2016 Transportation Performance Measures Update

Mid-America Regional Council

Transportation and Environmental Department

MARC
MID-AMERICA REGIONAL COUNCIL

Transportation Outlook 2040

Transportation Outlook 2040 (TO 2040) is the metropolitan transportation plan for the bistate Kansas City region. It provides a policy framework for the investment of anticipated federal, state and local funds based on anticipated needs and regional goals and objectives through the year 2040. Based on these goals, MARC developed a series of performance measures to monitor trends and track progress toward desired outcomes.

This report provides historical data and analysis for selected performance measures.

The document is organized according to goals in the TO 2040 policy framework, which is based on a shared vision of a more vibrant, connected and green region. In general, performance measures are calculated based on data for the eight-county MARC transportation planning boundary.

Each performance measure corresponds to at least one goal in the TO 2040 policy framework, as depicted in the figure below. Some measures are cross-cutting and may be applicable to more than one goal.

For each measure, the report provides:

- Definition
- Brief description of the methodology used for calculation
- Historical trend information and desired trend direction
- Data observation and interpretation
- Data source

Vibrant			Connected				Green		
Equity	**Placemaking**	**Economic vitality**	**Transportation choices**	**Safety & security**	**System conditions**	**System performance**	**Environment**	**Public health**	**Climate change & energy use**
Travel time to work	Multimodal options	*Reliable truck travel times	Transit service usage	Crash fatalities	Structurally deficient bridges	On-time transit performance	Tree canopy coverage	Bicycle and pedestrian accessibility	Vehicle miles traveled per capita
	*Access to jobs by transit	*Truck congestion on interstates		Crash fatalities per vehicle miles traveled	Functionally obsolete bridges	*Reliable travel times	*Emissions reduction		
				Serious injuries	Pavement conditions	*Acceptable peak hour travel times			
				Serious injuries per vehilce miles traveled		*Travel delay per capita			
				Non-motorized fatalities and injuries					

*Federal measure not yet finalized.

Performance Measures Development

Regional performance measures

In 2015, regional transportation planning committees agreed on a set of performance measures based on research on best practices. MARC staff developed a list of candidate measures, which were evaluated according to several criteria including data availability, transportation nexus, the ability to forecast, scalability, and realistic potential to be influenced by transportation planning and programming.

Performance-based planning

Performance-based planning and programming (PBPP) refers to the application of performance management principles within the planning and programming processes of transportation agencies to achieve desired performance outcomes for the multimodal transportation system.

PBPP attempts to ensure that transportation investment decisions are made — both in long-term and short-term planning — based on their ability to meet established goals for improving the overall transportation system. Furthermore, it involves measuring progress toward meeting goals and using information on past and anticipated future performance trends to inform investment decisions.

Federal performance management requirements

The Moving Ahead for Progress in the 21st Century Act (MAP-21), enacted in 2012, incorporated performance management requirements intended to transform the federal-aid highway program and encourage the most efficient investment of federal transportation funds. MAP-21 aimed to:

- Refocus on national transportation goals.
- Increase the accountability and transparency of the federal-aid highway program.
- Improve project decision-making through performance-based planning and programming.

In 2015, Congress passed the Fixing America's Surface Transportation (FAST) Act into law. The FAST Act continues MAP-21's overall performance management approach and seeks to establish a series of performance measures related to national transportation goals of safety, infrastructure condition and system performance.

The U.S. Department of Transportation is charged with developing these performance measures through a federal rulemaking process that solicits and incorporates stakeholder comments. State Departments of Transportation and metropolitan planning organizations will be required to establish targets for the performance measures, and work towards achieving them through transportation planning and programming activities.

At the time of publication, only one of three federal performance measure rules has been finalized: the safety rule. The rules for infrastructure condition and system performance will be finalized soon.

The 2016 Transportation Performance Measures Report includes performance measures defined especially for the Greater Kansas City region, as well as measures required by the FAST Act.

In this document, unique symbols are used to differentiate between regionally defined and federally required performance measures.

Federal measure

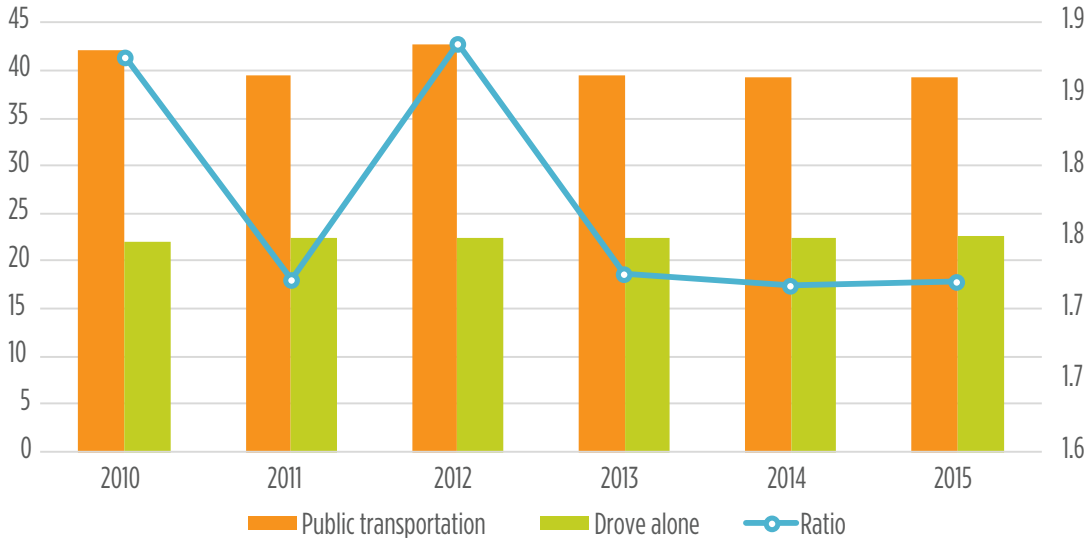
Regional measure

Travel time to work

Vibrant — Equity

Measure	Data	Goal	Actual	Trend
Ratio of transit travel time to auto travel time	2014: 1.7 times longer by transit 2015: 1.7 times longer by transit	↓	–	Not significant

Comparison of travel time to work



Since 2010, average travel times for work trips in the MARC region have not changed significantly. There is a considerable difference between the commute times for driving alone and using public transportation.

Data source: American Community Survey - 1 year estimates 2010-2015

This measure looks at the average travel time for commuters driving alone compared to those taking public transportation.

The American Community Survey calculates annual estimates of the average travel time to work (in minutes) for various modes of transportation. Travel time for automobiles is influenced by a variety of factors such as trip length, traffic volume, roadway capacity and signal timing. Travel time for public transportation is also affected by service frequency, vehicle capacity, boarding and dwell times and number of transfers.

Commuting by public transportation should not take significantly longer than driving alone. Ideally, these numbers should be equal. Achieving social equity for all members of the community requires constant effort to correct structural disparities.

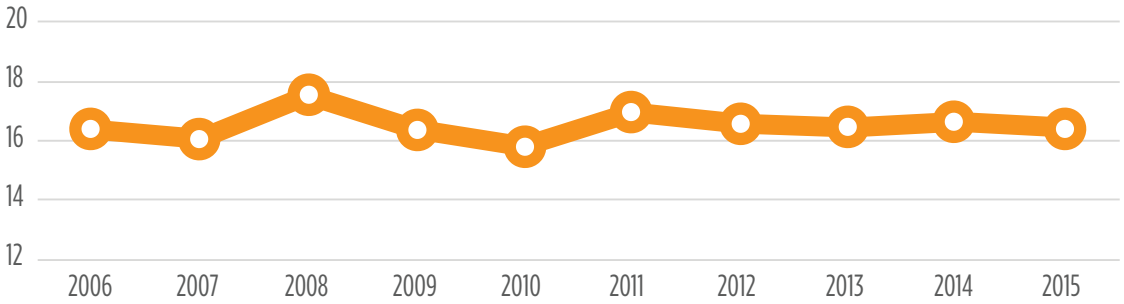
Transportation can play a key role in providing equitable access for low-income and minority residents to jobs, other services and opportunities.

Multimodal options

Vibrant — Placemaking

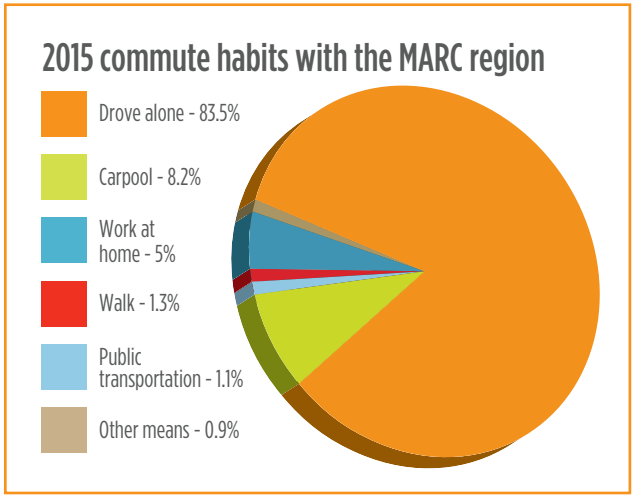
Measure	Data	Goal	Actual	Trend
Percent of work trips using alternatives modes (transit, bicycling, walking, etc.)	2014: 16.6 percent 2015: 16.4 percent	↑	–	Not significant

Percent of work trips using alternative modes



Since 2006, the percent of commuters using alternative modes of transportation in the MARC region has not changed significantly. The region experienced some small fluctuations from 2007 through 2010, but the measure has remained steady since then.

Data source: American Community Survey (ACS) 1-Year Estimates. Miami County is not included because it has a population below 65,000, below the threshold necessary for reporting ACS 1-year estimates.



This measure represents the percent of workers who commute to work by carpooling, walking, taking public transportation or working from home.

According to the 2009 National Household Travel Survey (NHTS), commuting accounts for nearly 28 percent of vehicle miles of travel in the United States. Driving alone contributes to traffic congestion, increases the amount of space needed for parking and is not an affordable option for many households.

Transportation Outlook 2040 seeks to improve transportation choices by prioritizing complete streets, expanding transit coverage and service levels, and building out bicycle and pedestrian networks. The plan also supports public and special transportation services, encourages ridesharing, such as carpooling and vanpooling.

While mode choice depends on available options, it's also influenced by the built environment — physical factors such as community design, land use, residential density, street connectivity and proximity of destinations.

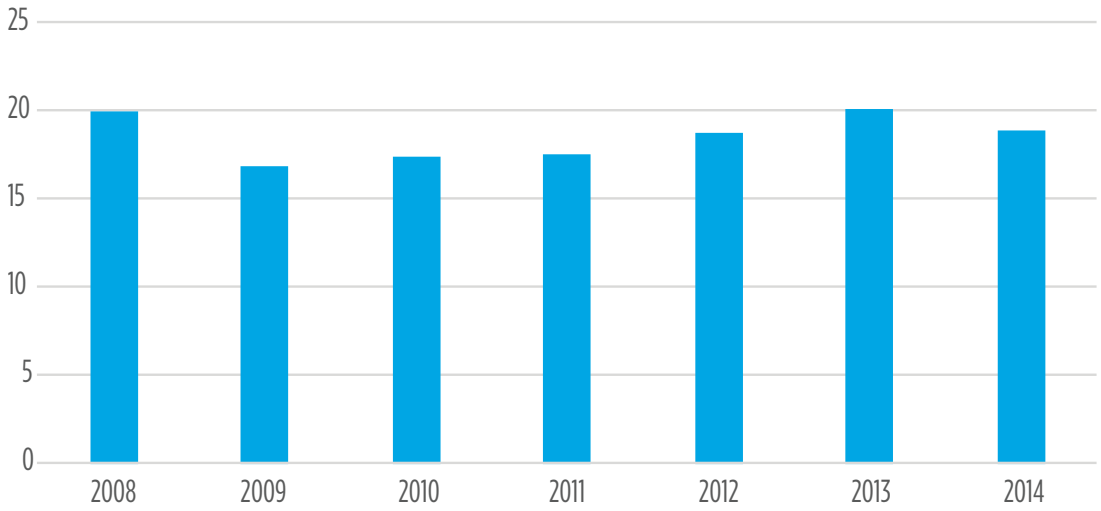
The Regional Plan for Sustainable Development encourages pedestrian connections, transit-supportive development and links among activity centers. Vibrant, mixed-use centers and corridors accommodate mobility needs of residents, enhance the character of a community and help sustain neighborhood longevity.

Transit service usage

Connected — Transportation choices

Measure	Data	Goal	Actual	Trend
Average transit boardings per revenue service hour	2013: 20.1 2014: 18.9	↑	↓	-6.1%

Average transit boardings per hour of service



The annual number of transit boardings per revenue service hour increased steadily between 2010 and 2013. Between 2013 and 2014 however, the number decreased by about 6 percent, from 20.1 to 18.9.

Data source: National Transit Database (NTD) Annual Transit Profiles

This measure divides the total number of annual, unlinked passenger trips (boardings) on transit vehicles by the number of hours those vehicles are in service.

This ratio is a way to measure the utilization rate of fixed-route public transportation services. By comparing those two values, transit operators can maximize efficiency by balancing the amount of service (supply) with ridership (demand). Ideally, boardings per revenue service hour should approach, but not exceed, the overall carrying capacity of the transit system.

Public transit in the Kansas City region is provided by five area transit agencies. Together, this network of services provides equitable alternatives to trips made via personal vehicles.

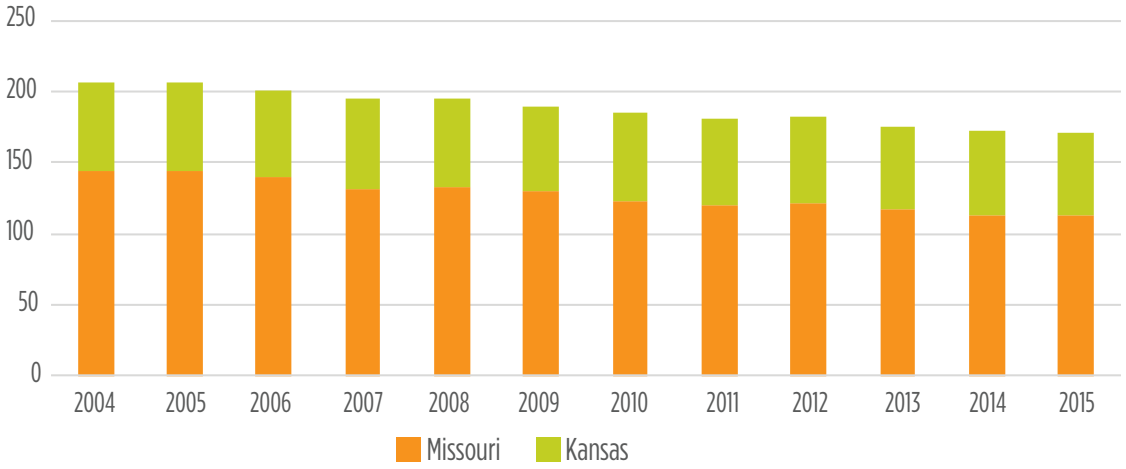
Increased transit ridership not only benefits providers in terms of efficiency, but also helps to relieve congestion on major roadways and improves air quality for the region.

Crash fatalities

Connected — Safety & security

Measure	Data	Goal	Actual	Trend
5-year average fatalities	2014: 172.8 fatalities 2015: 171.6 fatalities	↓	↓	-0.7%

5-year average fatalities



For the period ending in 2015, the 5-year average for crash fatalities was 171.6, slightly down from 172.8 in the previous period. There is a general downward trend for this measure over the long term, although here have been some periods with an increase.

Data sources: Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT)

Transportation infrastructure, education, enforcement, engineering and emergency service strategies all play important roles in improving safety and security for the traveling public. One specific performance measure is the number of roadway fatalities that result from crashes on the transportation network.

This measure tracks the 5-year average of fatalities in the MARC region — simply the sum of annual fatalities over a 5-year period divided by five. The number of fatalities resulting from crashes can sometimes vary significantly from one year to the next. Using the average is a way to smooth out annual variations and observe trends over time. The years shown on the horizontal axis of the chart represent the last year of a 5-year period. For example, the 2004 data reflects the average for the period 2000-2004.

Ideally, roadways on the transportation network would be completely safe, but unfortunately automobile crashes occur daily across the region. Traffic crashes can involve multiple contributing factors, including infrastructure-related and behavior-related factors.

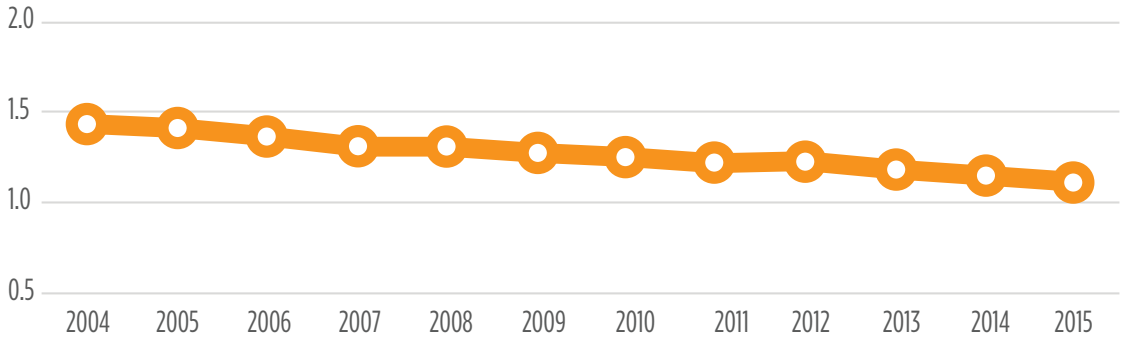
Roadway crashes have tremendous financial consequences and human tolls. Tracking fatalities and injuries helps inform efforts by area planners and policy makers to combat a range of crash causes.

Rate of crash fatalities per VMT

Connected — Safety & security

Measure	Data	Goal	Actual	Trend
5-year average rate of fatalities per 100 million vehicle miles traveled	2014: 1.15 fatalities 2015: 1.12 fatalites	↓	↓	-2.5%

5-year average rate of fatalities per 100 million vehicle miles traveled



For the period ending in 2015, the 5-year average fatality rate was 1.12 for the most recent period ending in 2015, slightly down from 1.15 for the period ending in 2014. Hisorically there has been a gradual, but steady downward trend for this meaure.

Data sources: Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT)

Another way to measure fatalities is to consider them within the context of total travel. There is a relationship between the amount of travel the and probability of a crash (and fatal injury).

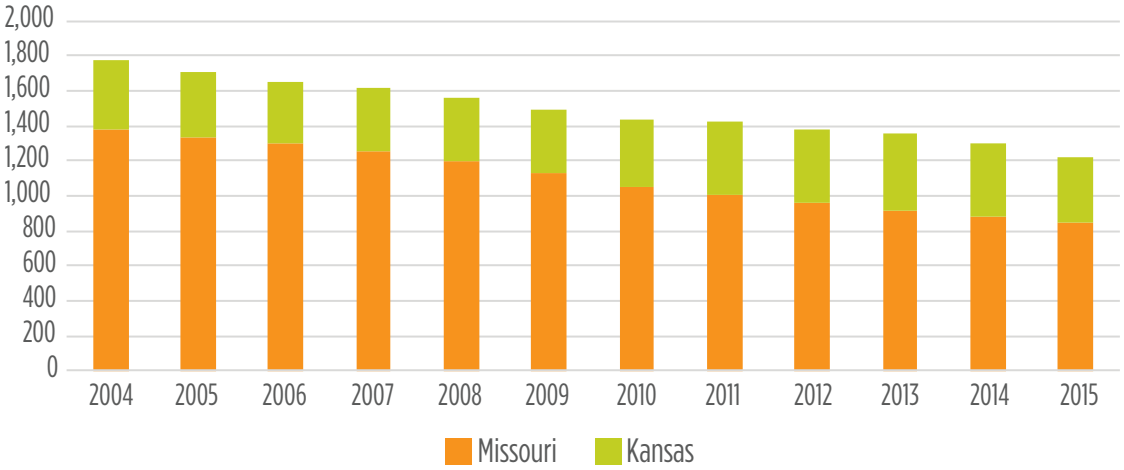
This measure tracks the 5-year average for the rate of fatalities per 100 million vehicle miles traveled (VMT). To calculate the annual fatality rate (per 100 million VMT), the annual number of fatalities is multiplied by 100,000,000, and the product is divided by the annual vehicle miles traveled. The 5-year average fatality rate is then calculated by averaging the annual rates over a 5-year period. The years shown on the horizontal axis of the chart represent the last year of a 5-year period. For example, the 2004 data reflects the average for the period 2000-2004.

Serious injuries

Connected — Safety & security

Measure	Data	Goal	Actual	Trend
5-year average of serious injuries	2014: 1,298.8 serious injuries 2015: 1,224.2 serious injuries	↓	↓	-5.7%

5-year average serious injuries



For the period ending in 2015, the 5-year average for serious injuries was 1,224.2, slightly down from 1,298.8 for the previous period ending in 2014. There has been a steady downward trend in this measure for at least the past 12 years.

Data sources: Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT)

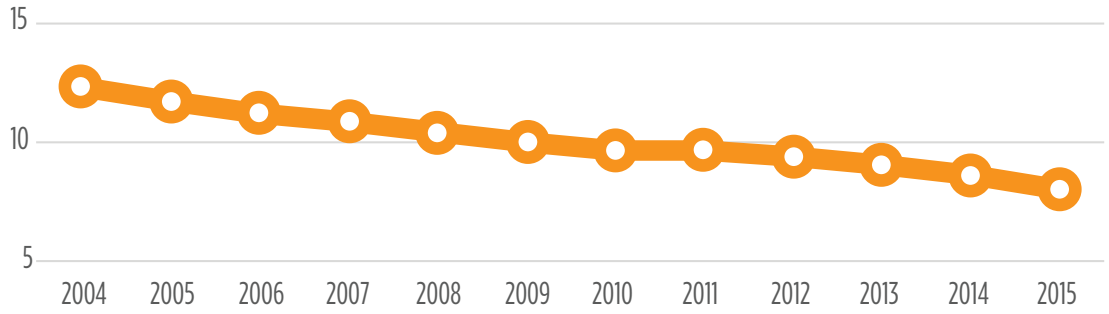
Serious (sometimes called disabling) injuries are also a major focus of transportation safety planning. Generally, an injury is considered serious when a vehicle occupant must be transported from the crash site in an ambulance.

This measure tracks the 5-year average of serious injuries in the MARC region — simply the sum of annual serious injuries over a 5-year period divided by five. The number of serious injuries resulting from crashes can sometimes vary significantly from one year to the next. Using the 5-year average is a way to smooth out annual variations and observe trends over time. The years shown on the horizontal axis of the chart represent the last year of a 5-year period. For example, the 2004 data reflects the average for the period 2000-2004.

Rate of serious injuries per VMT

Measure	Data	Goal	Actual	Trend
5-year average rate of fatalities per 100 million vehicle miles traveled	2014: 8.6 serious injuries 2015: 8.0 serious injuries	↓	↓	-7.2%

5-year average rate of serious injuries per 100 million VMT



For the period ending in 2015, the 5-year average rate of serious injuries per 100 million VMT was 8, slightly down from 8.63 for the period ending in 2014. Over the long term, this measure has consistently seen a downward trend.

Dat sources: Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT)

Another way to measure serious injuries is to consider them in the context of total travel. There is a relationship between the amount of travel the and probability of a crash (and serious injury).

This measure tracks the 5-year average of of the rate of serious injuries per 100 million vehicle miles traveled (VMT). To calculate the annual serious injury rate (per 100 million VMT), the annual number of serious injuries is multiplied by 100,000,000, and the product is divided by the annual vehicle miles traveled. The 5-year average is then calculated by averaging the annual rates during the 5-year period. The years shown on the horizontal axis of the chart represent the last year of a 5-year period. For example, the 2004 data reflects the average for the period 2000-2004.

Non-motorized fatalities and injuries

Connected — Safety & security

Measure	Data	Goal	Actual	Trend
5-year average of non-motorized fatalities and serious injuries	2014: 87.6 fatalities and serious injuries 2015: 84.8 fatalities and serious injuries	↓	↓	-3.2%

5-year average of non-motorized fatalities and serious injuries

TO 2040 calls for the reduction of non-motorized fatality and disabling injury crashes by half through the plan's maturation in 2040. In 2015, the 5-year average of regional non-motorized fatalities and disabling injuries was 84.8, slightly down from 87.6 in 2014.

Data sources: Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT)

This measure tracks the number of non-motorized — primarily bicycle and pedestrian — fatalities and serious injuries during a calendar year. Many non-motorized accidents go unnoticed or unreported.

It is imperative as a region that planners and safety stakeholders give non-motorized accidents the same attention as motorized crashes.

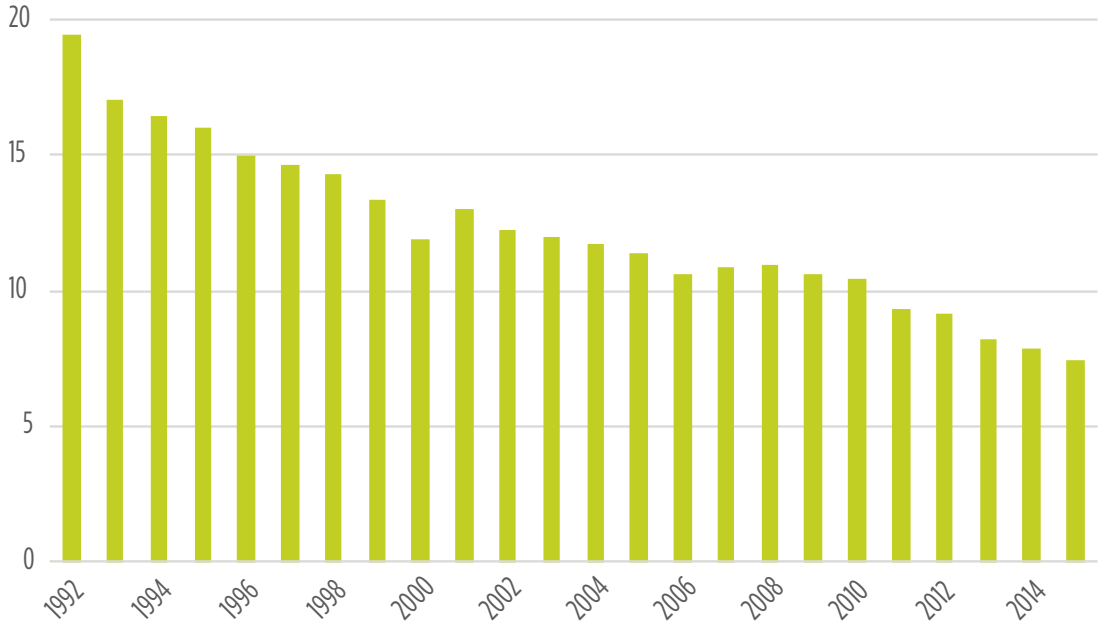
The 5-year average of non-motorized fatalities and non-motorized serious injuries is equal to the total number of non-motorized fatalities and serious injuries in a five year period, divided by five.

Structurally deficient bridges

Connected — System conditions

Measure	Data	Goal	Actual	Trend
Percent of structurally deficient bridges	2014: 7.8 percent 2015: 7.4 percent	↓	↓	-0.4%

Percent of structurally deficient bridges



Although the majority of area bridges are in excellent condition, it is important to regularly review, rehabilitate and replace bridges as needed. For 2015, the Kansas City area has about the same percentage of structurally deficient bridges as in 2010, the plan inception year.

Data source: Federal Highway Administration (FHWA) 2000-2015 National Bridge Inventory (NBI)

A quality transportation network ensures efficient performance and reliability in moving users from place to place. A system that is not well maintained can pose barriers to performance and safety. The TO 2040 update plan supports maintaining the good condition of the region's transportation infrastructure in order to improve performance and avoid higher maintenance costs associated with deterioration.

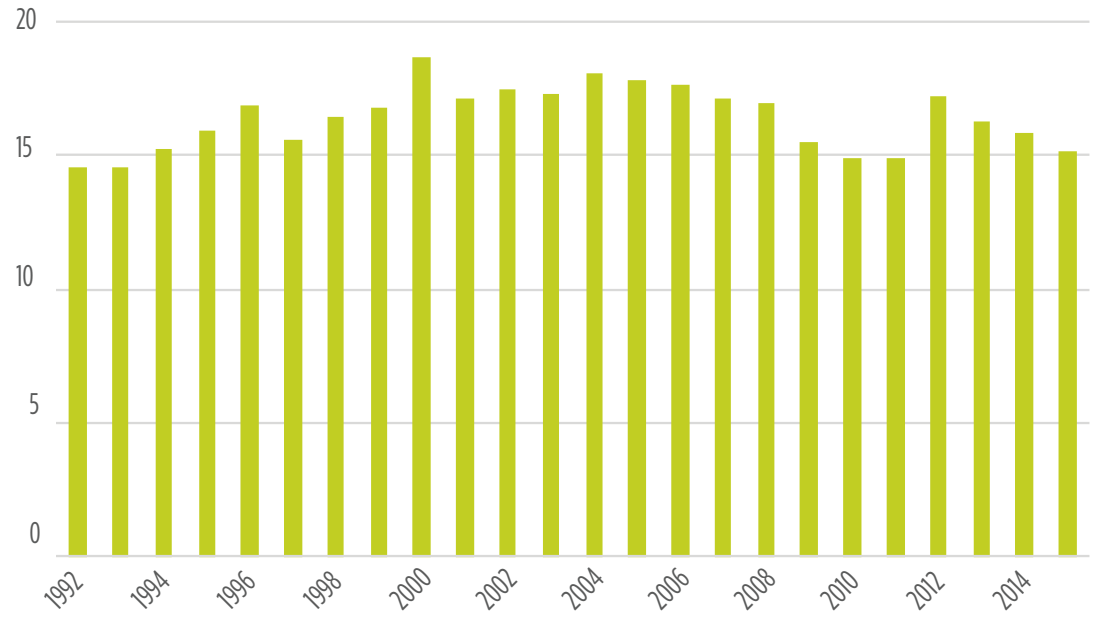
This measure quantifies the relative condition of federal-aid highway system bridges that are part of the National Bridge Inventory (NBI). Structurally deficient means that a bridge requires repair or replacement of a certain component. This may include cracked or spalled concrete, the bridge deck, the support structure, or the entire bridge itself.

Pavement and bridge conditions on the transportation network directly impact safety, performance and economic vitality in the Kansas City region.

Functionally obsolete bridges

Connected — System conditions

Measure	Data	Goal	Actual	Trend
Percent of functionally obsolete bridges	2014: 15.9 percent 2015: 15.1 percent	↓	↓	-0.8%



Bridges that are not structurally deficient may still be functionally obsolete. For 2015, the Kansas City area has about the same percentage of functionally obsolete bridges as in 2010, the plan inception year.

Data source: Federal Highway Administration (FHWA) 2000-2015 National Bridge Inventory (NBI)

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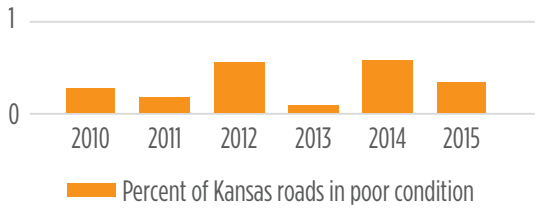
This measure quantifies the relative condition of federal-aid highway system bridges that are part of the National Bridge Inventory (NBI). Functional obsolescence is assessed by comparing the existing configuration of each bridge to current standards and demands. A bridge can be categorized as functionally obsolete due to a number of factors, such as sub-standard lane widths, outdated design standards or narrow shoulders. Pavement and bridge conditions on the transportation network directly impact safety, performance and economic vitality in the Kansas City region.

Pavement conditions

Connected — System conditions

Measure	Data	Goal	Actual	Trend
Percent of Kansas roads in poor condition	2014: 0.6 percent 2015: 0.3 percent	↓	↓	-0.3%
Percent of Missouri roads in not good condition	2014: 16.1 percent 2015: 15.3 percent	↓	↓	-0.8%

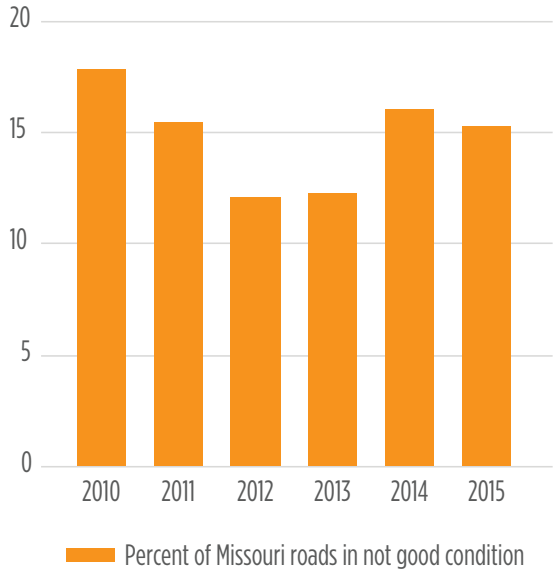
Kansas pavement conditions



From 2010 to 2013, there was a consistent downward trend in the percentage of regional roads classified poor or not good. However, the trend changed and this measure increased in 2014 and 2015.

Data sources: Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT)

Missouri pavement conditions



Accurate and timely data on pavement condition is used to assess system performance and deterioration, identify maintenance and reconstruction needs and determine financial needs. The Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT) determine whether highway pavement is in acceptable condition.

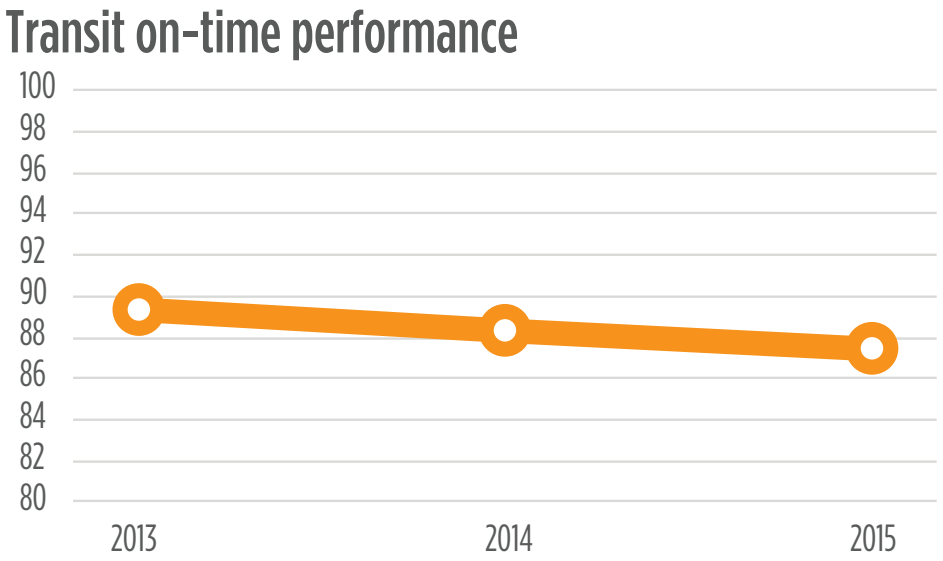
- KDOT uses three different distinctions for pavement condition: good, fair and poor. KDOT examines and rates the entire state's system of roads.
- MoDOT uses two distinctions to determine the pavement condition: good and not good. Missouri data measures the state's extensive highway network.

Both KDOT and MoDOT have established targets that they would like road pavement conditions to meet or exceed. KDOT strives to achieve a good pavement rating for 85 percent of its interstates and 80 percent of non-interstate roads. MoDOT aims for a good rating for 85 percent of its major highways.

On-time transit performance

Connected — System performance

Measure	Data	Goal	Actual	Trend
Regional on-time transit performance	2014: 88.4 percent on-time 2015: 87.4 percent on-time	↑	↓	-1%



Since 2013, on-time performance of the region's transit system has steadily declined. In 2014, the region's transit system showed an average performance of 88.38 percent, meaning that roughly 88 percent of the region's transit trips arrived and departed on time.

In 2015 however, the system experienced a 1 percent decrease in on-time performance, with only 87.39 percent of trips being on time. Although this is only a marginal decrease, the overall goal is to increase system reliability through increased on-time performance and regular schedule adherence.

Data source: Transit on-time performance data from KCATA

For transit riders, on-time performance is a key measure of quality service. Regular schedule adherence and system reliability are important factors in maintaining a reliable transit system.

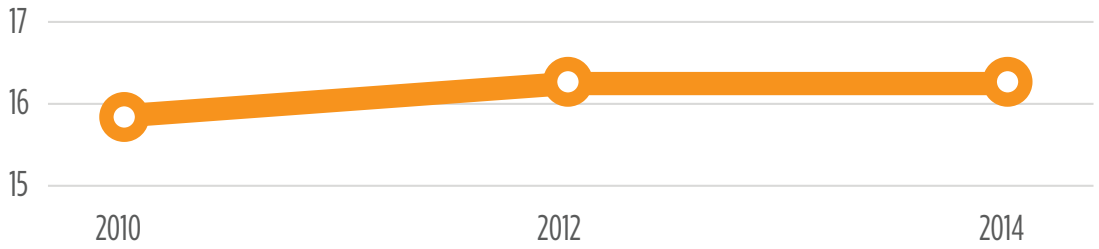
For the Kansas City region, on-time performance data was collected from the Kansas City Area Transportation Authority (KCATA) and Johnson County Transit (The JO). Although both use the industry standard definition of one-minute early to 5 minutes late, KCATA collects data using Automatic Vehicle Location (AVL) software, while Johnson County relies on random field work to collect data. Because these methods are so different, comparing the two sets of data is difficult, therefore, the data shown here is only from KCATA.

Tree canopy coverage

Green — Environment

Measure	Data	Goal	Actual	Trend
Tree canopy coverage	2012: 16 percent 2014: 16 percent	↓	–	not significant

Tree canopy coverage



Tree canopy coverage has remained near 16 percent since 2010 with a 1.16 percent standard error. There was a 0.2 percent increase from 2010 to 2012 and the percent remained the same the next year imagery was captured in 2014.

Data source: USDA Geospatial Gateway, NAIP, FSA

Tree canopy coverage quantifies urban forestry within the activity centers of the MARC region, facilitating efforts for more environmental services. Trees reduce smog, create oxygen, diminish heat and produce a cooling effect. They also reduce storm water runoff and noise pollution. The tree canopy coverage measure is designed to allow easy and accurate estimates of tree coverage using National Agriculture Imagery Program (NAIP) aerial imagery. NAIP imagery for Kansas and Missouri is collected and made available every other year.

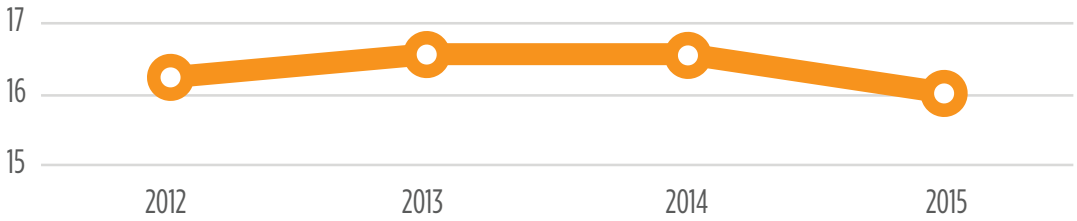
Activity centers are focal points or destinations within a community. They are vibrant areas containing a concentration of mixed land uses, diversity of demographics and face-to-face social interaction. This includes housing, retail, offices, restaurants, medical care and other services. Their scale ranges from large regional centers to mid-size community centers, down to neighborhood-level convenience centers. In terms of transportation planning, activity centers provide a variety of mobility options and serve as connection points helping people reach their destinations.

Bicycle and pedestrian accessibility

Green — Public health

Measure	Data	Goal	Actual	Trend
Percent of bicycle facility mileage serving activity centers	2014: 16.6 percent 2015: 16 percent	↑	↓	-0.6%

Percent of bike facility mileage serving activity centers



Since 2010, communities in the MARC region have constructed more than 480 miles of bicycle and pedestrian infrastructure. However, since then, the number of miles built to serve the region's activity centers has fluctuated. Between 2014 and 2015, the percent decreased by 0.6 percent.

Although the regional network is adding linear mileage, the location of these projects has caused a decrease in performance in terms of accessibility and mobility.

Data sources: MARC Bikeways data for years 2012 through 2015, and ACS 2010-2014 demographic and population data

Convenient access to bicycle and pedestrian facilities increases the viability of these modes as alternative transportation choices. Bicycling and walking are environmentally friendly modes of transportation that do not contribute to roadway congestion or air pollution. These facilities can connect residents to activity centers, transit routes and recreational opportunities. They can also minimize hazards at major barriers to non-motorized travel, such as rivers or highways. These facilities are valuable components of livable communities.

This calculation shows not only the progression of the region's bicycle and pedestrian infrastructure, but also its effectiveness in providing mobility options and access to jobs and community resources for the region. This measure specifically focuses on bicycle facilities that serve mixed-use centers, encouraging bicycle trips for purposes other than recreation.

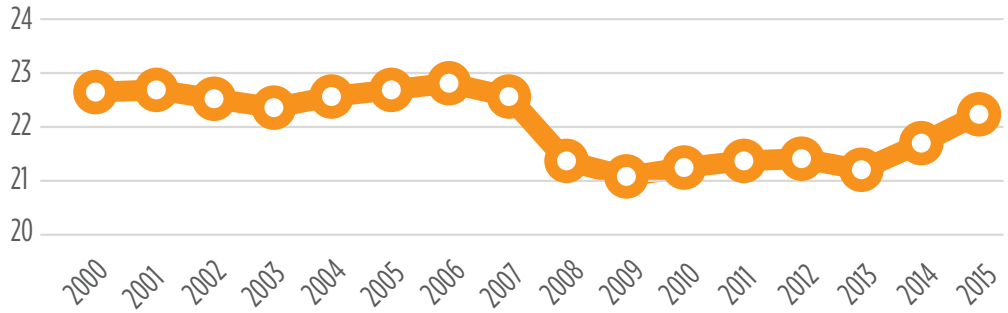
Tracking bicycle and pedestrian access to the region's mixed use and activity centers encourages municipalities in the region to focus investments in areas that may promote the use of bicycles for purposes other than recreation. However, the quality of a network of bicycle and pedestrian infrastructure involves more than just measuring completed linear mileage. Understanding the location of bicycle and pedestrian facilities in terms of populations served is key in assessing the performance of the regional network.

Vehicle miles traveled per capita

Green — Climate change & energy use

Measure	Data	Goal	Actual	Trend
Vehicle miles traveled per capita	2014: 21.7 miles 2015: 22.3 miles	↓	↑	2.6%

Vehicle miles traveled per capita



In the long term, the number of vehicle miles traveled per capita in the MARC region has held relatively steady, with the exception of a noticeable drop in 2008 due to an economic recession. Since 2013, there appears to be a trend of increasing VMT per capita.

Data source: Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT) 2014-2015 State DOT Roadway Databases

Reducing fuel consumption and emissions can have a positive impact on air quality. One key measure of how the transportation system is affecting air quality and energy use is vehicle miles traveled per capita

Vehicle miles traveled (VMT) quantifies the extent of motor vehicle operation on roadways. An increase in VMT typically correlates to a region's growth in population and economic development, but also contributes to traffic congestion and air pollution. Because population growth affects total VMT, we measure performance using miles per capita.

As the Kansas City region continues to grow, TO 2040 supports policies and alternative modes of transportation that can reduce per capita VMT, improving air quality and reducing congestion on the region's roadways.