2018 Transportation Performance Measures Update

Mid-America Regional Council
Transportation and Environment

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 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.

Vibrant

Equity

Travel time to work

*Access to jobs by transit

Placemaking

Walkability index

Multimodal options

Connected

Transportation choices

Transit service usage

System conditions

Pavement conditions

Bridge conditions

*Transit asset management (TransitSGR)

Safety & security

Crash fatalities

Crash fatalities per vehicle miles traveled

Serious injuries

Serious injuries per vehicle miles traveled

Non-motorized fatalities and serious injuries

System performance

On-time transit performance

Level of travel time reliability

Reliable truck travel times

Green

Climate change & energy use

Vehicle miles traveled per capita

Public health

Bicycle and pedestrian accessibility

Environment

Tree canopy coverage in activity centers

Trends cannot be seen for this measure due to a change in data collection.

The dials give a general indication of the trend of each measure — red means we're heading the opposite way we'd like to be, yellow means we're not getting better or worse and green means we're moving in the desired direction.

*Not included in this year's report

Performance measures development

Regional performance measures

In 2015, MARC committees responsible for regional transportation planning agreed on a set of performance measures based on best practices research. 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 rule-making process that solicits and incorporates stakeholder comments. State departments of transportation and metropolitan planning organizations are required to establish targets for the performance measures, and work towards achieving them through transportation planning and programming activities.

Targets were finalized for all federal measures in October 2018.

The 2018 Transportation Performance Measures Report includes performance measures defined specifically for Greater Kansas City, as well as measures required by the FAST Act.

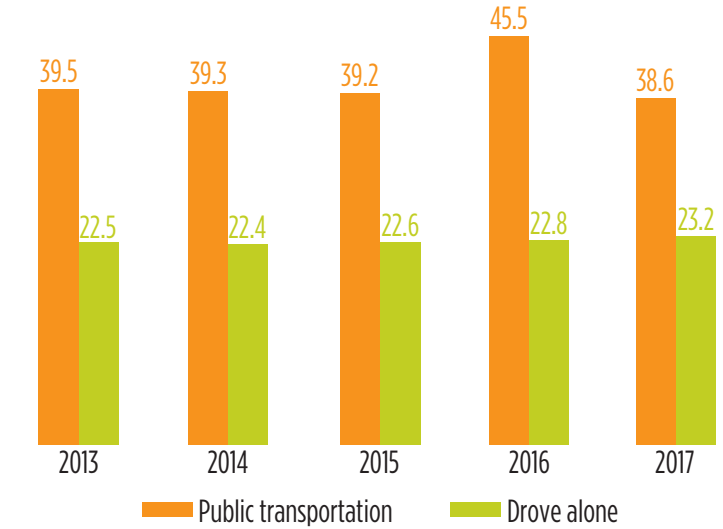
In this document, unique symbols are used to differentiate between regionally defined and federally required performance measures.

Federal measure

Regional measure

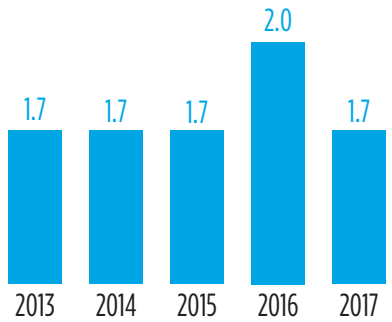
Travel time to work

Comparison of travel time to work in minutes



This measure looks at the average travel time for commuters driving alone compared to those taking public transportation. There is considerable difference between the commute times for driving alone and using public transportation.

Ratio of travel time to work for driving alone versus using public transportation



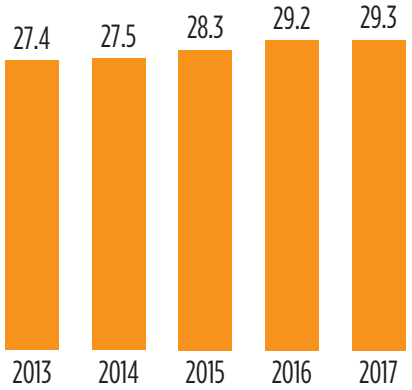
The American Community Survey calculates annual estimates of the average travel time to work (in minutes) for various modes of transportation. Travel time for automobiles is influenced by a variety of factors such as trip length, traffic volume, roadway capacity and signal timing. Travel time for public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

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

Data source: American Community Survey - 1 year estimates 2010-2016

Vehicle miles traveled per capita

Daily vehicle miles traveled per capita



While multiple variables influence the amount of vehicle travel, daily vehicle miles traveled (VMT) per capita is increasing at a time when carpooling and transit ridership are decreasing. It is also increasing faster than the rate of population growth.

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 VMT per capita.

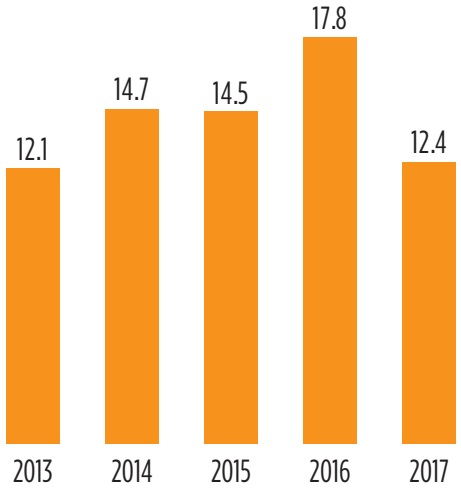
VMT quantifies the extent of motor vehicle operation on roadways. An increase in VMT typically correlates to a region's growth in population and economic development, but also contributes to traffic congestion and air pollution. Because population growth affects total VMT, we measure performance using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

Data source: Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT) 2012-2016 State DOT Roadway Databases

Walkability

Percent of regional permits for new housing units within walkable areas



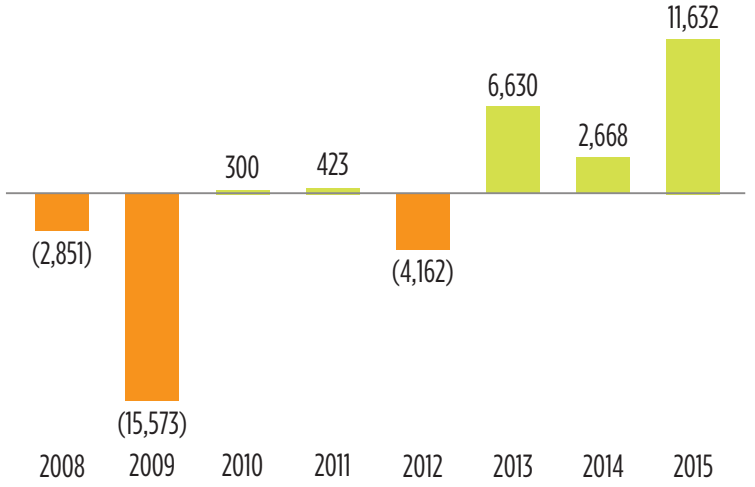
This measure calculates the percent of annual housing permits in the region's most vibrant, walkable areas.

The percent of regional permits for new housing units within walkable areas is obtained by subtracting the housing units within a quarter mile of walkable area from the total housing units in eight of the nine MARC counties, excluding Ray county.

Focusing residential development in vibrant, walkable areas facilitates use of sustainable transportation modes such as walking, biking, carpooling and public transportation.

Data source: MARC GIS Activity Centers layer, HBA permit data, 2007-2014 Census LEHD block employment data, and MARC 2015 walkability index.

Change in employment within walkable area



This measure tracks the year-over-year change in employment within a quarter mile of the most vibrant, walkable areas.

Vibrancy may involve providing people with access to services, entertainment and social interaction, plus employment, transportation and housing options. Vibrancy depends on density, mixed use, and urban design that supports access by pedestrians, bicycles and transit.

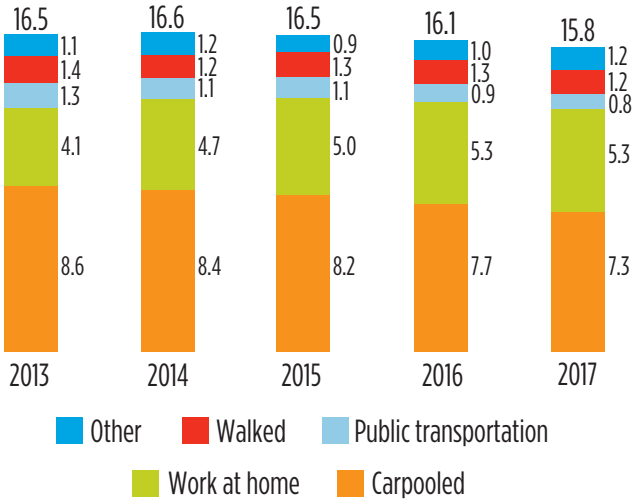
MARC's walkability index measures vibrancy by combining intensity of development (population and employment density), mixed land use, density of businesses and other destinations, transit access, and walkable street layout.

The change in employment is calculated by subtracting the total employment within one mile of walkable area from one year to the next. This creates the time frame for each two year period to measure the change in employment.

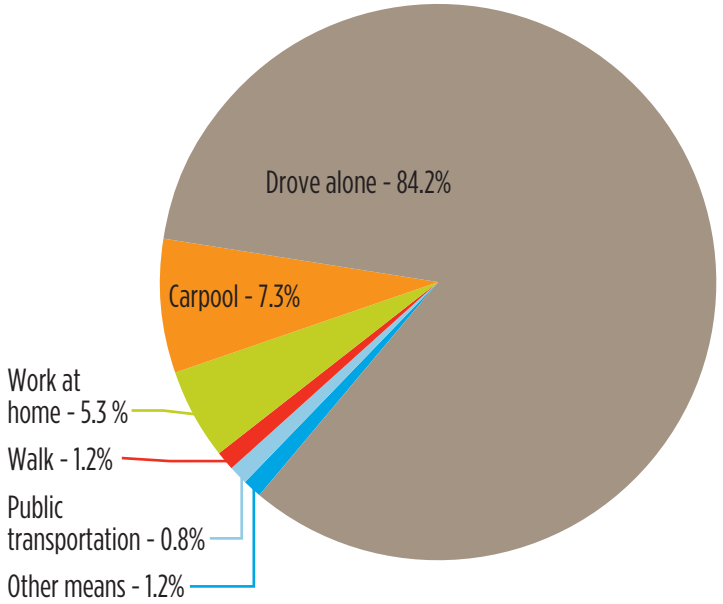
Data source: MARC GIS Activity Centers layer, HBA permit data, 2007-2014 Census LEHD block employment data and MARC 2015 walkability index.

Multimodal options

Percent of work trips using alternative modes



2017 commute habits within the MARC region



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

TO 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, and 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.

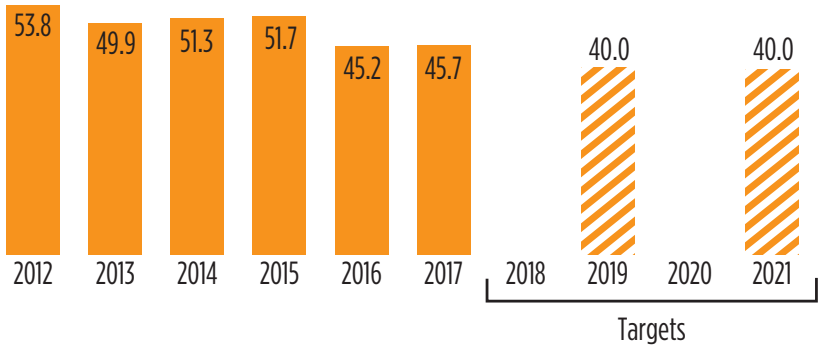
The Regional Plan for Sustainable Development encourages pedestrian connections, transit-supportive development and links among activity centers. Vibrant, mixed-use centers and corridors accommodate mobility needs of residents, enhance the character of a community and help sustain neighborhood longevity.

According to the 2009 National Household Travel Survey (NHTS), commuting accounts for nearly 28 percent of vehicle miles of traveled 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.

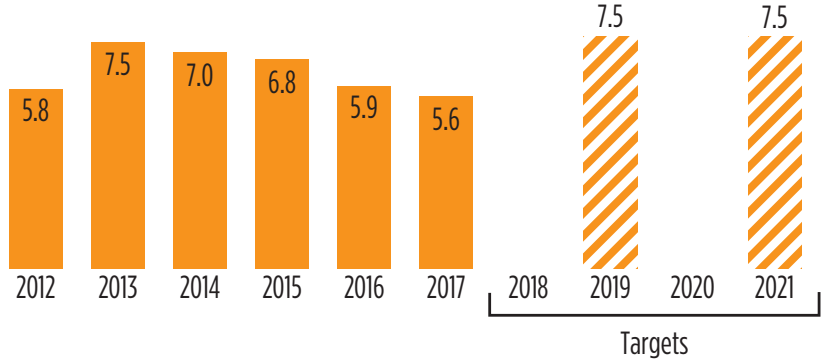
Data source: American Community Survey (ACS) 1-Year Estimates. Miami County is not included because it has a population below 65,000, below the threshold necessary for reporting ACS 1-year estimates.

Bridge conditions

Percent of bridge deck area in good condition



Percent of bridge deck area in poor condition



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. Transportation Outlook 2040 supports maintaining the condition of the region's transportation infrastructure in order to improve performance and avoid higher maintenance costs associated with deterioration.

The classification of this performance measure is based on National Bridge Inventory (NBI) condition ratings for items 58 (deck), 59 (superstructure), 60 (substructure) and 62 (culvert). Condition is determined by the lowest rating of deck, superstructure, substructure or culvert. If the lowest rating is greater than or equal to 7, the bridge is classified as good; if it is less than or equal to 4, the classification is poor. (Bridges rated below 7 but above 4 will be classified as fair; there is no related performance measure.) This measure addresses National Highway System bridge deck area only.

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

Data source: Federal Highway Administration (FHWA) 2012-2016 National Bridge Inventory (NBI)

Pavement conditions

Percent of	2017	2019 Goal
Interstate roads in good condition	73.1	72.6
Interstate roads in poor condition	0.1	0.2
Non-Interstate roads in good condition	54.7	52.0
Non-Interstate roads in poor condition	0.7	0.5

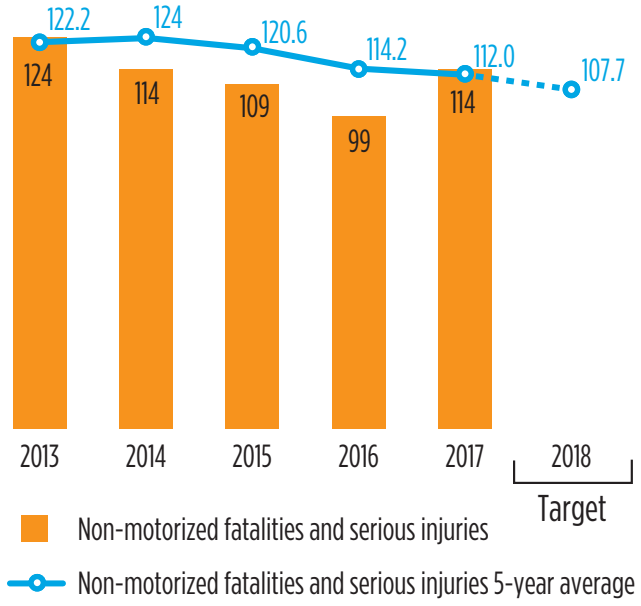
Accurate and timely data on pavement condition is used to assess system performance and deterioration, identify maintenance and reconstruction needs and determine financial needs. The Kansas Department of Transportation (KDOT) and Missouri Department of Transportation (MoDOT) determine whether highway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

Prior to 2017, Kansas and Missouri defined pavement conditions differently. There is no historical data because this is the first year the definitions of good and poor have been the same for each state.

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

Non-motorized fatalities and injuries

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



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.

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.

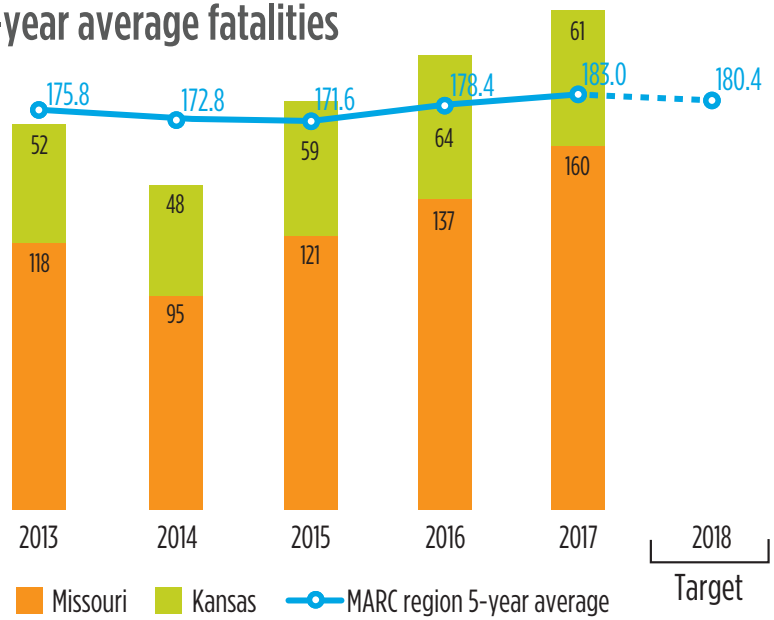
The region's next Metropolitan Transportation Plan calls for the reduction of non-motorized fatality and disabling injury crashes by half through the plan's maturation in 2050.

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

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

Fatalities

5-year average fatalities

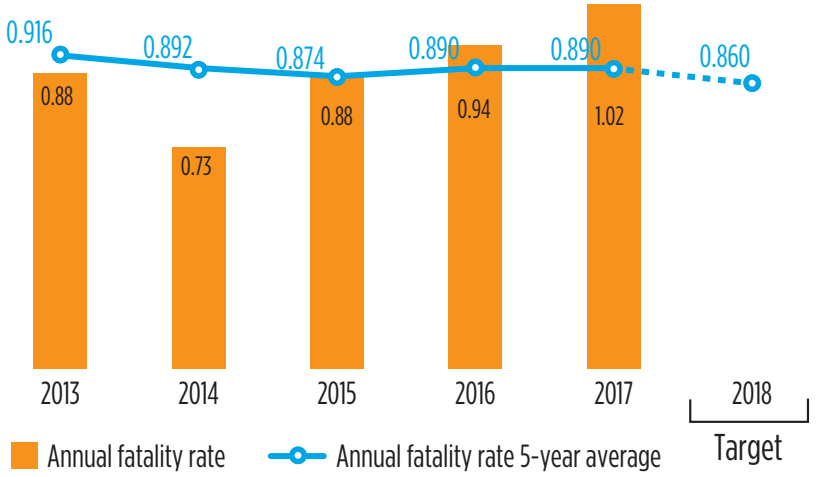


Transportation infrastructure, education, enforcement, engineering and emergency service strategies all play important roles in improving safety and security for the traveling public. One specific performance measure is the number of roadway fatalities that result from crashes on the transportation network.

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 bars of show the number of fatalities for that year, while the blue line shows the average for the 5-year period ending that year. The 2018 data point shows the target 5-year average.

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.

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



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

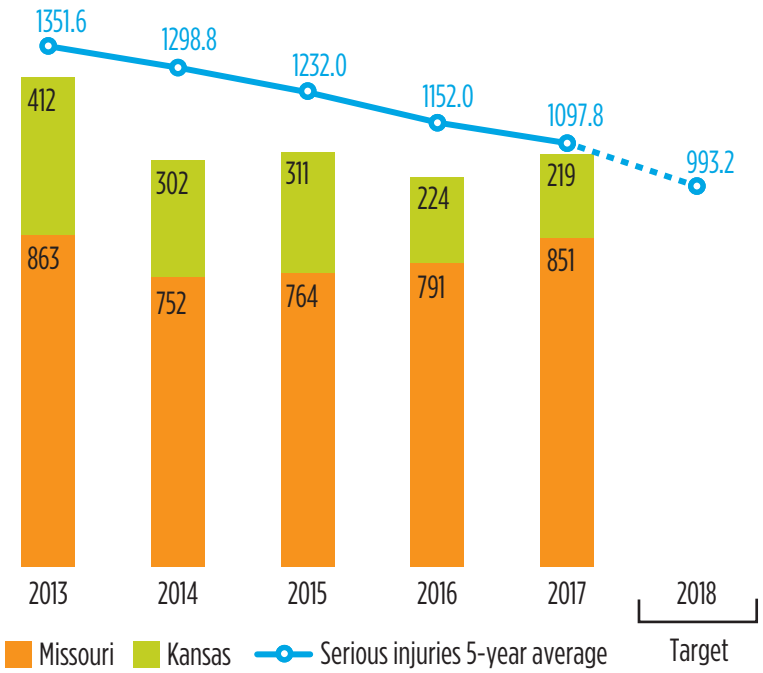
Roadway crashes have tremendous financial consequences and human tolls. Tracking fatalities and injuries helps inform efforts by area planners and policy makers to combat a range of crash causes.

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 result 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 bars represent the fatality rate for only that year, while the blue line shows the 5-year average rate for the 5-year period ending that year. The 2018 data point shows the target 5-year average.

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

Serious injuries

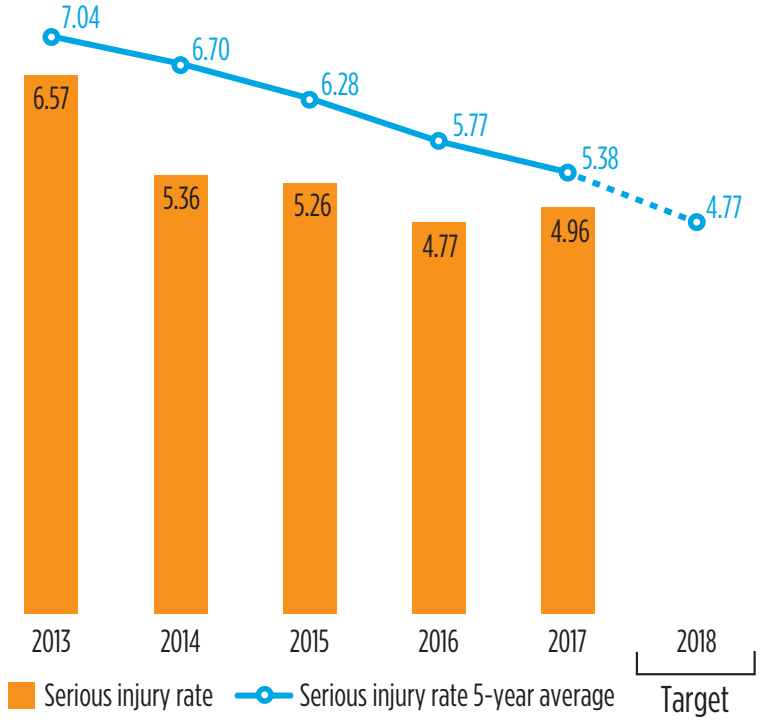
5-year average serious injuries



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 bars of show the number of serious injuries for that year, while the blue line shows the average for the 5-year period ending that year. The 2018 data point shows the target 5-year average.

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



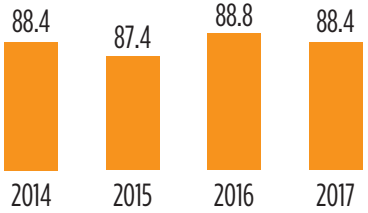
Another way to measure serious injuries is to consider them in the context of total travel. There is a relationship between the amount of travel the and probability of a crash (and serious injury).

This measure tracks the 5-year average of 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 result 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 bars represent the rate of serious injuries for only that year, while the blue line shows the 5-year average rate for the 5-year period ending that year. The 2018 data point shows the target 5-year average.

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

On-time transit performance

Transit on-time performance



As the Kansas City region's largest transit service provider, the Kansas City Area Transit Authority's (KCATA) on-time performance has remained high and fluctuated only slightly over the past few years.

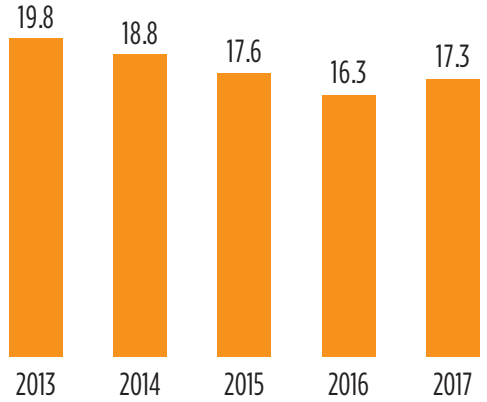
For transit riders, on-time performance is a key measure of quality service. Regular schedule adherence and system reliability are important factors in maintaining a reliable transit system.

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 fieldwork 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.

Data source: Transit on-time performance data from KCATA

Transit service usage

Average transit boardings per hour of service



Each transit operator in the region — Kansas City Area Transit Authority, Johnson County Transit and Unified Government transit — experienced different trends for ridership and service hours.

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.

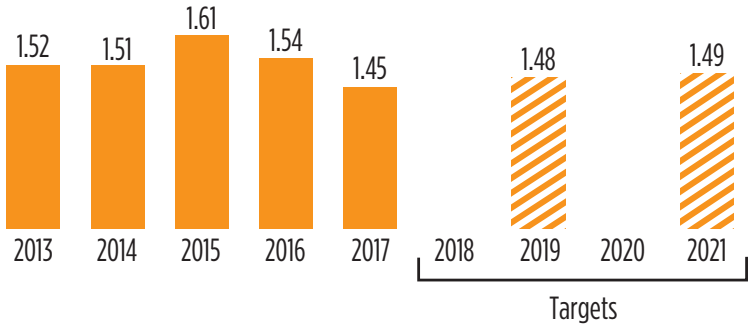
Increased transit ridership not only benefits providers in terms of efficiency, but also helps to relieve congestion on major roadways and improves air quality for the region.

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

Source: National Transit Database (NTD) Annual Transit Profiles and Federal Transit Administration.

Reliable travel times

Truck travel time reliability index



Travel times for trucks in the urbanized Kansas City area are highly unreliable. This seems to contrast with travel time reliability for the general public, although they are measured differently (percentage of reliable miles traveled versus a plain index).

For truckers, it is important to make deliveries on time. A better level of reliability would help them accomplish their goals.

The Truck Travel Time Reliability (TTTR) Index measures the extent of unexpected delay for freight movement. It is expressed as a ratio. When the ratio is higher, truckers experience more unexpected delay on the roads. When it is lower (closer to 1), the roads are more reliable.

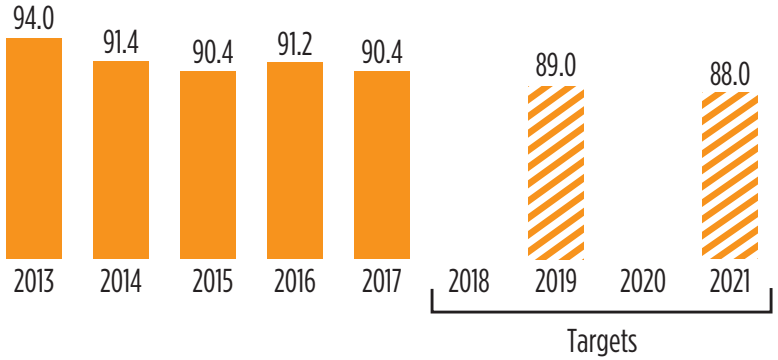
Reporting is divided into five periods:

- Morning peak — 6 to 10 a.m. Mondays through Fridays.
- Midday — 10 a.m. to 4 p.m., Mondays through Fridays
- Afternoon peak — 4 to 8 p.m., Mondays through Fridays
- Weekends — 6 a.m. to 8 p.m., Saturdays and Sundays
- Overnights — 8 p.m. to 6 a.m., all days

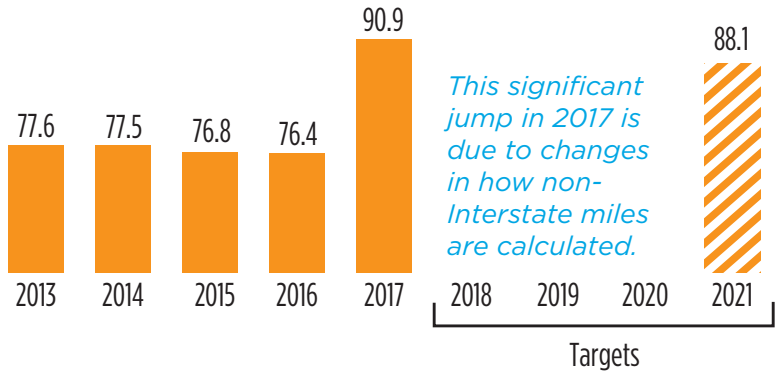
The TTTR ratio is generated by dividing the 95th percentile time by the normal time (50th percentile) for each segment. The TTTR Index is generated by multiplying each segment's largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of Interstate.

The targets in 2019 and 2021 represent ratios the region would like to stay at or below.

Percent of reliable Interstate miles



Percent of reliable non-Interstate miles



This significant jump in 2017 is due to changes in how non-Interstate miles are calculated.

Travel time reliability measures the extent of unexpected delay. This is represented as the percent of miles traveled where users do not experience significant unexpected delay. The targets for 2019 and 2021 indicate levels that the region would like to stay at or above.

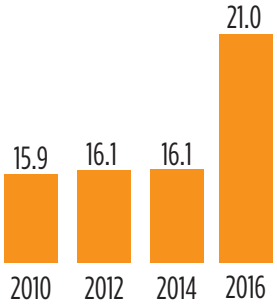
These targets are lower than the current measures because it is anticipated that the region won't have the resources over time to maintain its current transportation system.

Most travelers are not tolerant of unexpected delays because they will have larger consequences than expected delays due to everyday congestion. Travelers also tend to remember the few bad days spent in traffic, rather than the average time for travel throughout the year. In order to improve travel time reliability, the first step is to measure it. This measure better represents a commuter's experience than a simple average travel time.

Data sources: National Performance Measures Research Dataset and the RITIS tool (developed by University of Maryland CATT Lab)

Tree canopy coverage

Tree canopy coverage



The significant jump in 2016 can be attributed to updates in the maps MARC uses to define the locations of activity centers, which changed the amount of trees located in activity centers.

Tree canopy coverage had remained near 16 percent since 2010 with a 1.16 percent standard error until 2016 when the coverage rose to 21 percent. This change can be attributed to updates in the maps MARC uses to define the locations of activity centers, which would change the amount of trees located in activity centers.

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.

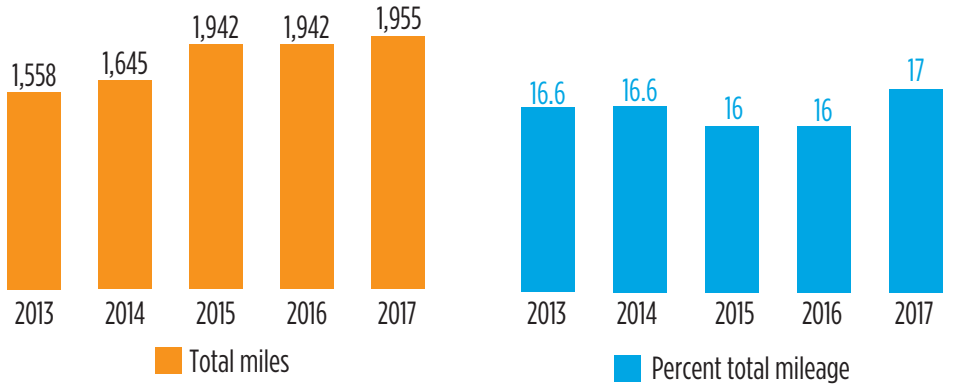
The tree canopy coverage measure is designed to allow easy and accurate estimates of tree coverage using National Agriculture Imagery Program (NAIP) aerial imagery. NAIP imagery for Kansas and Missouri is collected and made available every other year.

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.

Data source: USDA Geospatial Gateway, NAIP, FSA

Bicycle and pedestrian accessibility

Percent of bike facility mileage serving activity centers



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 to assessing the performance of the regional network.

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