area Classified as Good Condition

This measure is based on deck area. Condition is determined by the lowest rating of deck, superstructure, substructure, or culvert. The MPO set our own countywide targets. Data is shown by jurisdiction, but the total Douglas County number is our official measure and target.

	KDOT	KTA	Total
2018	85%	99%	92%
2019	81%	99%	91%
2020	86%	99%	92%
2021	85%	99%	92%
2022	85%	99%	92%



Source: Kansas Department of Transportation
 Anticipated Update: 2028
 Target Set by MPO Policy Board: [March, 2023](#)

2027 Target
91.0%

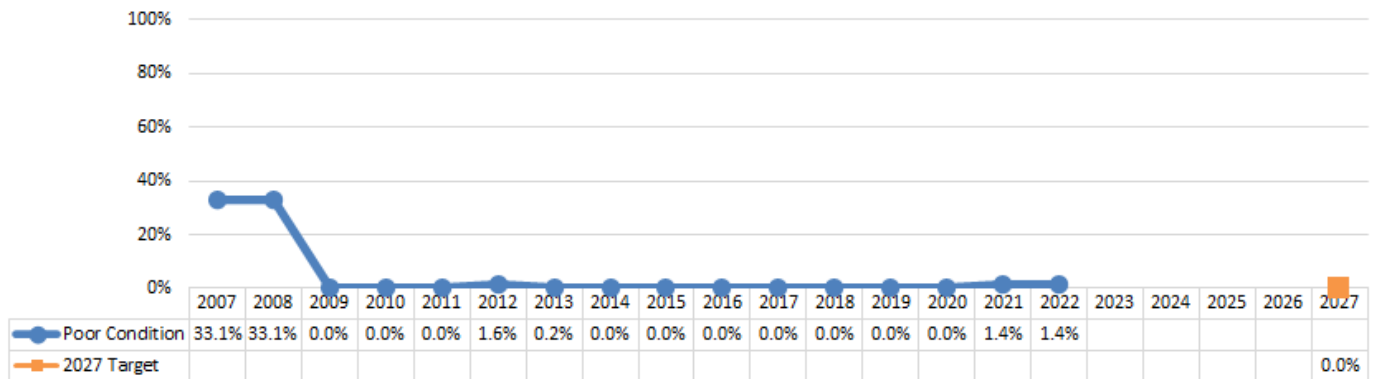
Pavement & Bridge

Performance Measure 14:

Percentage of NHS Bridges by Deck Area Classified as Poor Condition

This measure is based on deck area. Condition is determined by the lowest rating of deck, superstructure, substructure, or culvert. The MPO set our own countywide targets. Data is shown by jurisdiction, but the total Douglas County number is our official measure and target.

	KDOT	KTA	Total
2018	0%	0%	0%
2019	0%	0%	0%
2020	0%	0%	0%
2021	3%	0%	1%
2022	3%	0%	1%



Source: Kansas Department of Transportation

Anticipated Update: 2028

Target Set by MPO Policy Board: [March, 2023](#)

2027 Target

0.0%

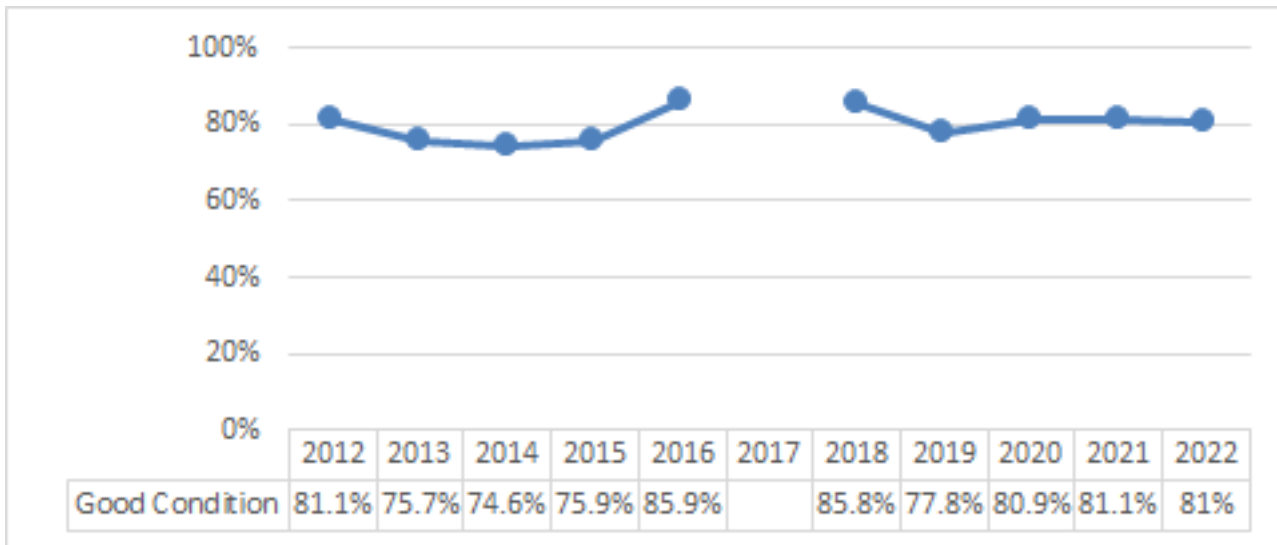
Pavement & Bridge

Performance Measure 15:

Percentage of Non-NHS Bridges by Deck Area Classified as Good Condition

This measure is based on deck area. Condition is determined by the lowest rating of deck, superstructure, substructure, or culvert.

	State Highway System	Lawrence /Eudora	County	KTA	Total	
2018	96%	66%	80%	100%	86%	
2019	94%	69%	66%	100%	78%	
2020	93%	69%	72%	100%	81%	
2021	93%	72%	73%	100%	81%	
2022	93%	72%	72%	100%	81%	



Source: Kansas Department of Transportation

Anticipated Update: 2028

Target Set by MPO Policy Board: N/A



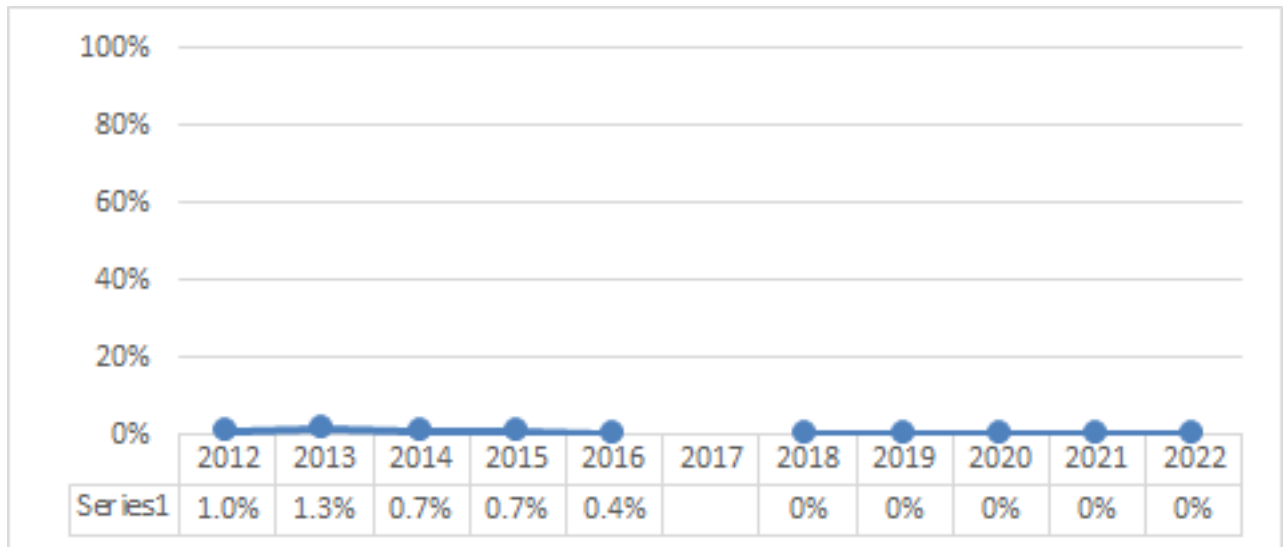
Pavement & Bridge

Performance Measure 15:

Percentage of Non-NHS Bridges by Deck Area Classified as Poor Condition

This measure is based on deck area. Condition is determined by the lowest rating of deck, superstructure, substructure, or culvert.

	State Highway System	Lawrence /Eudora	County	KTA	Total	
2018	0%	0%	0%	0%	0%	0%
2019	0%	0%	0%	0%	0%	0%
2020	0%	0%	0%	0%	0%	0%
2021	0%	0%	0%	0%	0%	0%
2022	0%	0%	0%	0%	0%	0%



Source: Kansas Department of Transportation

Anticipated Update: 2028

Target Set by MPO Policy Board: N/A

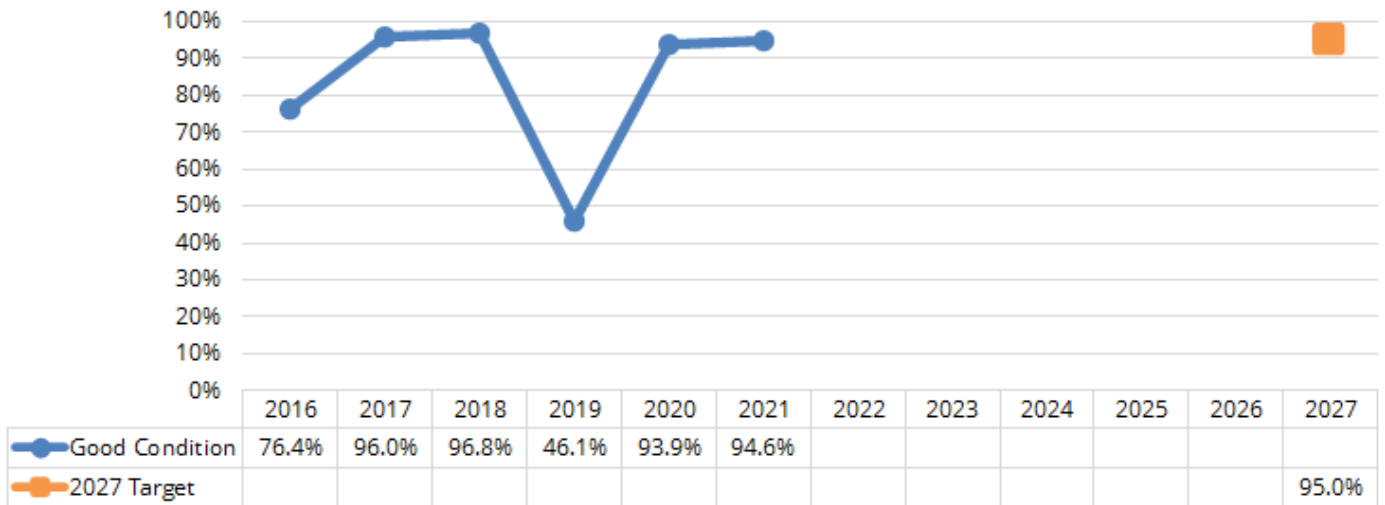


Pavement & Bridge

Performance Measure 18:

Percentage of Pavements of the Interstate System in Good Condition

This measure categorizes pavement as Good and Poor. Good condition suggests no major investment is needed, while poor condition suggests major reconstruction investment is needed. Pavement condition is evaluated by measuring International Roughness Index (IRI), Present Serviceability Index (PSR), Cracking Percent, Rutting, and Faulting (uneven slabs of concrete).



Source: Kansas Department of Transportation

Anticipated Update: 2028

Target Set by MPO Policy Board: [March, 2023](#)

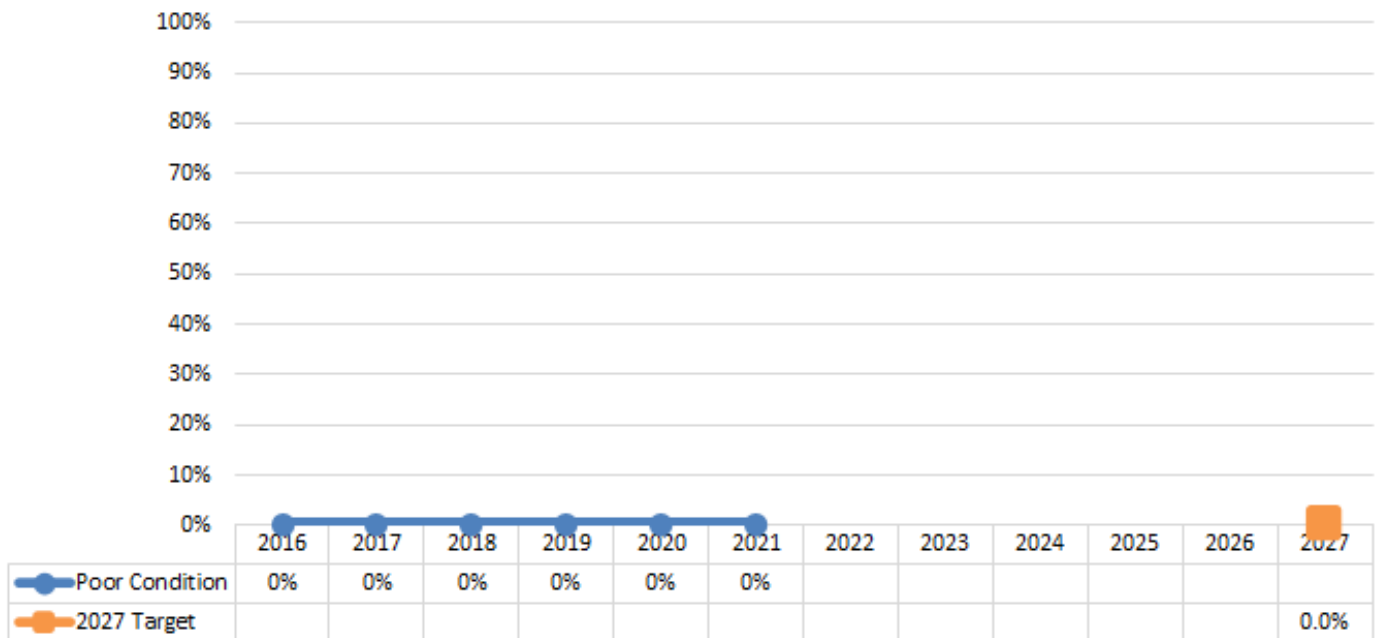
2027 Target
95%

Pavement & Bridge

Performance Measure 18:

Percentage of Pavements of the Interstate System in Poor Condition

This measure categorizes pavement as Good and Poor. Poor condition suggests major reconstruction investment is needed, while good condition suggests no major investment is needed. Pavement condition is evaluated by measuring International Roughness Index (IRI), Present Serviceability Index (PSR), Cracking Percent, Rutting, and Faulting (uneven slabs of concrete).



Source: Kansas Department of Transportation

Anticipated Update: 2028

Target Set by MPO Policy Board: [March, 2023](#)

2027 Target
0.0%

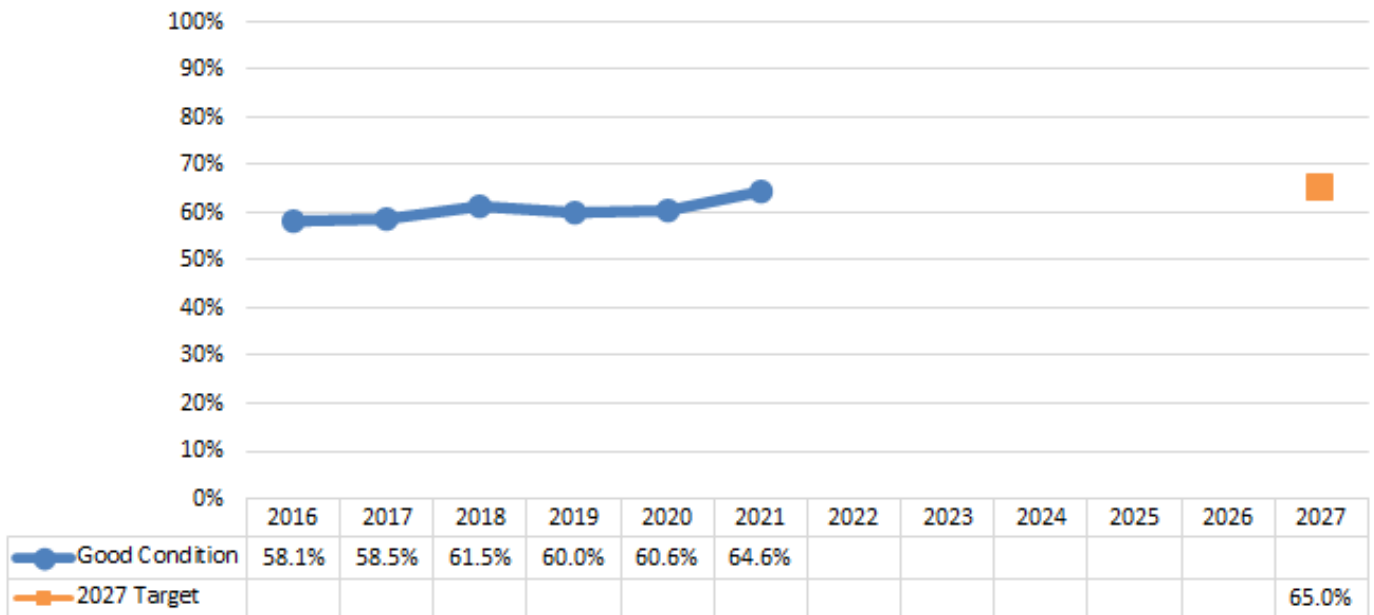
Pavement & Bridge

Performance Measure 19:

Percentage of Pavements of the Non-Interstate NHS in Good Condition

Pavement condition is evaluated by measuring International Roughness Index (IRI), Present Serviceability Index (PSR), Cracking Percent, Rutting, and Faulting (uneven slabs of concrete). Good condition suggests no major investment is needed, while poor condition suggests major reconstruction investment is needed.

The Non-Interstate NHS consists of Other Freeways & Expressways, and Other Principal Arterials. In our region this consists of K-10, US-59/Iowa St, US-40 (6th St) east of Iowa St, US 24/40/59, and US-56 east of US-59. View a map of Federal Roadway Functional Classification at - <http://lawrenceks.maps.arcgis.com/apps/webappviewer/index.html?id=26d48d3df30f425f911e6cb41027c67e>.



Source: Kansas Department of Transportation

Anticipated Update: 2028

Target Set by MPO Policy Board: [March, 2023](#)

2027 Target
65%

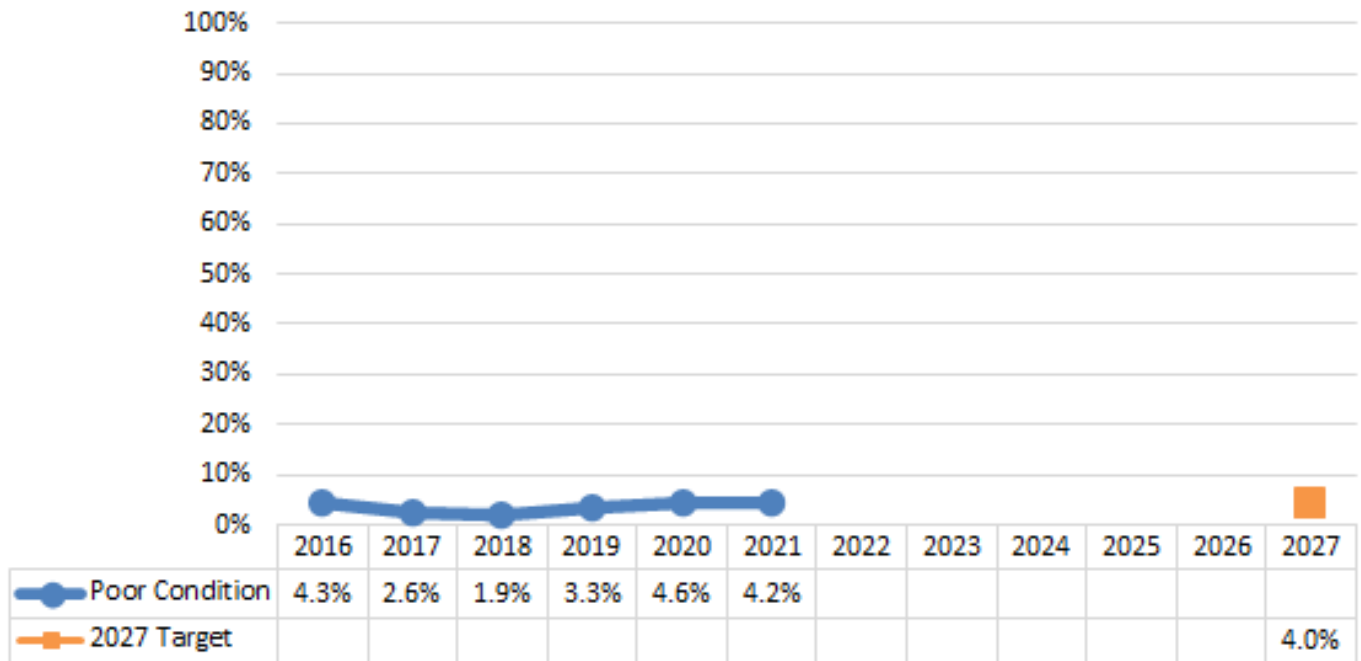
Pavement & Bridge

Performance Measure 19:

Percentage of Pavements of the Non-Interstate NHS in Poor Condition

Pavement condition is evaluated by measuring International Roughness Index (IRI), Present Serviceability Index (PSR), Cracking Percent, Rutting, and Faulting (uneven slabs of concrete). Good condition suggests no major investment is needed, while poor condition suggests major reconstruction investment is needed.

The Non-Interstate NHS consists of Other Freeways & Expressways, and Other Principal Arterials. In our region this consists of K-10, US-59/Iowa St, US-40 (6th St) east of Iowa St, US 24/40/59, and US-56 east of US-59. View a map of Federal Roadway Functional Classification at - <http://lawrenceks.maps.arcgis.com/apps/webappviewer/index.html?id=26d48d3df30f425f911e6cb41027c67e>.



Source: Kansas Department of Transportation

Anticipated Update: 2028

Target Set by MPO Policy Board: [March, 2023](#)

2027 Target
4%

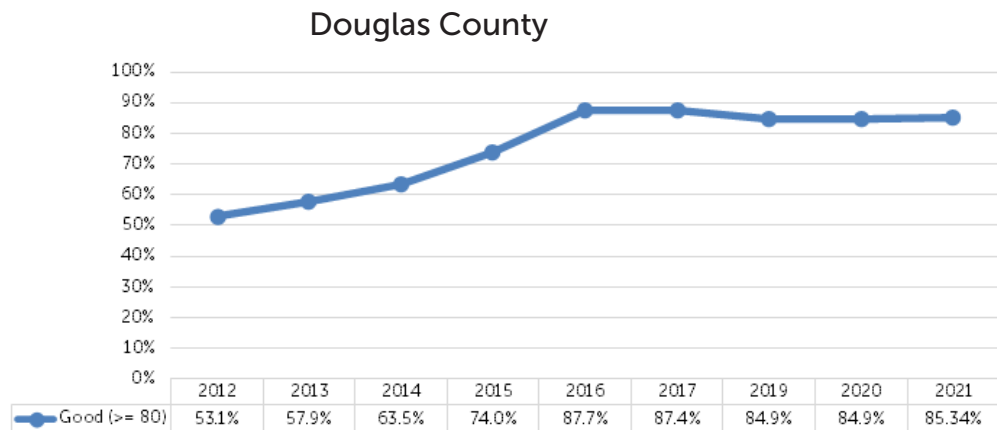
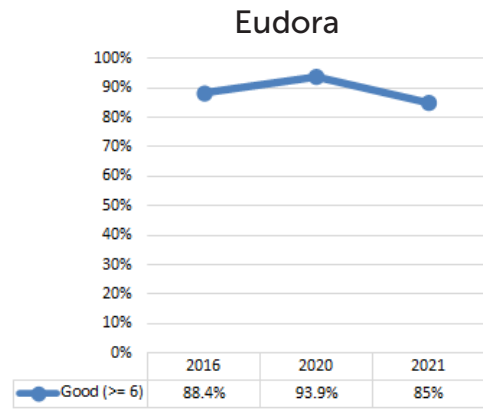
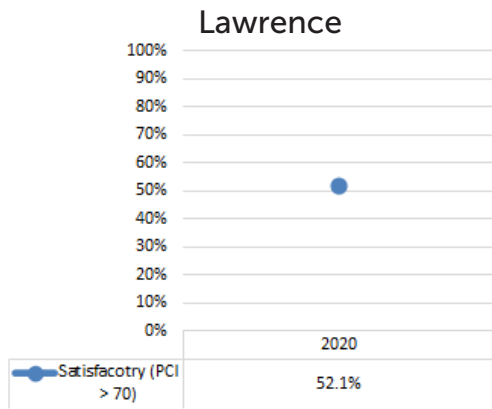
Pavement & Bridge

Performance Measure 20:

% of Pavement of Non-NHS Major Roads (Collector and Above) in Good Condition

Good condition suggests no major investment is needed, while poor condition suggests major reconstruction investment is needed. The National Highway System (NHS) consists of roadways important to the Nation's economy, defense, and mobility. The NHS includes Interstates, Other Freeway & Expressways, and Other Principal Arterials.

The City of Lawrence plans to collect PCI data every 3-4 years and 2020 is the most recent data. Data prior to 2020 is not shown because Lawrence instituted a new way of collecting and evaluating pavement condition in 2020, making earlier data not comparable.



Source: City of Lawrence, Eudora, & Douglas County

Anticipated Update: 2024

Target Set by MPO Policy Board: N/A



Pavement & Bridge

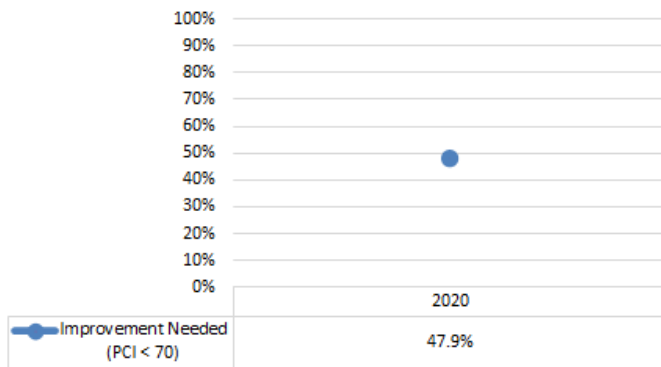
Performance Measure 20:

% of Pavement of Non-NHS Major Roads (Collector and Above) in Poor Condition

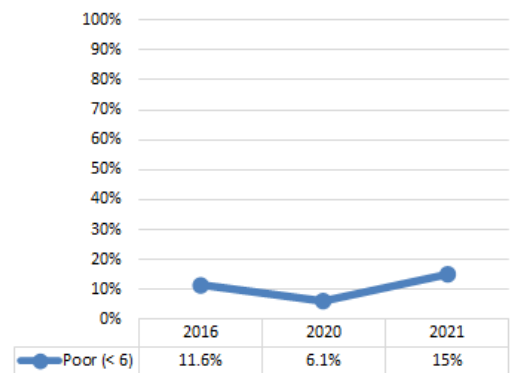
Good condition suggests no major investment is needed, while poor condition suggests major reconstruction investment is needed. The National Highway System (NHS) consists of roadways important to the Nation's economy, defense, and mobility. The NHS includes Interstates, Other Freeway & Expressways, and Other Principal Arterials.

The City of Lawrence plans to collect PCI data every 3-4 years and 2020 is the most recent data. Data prior to 2020 is not shown because Lawrence instituted a new way of collecting and evaluating pavement condition in 2020, making earlier data not comparable.

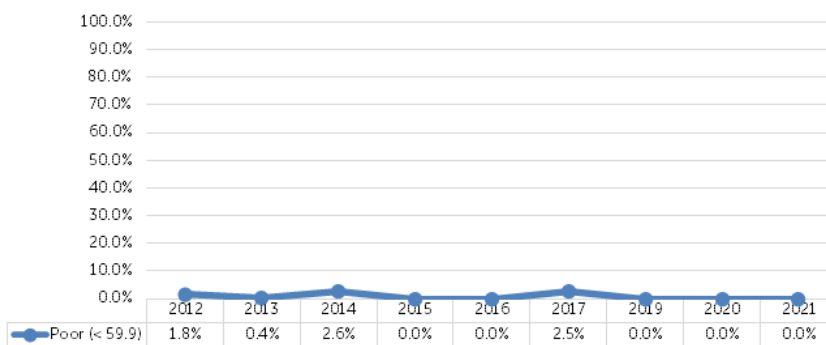
Lawrence



Eudora



Douglas County



Source: City of Lawrence, Eudora, & Douglas County

Anticipated Update: Yearly

Target Set by MPO Policy Board: N/A



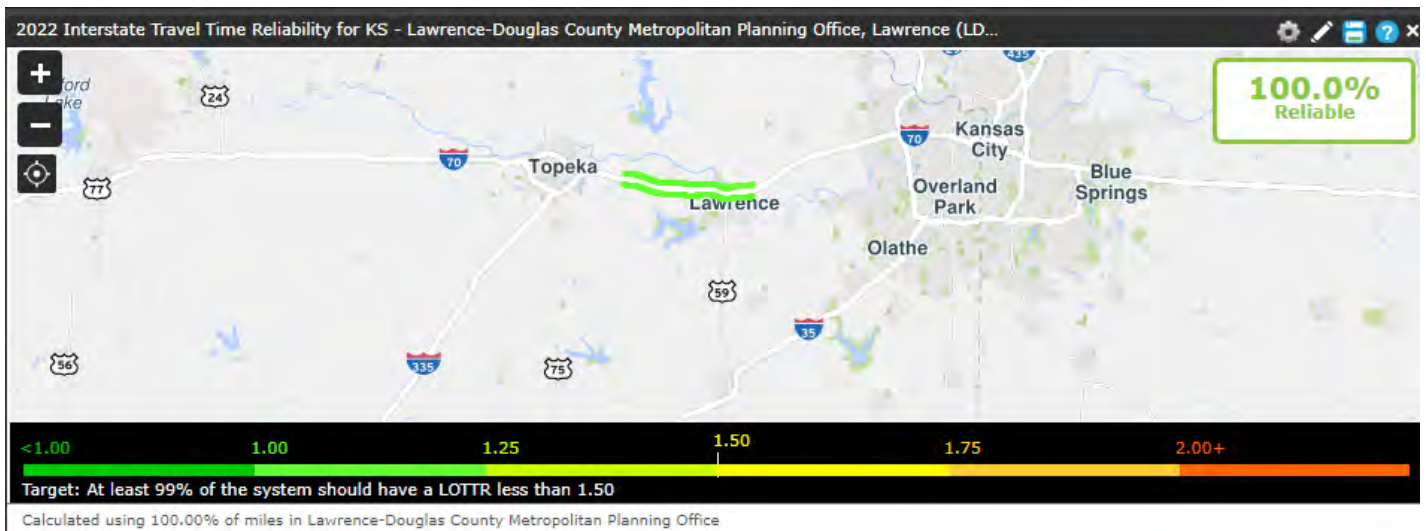
System Performance

Performance Measure 6:

Percent of the Person-Miles Traveled on the Interstate NHS That Are Reliable

The National Highway System (NHS) consists of roadways important to the Nation's economy, defense, and mobility. In our region the interstate NHS consists of I-70.

While the current Level of Travel Time Reliability on the Interstate NHS is 100% the MPO did not feel it would be appropriate to project the Interstate NHS would continue at a 100% rate of reliability.



	2016	2017	2018	2019	2020	2021	2022	2027
● Reliable Interstate	100.0%	100.0%	100.0%	100.0%	100.00%	100.00%	100.00%	
■ 2027 Target								99.00%

Source: National Performance Management Research Data Set (NPMRDS) <https://npmrds.ritis.org>

Anticipated Update: 2028

Target Set by MPO Policy Board: [March, 2023](#)

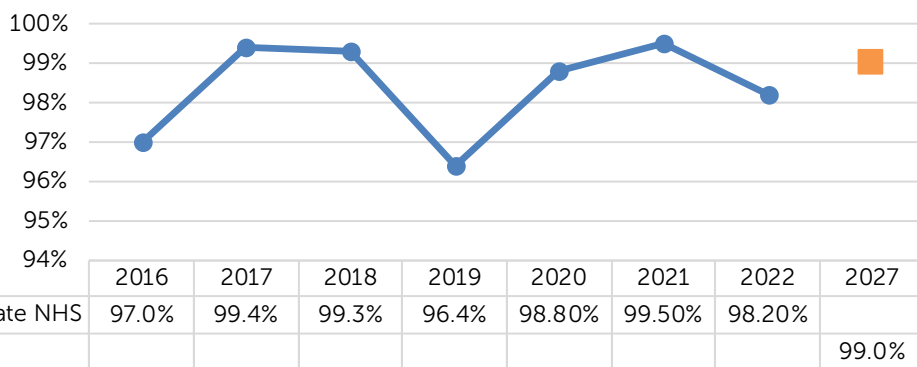
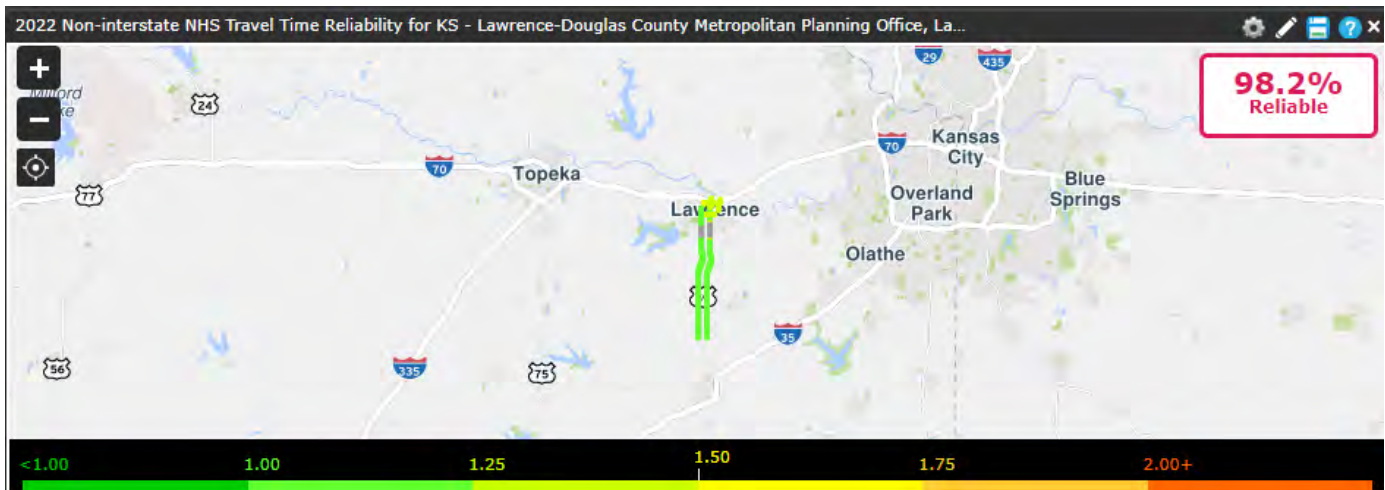
2027 Target
99%

System Performance

Performance Measure 6:

Percent of the Person-Miles Traveled on the Non-Interstate NHS That Are Reliable

The Non-Interstate NHS consists of Other Freeways & Expressways, and Other Principal Arterials. In our region this consists of K-10, US-59/Iowa St, US-40 (6th St) east of Iowa St, US 24/40/59, and US-56 east of US-59. The NPMRDS data has inaccurate NHS designations, thus the best available data is used.



Source: National Performance Management Research Data Set (NPMRDS) <https://npmrds.ritis.org>

Anticipated Update: 2028

Target Set by MPO Policy Board: [March, 2023](#)

2027 Target
99%

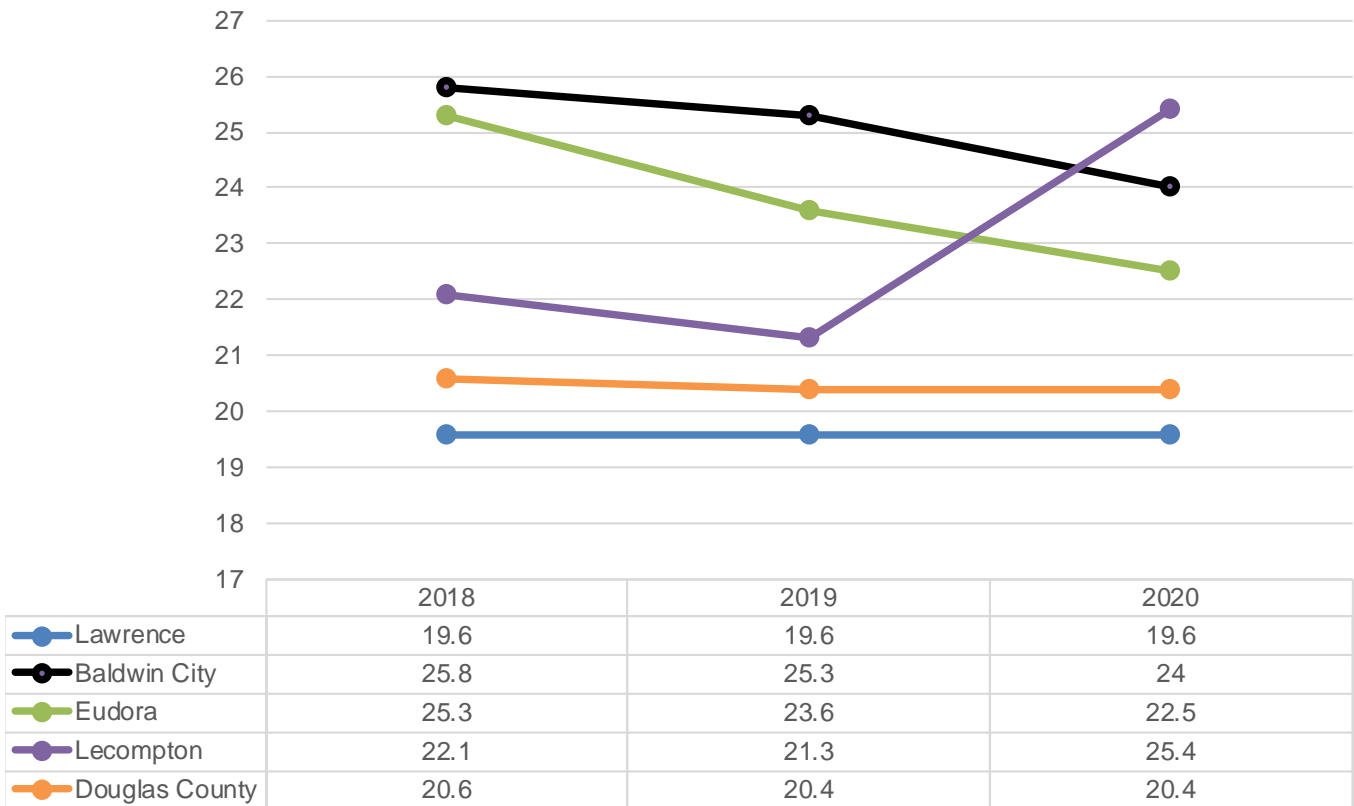
System Performance

Performance Measure 7: Average Travel Time to Work (Minutes)

Travel time to work refers to the total number of minutes it usually took a person to get from home to work each day during the survey week. The elapsed time includes time spent waiting for public transportation, picking up passengers in carpools, and time spent in other activities related to getting to work. This data include workers 16 years old and over.

American Community Survey (ACS) data is compiled yearly by sampling over 3.5 million housing unit addresses over a 12 month period. Since this data is based on a survey there is a margin of error associated with the data.

The average travel time to work for the cities of Baldwin City, Eudora, and Lecompton are higher than Lawrence and the overall County. This is due to people driving out of their communities to work, possibly in Lawrence or outside of the County.



Source: US Census Bureau American Community Survey (ACS) 5-year estimates (S0801)

Anticipated Update: 2028

Target Set by MPO Policy Board: N/A



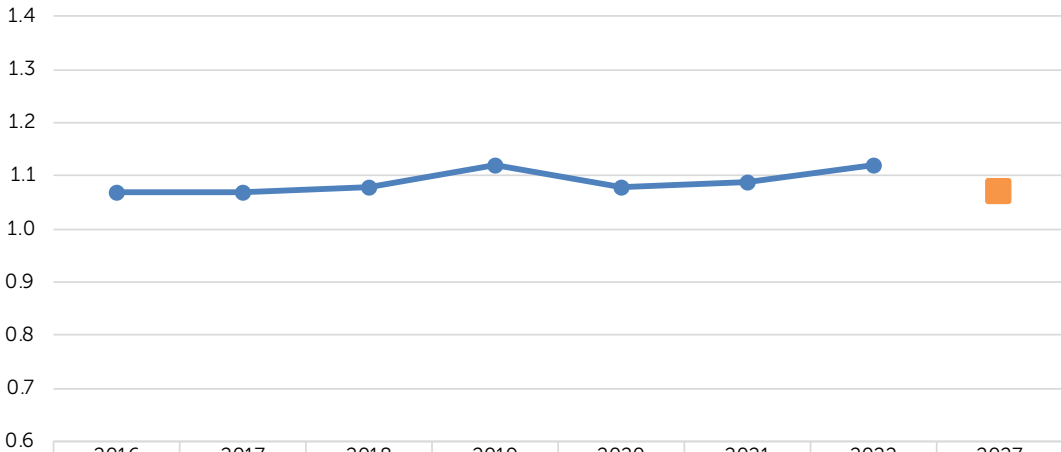
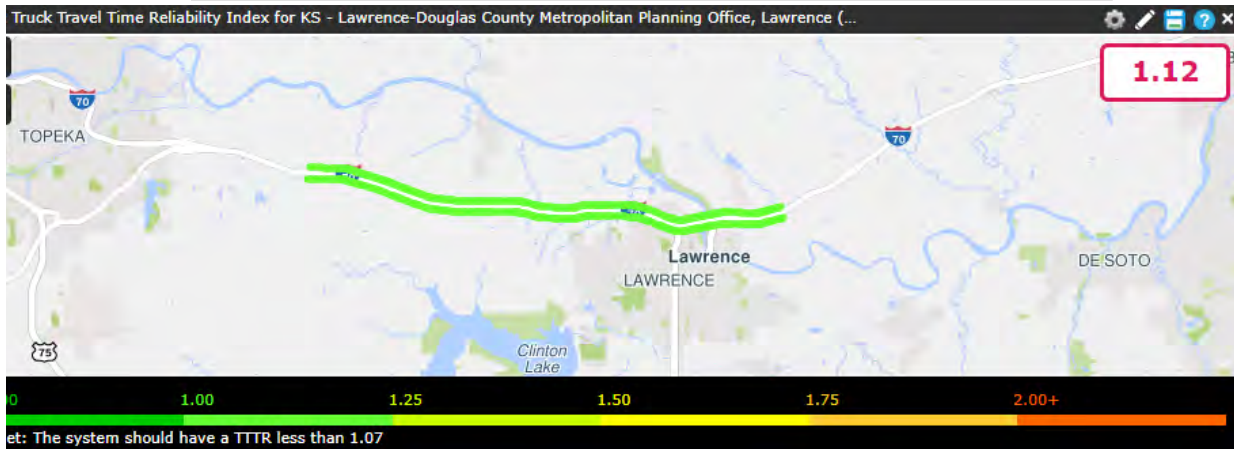
System Performance

Performance Measure 8:

Truck Travel Time Reliability (TTTR) Index on the Interstate system

Reporting is divided into five periods: morning peak (6 - 10 a.m.), midday (10 a.m. - 4 p.m.) and afternoon peak (4 - 8 p.m.) Mondays through Fridays; weekends (6 a.m. - 8 p.m.); and overnights for all days (8 p.m. - 6 a.m.). The TTTR ratio is generated by dividing the 95th percentile time by the normal time (50th percentile) for each segment. The TTTR Index is generated by multiplying each segment's largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of the interstate.

Truck Travel Time Reliability Index (TTTR) is used to assess freight movement. The lower the numbers the better.



	2016	2017	2018	2019	2020	2021	2022	2027
TTTR	1.07	1.07	1.08	1.12	1.08	1.09	1.12	
2027 Target								1.07

Source: National Performance Management Research Data Set (NPMRDS) <https://npmrds.ritis.org>

Anticipated Update: 2028

Target Set by MPO Policy Board: [March, 2023](#)

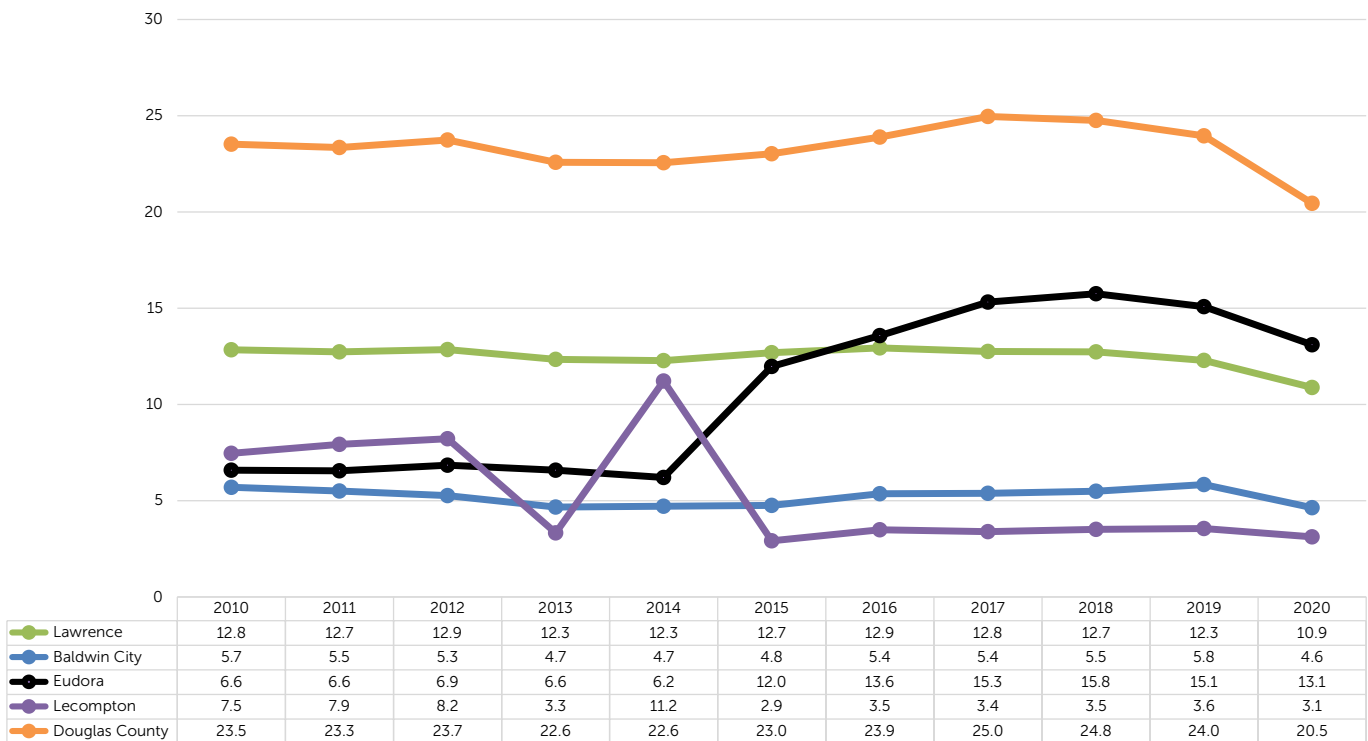
2027 Target
1.07

System Performance

Performance Measure 23: Daily Vehicles Miles Traveled (VMT) per Capita

Vehicle miles traveled (VMT) per capita is calculated as the total 1-year miles of vehicle travel divided by the total population. Decreasing 1-year VMT per capita can directly improve air quality and the overall health of a population. VMT levels are lower in communities that are more walkable and compact and in communities that have strong public transportation systems.

(Source: <https://www.transportation.gov/mission/health/vmt-capita>)



Source: Kansas Department of Transportation & US Census

Anticipated Update: Yearly

Target Set by MPO Policy Board: N/A



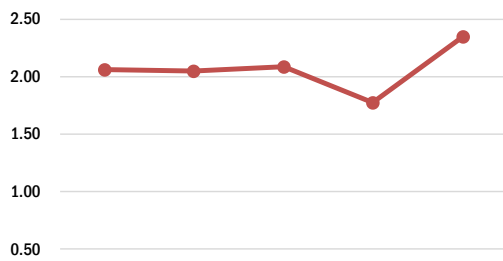
Transit

Performance Measure 4:

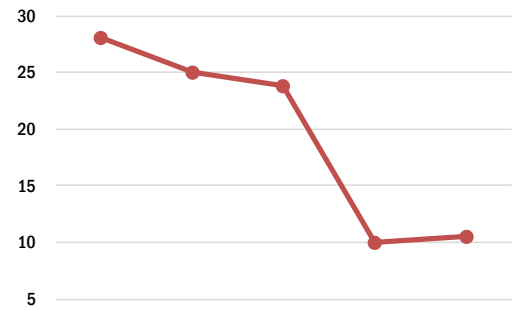
Unlinked Passenger Trips per Vehicle Revenue Hour (Demand Response & Fixed Route Service)

Unlinked passenger trips are the number of passengers who board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination. The passengers per revenue hours are calculated by dividing the total number of unlinked passenger trips by the total vehicle revenue hours. This number equates to the number of people using the transit system per hour.

Demand Response (T Lift & Night Line)				Fixed Route			
	Total Unlinked Passenger Trips	Total Vehicle Revenue Hours	Average Passenger per Revenue Hour		Total Unlinked Passenger Trips	Total Vehicle Revenue Hours	Average Passenger per Revenue Hour
2013	60,418	29,391	2.06	2013	2,916,833	89,049	32.76
2014	75,906	35,974	2.11	2014	3,025,738	90,514	33.43
2015	79,364	37,419	2.12	2015	2,913,606	95,827	30.40
2016	84,369	40,844	2.07	2016	3,282,422	105,996	30.97
2017	82,341	39,989	2.06	2017	3,202,570	113,905	28.12
2018	84,183	41,128	2.05	2018	2,884,370	115,021	25.08
2019	82,233	39,394	2.09	2019	2,799,555	117,507	23.82
2020	43,977	24,805	1.77	2020	1,049,204	105,402	9.95
2021	57,960	24,693	2.35	2021	1,247,745	118,583	10.52



	2017	2018	2019	2020	2021
— Demand Response - Avg. Psgr/Rev Hr	2.06	2.05	2.09	1.77	2.35



	2017	2018	2019	2020	2021
— Fixed Route - Avg. Psgr/Rev Hr	28.12	25.08	23.82	9.95	10.52

Source: Lawrence Transit & KU on Wheels

Anticipated Update: Yearly

Target Set by MPO Policy Board: N/A



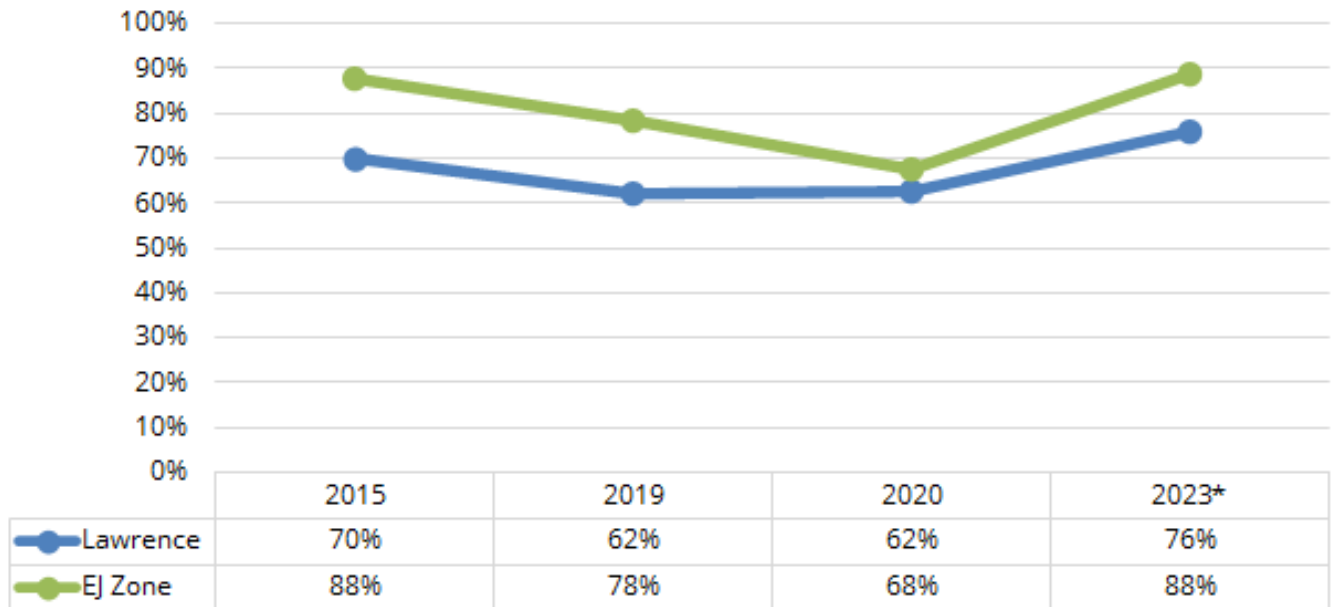
Transit

Performance Measure 5:

Percentage of population with access within a ¼ mile to a bus stop for fixed route transit

A quarter mile is the distance a pedestrian can cover in five minutes at a normal walking pace.

The 2019 data utilized a model and will be consistent moving forward. The 2015 data was calculated using a GIS tool, which summed population data into one centroid point, which made it so fractional coverage of population by bus stop buffers or city limits were not included.



*Calculated in 2022 based on planned 2023-2024 Transit Routes

Source: 2022 Population Estimate & 2023-24 Transit Stops

Anticipated Update: Yearly

Target Set by MPO Policy Board: N/A

Environmental Justice (EJ) zones are low-income or minority areas. Visit lawrenceks.org/mpo/Environmental-Justice to view the most current EJ Zone map and historic EJ zone maps.

Transportation Options



Transit

Performance Measure 16:

Percentage of Non-Revenue & Revenue Vehicles Met or Exceeded Their Useful Life Benchmark (ULB)

The Useful Life Benchmark (ULB) is the expected service years for a vehicle class. For example, a minivan is expected to last for at least 8 years. The MPO supports the [State's targets](#). Targets set in the State TAM Plan are used for federal reporting. The L-DC MPO Target are for local planning purposes only.

Category	Class	ULB	KU on Wheels (15-YR ULB)	Lawrence Transit	Other Human Service Providers	% of Vehicles at or Exceeding ULB	L-DC MPO Target
Revenue Vehicles	Full-sized bus	14	11%	0%	-	11%	25%
	Cutaway bus	10	-	0%	100%	100%	25%
	Van	8	-	-	23%	23%	25%
	Minivan	8	-	-	-	-	25%

Note: Target is to meet or exceeded FTA Useful Life Benchmark (ULB). Targets set in the State TAM Plan are used for federal reporting. The L-DC MPO Target are for local planning purposes only.

KDOT Group TAM Plan Targets set as of 12.05.22

(Includes MPOs in Flint Hills, Topeka, Lawrence, and St. Joe)

Category	Class	ULB	KDOT Replacement Threshold	KDOT Target % of fleet that is older than the ULB (State of Good Repair - SGR)
Revenue Vehicles	Full-sized bus	14	12 years / 500K Miles	25%
	Cutaway bus	10	5 years / 100K Miles	25%
	Van	8	5 years / 100K Miles	25%
	Minivan	8	5 years / 100K Miles	25%
Non-Revenue Vehicles	Minivan	8	5 years / 100K Miles	75%
	SUV	8	5 years / 100K Miles	75%
	Automobile	8	5 years / 100K Miles	75%

Source: Transit Asset Management (TAM) Plan State-sponsored Group Plan, December 5, 2022

Source: Lawrence Transit, KU on Wheels, Other Human Service Providers

Anticipated Update: 2027

Target Set by MPO Policy Board: N/A - Supported the State's Targets with approval of Transportation 2050 in [March 2023](#)



Transit

Performance Measure 17:

Percentage of assets with a condition rating below 3 on the FTA Transit Economic Requirements Model (TERM) scale

Federally funded transit facilities are evaluated using the Transit Economic Requirements Model (TERM). It is a condition assessment using a scale of 1-5. Under the TERM scale, an asset in need of immediate repair or replacement is scored as one (1), whereas a new asset with no visible defects is scored as five (5).

There are no federally funded transit facilities within the MPO.

Source: N/A

Anticipated Update: No update until necessary

Target Set by MPO Policy Board: No federally funded facilities

N/A

Transit

Performance Measure 27: Transit Safety Performance

Safety events are comprised of collisions, fires, hazardous material spills, act of nature (Act of God), evacuation, or [other safety occurrence not otherwise classified] occurring on transit right-of-way, in a transit revenue facility, in a transit revenue facility, or in a transit revenue vehicle and meeting established NTD thresholds. Safety performance is an organization’s safety effectiveness and efficiency, as defined by safety performance indicators and targets, measured against the organization’s safety objectives.

Mode of Transit Service	2021							
	Fatalities (total)	Fatalities (per 100 thousand vehicle revenue miles)	Injuries (total)	Injuries (per 100 thousand vehicle revenue miles)	Safety Events (total)	Safety Events (per 100 thousand vehicle revenue miles)	System Reliability (vehicle revenue miles/failures)*	
Fixed Route Bus Service	0	0	1	0.000001	0	0	5,338	
Demand Response Bus Service	0	0	0	0	1	0.000003	27,425	

2023 Targets

Mode of Transit Service	2023 Targets							
	Fatalities (total)	Fatalities (per 100 thousand vehicle revenue miles)	Injuries (total)	Injuries (per 100 thousand vehicle revenue miles)	Safety Events (total)	Safety Events (per 100 thousand vehicle revenue miles)	System Reliability (vehicle revenue miles/failures)*	
Fixed Route Bus Service	0	0	2	0.2	2	0.2	40,000	
Demand Response Bus Service	0	0	2	0.2	2	0.2	40,000	

Source: 2022-State Sponsored Agency Safety Plan Lawrence Transit and Lawrence Transit.

Frequency of Data Update: Yearly

Anticipated Update: 2024

Target Set by MPO Policy Board: [March 2023](#)

Vehicle Revenue Miles

The miles driven when a vehicle is operating and is available for the general public to ride and there is the expectation for carrying passengers. Revenue miles excludes miles that transit vehicles travel for deadhead services (leaving or returning to the maintenance facility), vehicle maintenance testing, etc.

Bicycle & Pedestrian

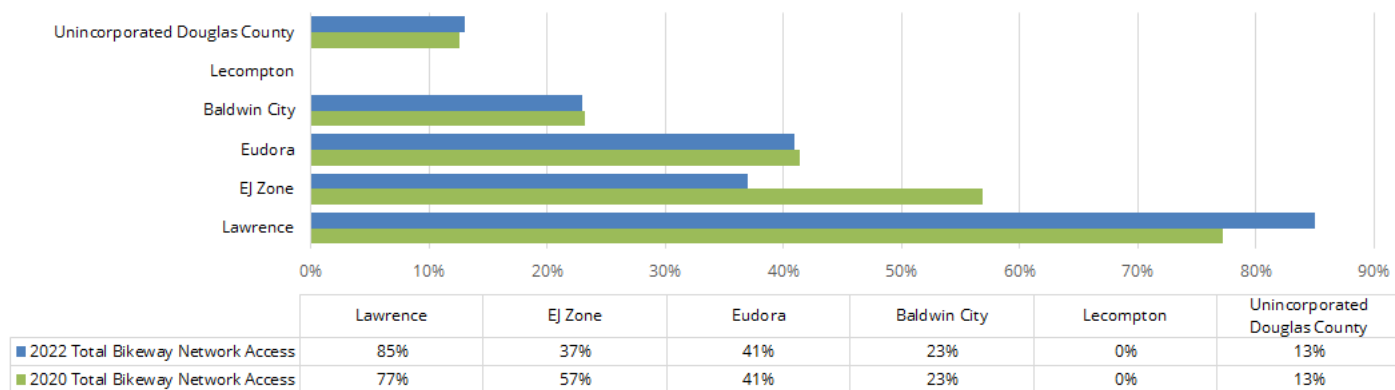
Performance Measure 1:

Percentage of people who have access within a ¼ mile to the Level of Comfort 3 or below bikeway network

The original Transportation 2040 measure included the entire bikeway network; however, the Lawrence Bikes Plan specified bikeways with a level of comfort of 3 or below because a primary goal of the Bike Plan is to increase the comfort of bikeways. Comfort is based on street's posted speed and Average Annual Daily Traffic counts to determine level of comfort a person who bicycles would experience on the provided bikeway.

	Marked Shared Lane	Bike Boulevard	Bike Lane	Buffered Bike Lane	Protected Bike Lane	Shared Use Path	Total Bikeway Network Access
Lawrence	21%	4%	34%	4%	0%	56%	85%
EJ Zone	11%	2%	9%	0%	0%	27%	37%
Eudora	0%	0%	0%	0%	0%	41%	41%
Baldwin City	0%	0%	0%	0%	0%	23%	23%
Lecompton	0%	0%	0%	0%	0%	0%	0%
Unincorporated Douglas County	0%	0%	3%	0%	0%	11%	13%

Source: Lawrence-Douglas County MPO (2022)



Note: The EJ Zone changes as newer socio-economic data is available; therefore, the EJ Zone changed between 2020 and 2021

Source: 2022 Population Estimate & 2022 Bikeway Network

Anticipated Update: Yearly

Target Set by MPO Policy Board: N/A

Environmental Justice (EJ) zones are low-income or minority areas. Visit lawrenceks.org/mpo/Environmental-Justice to view the most current EJ Zone map and historic EJ zone maps.



Bicycle & Pedestrian

Performance Measure 2:

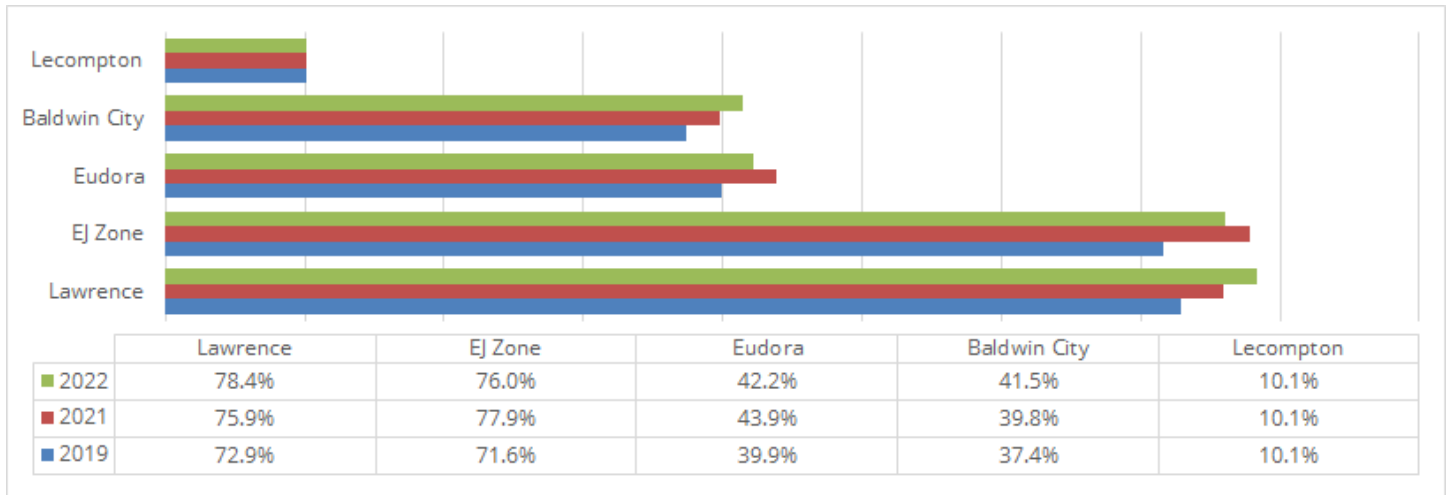
Percentage of Public Streets with Sidewalks on at Least One Side

Filling sidewalk gaps with at least sidewalk on at least one side is important to promote walkability.

	Miles	%
Lawrence	306.3	78.4%
EJ Zone	120.9	76.0%
Eudora	18.1	42.2%
Baldwin City	12.9	41.5%
Lecompton	0.6	10.1%

Note: EJ zone percentage is separate from the total Lawrence data

Source: Lawrence-Douglas County MPO (2022)



Note: The EJ Zone changes as newer socio-economic data is available; therefore, the EJ Zone changed between 2019, 2021, and 2022

Source: Lawrence (2022), Eudora (2022), Baldwin City (2022), Lecompton (2022)

Anticipated Update: Yearly

Target Set by MPO Policy Board: N/A

Environmental Justice (EJ) zones are low-income or minority areas. Visit lawrenceks.org/mpo/Environmental-Justice to view the most current EJ Zone map and historic EJ zone maps.

Transportation Options



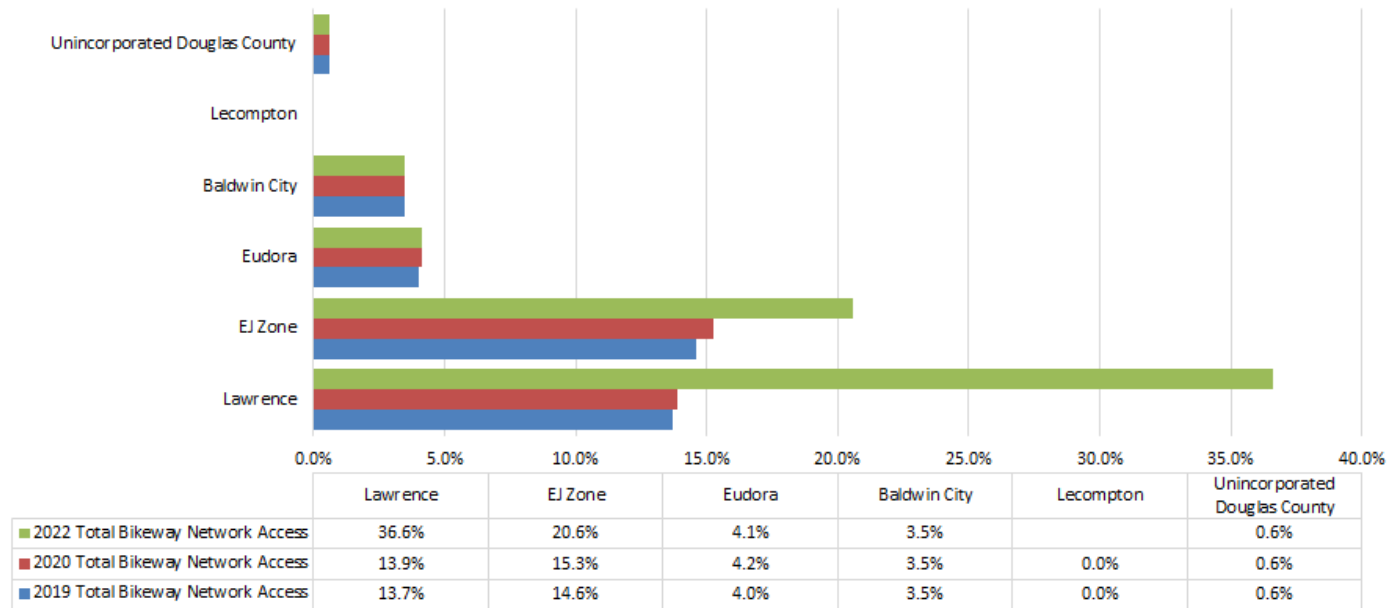
Bicycle & Pedestrian

Performance Measure 3: Percentage of Public Streets with Bikeway Network

Having a contiguous bikeway network is important to promoting biking. Measuring contiguous bikeway is difficult thus we are measuring public streets with bikeway network as a proxy.

	Marked Shared Lane	Bike Boulevard	Bike Lane	Buffered Bike Lane	Protected Bike Lane	Shared Use Path	2022 Total Bikeway Network Access
Lawrence	2.9%	-	7.7%	4.8%	-	7.1%	36.6%
EJ Zone	5.5%	-	6.7%	1.2%	-	6.2%	20.6%
Eudora	-	-	-	-	-	4.1%	4.1%
Baldwin City	-	-	-	-	-	3.5%	3.5%
Lecompton	-	-	-	-	-	-	-
Unincorporated Douglas County	-	-	-	-	-	0.6%	0.6%

Note: EJ zone percentage is separate from the total Lawrence data



Source: L-DC GIS (Road Centerline & Bikeway Network)

Anticipated Update: Yearly

Target Set by MPO Policy Board: N/A

Environmental Justice (EJ) zones are low-income or minority areas. Visit lawrenceks.org/mpo/Environmental-Justice to view the most current EJ Zone map and historic EJ zone maps.

Transportation Options

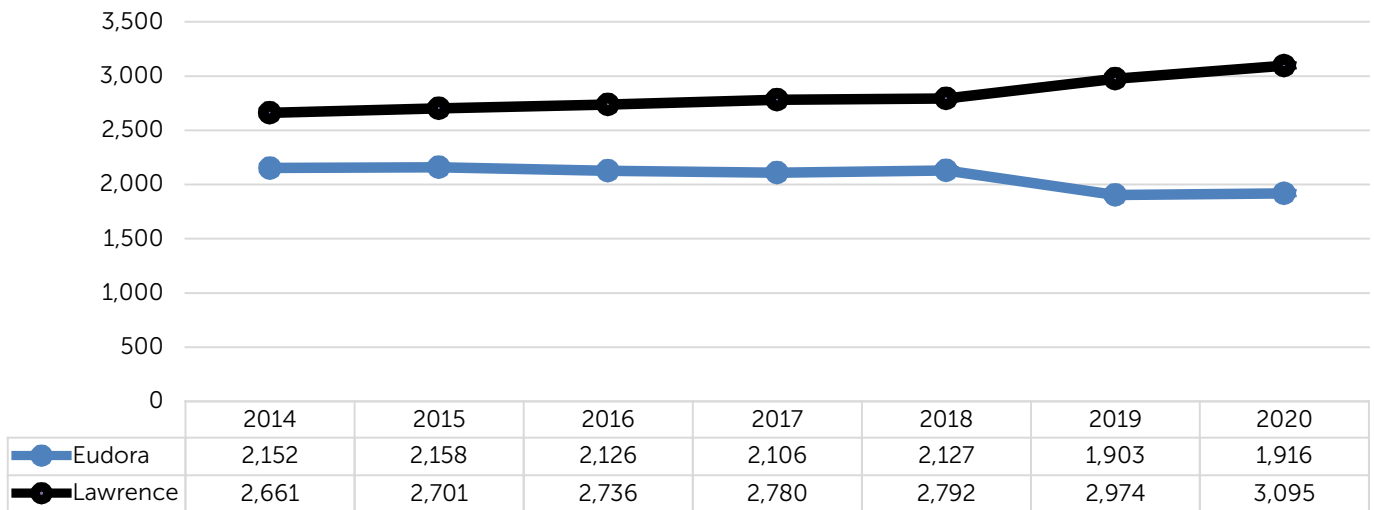


Miscellaneous

Performance Measure 21: Density of Urban Area (people/sq. mi)

This measure references the number of people divided by the number of square miles within a city.

Low-density land use increases vehicle use and reduces the viability of other modes of travel. Therefore, transportation costs are reduced by promoting density.



Source: Lawrence-Douglas County GIS & US Census Bureau

Anticipated Update: Yearly

Target Set by MPO Policy Board: N/A



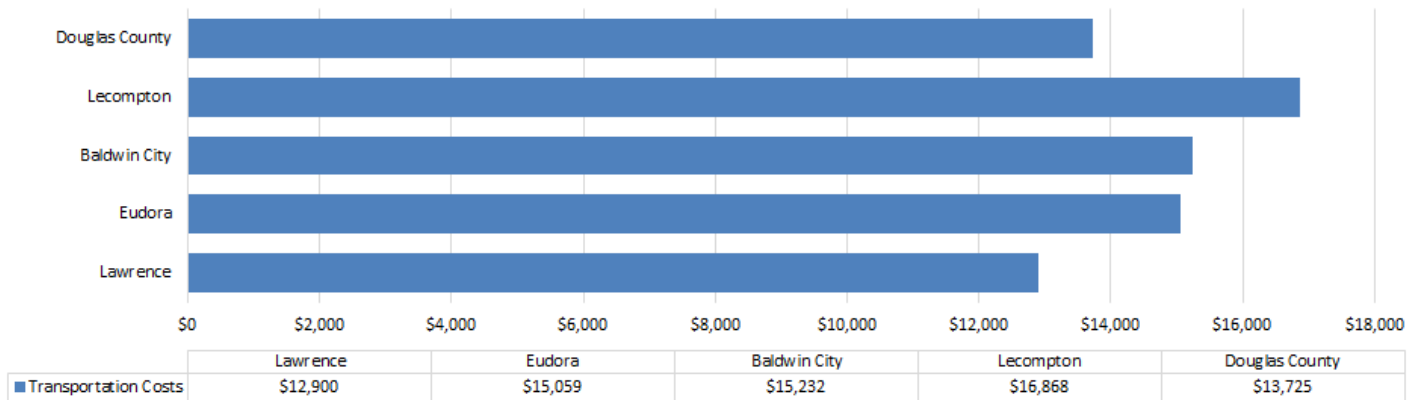
Miscellaneous

Performance Measure 22: Average Cost of Transportation per Household

Transportation costs are considered affordable if they are 15% or less of household income. 15% of the Regional Typical Household is \$61,020. Thus affordable transportation costs should only account for \$9,153 of a household's income. (This calculation used gas priced at \$3.80.)

	2022 Total 1-year Transportation Costs	1-year Transportation Costs % Over Affordable
Lawrence	\$12,900	141%
Eudora	\$15,059	165%
Baldwin City	\$15,232	166%
Lecompton	\$16,868	184%
Douglas County	\$13,725	150%

Gas costs are only a fraction of total driving costs. Car maintenance and use combine for the true cost of car ownership.



Source: Center for Neighborhood Technology's Total Driving Costs Tool - <https://htaindex.cnt.org/total-driving-costs>

Anticipated Update: 2024 (Assuming data is available)

Target Set by MPO Policy Board: N/A

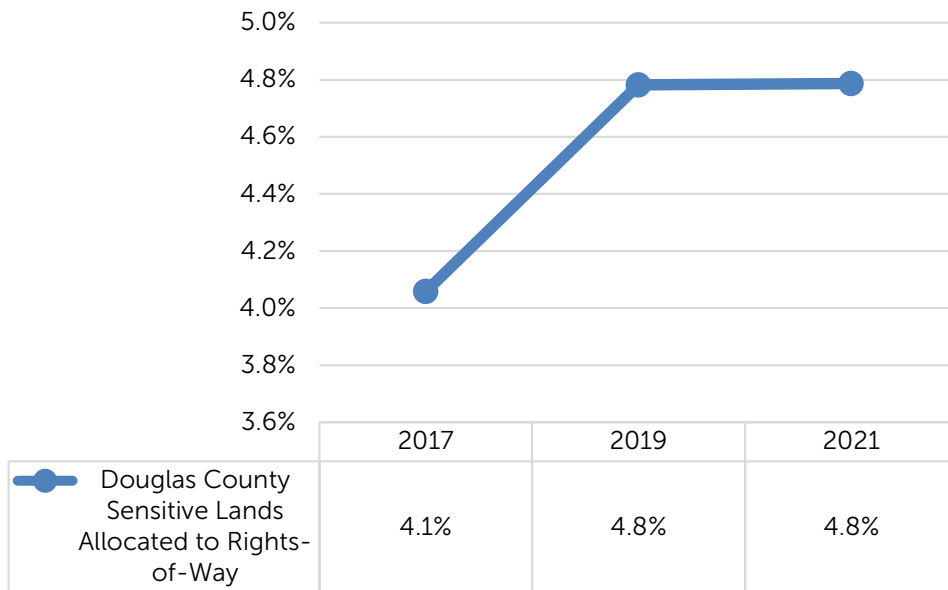


Miscellaneous

Performance Measure 24:

Percentage of Sensitive Lands Allocated Within Public Rights-of-Way

Sensitive lands are places which have unique environmental attributes worthy of retention or special care. They are critical to the maintenance of ecosystem services and healthy plant and wildlife populations. Protection of sensitive lands reduces vulnerability to Natural hazards and enhances quality of life. Public rights-of-way are an area dedicated to public use for pedestrian and vehicular movement, which may also accommodate public utilities.



Note: Sensitive lands include parkland, habitat, & wetlands.

Source: Lawrence-Douglas County GIS

Anticipated Update: 2023

Target Set by MPO Policy Board: N/A

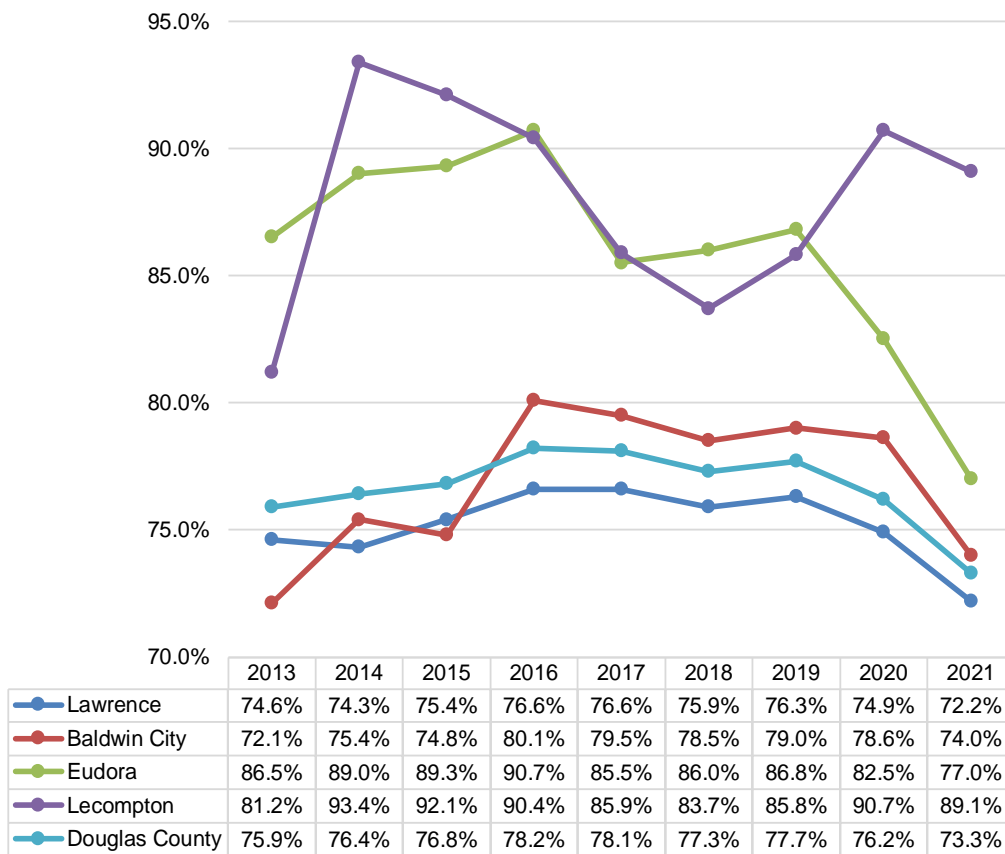


Miscellaneous

Performance Measure 25: Percentage of Single Occupancy Vehicles

Single occupancy vehicles commuting trips are where an individual drove alone to work in a car, truck, or van. Single occupancy vehicles contribute more greenhouse gas emissions per person compared to vehicles with more than one person. This data include workers 16 years old and over.

American Community Survey (ACS) data is compiled yearly by sampling over 3.5 million housing unit addresses over a 12 month period. Since this data is based on a survey there is a margin of error associated with the data.



Source: US Census Bureau American Community Survey (ACS) 5-year estimates (S0801)

Anticipated Update: 2024

Target Set by MPO Policy Board: N/A



Miscellaneous

Performance Measure 26: Percentage of Mode Choice

This data includes workers 16 years old and over.

2018						
	Drove Alone	Carpooled	Bus	Walked	Biked	Taxicab, Motorcycle or Other
Lawrence	75.9%	8.9%	2.9%	6.3%	1.0%	1.1%
Baldwin City	78.5%	9.5%	0.0%	7.4%	0.3%	1.2%
Eudora	86.0%	9.9%	0.0%	0.0%	0.0%	0.0%
Lecompton	83.7%	12.7%	0.0%	0.7%	0.0%	1.1%
Douglas County	77.3%	9.0%	2.3%	5.5%	0.8%	1.0%

2019						
	Drove Alone	Carpooled	Bus	Walked	Biked	Taxicab, Motorcycle or Other
Lawrence	76.3%	8.8%	2.5%	5.9%	1.1%	1.0%
Baldwin City	79.0%	7.9%	0.0%	11.6%	0.2%	0.0%
Eudora	86.8%	10.5%	0.0%	0.0%	0.0%	0.0%
Lecompton	85.8%	12.0%	0.0%	0.6%	0.0%	0.0%
Douglas County	77.7%	8.7%	2.1%	5.3%	0.9%	0.9%

2020						
	Drove Alone	Carpooled	Bus	Walked	Biked	Taxicab, Motorcycle or Other
Lawrence	74.9%	7.7%	2.4%	5.5%	1.3%	0.9%
Baldwin City	78.6%	6.0%	0.0%	14.4%	0.3%	0.0%
Eudora	82.5%	10.0%	0.0%	0.0%	0.0%	0.0%
Lecompton	90.7%	8.7%	0.0%	0.2%	0.0%	0.0%
Douglas County	76.2%	7.9%	2.0%	5.1%	1.1%	0.9%

American Community Survey (ACS) data is compiled yearly by sampling over 3.5 million housing unit addresses over a 12 month period. Since this data is based on a survey there is a margin of error associated with the data.

Source: US Census Bureau American Community Survey (ACS) 5-year estimates (S0801)

Anticipated Update: 2024

Target Set by MPO Policy Board: N/A



Miscellaneous

Performance Measure 26: Percentage of Mode Choice

These data include workers 16 years old and over.

	2021					
	Drove Alone	Carpooled	Bus	Walked	Biked	Taxicab, Motorcycle or Other
Lawrence	72.2%	8.2%	2.4%	5.1%	1.4%	1.4%
Baldwin City	74.0%	8.0%	0.0%	14.9%	0.4%	0.0%
Eudora	77.0%	10.2%	0.0%	0.0%	0.0%	0.0%
Lecompton	89.1%	5.7%	0.0%	0.4%	0.0%	0.0%
Douglas County	73.3%	8.3%	2.0%	4.7%	1.1%	1.1%

American Community Survey (ACS) data is compiled yearly by sampling over 3.5 million housing unit addresses over a 12 month period. Since this data is based on a survey there is a margin of error associated with the data.

Source: US Census Bureau American Community Survey (ACS) 5-year estimates (S0801)

Anticipated Update: 2024

Target Set by MPO Policy Board: N/A



Appendix E

System Performance Report

This report is Appendix E System Performance Report for [Transportation 2050](#), also known as T2050. T2050 is the blueprint for our future transportation system. It is a vision for a healthy, safe, and efficient transportation system, which adequately serves Lawrence, Eudora, Baldwin City, Lecompton, and unincorporated areas of Douglas County.

T2050 is a data-driven, performance based plan meeting the Federal Fixing America's Surface Transportation (FAST) Act requirements. It utilizes infrastructure condition and inventories, assessing performance trends, and setting performance measures. The plan includes 27 performance measures: 13 federally mandated and 14 community established.

Federal measures have targets set to meet requirements. Local measures have desired trend-lines identified. Data for these measures are provided by the Kansas Department of Transportation, the City of Lawrence, the City of Eudora, the City of Baldwin City, the City of Lecompton, Douglas County, the U.S. Census Bureau, the Federal Highway Administration, Lawrence Transit, KU on Wheels, Other Human Service Transportation Providers, and the Center for Neighborhood Technology. Data availability dictates data update schedules.

The [T2050 Performance Measure web page](#) contains the most up-to-date data. The performance measures are divided into theme areas. A pdf containing the measures for the theme are linked to the theme image.

[T2040](#) is a data-driven, performance based plan meeting the Federal Fixing America's Surface Transportation (FAST) Act requirements. It utilizes infrastructure condition and inventories, assessing performance trends, and setting performance measures. The plan includes 27 performance measures: 13 federally mandated and 14 community established. The measures are grouped by type in the pdfs below and can be found in Appendix F: System Performance Report of T2040.



[Click here](#) for a pdf with all 27 measures.



Safety

Serious Injuries Definition:

The Kansas Department of Transportation (KDOT) changed the definition of “Serious Injuries” used in crash reporting to the national definition of serious injuries on January 1, 2019. The new definition is defined in the Model Minimum Uniform Crash Criteria Guideline, or MMUCC (MMUCC) 4th Edition “Suspected Serious Injury (A)” attribute found in the “injury status” data element.¹

A suspected serious injury is defined in the MMUCC 4th Edition as any injury other than fatal that results in one or more of the following:

- Severe laceration resulting in exposure of underlying tissues/muscle/organs or resulting in significant loss of blood
- Broken or distorted extremity (arm or leg)
- Crush injuries
- Suspected skull, chest, or abdominal injury other than bruises or minor lacerations
- Significant burns (second and third degree burns over 10% or more of the body)
- Unconsciousness when taken from the crash scene
- Paralysis (loss of the ability to move or feel in part or most of the body)

The definition KDOT utilized prior to January 1, 2019 was:

A Disabling (incapacitating) injury is any injury, other than a fatal injury, which prevents the injured person from walking, driving, or normally continuing the activities he/she was capable of performing before the injury occurred. This includes:

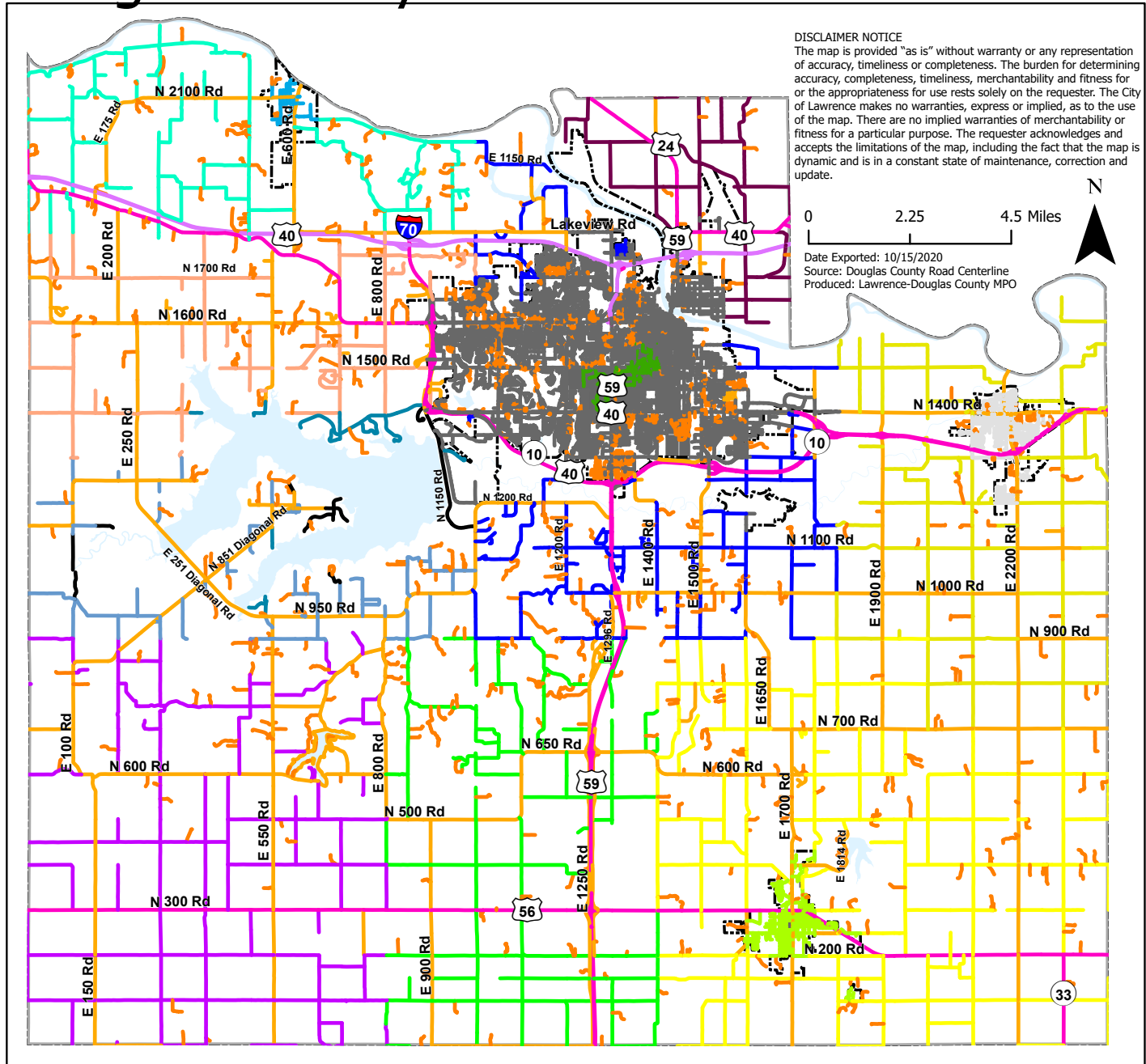
- Severe lacerations
- Broken or distorted limbs
- Skull or chest injuries
- Abdominal injuries
- Unconsciousness at or when taken from the accident scene
- Inability to leave the accident scene without assistance.

¹ <https://safety.fhwa.dot.gov/hsip/spm/docs/factsheet-mmucc-4edition.pdf>

Douglas County Road Maintenance Entities

DISCLAIMER NOTICE
 The map is provided "as is" without warranty or any representation of accuracy, timeliness or completeness. The burden for determining accuracy, completeness, timeliness, merchantability and fitness for or the appropriateness for use rests solely on the requester. The City of Lawrence makes no warranties, express or implied, as to the use of the map. There are no implied warranties of merchantability or fitness for a particular purpose. The requester acknowledges and accepts the limitations of the map, including the fact that the map is dynamic and is in a constant state of maintenance, correction and update.

0 2.25 4.5 Miles
 Date Exported: 10/15/2020
 Source: Douglas County Road Centerline
 Produced: Lawrence-Douglas County MPO



- Road Maintained By:
- Army Corps of Engineers
 - City of Baldwin
 - Clinton Township
 - Douglas County
 - Eudora Township
 - City of Eudora
 - Grant Township
 - Kansas Department of Transportation
 - Kansas Department of Wildlife, Parks, and Tourism
 - Kanwaka Township
 - Kansas Turnpike Authority
 - University of Kansas
 - City of Lawrence
 - City of Lecompton
 - Lecompton Township
 - Marion Township
 - Other
 - Private
 - Palmyra Township
 - Willow Springs Township
 - Wakarusa Township
 - University
 - Water
 - City Limits
 - County Limits