



UPDATE

Connected2045

Long-Range Transportation Plan for the St. Louis Region
June 2019



EAST-WEST GATEWAY
Council of Governments

Creating Solutions Across Jurisdictional Boundaries

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Contents

Regional Context	1
Performance Management Framework	9
Investment Plan	33
Air Quality Conformity	47
Appendix ■ ■ ■ ■ ■ ■ ■ ■ State of the System Report	

Overview

Connected2045 is the long-range transportation plan for the St. Louis region. Based on input from regional citizens, stakeholders, and guidance from elected officials, it guides transportation decision-making in the region over the next 25 years. East-West Gateway Council of Governments (EWG) is the St. Louis region's federally designated Metropolitan Planning Organization (MPO), and, as required by federal law, EWG develops the long-range transportation plan (LRTP) every four years. *Connected2045* establishes a project- and policy-based framework that will be implemented through a variety of short-range transportation plans and programs. While the project list included in *Connected2045* focuses on regionally significant roadway and bridge projects, the policies established by the Plan will guide EWG as it prioritizes funding for all modes of transportation—including public transportation, freight, bicycle, pedestrian, and paratransit.

The EWG Board of Directors oversees the development of short- and long-range transportation plans for the region and selects the federally funded capital projects and operation initiatives that will best carry out the framework created by *Connected2045*. Project selection is conducted through the Transportation Improvement Program (TIP), an annually updated, four-year list of projects using federal funds. All federally funded transportation projects must be consistent with *Connected2045*'s framework to be included in the Transportation Improvement Program.

Summary and Top Priorities

Chapter 1 of the Plan discusses the potential for fundamental changes to the transportation system that may be brought on by new technologies and the implications of those changes on the St. Louis region.

Chapter 2, the System Performance Report, summarizes EWG's efforts to implement a performance-driven, outcome-based planning and programming process in line with the requirements of the FAST Act, the current federal transportation law. EWG developed its performance management framework to ensure the region's transportation investments align with federal and state priorities. The framework also establishes a set of performance measures and targets that will allow EWG to score transportation projects and track progress toward achieving the region's goals.

Chapter 3 includes *Connected2045*'s Transportation Investment Plan. It outlines the major projects that will be funded over the next 26 years. Given limited financial resources, this list cannot address the entirety of the region's transportation needs.

Chapter 4 of *Connected2045* summarizes the Plan's Air Quality Conformity process to ensure that the Plan is consistent with regional and state efforts to improve air quality and protect public health.

The **State of the System** appendix supplements *Connected2045*. It explores the data and analysis that went into developing the Plan in more detail and provides additional sources and notes.

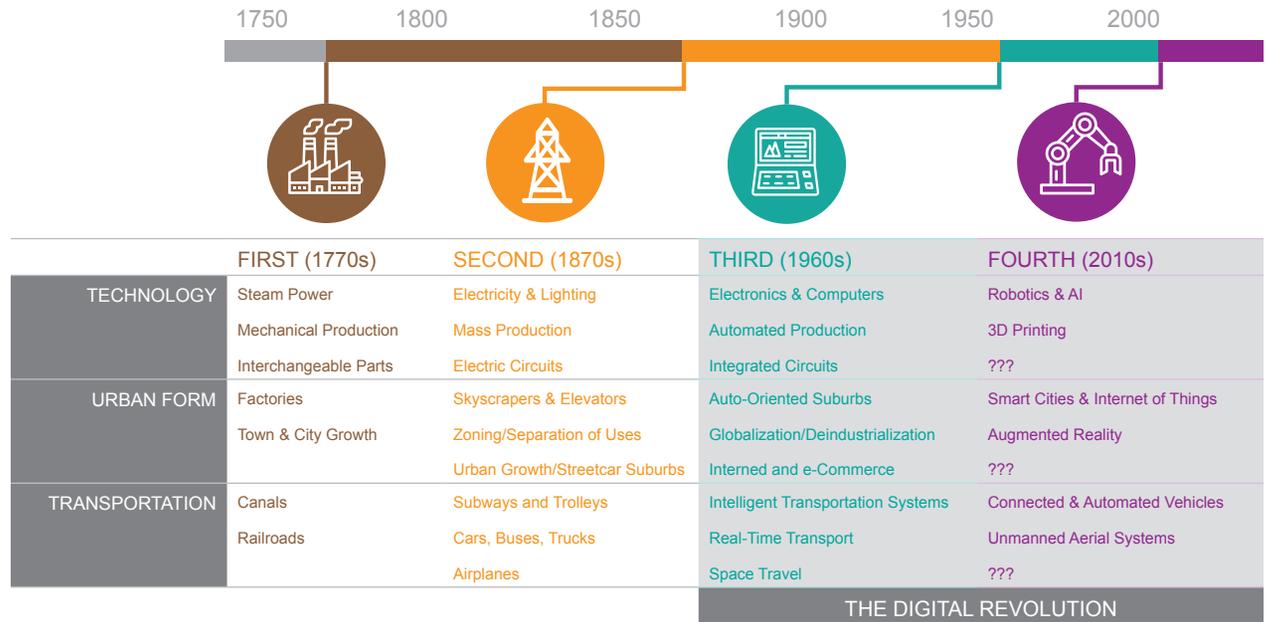


Chapter 1: Regional Context

Society today is in the midst of a technological revolution that is likely to fundamentally change the way in which people live, work, and relate to one another. This new wave of technology deployment goes beyond the digital revolution (Figure 1) that started in the middle of the 20th Century. It is characterized by a fusion of technologies built on the Internet of Things along with breakthroughs in artificial intelligence, robotics, and quantum computing that are blurring the lines between the physical, digital, and biological spheres. While these technological leaps are rapidly changing many aspects of society, they are having a particularly important impact on transportation. Emerging transportation technologies, such as connected vehicles and infrastructure, new shared mobility options, autonomous vehicles, and drones are ushering in a new era of transportation that may fundamentally affect the way people travel and deliver goods and services.

The St. Louis region has identified **Ten Guiding Principles** to support the region’s future growth and prosperity, and emerging technologies may have significant impacts on desired outcomes in relation to these principles. Technological advancements have already disrupted traditional transportation business models and are likely to have dramatic impacts on safety, mobility, and system performance over the next 20 to 30 years. Moreover, the pace of broad technology adoption has been quickening over time. New technologies may have positive and/or negative impacts on the Ten Guiding Principles. **Table 1** lists some of the factors that suggest how new and emerging transportation technologies could influence EWG’s Ten Guiding Principles and regional transportation planning.

Figure 1: The Four Industrial Revolutions



Source: Adapted from World Economic Forum.

Emerging transportation technologies go well beyond the Intelligent Transportation System (ITS) investments that have been implemented in the past and present significant new opportunities to address previously unsolvable problems. But these technologies also present new challenges, and as technologies continue to advance, governments will need to understand and mitigate risks (**Table 1**).

With regard to the ongoing rapid technological changes in the transportation sector, *Connected2045* identifies three goals associated with emerging transportation technology and ITS integration in regional planning:

1. Harness positive impacts from technology

Foster emerging transportation technologies that help advance the region’s vision and Ten Guiding Principles through policies, plans, and strategic investments.

2. Address potential negative impacts from technology

Consider the risks of emerging transportation technologies in the region’s planning and investment decision making to help mitigate potential adverse consequences on the region and its residents.

3. Support the region to be a laboratory for innovation

Bring innovation to the region through application of emerging transportation technologies that support economic growth and quality jobs.

Table 1: Guiding Principles		Factors suggesting positive impacts	Factors suggesting negative impacts
	Preserve and Maintain the Existing System	<ul style="list-style-type: none"> • Use of drones for bridge inspections • Instrumentation of highways to monitor conditions • Pavements that can repair themselves, melt snow, and provide lighted lane striping 	<ul style="list-style-type: none"> • Decline in traditional transportation funding sources through fuel taxes and vehicle registration fees
	Support Public Transportation	<ul style="list-style-type: none"> • Improved transit signal priority, fare collection, and service enhancements • Potential for greater integration with on-demand services that provide first-mile, last-mile connections 	<ul style="list-style-type: none"> • Potential for autonomous vehicles, transportation network companies, and other service providers to reduce transit market share
	Support Neighborhoods and Communities Throughout the Region	<ul style="list-style-type: none"> • May provide more access to opportunities for people without access to a private vehicle, as well as disabled and elderly populations 	<ul style="list-style-type: none"> • Technology such as AVs might be primarily for those who can afford it • Potential negative implications of e-commerce on community businesses
	Foster a Vibrant Downtown	<ul style="list-style-type: none"> • Increased shared mobility options could enhance the demand for urban living and working environments • Reduced vehicle and parking demands could provide more space to lower housing cost, add bike lanes, parks, or other amenities 	<ul style="list-style-type: none"> • Reduced time burden of driving due to AVs could encourage more longer commute times • Electronic access to health care, education, etc. could reduce benefits of being in the urban core
	Provide More Transportation Choices	<ul style="list-style-type: none"> • Technology enhances alternatives to personal auto use, including bicycle sharing, microtransit, carsharing, and ridesourcing 	—
	Promote Safety and Security	<ul style="list-style-type: none"> • CV and AV technology reduces driver error; technologies are designed to reduce crashes, injuries, and fatalities 	<ul style="list-style-type: none"> • Potential concerns about cyber-security in relation to CV and AV technology
	Support a Diverse Economy with a Reliable System	<ul style="list-style-type: none"> • Improvements in monitoring roadway conditions, as well as safety improvements, should directly result in fewer vehicle incidents, which would improve reliability • Better traveler information in vehicles enables travelers to re-route to minimize time stuck in congestion • More vehicle throughput within the existing transportation system that should help to reduce traffic congestion 	<ul style="list-style-type: none"> • Increased VMT could offset some of these benefits
	Support Quality Job Development	<ul style="list-style-type: none"> • Connectivity has the potential to reduce barriers to travel and facilitate market interaction and overall economic growth • Opportunities for quality job development in emerging fields, including advanced logistics and data analytics, as well as in the development of innovative technologies and services 	<ul style="list-style-type: none"> • Vehicle automation could reduce direct employment in the transportation sector, as jobs related to driving (everything from truck drivers to taxi and transit service drivers) could be displaced
	Strengthen Intermodal Connections	<ul style="list-style-type: none"> • Opportunities to optimize the supply chain through improved logistics and data sharing are anticipated, resulting in travel time savings • Improvements in passenger connections between modes and services are expected 	—
	Protect Air Quality and Environmental Assets	<ul style="list-style-type: none"> • Potential for significant air pollutant and greenhouse gas emissions reductions from shifts to EVs • Potential for clean energy generation throughout roadways, including solar and kinetic energy 	<ul style="list-style-type: none"> • Increased VMT could offset some gains

Key Factors of Uncertainty

Large uncertainties in the direction of impacts of advanced technologies depends on what happens in relation to travel choices/vehicle travel and urban form, as well as public policy decisions. **Figure 2** shows the potential positive or negative impact of new technology on EWG's Ten Guiding Principles, along with the level of certainty that those impacts may actually occur.

Vehicle Travel Demand

Impacts on vehicle miles of travel (VMT) from emerging technologies, especially from autonomous vehicles (AVs) and shared mobility services, remains a hotly debated topic due to a litany of different competing effects associated with these technologies. Perhaps the most significant factor to consider is the reduced cost of travel from automation, in part because time spent driving is freed to do other activities, and in part because services like transportation network companies (TNCs) or freight shippers could benefit from reduced driver costs. Additionally, AVs could also induce new vehicle travel from previously underserved groups who are unable to drive, as well as encourage longer trips. A study attempting to estimate the potential VMT increase from these latent demand groups estimated that total U.S. VMT could increase 14 percent if currently non-driving adults drove as much as average adults in their age cohort. The strength of these effects makes it likely for AVs to induce VMT, all else equal.

Other technologies could work to reduce VMT, such as trends toward shared mobility and reduced vehicle ownership. Most analysts believe that using self-driving fleets will be significantly less expensive than owning a vehicle, which sits idle about 95 percent of the time, ultimately reducing vehicle ownership and putting a price on each trip made. Moreover, since labor is the largest cost associated with operating public transportation services, transit operating costs should also be reduced. Overall, the extent to which new technologies induce VMT

will be subject to local policy decisions that will incentivize some travel modes (e.g., transit) and/or technologies/services (e.g., telecommuting) over others. Efforts to implement road pricing or time-adjusted subsidies or fees on certain modes could also provide incentives to curtail VMT.

Land Use and Urban Form

Technology's impact on land use is uncertain, with possibilities ranging from increased travel times to more efficient use of existing space. Many industry observers have speculated that AV technology could have profound impacts on land use and urban design in the long term, reducing the need for parking lots for example, with the impacts largely dependent upon the travel and service models for which AVs are deployed (i.e., privately owned AVs or mainly shared AVs). Reduced parking could open up land for affordable housing, parks, and other uses, and the ability to squeeze more vehicles into limited road capacity due to automation and advanced safety features could enable more road space to be turned over to bicycling, walking, or high-capacity transit. On the other hand, continued movements toward digital services, such as e-commerce and telemedicine, as well as AVs may lead to growth in lower density, exurban areas surrounding cities.

Role of Public Policy

While new transportation technologies and mobility services offer potentially significant societal benefits, it should be noted that private sector service providers have a primary motive of corporate profit rather than advancing social policy goals. Gleaning the greatest social benefit—and equitable distribution of benefits—may require deliberate efforts by policymakers to steer technology deployments in various directions with incentives, partnerships, or regulations. For example, competition between separate mobility companies could result in VMT and congestion increases if these services induce new demand or compete with modes such as walking, biking, and public transit.

To alleviate this issue, some experts advocate for congestion or toll pricing, incentives to switch to concurrent sharing algorithms, subsidies for off-peak travel, or even an outright ban of certain technology applications if deemed necessary (such as empty driving of personal autonomous vehicles to go on errands).

As an example, from an environmental (emissions) perspective, the advent of new vehicle service models, combined with varying levels of automation, could catalyze significant changes to vehicle design and usage patterns. Higher vehicle utilization from shared, automated cars (that could essentially drive non-stop) provides an incentive for them to be built with fuel efficient engines and/or electric motors since electricity is generally much cheaper per mile than gasoline. These market trends may lead toward more adoption of clean vehicle technologies. However, these impacts will be shaped by policy decisions at all levels of government. Incentives to use alternative fuels, fuel efficient vehicles, fuel-saving technology (e.g., e-braking or platooning), or efficient service models could play an important role in fostering adoption of these beneficial technologies. Consequently, there should be a strong public interest in influencing the direction of technology deployments to ensure that the public interest is served and that public policy, not just market forces, influences the path forward.

Impacts to Investment Needs and Priorities

One of the most critical issues facing elected decision-makers and those in the transportation planning community relates to how long-range capital investments, and the planning for those investments, should be affected by the presence of emerging technologies. Emerging transportation technologies are anticipated to have important impacts on transportation infrastructure, with corresponding implications for future investment needs. These technology changes could make some investments especially valuable, or render others obsolete. For example, debate continues as to what the preferred method of communication may be between future connected vehicles (CVs) and their surrounding environment. Investments in Dedicated Short Range Communication (DSRC) infrastructure could be a strong choice to spur the proliferation of new CV technology with safety and efficiency benefits, but may not be necessary if vehicles instead become connected with cellular networks. AVs in particular have important consequences for investments in areas of safety, road capacity, and parking developments.

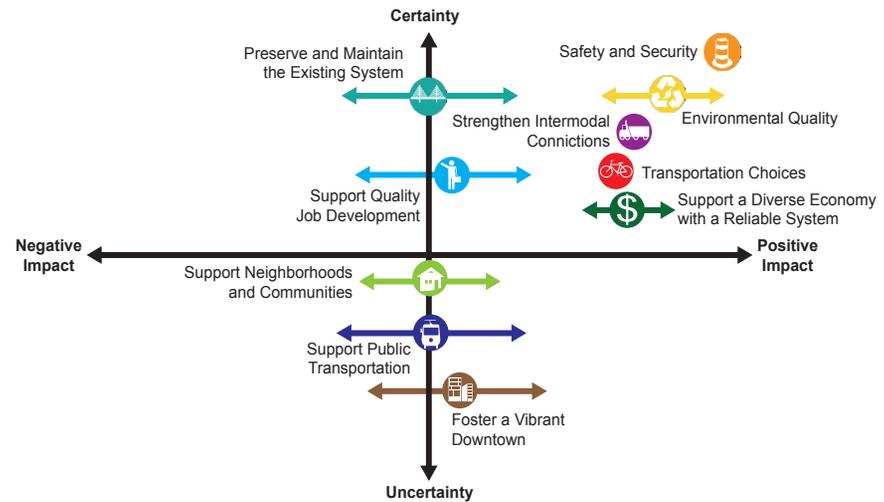
Reduced Needs for New Highway Infrastructure

The additional safety of AVs and their ability to travel closer to one another through connectivity suggests that they may be able to make more efficient use of roadways, essentially boosting capacity. As such, investments to expand capacity might be less valuable than expected. Recent research has even found that these effects could be profound even with very low market adoption levels of AVs; in a study modeling congestion flows on roadways, the inclusion of just one AV amid 20 conventional vehicles on a road track proved to garner substantial reductions in the frequency of traffic congestion.

Impacts on Public Transportation Services

Given the uncertainty of impacts of technologies to public transportation, there is significant uncertainty about the value of high-capacity fixed route services,

Figure 2: Estimated Impact of Transportation Technologies on EWG's Ten Guiding Principles



with potential divergent future roles of public transportation in society. Given the commitment of the St. Louis region to public transportation, as articulated in the Ten Guiding Principles, and desire to support accessibility and a strong urban core, these policy priorities suggest the importance of efforts to integrate technology into public transportation services to enhance its role in the region. The prospect of reducing transit operating costs through automation, for instance, creates the opportunity to redeploy those resources on more service. As noted in a study on the implications of emerging technologies on transit, technology changes also provide an opportunity to substantially restructure the nature of public transportation services themselves. Since part of the motivation for large vehicle sizes is to increase productivity per operator, when unburdened by operator costs, the optimal vehicle size to accommodate passenger volumes and service frequency might favor smaller vehicles running at higher frequencies. Such a service concept might substantially increase the overall appeal of public transportation services. In addition, removing operator costs coupled with lower operation costs that are associated with smaller vehicles, would make public transit service more

viable for off-peak service times during which large vehicle capacity is unnecessary.

Impacts on ITS Infrastructure

Advanced vehicle technologies, including connected vehicles, will have important implications on ITS infrastructure needs over the long-run, as well as near-term deployments. A study conducted for Pennsylvania Department of Transportation on a Connected and Autonomous Vehicles 2040 Vision noted that "...radio advisories as well as ITS message signs and the way they are designed today will be obsolete in a fully connected environment. Information that currently is available through ITS message signs will be disseminated directly to the vehicles using vehicle-to-infrastructure (V2I) or vehicle-to-everything (V2X) technologies and on-board units (OBUs). Cellular technology available today can provide capabilities of sending ITS messages to individuals through smartphone applications. As capabilities of new cellular technologies are expanding, information provided through ITS message signs will become readily available inside vehicles through original equipment manufacturers (OEMs) and on-board units in as early as several years."

Changing Needs Associated with Law Enforcement

The advent of both CV and AV technology could collectively make huge reductions in accident rates. Also, shared-use modes like TNCs, regardless of whether they are automated, could reduce instances of drunk driving. Together, these transportation technologies are highly likely to reduce the need for law enforcement and monitoring of a wide array of behavioral issues, such as red light running, speeding, and impaired or distracted driving, over the long-run. These staff resources could be deployed for improved customer service and to address public safety, potentially supplemented with increased surveillance and data available on passengers to reduce crime on public transportation and within the broader society.

Reduced Parking Needs

Parking needs could also be drastically cut; a study by the International Transport Forum (ITF) modeled the impacts of substituting private car travel for a fleet of ridesharing mini-buses (autonomous or driven) in Lisbon, Portugal, and found that such a fleet could “completely remove the need for on-street parking” and up to 80 percent of off-street parking.

Workforce Development Needs

The prospect of automated vehicle operation raises the important issue of impacts on the labor force. Driver labor plays an important role in freight movement (i.e., truck drivers), public transportation (e.g., bus drivers, train operators), and other services (e.g., taxis, transportation network companies), and there will be important workforce implications from a shift toward automation. While there is potential for significant reduction of jobs in these industries, there also may be some adjustment of job roles. For instance, some have speculated that rather than entirely eliminating staff, some vehicle driver positions would be redefined as an onboard customer service representative.

Across many aspects of the transportation industry, there will be needs to likely develop a smaller but more technology-savvy workforce in order to take advantage of advances in data and technology.

Transportation Funding

Finally, emerging transportation technologies are expected to have significant impacts on the generation of funds through traditional fuel taxes. The primary policy mechanism to generate revenues for road construction and maintenance is the taxing of fuels. These taxes have remained relatively stagnant for many regions for decades, and thus revenues have not been adjusted for inflation, growth in road usage, and increases in construction cost. This challenge is exacerbated by technology advancements leading to improved vehicle fuel economy and an increasing share of electric or hybrid vehicles.

The national motor fuel tax has not been raised since 1993 (even to account for inflation); the last time Illinois and Missouri increased their gas taxes were 1990 and 1996, respectively. This, combined with an increase in the cost of construction materials and the increased use of more fuel efficient vehicles,

has significantly lowered the amount of money available to fund transportation at all levels of government.

Currently, the Congressional Budget Office anticipates that by 2029 there will be a nearly \$160 billion shortfall in the Highway Trust Fund (**Figure 3**). The Missouri Department of Transportation predicts that residents in the St. Louis region will really start to feel the effects of this shortfall in the coming years as roads become rougher and aging bridges must be closed due to unaffordable rehabilitation costs.

The traditional means of funding transportation in St. Louis and across the nation are no longer viable —policymakers nationally and at the state and local level will need to consider new transportation funding mechanisms, including but not limited to a vehicle-miles-traveled fee, sales tax, increased motor fuel taxes, public-private partnerships, freight fees, tolls, or some combination thereof to ensure adequate funding in the future.

Figure 3: Projected Highway Trust Fund Shortfalls (\$ billions)

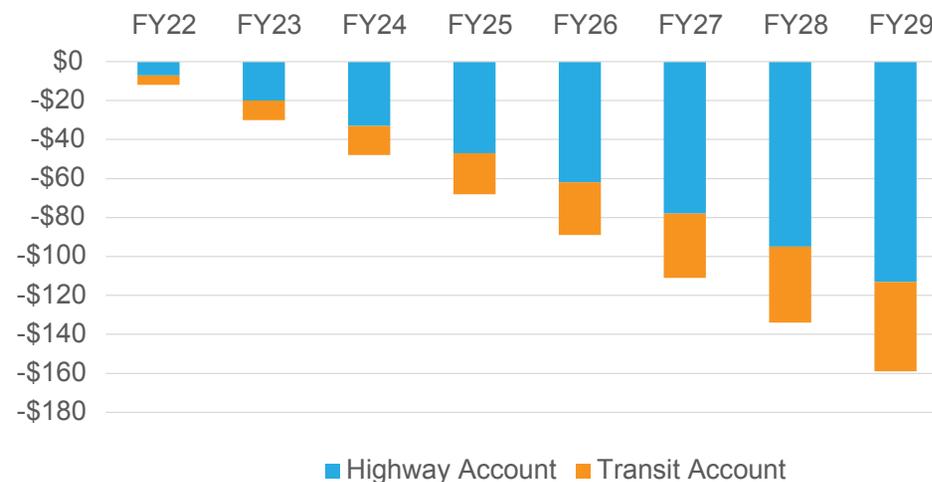


Figure 4:



Facts & Trends



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The average St. Louisan drives: **27.1** Miles per day in 2017.
1 in 4

Source: FHWA & EWG

23% More St. Louisans lived in poverty in 2017 than in 2000.
Source: U.S. Census Bureau

St. Louis residents will be **65 years or older in 2045**. The number of seniors with a disability grew 11.7% from 2010 to 2017.

Source: EWG & U.S. Census Bureau



\$8,849 vs. \$936
Average annual cost of **car ownership vs. Metro** monthly passes for a year.

Source: AAA & Metro, 2018

\$120 Billion

The anticipated national transportation funding shortfall by 2028.

Source: Congressional Budget Office



St. Louisans face **low congestion** with

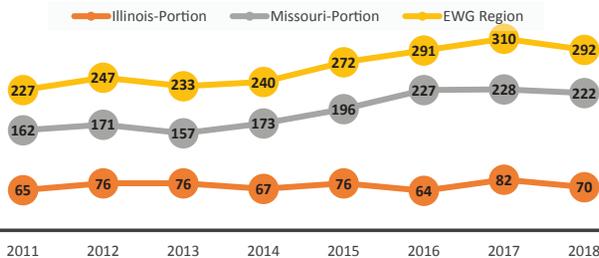


85% of highway travel being consistent and dependable.

Source: FHWA, NPMRDS, 2018

Traffic Fatalities

East-West Gateway (EWG) Region, 2011-2018



Source: Missouri Department of Transportation, Illinois Department of Transportation

14 Days

The average number of **unhealthy air quality** days in St. Louis per year (2016-2018). Transportation emissions contribute to poor air quality.

Source: EPA & EWG

20%

The percentage of **black households that do not have access to a car**, compared to **4% for white households**.

Source: 2017 American Community Survey

Transportation Mode

In 2017, compared to 2000:

83% of commuters drove alone, **unchanged**

7% carpooled, **down from 10%**

5% work from home, **up from 3%**

2% walked or biked, **unchanged**

3% took public transit, **up from 2%**

Source: U.S. Census Bureau



9.6% of **bridge deck** area in the region is deficient.

Source: National Bridge Inventory 2018

Chapter 2: Performance Management Framework



To guide decision-making and comply with the current federal transportation legislation, the FAST Act, *Connected2045* establishes a Performance Management Framework, **Table 2**, around EWG's Ten Guiding Principles. When read from left to right, the framework shows how federal and state transportation goals align with EWG's Ten Guiding Principles. It also establishes two levels of performance measures and targets that are directly tied to each of the Ten Guiding Principles and will allow EWG to track progress toward its goals.

- The system-level performance measures and targets will be updated in an annual report by EWG. By tracking these measures over time, EWG will be able to ensure that investments in the transportation system are moving the region toward achieving its goals.
- The project-level performance metrics were used to score and prioritize the transportation projects included in Chapter 3's Investment Plan.

The performance metrics included in the Framework were selected based on federal requirements, as well as with stakeholder input based on the criteria in **Figure 5**—the selection criteria represent EWG's use of national best practices in performance management, in particular the recommendations of the Federal Highway Administration.

EWG's Ten Guiding Principles

In 2009, the Council conducted the Renewing the Region (RTR) initiative to assess the region's economic and social health and to explore possible ways to enhance cooperative planning and action in the region. The Ten Guiding Principles were derived from discussions with a broad range of citizens and regional leaders; those discussions occurred through interviews, focus groups, and small group meetings centered on identifying issues likely to affect the region's future growth and prosperity. In the region's last long-range transportation plan, *Connected2040*, the Ten Guiding Principles were used to establish a set of policy-focused strategies based on the intent of the Principles, an analysis of regional trends and challenges, an assessment of strategies in previous long-range plans, and input from the public. To build on that, *Connected2045* updates and operationalizes the Principles by aligning them with federal and state goals and related performance metrics. The Principles challenge the region to think beyond strictly transportation and begin to make the connection between transportation and the broader society. Additionally, the Principles work together as one unit, as opposed to 10 individual goals. For example, transportation investments that focus on strengthening "Intermodal Connections" also support other Principles like "Support a Diverse Economy with a Reliable Transportation System" and "Support Quality Job Development."

Figure 5:

Performance Metric Selection Criteria

- Does the metric represent a key concern?
- Is the metric clear and understandable?
- Are data available for the metric?
- Can the metric be forecasted?
- Is the metric something EWG can influence with its investments?
- Is the metric tied to desired outcomes?

The following pages of Chapter 2 include Fact Sheets for each of the Ten Guiding Principles. Those sheets include:

- An explanation and discussion of the principle
- Relevant data relating to the principle
- Policy strategies to guide future EWG decision-making
- System-level performance measures that will allow EWG to track progress toward that principle on an annual basis

Table 2: Performance Management Framework

FAST Act Goals	MoDOT Goals	IDOT Goals	EWG's Ten Guiding Principles		System Performance Measures	Project Measures
Infrastructure Condition —To maintain the highway infrastructure asset system in a state of good repair	Take care of the transportation system	Stewardship		Preserve and Maintain the Existing System Ensure the transportation system remains in a state of good repair.	% of Interstate pavements in Good condition % of Interstate pavements in Poor condition % of non-Interstate NHS pavements in Good condition % of non-Interstate NHS pavements in Poor condition % of NHS bridges classified as in Good condition % of NHS bridges classified as in Poor condition	Project Addresses Preservation Deficiency
	Give Missourians better transportation choices	Livability/Mobility		Support Public Transportation Invest in public transportation to spur economic development, protect the environment, and improve quality of life.	Annual transit boardings systemwide Percent of households within 1/4 mile of a transit stop	Project Strengthens Transit Access
	Give Missourians better transportation choices	Livability		Support Neighborhoods & Communities Connect communities to opportunities and resources across the region.	Percent of residents living within a reasonable travel time to work	Project Serves EJ Communities
	Give Missourians better transportation choices	Livability		Foster a Vibrant Downtown & Central Core Improve access to and mobility within the central core by all modes to increase the attractiveness of St. Louis and strengthen the regional economy.	Employment in the central core Population in the central core	Project Serves Downtown and/or the Central Core
	Give Missourians better transportation choices	Livability/Mobility		Provide More Transportation Choices Create viable alternatives to automobile travel by providing bicycle and pedestrian facilities.	Percent of non-single occupancy vehicle travel VMT per capita	Project Supports Bicycling and Walking
Safety —To achieve a significant reduction in traffic fatalities and serious injuries on all public roads	Keep all travelers safe, no matter the mode of transportation	Mobility		Promote Safety and Security Provide a safe and secure transportation system for all users.	Five-year rolling averages for: Number of Fatalities; Rate of Fatalities for 100 million VMT; Number of Serious Injuries; Rate of Serious Injuries per 100 million VMT; Number of non-motorized fatalities and non-motorized serious injuries	Project Improves Transportation Safety
Congestion Reduction and System Reliability —To achieve a significant reduction in congestion on the National Highway System and to improve the efficiency of the surface transportation system	Improve reliability and reduce congestion on Missouri's transportation system	Economy		Support a Diverse Economy with a Reliable System Reduce congestion and improve travel time reliability to support the diverse economic sectors of the region.	Percent of person-miles traveled on the Interstate that are reliable; Percent of person-miles traveled on the non-Interstate that are reliable; Annual Hours of Peak Hour Excessive Delay per capita	Project Improves System Reliability
	Invest in projects that spur economic growth and create jobs	Economy		Support Quality Job Development Support the growth of wealth producing jobs that allow residents to save and return money to the economy.	Percent of jobs with a median wage higher than self-sufficiency for a 1 adult, 1 child household	Project Increases Access to Quality Jobs
Freight Movement and Economic Vitality —To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.	Invest in projects that spur economic growth and create jobs	Economy		Strengthen Intermodal Connections Support freight movement and connections that are critical to the efficient flow of both people and goods	Truck Travel Time Reliability Index	Project Supports Regional Freight Assets
Environmental Sustainability —To enhance the performance of the transportation system while protecting and enhancing the natural environment.		Livability/Resiliency		Protect Air Quality and Environmental Assets Encourage investments that recognize the linkages between the social, economic, and natural fabric of the region	On-Road Mobile Source Emissions—Total Emissions reduction Number of funded projects that impact areas of ecological significance	Project Improves Air Quality/Protects the Natural Environment

PERFORMANCE MANAGEMENT FRAMEWORK



Preserve and Maintain the Existing System

Ensure that the transportation system remains in a state of good repair.

One of the major challenges facing the federal government, states, and metropolitan areas is keeping the transportation system in good repair. The decades-long emphasis on system expansion has limited the resources available for rehabilitating and replacing aging system components. **Failing pavements, deficient bridges, and deteriorated transit facilities create safety problems, reduce operational efficiency, and negatively impact travel quality.** Deficient bridges (Map 1) and deteriorating pavement (Figure 7) are spread throughout the St. Louis region, impacting the travel of citizens and businesses within and through the region.

Deferring preservation work is significantly more expensive than pursuing a regular cycle of maintenance, rehabilitation, and replacement and the ongoing transportation funding shortfall emphasizes the need to prioritize limited resources in the preservation of existing infrastructure to avoid incurring much larger expenses in the future. EWG has, over time, substantially invested in preservation but additional preservation spending will be required to ensure the St. Louis region does not fall farther behind peer regions in maintaining critical infrastructure such as bridges (Table 3).

EWG will track system condition over time to assist in prioritizing funding, recognizing that system preservation is a regional issue—suburban, rural, and urban areas all face the challenge of maintaining the transportation system to serve the needs of citizens both now and into the future.

Map 1: Deficient Bridges in the St. Louis Region

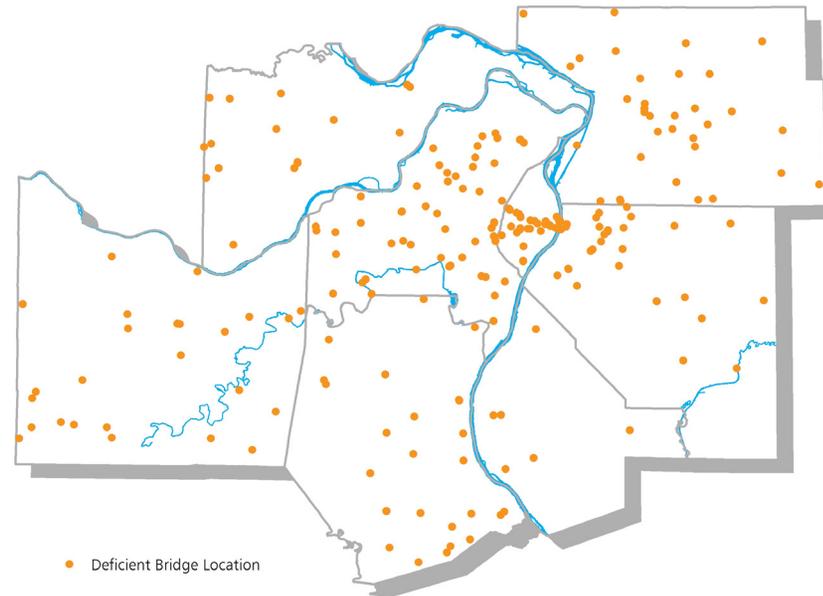


Figure 6: Percent of Total Bridge Deck Area that is Deficient, Missouri and Illinois Counties, 2017

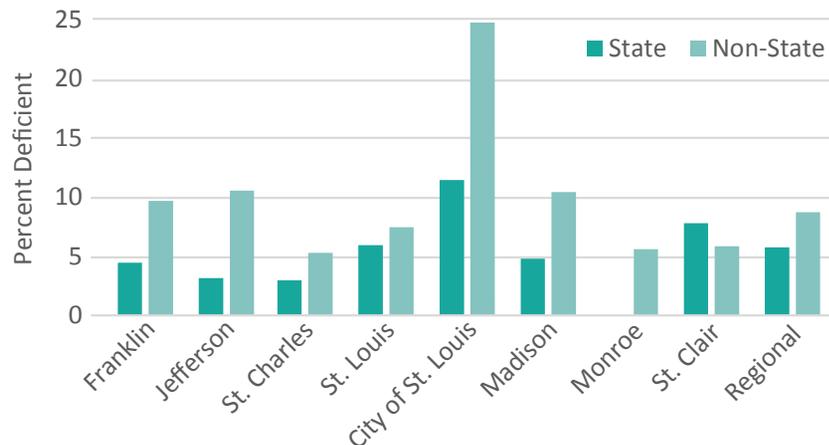


Table 3: Deficient Bridges

	Percent of total bridge deck area, 2017
1 Providence	23.7
2 Hartford	13.8
3 Boston	13.7
4 New York	11.7
5 Memphis	11.3
6 Detroit	10.7
7 San Francisco	9.7
8 St. Louis	9.6
9 Chicago	9.5
10 New Orleans	9.3
11 Pittsburgh	9.0
12 Louisville	8.5
13 Oklahoma City	8.3
14 Philadelphia	8.2
15 Indianapolis	8.1
15 San Jose	8.1
17 Charlotte	8.0
18 Seattle	7.1
19 Buffalo	7.0
20 Richmond	6.9
21 Virginia Beach	6.6
22 Birmingham	6.4
22 Cleveland	6.4
24 Kansas City	6.0
United States	5.8
25 Nashville	4.7
26 Milwaukee	4.5
27 Riverside	4.4
28 Los Angeles	4.2
29 Cincinnati	4.1
30 Baltimore	4.0
31 San Diego	3.9
32 Sacramento	3.6
33 Minneapolis	3.5
34 Columbus	3.3
34 Portland	3.3
36 Raleigh	2.9
37 Denver	2.6
38 Washington, D.C.	2.5
39 Atlanta	1.9
40 Dallas	1.8
41 Jacksonville	1.3
42 Salt Lake City	1.2
43 Houston	0.7
43 Orlando	0.7
45 Miami	0.6
46 Las Vegas	0.5
46 Phoenix	0.5
48 Tampa	0.3
49 San Antonio	0.2
50 Austin	0.1

Source: FHWA, National Bridge Inventory



Strategies

- Strategy:** Ensure investments in preservation are adequate to continuously improve pavement and bridge conditions on state highway systems.
- Strategy:** Ensure investments in transit are adequate to keep the current fleet in a state of good repair and to maintain operations.
- Strategy:** Ensure investments in bicycle and pedestrian facilities are adequate to keep the current network in a state of good repair.
- Strategy:** Effectively manage and maximize the efficiency of existing transportation assets by prioritizing limited resources on rehabilitating and replacing aging infrastructure over system expansion.
- Strategy:** Give priority to preservation in the programming of suballocated federal funds to encourage consistent improvement of locally owned roads and bridges.
- Strategy:** Employ life-cycle analyses with any capacity expansion projects and demonstrate resources for future operations and maintenance.
- Strategy:** Advance use of technologies such as use of drones and use of connected vehicle data to efficiently monitor pavement and bridge conditions.
- Strategy:** Encourage use of advanced pavement technologies and design that increase infrastructure resiliency.
- Strategy:** Consider new preservation protocols to address changes in travel conditions associated with connected/autonomous vehicles.

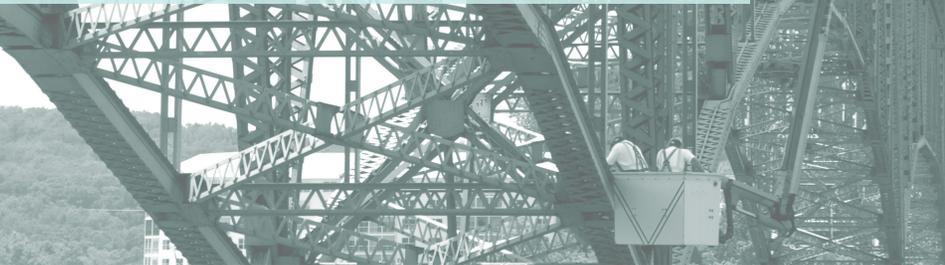
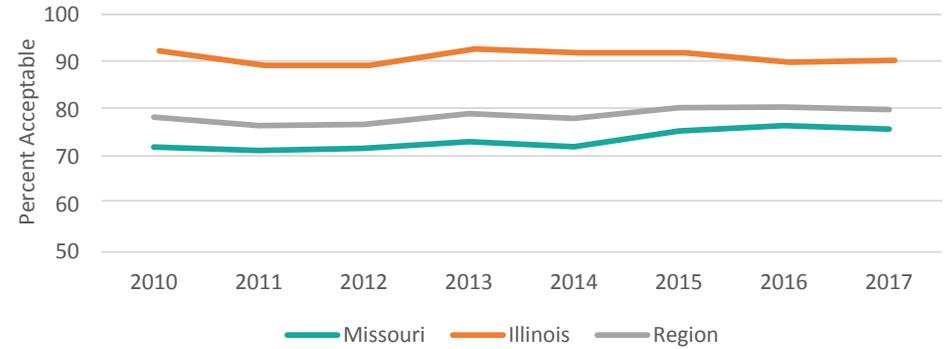


Figure 7: Percent of State Maintained Road Lane Miles with Acceptable Pavement Conditions, 2010-2017



Performance Measures

Measure	Baseline (2018)		Target			
	Good	Poor	2-year		4-year	
	Good	Poor	Good	Poor	Good	Poor
Interstate NHS Pavement Condition						
Illinois	54.94%	0.40%	n/a	n/a	56.00%	1.00%
Missouri	70.70%	0.00%	n/a	n/a	77.50%	0.00%
Non-Interstate NHS Pavement Condition						
Illinois	49.31%	0.56%	48.00%	1.00%	46.00%	2.00%
Missouri	39.20%	3.50%	41.00%	2.00%	43.00%	1.00%
Bridge Condition						
Illinois	39.62%	10.87%	40.00%	9.00%	40.00%	8.00%
Missouri	31.40%	9.20%	31.40%	9.20%	31.40%	9.20%

PRESERVE AND MAINTAIN



Support Public Transportation

Invest in public transportation to spur economic development, protect the environment and improve quality of life for regional citizens.

Public transit—MetroLink light rail, buses, and paratransit services for seniors and those with disabilities—provides a variety of benefits, including accessible transportation options for users of all ages and abilities, reduced pollution, reduced energy use, and reduced congestion on roads (**Map 2**). Public transit also benefits the local economy and increases access to employment opportunities.

Despite recent service improvements (a new Cortex MetroLink station which opened in 2018) and over 46 million annual transit trips (**Figure 8**), the St. Louis region ranks below average among peer regions on measures of transit (**Table 4**). For example, only 2.4 percent of workers used public transit to get to work in 2017 and only 4.9 percent of jobs can be reached by the typical worker via public transportation within 60 minutes.

Investments in transit are essential to the future of the region with benefits accruing to everyone—**every \$1 invested in public transportation generates approximately \$4 in economic returns**; every \$10 million in capital investment in public transportation yields \$30 million in increased business sales; every \$10 million in operating investment yields \$32 million in increased business sales; and a household can save nearly \$10,000 per year by taking public transportation and living with one less car.

Map 2: Residential Transit Access in the St. Louis Region

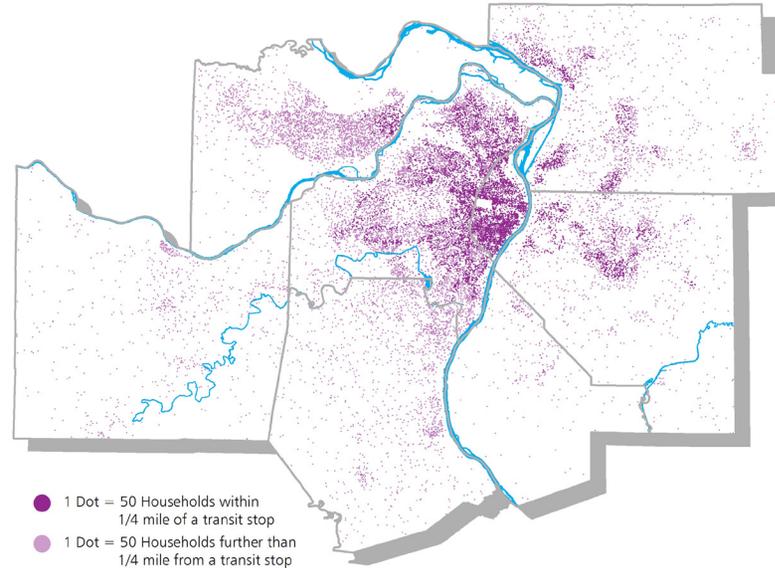


Figure 8: St. Louis Area Transit Ridership 1997-2017

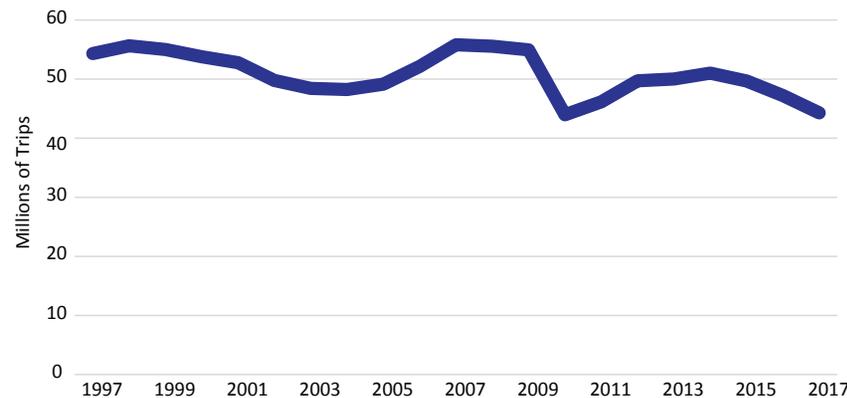


Table 4:

Transit Ridership

Annual transit boardings per capita, 2017

1	New York	233.1
2	San Francisco	139.5
3	Boston	93.6
4	Washington, D.C.	89.5
5	Seattle	75.1
6	Chicago	68.8
Peer Average		64.6
7	Philadelphia	63.6
8	Portland	60.8
9	Baltimore	49.9
10	Los Angeles	47.9
11	Salt Lake City	44.1
12	Denver	42.2
13	Pittsburgh	37.7
14	Las Vegas	37.3
15	Minneapolis	36.0
16	San Diego	35.1
17	Atlanta	30.7
18	Buffalo	28.3
19	Milwaukee	26.8
20	Miami	25.0
21	New Orleans	25.0
22	San Jose	24.2
23	Austin	22.8
24	Cleveland	22.7
25	San Antonio	21.2
26	Phoenix	21.0
27	Charlotte	20.5
28	St. Louis	20.2
29	Hartford	20.0
30	Houston	18.4
31	Orlando	17.8
32	Sacramento	15.0
33	Providence	14.9
34	Dallas	14.8
35	Columbus	13.8
36	Louisville	13.7
37	Jacksonville	12.0
38	Cincinnati	11.8
39	Tampa	11.0
40	Kansas City	11.0
41	Nashville	10.8
42	Riverside	10.7
43	Virginia Beach	10.3
44	Detroit	10.2
45	Raleigh	10.1
46	Richmond	9.7
47	Memphis	6.9
48	Indianapolis	6.2
49	Oklahoma City	4.0
50	Birmingham	3.8

Source: Federal Transit Administration, National Transit Database



Strategies

- Strategy:** Encourage efforts to create a statewide transit funding program in Missouri.
- Strategy:** Provide educational and planning assistance to encourage transit oriented development.
- Strategy:** Promote projects that improve multi-modal connections between existing transit stops and surrounding communities.
- Strategy:** Continue to study and identify funding sources for MetroLink expansion.
- Strategy:** Support the implementation of Bus Rapid Transit (BRT), trolley, and street car initiatives.
- Strategy:** Ensure adequate funding for regional paratransit providers that serve disabled and elderly populations.
- Strategy:** Support the national High-Speed Intercity Passenger Rail Program, in particular the Chicago to St. Louis route.
- Strategy:** Encourage pilot initiatives to provide better first-mile last-mile connections to fixed route transit, such as autonomous shuttles, and partnerships with private sector service providers.
- Strategy:** Integrate fare payment systems to facilitate multi-modal travel options.
- Strategy:** Advance testing of automation in public transportation to reduce transit operating costs and improve service efficiency.
- Strategy:** Promote use of transit signal priority on major arterials.



Performance Measures

Measure	Baseline (2013)	2017	Desired Trend
Transit Ridership			
Annual transit boardings system-wide (MetroLink/Bus System/Call-A-Ride)	49.9 million	46.7 million	

Measure	Baseline (2010)	2013-2017	Desired Trend
Transit Access			
Percent of households within 1/4 mile of a transit stop	43.9%	43.0%	



Support Neighborhoods and Communities

Connect communities to opportunities across the region.



NEIGHBORHOODS AND COMMUNITIES

The transportation system provides value to neighborhoods and communities in the St. Louis region by improving access to destinations spread throughout 8,600 square miles in eight counties. Recent land development patterns have increased the amount of developed land per capita, creating a larger, less dense region, and making those destinations more spread out.

To reduce transportation costs and help communities in the region thrive, transportation options that allow residents to reach important destinations such as schools, health care facilities, grocery stores, and parks must be available. Environmental Justice communities warrant additional attention to ensure that residents have access to resources and that transportation projects reflect community values (**Map 4**).

One way to examine how well the region is meeting the accessibility needs of residents is to look at the combined affordability of housing and transportation (H+T) (**Map 3**). These two costs are the largest expenditures for most households and they indicate how efficiently the transportation network connects people to destinations and whether or not the region is providing its citizens with options to live and work in locations that make sense for them.

Currently, the St. Louis region ranks below average in terms of combined housing and transportation costs (Table 5). This is a positive statistic which means it is a more affordable region in which to live and travel.

Map 3: H+T Index at Current Gas Prices

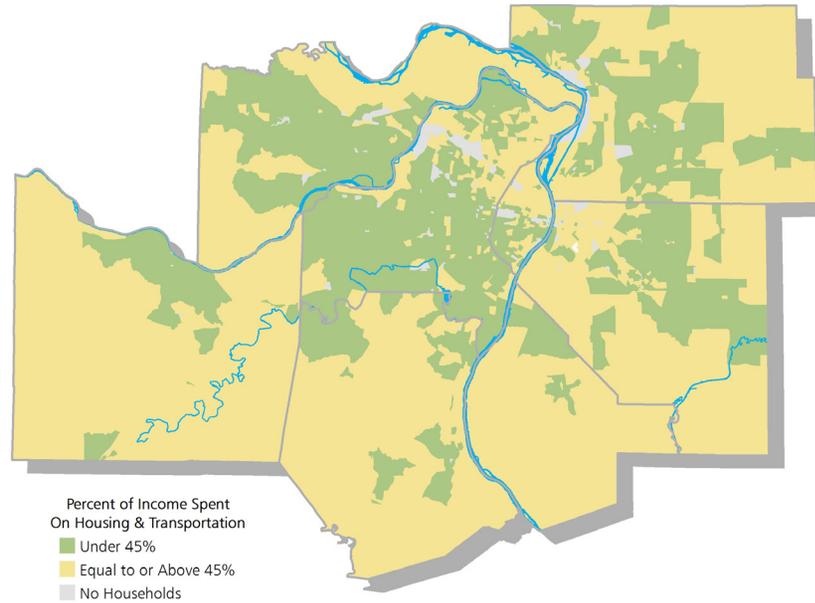


Figure 9: Global Gasoline Prices (\$/gallon), February 2019

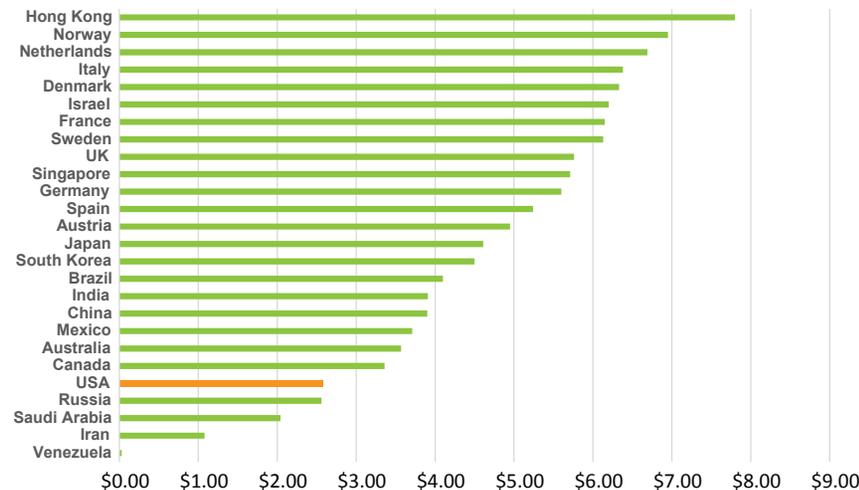


Table 5:

Housing Plus Transportation Affordability

Transportation and housing costs as a percent of median household income, 2011-2015

1	Miami	63
2	Riverside	61
3	Los Angeles	59
4	Orlando	58
5	New Orleans	57
5	San Diego	57
5	Tampa	57
8	Memphis	56
9	Sacramento	55
10	Birmingham	54
10	Jacksonville	54
10	Las Vegas	54
13	Cleveland	53
13	Phoenix	53
13	Providence	53
16	Atlanta	52
16	Charlotte	52
16	Detroit	52
16	Nashville	52
16	Oklahoma City	52
16	Portland	52
16	San Antonio	52
Peer Average		52
23	Chicago	51
23	Louisville	51
23	Milwaukee	51
23	Philadelphia	51
23	Virginia Beach	51
28	Austin	50
28	Buffalo	50
28	Indianapolis	50
28	New York	50
28	St. Louis	50
33	Cincinnati	49
33	Columbus	49
33	Dallas	49
33	Houston	49
33	Kansas City	49
33	Pittsburgh	49
33	Richmond	49
33	Salt Lake City	49
33	Seattle	49
42	Hartford	48
42	San Francisco	48
44	Baltimore	47
44	Boston	47
44	Denver	47
44	Raleigh	47
48	San Jose	46
49	Minneapolis	45
50	Washington, D.C.	41

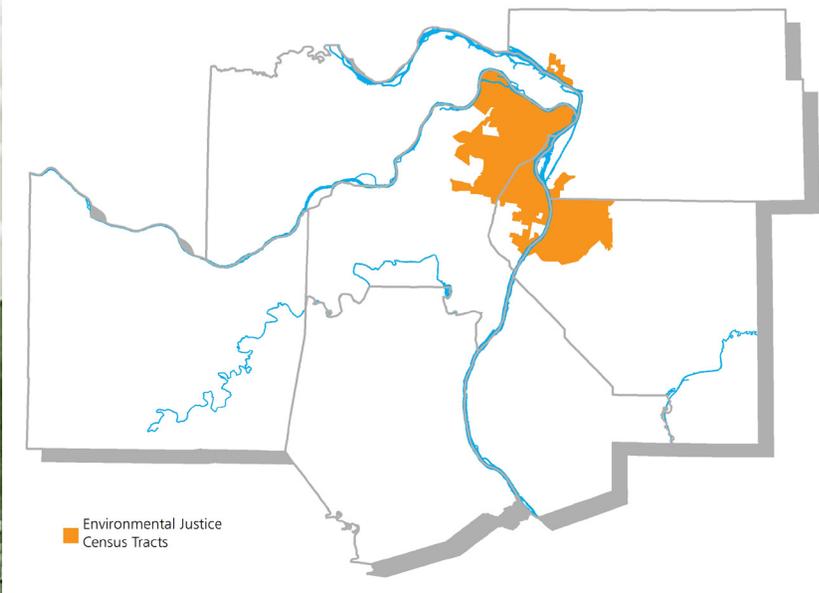
Source: Center for Neighborhood Technology



Strategies

- Strategy:** Provide educational and planning assistance to local governments to expand the implementation of Great Streets and Complete Streets principles.
- Strategy:** Prioritize projects that include multi-modal access to community resources, especially for environmental justice populations.
- Strategy:** Ensure that low-income, minority, and aging populations have equal access to the metropolitan planning and decision making process through proactive outreach.
- Strategy:** Support planning and development efforts in areas with high growth or redevelopment potential by prioritizing their transportation infrastructure needs and encouraging local government participation in regional planning efforts.
- Strategy:** Reduce combined housing and transportation costs by encouraging coordinated land use and transportation planning that increases access to community resources, promotes public health, and improves access to transit and active modes of transportation.
- Strategy:** Encourage private sector mobility services to serve disadvantaged communities.
- Strategy:** Support application of emerging transportation mobility services and technologies to strengthen accessibility for environmental justice populations.

Map 4: Environmental Justice



Performance Measures

Measure	Baseline (2006-2010)	2012-2016	Desired Trend
Commute Time Percent of residents living within a reasonable travel time to work	88.0%	87.3%	



Foster a Vibrant Downtown and Central Core

Improve access to and mobility within the central core by all modes to increase the attractiveness of St. Louis and strengthen the regional economy.



The health of St. Louis' downtown and central core (which extends into St. Louis County and Illinois) is closely tied to the overall health of the region (Map 5). As a significant job and population center, the central core serves as:

- The region's primary economic engine
- The face of the region for businesses and people interested in relocation
- The sports, cultural, and entertainment hub of the region

Strengthening St. Louis' central core is essential to the entire region. Despite more than 170,000 workers commuting to the core daily from throughout the region, the share of employment in the central core has declined disproportionately over the past 15 years (Table 6). Additionally, **population in the region's central core has dramatically declined** over the past half century as citizens continued to move outward. Currently, St. Louis ranks well below average among peer regions regarding the largest city's share of the metro area population (Table 7). Continuing to invest in multimodal access to and mobility within the region's central core and downtown will support the regional economy, enhance quality of life for residents, and make the St. Louis region more attractive to visitors.

Map 5: St. Louis Region Central Core Total Commuter Flow

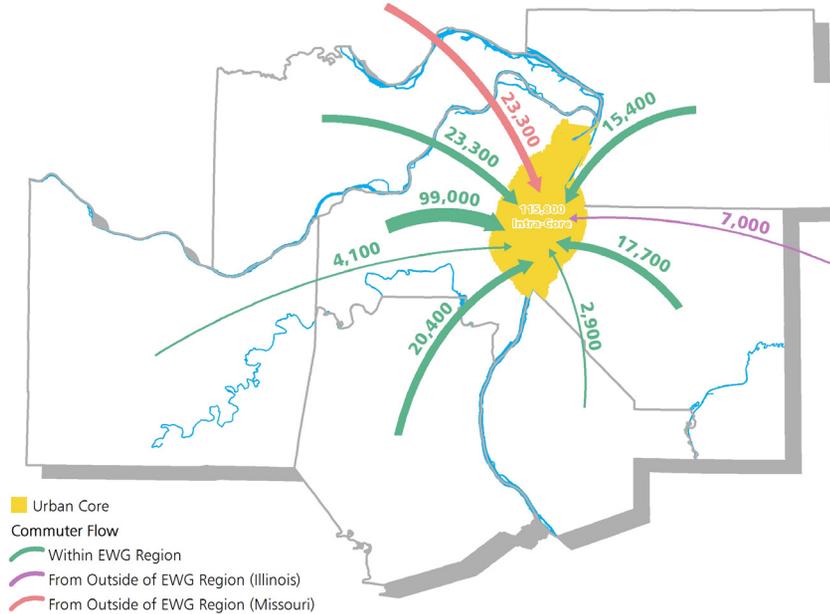


Table 6: Commuter Flow, 2016

Place of Residence	Place of Work								
	Madison	Monroe	St. Clair	Franklin	Jefferson	St. Charles	St. Louis	City of St. Louis	Outside Region
Madison	75,020	140	11,395	150	230	1,795	15,075	14,840	4,689
Monroe	560	6,020	2,525	25	230	135	3,205	3,380	984
St. Clair	8,570	1,855	73,765	20	485	685	12,290	16,445	3,602
Franklin	135	4	10	31,045	980	1,005	10,115	2,255	2,879
Jefferson	595	145	1,090	1,400	38,840	1,850	45,560	14,430	2,625
St. Charles	995	15	825	615	530	100,330	77,145	14,445	5,455
St. Louis	4,340	525	4,025	1,540	6,345	20,690	346,595	95,670	6,172
City of St. Louis	1,455	175	1,925	165	1,025	2,540	53,620	84,050	1,716
Outside Region	13,029	607	8,262	4,762	3,405	15,066	21,424	10,050	

Source: US Census, 2009-2013 5 Year American Community Survey

Table 7:

Largest City Share of MSA Population

Percent of total population, 2017		
1	San Antonio	61.1
2	Jacksonville	59.3
3	San Jose	51.8
4	Memphis	48.4
5	Louisville	48.0
6	Oklahoma City	46.5
7	Austin	44.9
8	Indianapolis	42.5
9	San Diego	42.5
10	New York	42.4
11	Columbus	42.3
12	Milwaukee	37.8
13	Nashville	35.1
14	Raleigh	34.8
15	Phoenix	34.3
16	Charlotte	34.0
17	Houston	33.6
18	New Orleans	30.8
19	Los Angeles	30.0
20	Las Vegas	29.1
21	Chicago	28.5
22	Portland	26.4
Peer Average		
23	Virginia Beach	26.1
24	Philadelphia	25.9
25	Denver	24.4
26	Kansas City	23.0
27	Buffalo	22.7
28	Baltimore	21.8
29	Sacramento	21.6
30	Seattle	18.7
31	Cleveland	18.7
32	San Francisco	18.7
33	Birmingham	18.3
34	Dallas	18.1
35	Richmond	17.5
36	Salt Lake City	16.7
37	Detroit	15.6
38	Boston	14.2
39	Cincinnati	13.8
40	Pittsburgh	13.0
41	Tampa	12.5
42	Minneapolis	11.7
43	Orlando	11.2
44	Washington, D.C.	11.2
45	Providence	11.1
46	St. Louis	11.0
47	Hartford	10.2
48	Atlanta	8.3
49	Miami	7.5
50	Riverside	7.2

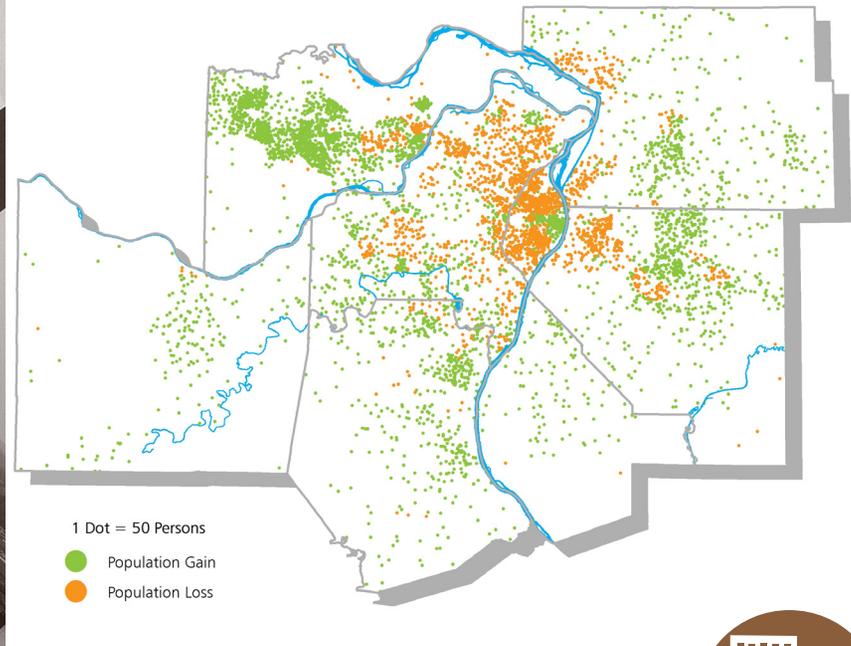
Source: U.S. Census Bureau, Population Estimates



Strategies

- Strategy:** Encourage projects that incorporate welcoming entryways into downtown, multi-modal linkages to surrounding neighborhoods, and wayfinding for all modes in the downtown area.
- Strategy:** Support the implementation of central core projects outlined in regional plans and studies, including the Gateway Bike Plan, Downtown Next: 2020 Vision for Downtown St. Louis, Downtown Multi-Modal Access Study, and OneSTL Transit Oriented Development Study
- Strategy:** Continue to increase transit service in the central core to support the travel needs of residents and access to/from economic activity centers.
- Strategy:** Collaborate with developers, local governments, and businesses to coordinate (re)development projects that leverage existing or planned transportation investments.
- Strategy:** Monitor congestion and traffic flow reliability in the central core to ensure that highway-based trips within, into, and out of the core do not experience unreliable delays on a daily basis.
- Strategy:** Improve Americans with Disabilities Act (ADA) accessibility through transportation investments in the central core.
- Strategy:** Support the development of mobility hubs where modes such as bicycle sharing, ridesharing, public transit, and private sector service providers intersect.
- Strategy:** Collaborate with developers, local governments, and businesses to support urban vitality by providing an optimal mix of space for on-street parking, shared use options, transit services, and green space, leveraging emerging transportation technologies.

Map 6: Population Change 2000-2010, St. Louis Region



Performance Measures



Measure	Baseline (2013)	2016	Desired Trend
Central Core: Jobs	371,144	416,514	↑
Employment in the Central Core			
Central Core: People	523,166	534,238	↑
Population in the Central Core			

VIBRANT CENTRAL CORE



Provide More Transportation Choices

Create viable alternatives to private automobile travel by providing comprehensive bicycle and pedestrian facilities.



A high-quality walking and bicycling environment is essential for our region. The term “active transportation” refers to the travel options that connect people of all ages and abilities to where they need to go using active modes such as walking and bicycling. These options provide a number of benefits to area residents, the environment, and the transportation system. The facilities that allow for **biking and walking enhance the transportation system** by allowing people to travel without contributing to congestion and air pollution, **live healthier, access mass transit, and overall improve the quality of life.** In addition, biking and walking facilities are less costly to maintain over time and are more equitable.

Just over 8 percent of households in the St. Louis region, and 21 percent of households in the city of St. Louis, do not own a vehicle and rely on active modes of transportation, whether by choice, because they elect to not use a car (**Table 8**), or because they cannot afford a car. Even households that own a vehicle make bicycle and pedestrian trips, for example walking from a transit stop to work or biking to work (**Figure 9**). Active transportation facilities such as sidewalks, on-street bicycle facilities, shared use paths, accessible transit stops, and wayfinding signage are becoming more common throughout the St. Louis region. As of 2017, approximately 884 miles of bike facilities have been built—including 173 miles of on-street facilities, 513 miles of off-street facilities, and 198 miles of shared lanes (**Map 7**).

In addition, vehicle miles traveled (VMT) per capita in the St. Louis region has not yet returned to pre-recession levels, perhaps due to increased interest in alternative modes of transportation and the increase in the mileage of bicycle and pedestrian facilities (**Figure 10**).

Map 7: St. Louis Regional Bicycle Facilities

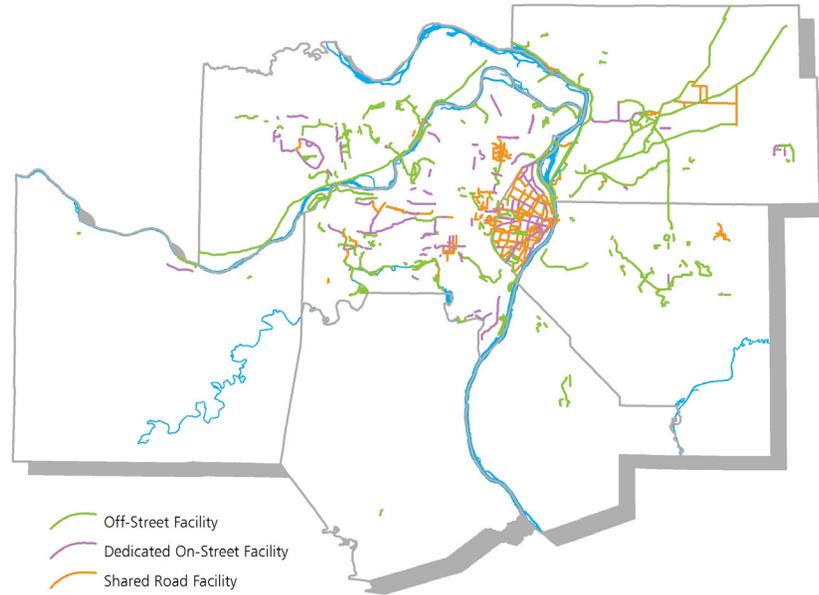


Figure 9: Means of Transportation to Work, EWG Region 2016

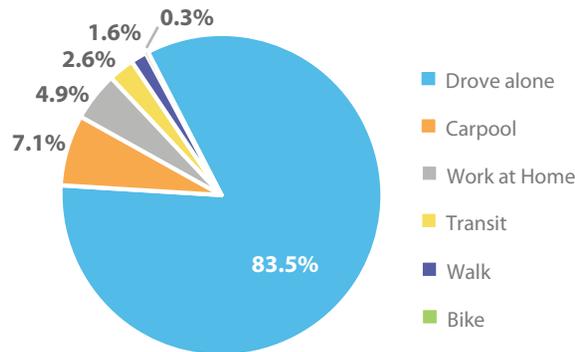


Table 8:

Non-Single Occupancy Vehicle Travel

Percent of workers walking, biking, carpooling, working from home, or taking public transit to work, 2017

1	New York	48.4
2	San Francisco	40.8
3	Washington, D.C.	32.2
4	Boston	32.1
5	Seattle	31.4
6	Portland	28.9
7	Chicago	28.6
8	Philadelphia	25.9
9	San Jose	24.7
10	Salt Lake City	23.9
11	Denver	23.6
12	Los Angeles	23.1
13	Austin	22.4
	United States	22.3
14	Baltimore	22.3
15	Phoenix	22.2
16	Pittsburgh	22.1
17	Sacramento	22.0
18	San Diego	21.9
19	Atlanta	21.6
20	Minneapolis	21.5
21	New Orleans	20.1
22	Miami	19.8
23	Riverside	19.7
24	Tampa	19.4
25	Providence	19.2
26	Raleigh	19.1
27	Orlando	19.0
28	Las Vegas	18.8
29	San Antonio	18.6
30	Charlotte	18.6
31	Hartford	18.5
32	Houston	18.4
33	Nashville	18.3
34	Jacksonville	18.0
35	Dallas	18.0
36	Milwaukee	17.9
37	Richmond	17.5
38	Cleveland	17.2
39	Louisville	17.1
40	Virginia Beach	16.8
41	Cincinnati	16.4
42	Oklahoma City	16.3
43	Columbus	16.3
44	St. Louis	16.2
45	Buffalo	16.2
46	Indianapolis	16.0
47	Kansas City	15.1
48	Birmingham	15.0
49	Detroit	14.9
50	Memphis	13.9

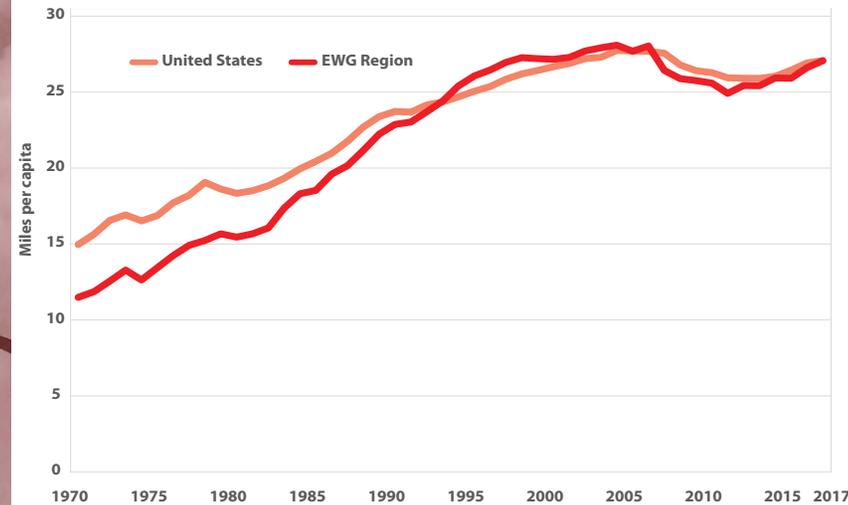
Source: U.S. Census Bureau, American Community Survey 1-Year Estimates (B08006)



Strategies

- Strategy:** Coordinate with implementing agencies to overcome physical barriers and provide safe environments for walking and bicycling for people of all ages and abilities, with added focus on improving intersections and crossings.
- Strategy:** Enhance connections between neighborhoods and activity centers through access to transit and continuous pedestrian and bicycle facilities using Complete Street principles.
- Strategy:** Increase mobility and access to opportunities by coordinating land use and multi-modal transportation.
- Strategy:** Promote the development of bicycle and pedestrian facilities that use best practices guidance from FHWA, NACTO and AASHTO. Provide education and training to municipalities on the national best practices.
- Strategy:** Work with the disabled community and local agencies to ensure that all planning and implementation processes meet or exceed ADA requirements.
- Strategy:** Assist in implementing regional and municipal bicycle and pedestrian plans, for example bikeable/walkable plans and the Gateway Bike Plan.
- Strategy:** Coordinate with partners to collect, maintain, and publicize bicycle and pedestrian facility and user data.
- Strategy:** Coordinate with local agencies and community organizations to ensure equitable access to and distribution of quality bicycle and pedestrian facilities throughout the region.
- Strategy:** Evaluate the use of “person delay” instead of vehicle delay when analyzing intersection performance and ITS to better understand wait times for people walking, bicycling, and taking transit.

Figure 10: Average Daily Per Capita Vehicle Miles Traveled 1970-2017



Performance Measures

Measure	Baseline (2016)	Target	
		2-Year	4-Year
Non SOV Travel			
Workers commuting via carpool, public transportation, commuter rail, walking, or bicycling as well as telecommuting.	16.4%	16.7%	17.0%
Measure	Baseline (2013)	2017	Desired Trend
VMT Per Capita			
Vehicle miles traveled (VMT) per capita per day	25.4	27.1	↓



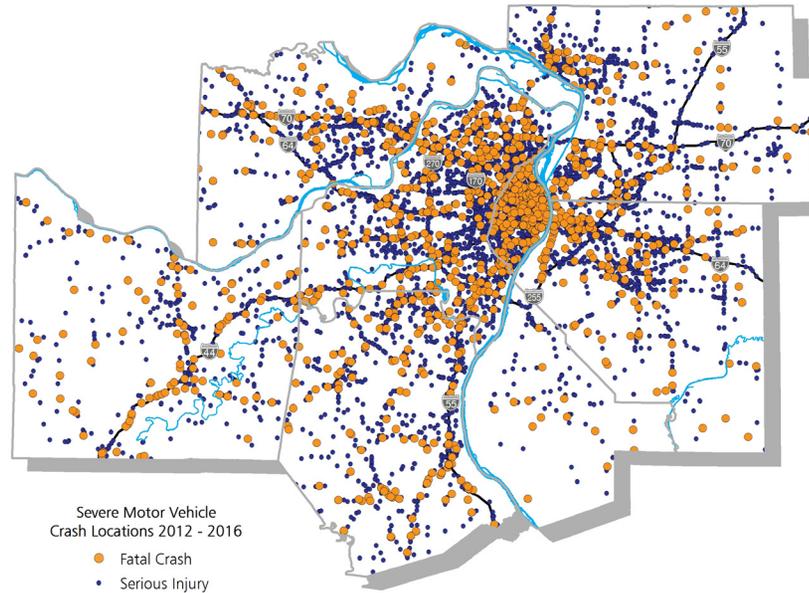
Promote Safety and Security

Provide a safe and secure transportation system for all users.

Safety throughout the system—for motorists, transit, emergency response, freight movement, and non-motorized users such as bicyclists and pedestrians—should be a top priority in transportation planning. In addition to causing preventable deaths and serious injuries, motor vehicle crashes across the region are a cause of major economic losses and disruptions to the transportation system—the comprehensive cost of motor vehicle crashes in the St. Louis region alone was estimated at \$11 billion in 2016.

The St. Louis region has seen an increase in total crashes over the past five years, with an increase of nearly 50 fatalities annually between 2012 and 2016 (Map 8). Over these five years, the St. Louis region had an average of 261 fatalities in automobile crashes. The St. Louis Metropolitan Statistical Area (MSA) had a fatal crash rate of 1.20 per 100 million VMT (Table 9). This was slightly above the national average in 2016 of 1.18 per 100 million VMT. In fact, the MSA was ranked 14th among the 50 most populous MSAs, and also had a higher rate than each of the other Midwest MSAs, which are shaded in purple in Table 9. Figure 11 shows the breakdown of crashes by county. In 2016, St. Louis County and the city of St. Louis had the most crashes within the EWG region.

Map 8: Fatal Crashes in the St. Louis Region



Severe Motor Vehicle Crash Locations 2012 - 2016
 ● Fatal Crash
 ● Serious Injury

Figure 11: Crashes by County EWG Region 2016

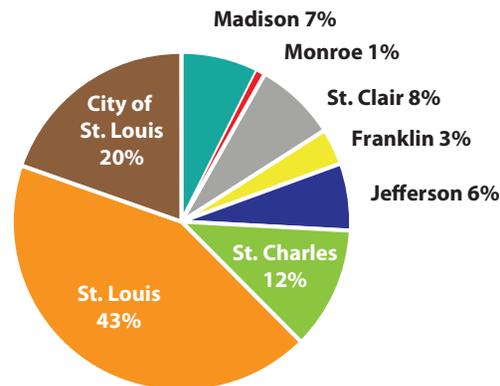


Table 9:

Motor Vehicle Crash Fatalities

Deaths per 100 million vehicle miles traveled, 2016

1	New Orleans	1.74
2	Memphis	1.68
3	Tampa	1.62
4	Miami	1.41
5	Jacksonville	1.41
6	San Antonio	1.39
7	Phoenix	1.38
8	Louisville	1.34
9	Charlotte	1.33
10	Austin	1.29
11	Sacramento	1.25
12	Riverside	1.23
13	Orlando	1.22
14	St. Louis	1.20
United States		
	United States	1.18
15	Houston	1.18
16	Birmingham	1.15
17	Dallas	1.13
18	Raleigh	1.11
19	Oklahoma City	1.10
20	Las Vegas	1.10
21	Nashville	1.08
22	Kansas City	1.08
23	Pittsburgh	1.03
24	Detroit	1.00
25	Atlanta	1.00
26	Philadelphia	0.99
27	Denver	0.97
28	Portland	0.94
29	Columbus	0.94
30	Cleveland	0.93
31	Cincinnati	0.93
32	Los Angeles	0.91
33	Virginia Beach	0.88
34	Milwaukee	0.87
35	Richmond	0.86
36	Salt Lake City	0.83
37	San Diego	0.82
38	Chicago	0.80
39	Baltimore	0.79
40	Providence	0.78
41	New York	0.78
42	Indianapolis	0.77
43	San Jose	0.76
44	Seattle	0.75
45	Hartford	0.75
46	Buffalo	0.72
47	Washington, D.C.	0.67
48	San Francisco	0.66
49	Boston	0.57
50	Minneapolis	0.57

Source: Federal Highway Administration, FARS database; State DOTs

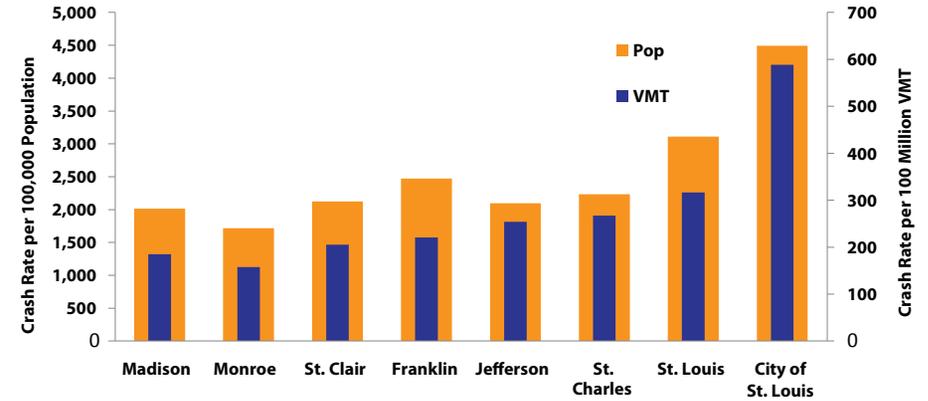


Strategies

- Strategy:** Continue to incorporate safety issues identified in state and local strategic highway safety plans into the planning process.
- Strategy:** Support projects that focus on pedestrian safety in the region .
- Strategy:** Continue to collaborate with MoDOT and IDOT to advance and continue teen and elderly driver safety programs.
- Strategy:** Continue to work with partners to integrate complete streets planning that focuses on engineering, education, enforcement, and emergency response.
- Strategy:** Support training of emergency officials for traffic and transit incident management.
- Strategy:** Utilize the results of the STARRS All Ready Preparedness Project's survey to ensure populations with functional and/or access needs are prepared for a major disaster.
- Strategy:** Strengthen regional security initiatives which create a region-wide communications system that supports daily emergency response and a massive response initiative for major disasters.



Figure 12: Crash Rate by Population and VMT, 2012 to 2016



SAFETY AND SECURITY



Performance Measures

Measure	Baseline (2009-2013)	Target	
		1-Year	Reduction Value
Number of Fatalities*	234.6	289.60	2%
Number of Serious Injuries*	2059.6	1,721.90	2%
Fatality Rate per 100 million VMT*	0.84	0.98	2%
Serious Injury Rate per 100 million VMT*	7.41	5.83	2%
Number of Non-Motorized Fatalities and Serious Injuries*	221.20	205.70	2%

*5-year rolling averages



Support a Diverse Economy

Support a Diverse Economy with a Reliable Transportation System

Long-Range Plan

The St. Louis region, when compared with peer regions around the country, falls into the lower tier of congested regions (**Table 9**). However, as depicted on **Map 9**, there is still congestion that impacts our lives and is significant to the citizens and businesses of our region. **The role of transportation planning and operations is to work toward managing congestion to provide a reliable transportation system.**

The regional Congestion Management Process (CMP) provides a systematic process for identifying and managing congestion. It involves a working partnership between regional transportation agencies to develop effective strategies to address current and future congestion problems. A key component of managing congestion is the region's Intelligent Transportation System (ITS) which has seen significant expansion in recent years.

Travel Time Index

Travel Time Index (TTI) is travel time represented as a percentage of the ideal travel time. For example, a TTI value of 1.2 means travel time during peak period is 20 percent longer than the free-flow travel time between the same origin and destination. **Figure 13** shows the TTI for the St. Louis urban area and the comparative peer region average.

Map 9: Congestion AM Peak in the St. Louis Region

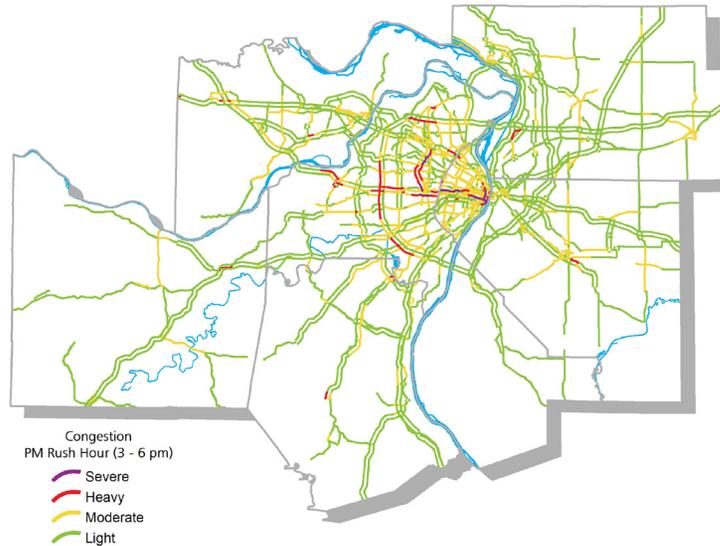


Figure 13: Travel Time Index 1982-2014

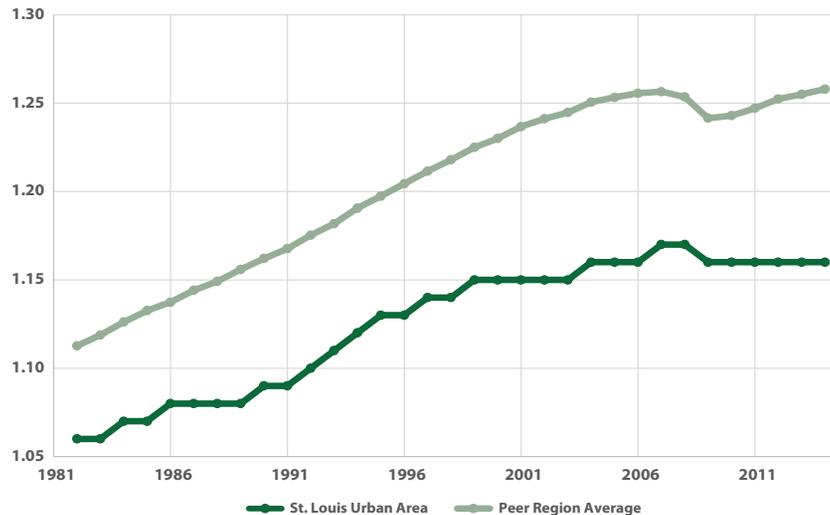


Table 9:

Average Commute Time

In minutes, 2017

1	New York	37.0
2	Washington, D.C.	34.9
3	San Francisco	34.4
4	Riverside	32.7
5	Atlanta	32.3
6	Chicago	31.8
7	Baltimore	31.5
8	Boston	31.4
9	Seattle	31.0
10	Los Angeles	30.8
11	Philadelphia	30.3
12	San Jose	30.0
13	Miami	29.9
14	Houston	29.9
15	Orlando	29.4
16	Dallas	28.6
17	Denver	28.1
18	Tampa	27.9
19	Nashville	27.9
20	Portland	27.7
21	Sacramento	27.6
22	Charlotte	27.3
23	Pittsburgh	27.3
24	Austin	27.0
United States		26.9
25	Phoenix	26.8
26	Detroit	26.7
27	Birmingham	26.6
28	San Antonio	26.5
29	Raleigh	26.5
30	San Diego	26.3
31	Jacksonville	26.3
32	Providence	26.3
33	New Orleans	25.8
34	Richmond	25.7
35	St. Louis	25.7
36	Minneapolis	25.6
37	Cincinnati	25.0
38	Indianapolis	24.9
39	Cleveland	24.5
40	Las Vegas	24.5
41	Virginia Beach	24.4
42	Memphis	24.2
43	Louisville	24.0
44	Columbus	23.9
45	Hartford	23.8
46	Milwaukee	23.2
47	Kansas City	23.2
48	Oklahoma City	23.0
49	Salt Lake City	22.6
50	Buffalo	21.8

Source: U.S. Census Bureau, American Community Survey 1-Year Estimates (B08013, B08302)



Strategies

Strategy: Employ the Congestion Management Process to manage regional congestion, reduce travel times, and improve reliability in the region.

Strategy: Support efforts to strengthen integrated management of the regional multimodal transportation system by fostering regional coordination and cooperation.

Strategy: Continue to invest in the regional ITS system by making use of the latest technology and Big Data capabilities to improve management of the transportation system and prepare the region for connected and autonomous vehicle technology.

Strategy: Support efforts to increase non-single occupancy vehicle travel choices in the region.

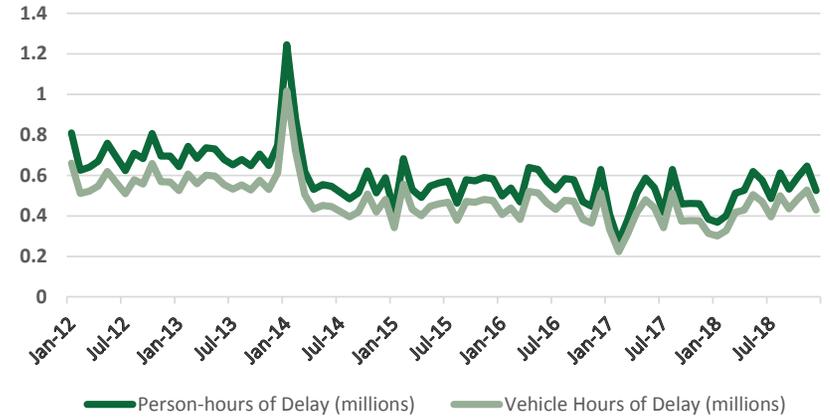
Strategy: Employ evolving applications of technology to support improved real-time traveler information and incident management

Strategy: Support use of advanced data, communications, and automation to improve transit system reliability

Strategy: Implement active system management strategies, including integrated corridor management to optimize reliability across the transportation network

Strategy: Account for the impacts of connected and autonomous vehicles on effective roadway capacity in planning for long-term infrastructure investment needs

Figure 14: Monthly Impact of Congestion, St. Louis Region, 2012-2018



Performance Measures



Measure	Baseline (2017)	Target	
		2-Year	4-Year
Level of Travel Time Reliability ratio of the longer travel times (80th percentile) to a "normal" travel time (50th percentile), using data from FHWA's National Performance Management Research Data Set (NPMRDS) or equivalent.			
Interstate NHS	86.9%	86.9%	86.9%
Non-Interstate NHS	83.6%	n/a	83.6%
Annual Hours of Peak-Hour Excessive Delay excessive delay is on the travel time at 20 miles per hour or 60% of the posted speed limit travel time, whichever is greater	9.5	9.5	9.5

DIVERSE ECONOMY



Support Quality Job Development

Support the growth of wealth producing jobs that allow residents to save and return money to the economy.

To grow the metropolitan economy, economic development and transportation planning strategies need to support the growth of wealth producing jobs. Quality jobs allow residents to save and to return money to the economy through purchases of goods and services (Table 10).

Quality jobs are located throughout the St. Louis region (Map 10). The highest concentrations of quality jobs are in the central corridor and parts of St. Louis County, and there are high concentrations of quality jobs in every county of the region.

When compared with peer regions, the majority of jobs in St. Louis are accessible within a reasonable amount of travel time by automobile but far less accessible for people who live in the outer portions of the region and for those who do not have access to a vehicle (Map 11).

Also, St. Louis ranks low among peer regions for job access by transit (Table 11).

While auto commuters in the city of St. Louis and St. Louis County can reach over 80 percent of jobs in the region within 45 minutes, far fewer jobs are accessible in this commute time for those who live in the suburban and rural parts of the region. Transportation expenditures that connect citizens, via multiple modes of transportation, to quality employment opportunities are a sound investment in the future prosperity of the St. Louis region.

Map 10: Quality Jobs in the St. Louis Region

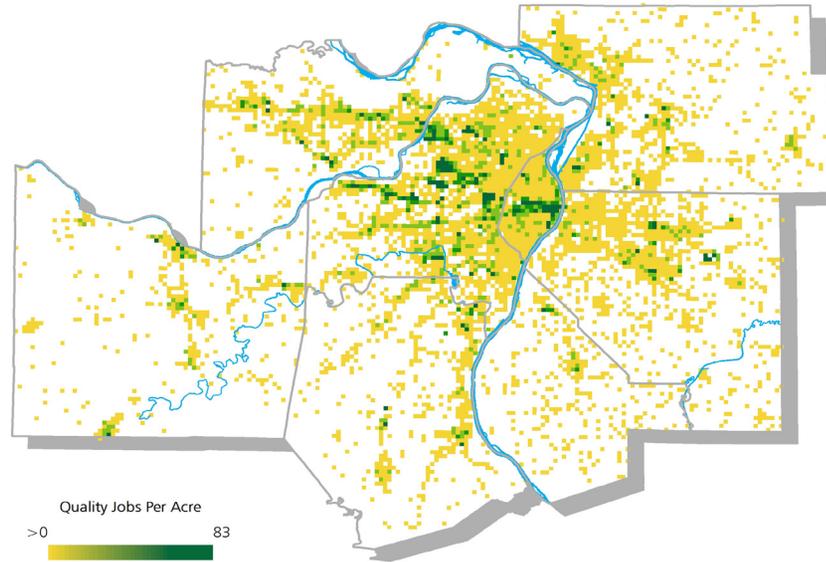


Table 10: Employment (thousands) by Sector, EWG Region, 1990-2017

Sector	1990	2017	Percent Change	Change (thousands)
Mining, Logging, and Construction	50.6	66.7	31.8	16.1
Manufacturing	202.4	114.7	-43.3	-87.7
Wholesale	62.7	64.4	2.7	1.7
Retail Trade	141.1	143.3	1.6	2.2
Transportation and Utilities	47.9	50.7	5.8	2.8
Information	28.9	28.1	-2.8	-0.8
Financial Activities	70.1	87.8	25.2	17.7
Professional and Business Services	147.4	213.1	44.6	65.7
Education and Health	134.5	251.5	87.0	117
Leisure and Hospitality	104.8	150.6	43.7	45.8
Other Services	49.2	51.9	5.5	2.7
Government	138.1	154.7	12.0	16.6

Source: Bureau of Labor Statistics



Table 11:

Job Access by Transit

Percent of jobs the typical working-age resident can reach via transit within 60 minutes, 2017

1	Salt Lake City	25.1
2	San Jose	22.3
3	San Francisco	19.2
4	Milwaukee	18.1
5	New York	14.9
6	Portland	14.3
7	Denver	13.3
8	Buffalo	13.3
9	Washington, D.C.	12.9
10	Las Vegas	12.4
11	Boston	11.5
12	Hartford	10.9
13	Seattle	10.8
14	New Orleans	9.4
15	Austin	8.9
16	San Antonio	8.8
17	Baltimore	8.6
Peer Average		8.5
18	Louisville	8.4
19	San Diego	8.3
20	Minneapolis	8.2
21	Columbus	8.2
22	Sacramento	8.0
23	Chicago	7.8
24	Cleveland	7.8
25	Philadelphia	7.4
26	Providence	7.0
27	Pittsburgh	7.0
28	Charlotte	6.3
29	Raleigh	6.2
30	Oklahoma City	6.1
31	Los Angeles	6.1
32	Indianapolis	5.9
33	Phoenix	5.9
34	Richmond	5.3
35	Jacksonville	5.2
36	St. Louis	4.9
37	Cincinnati	4.8
38	Miami	4.7
39	Virginia Beach	4.7
40	Orlando	4.6
41	Kansas City	4.6
42	Tampa	4.3
43	Nashville	4.3
44	Houston	4.0
45	Birmingham	3.7
46	Detroit	3.5
47	Dallas	3.1
48	Atlanta	3.0
49	Riverside	2.4

Source: University of Minnesota

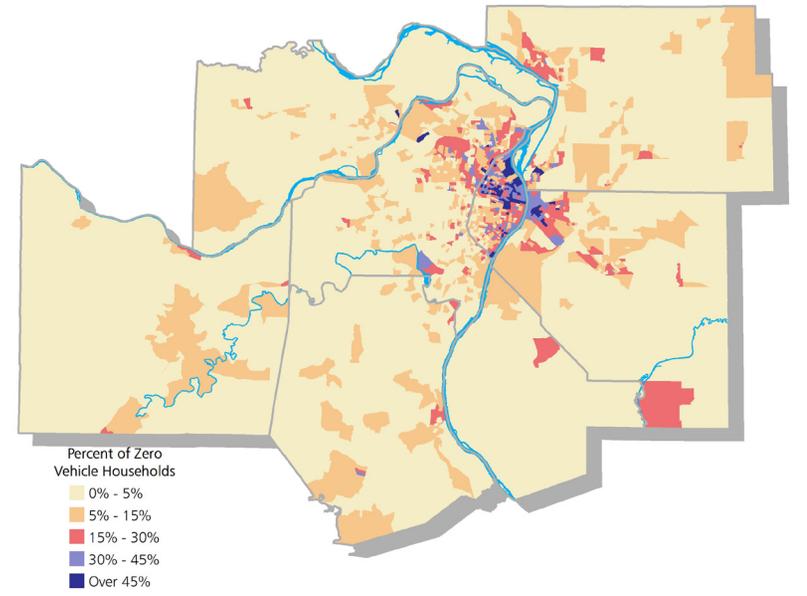
Note: Time includes transit and walking during 7-9 a.m. rush hour



Strategies

- Strategy:** Prioritize multi-modal transportation and land-use investments that increase access to quality job clusters, education and job training in the region.
- Strategy:** Coordinate with local development officials and implementation partners in the private sector to ensure the adequacy of transportation access to sites where quality jobs exist or where new job growth is anticipated.
- Strategy:** Research and support initiatives and policies that stimulate job training and quality job creation in low-income and minority communities.
- Strategy:** Promote programs and projects that address the spatial mismatch between jobs and workforce housing.
- Strategy:** Support transit programs that expand reverse commute possibilities and improve access to job centers.
- Strategy:** Improve access to opportunities by considering walking, biking, and public transit access to education and job centers.
- Strategy:** Support application of emerging transportation mobility services and technologies to strengthen accessibility to jobs for low-income and minority communities
- Strategy:** Work with the private sector, universities, and nonprofit institutions to advance innovation in development and application of emerging transportation technologies

Map 11: Zero Vehicle Households in the St. Louis Region



QUALITY JOB DEVELOPMENT

Performance Measure



	Baseline (2010)	2016	Desired Trend
Quality Jobs			
Percent of jobs with a self-sufficiency wage	34.8%	38.8%	↑



Strengthen Intermodal Connections

Support freight movement and connections that are critical to the movement of people and goods.



Freight volumes are expected to increase by 60 percent over the next 25 years in the United States.

In an effort to capitalize on this growth, EWG, MoDOT, IDOT, and members of the freight community in the St. Louis region undertook an evaluation of the regional freight system to determine how to better leverage the region's assets. The St. Louis Regional Freight study documents key regional, national, and global trends that will influence freight movement. It also analyzes the ability of the region's infrastructure to support freight growth by:

- Documenting areas where travel reliability and traffic bottlenecks are a problem.
- Locating opportunities for intermodal connections.
- Identifying 23 specific geographic areas in the region that are key to the freight industry in St. Louis (Map 12). These freight emphasis areas support about 230,000 jobs, sustain about one-quarter of regional economic activity (\$55.5 billion annually) and utilize 160 million square feet of industrial and distribution space.

The St. Louis region is well positioned to capture some of the expected growth in nationwide freight movement for all modes, given the region's central location, rivers, low traffic congestion, and lack of tolling (Table 12). Future growth will depend on coordinating public and private freight decision-making and investments, ensuring reliable truck travel times, strengthening multi-modal connections to the 23 key freight site areas and ensuring the region's workforce can access freight employment opportunities.

Map 12: St. Louis Regional Freight Network

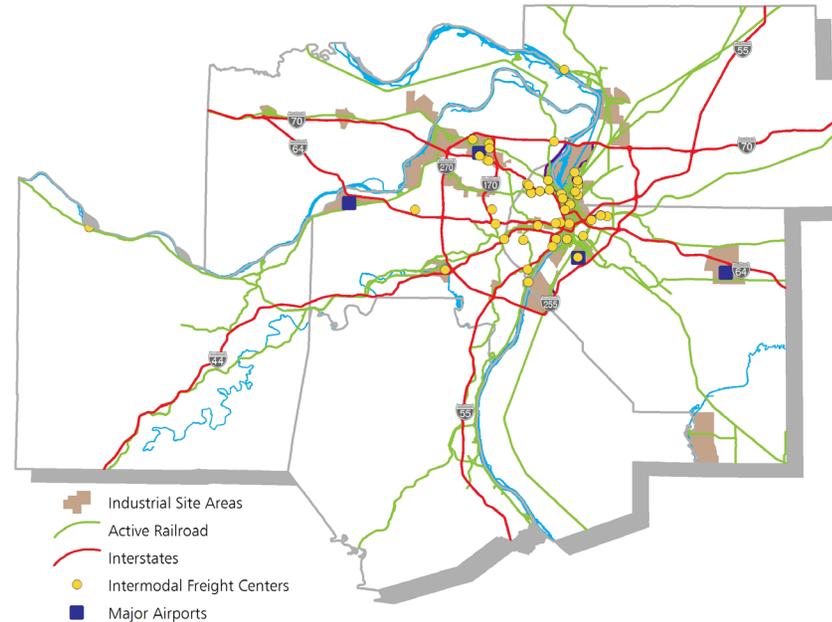


Figure 14: Amount of Freight Imported to, Exported from, or Shipped Within the Region (millions of tons, 2016)

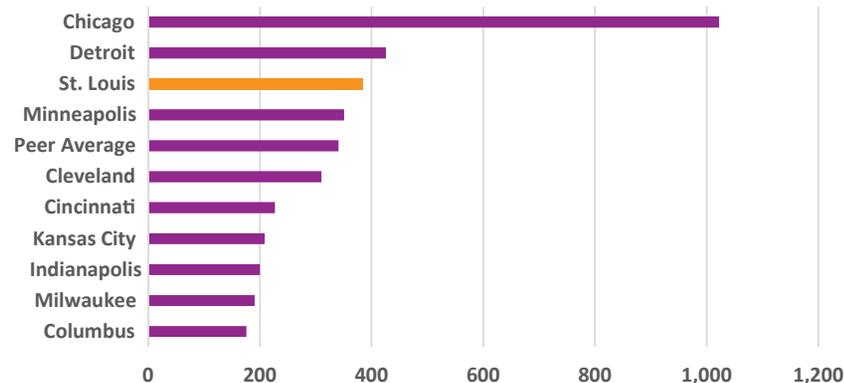


Table 12:

Freight Tonnage

Amount of freight imported to, exported from, or shipped within the region in thousands of tons, 2016

1	Houston	1,848,078
2	New York	1,184,331
3	Los Angeles	1,089,304
4	Chicago	1,022,264
5	Dallas	732,473
6	New Orleans	601,615
7	Philadelphia	568,803
8	San Francisco	532,600
9	Detroit	425,767
10	Boston	423,749
11	Miami	405,003
12	Atlanta	404,742
13	St. Louis	383,994
14	Seattle	383,241
15	Minneapolis	350,572
Peer Average		
16	San Antonio	323,929
17	Denver	310,393
18	Cleveland	309,999
19	Portland	261,548
20	Pittsburgh	232,007
21	Phoenix	227,159
22	Cincinnati	226,807
23	Tampa	223,784
24	Washington, D.C.	220,262
25	Kansas City	208,541
26	Indianapolis	199,753
27	Milwaukee	190,577
28	Baltimore	182,835
29	Columbus	176,019
30	Orlando	172,182
31	Buffalo	168,003
32	Birmingham	163,688
33	Salt Lake City	157,753
34	Austin	155,356
35	Oklahoma City	151,608
36	Nashville	140,878
37	Charlotte	136,520
38	Sacramento	133,207
39	Raleigh	128,713
40	Virginia Beach	127,643
41	Louisville	124,371
42	Memphis	121,500
43	San Diego	120,706
44	Jacksonville	102,228
45	Richmond	99,850
46	Las Vegas	88,260
47	Hartford	76,115

Source: Federal Highway Administration, Freight Analysis Framework



Strategies

Strategy: Initiate a regional rail network study to better identify needed operational and system infrastructure improvements.

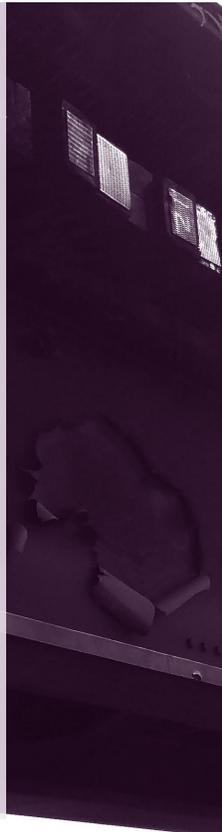
Strategy: Evaluate traveler information technology prototypes, such as real-time messages on incidents, congestion, and travel time to improve freight system reliability.

Strategy: Partner with St. Louis Freightway, the St. Louis regional freight district, to coordinate freight planning with the private sector and market the region as a national and international freight hub.

Strategy: Enhance the St. Louis region's air service to support key export industries and its connections to all modes of the freight transportation network.

Strategy: Coordinate with stakeholders from the freight sector to identify workforce challenges and infrastructure priorities.

Strategy: Prioritize application of vehicle-to-infrastructure connected technologies to freight corridors.



St. Louis Regional Freightway Priority Freight Projects

Advanced to Construction

- Merchants Bridge (TRRA) Replacement over the Mississippi River (MO-IL)***
- I-270 Improvements from I-70 (MO) to Illinois Route 111 (MO-IL)* (Partial)**
- J.S. McDonnell Connector Access Improvements (MO)
- North Park Access Improvements (MO)
- Earth City Access Improvements (MO)

Partially Programmed for Construction

- North Riverfront Commerce Corridor Improvements (MO)***
- Illinois Route 3 Access Improvements (IL)***
- Union Pacific Railroad Lenox Tower Replacement and Track Realignment (IL)
- St. Louis Lambert International Airport North Cargo Improvements (MO)
- America's Central Port Improvements (IL)

Concept Development or Planning

- I-270 Improvements from I-70 (MO) to Illinois Route 111 (MO-IL)* (Partial)**
- I-70 Improvements from Warrenton to Stan Musial Veterans Memorial Bridge (MO)
- MidAmerica St. Louis Airport Distribution Improvements (IL)
- I-64 Improvements from Green Mount Road to Illinois Route 158 (Air Mobility Drive) (IL)
- Kaskaskia Regional Port District Improvements (IL)
- I-255 / Davis Street Ferry Road Interchange (IL)
- I-255 / Fish Lake (Ramsey Road) Interchange (IL)
- St. Louis Lambert International Airport Access Improvements (MO)
- Mississippi River Port Development Projects (MO)
- Illinois Route 158 (Air Mobility Drive) Expansion from Route 161 to Route 177 (IL)

*Project titles in bold indicate the St. Louis Regional Freightway's highest priority projects.



Performance Measures

Measure	Baseline	Target	
	(2017)	2-Year	4-Year
Truck Travel Time Reliability Index	1.54	1.54	1.54



Protect Air Quality and Environmental Assets

Encourage investments that recognize the linkages between the social, economic, and natural fabric of the region.

The transportation system can have significant negative effects on the air quality and natural resources of the region. Great strides have been made in alleviating these effects through federal, state, and local initiatives that have led to cleaner burning fuels, consideration of Environmental Justice communities, and assessment of environmental impacts in the planning process. Early and ongoing consultation with natural resource agencies from planning and construction to operations and maintenance has resulted in the efficient delivery of projects while protecting and enhancing the region's environmental priorities. Nevertheless, the St. Louis region faces significant challenges in terms of air quality. Though there has been a gradual downward trend in ozone level exceedances over recent years, St. Louis still ranks poorly among peer regions with regards to adult asthma rates (Table 13). It is also important that the region consider energy use and the transportation system's contribution to regional greenhouse gas emissions. The 2014 National Climate Assessment identified several climate-related impacts on transportation systems, such as:

- Stress on pavement and expansion joints due to extreme heat
- Temporary inundation due to heavy precipitation
- Bridge scour resulting from faster streamflow following heavy rain

Several adaptation measures have been identified, including enhancing the tree canopy to reduce the urban heat island effect and using green infrastructure to reduce the runoff from heavy precipitation events.

Map 13: Project Level Ecological Significance

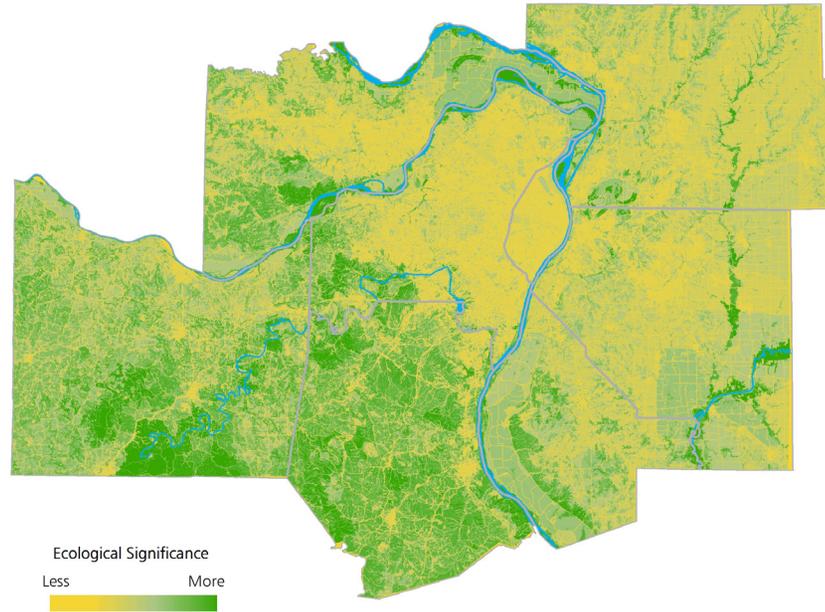


Table 13:

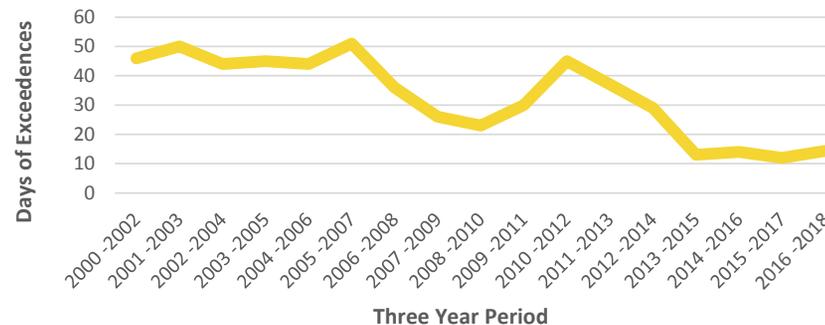
Prevalence of Asthma

Adults who currently have asthma as a percent of all adults, 2017

1	Jacksonville	12.7
2	Providence	12.5
3	Boston	12.2
4	Hartford	11.3
5	Sacramento	11.2
6	Louisville	11.1
7	Cleveland	10.7
8	Virginia Beach	10.7
9	Buffalo	10.6
10	Philadelphia	10.5
11	Birmingham	10.3
12	Baltimore	10.3
13	St. Louis	10.1
14	Portland	10.0
15	Indianapolis	10.0
16	Phoenix	9.9
17	Charlotte	9.8
United States		
18	Salt Lake City	9.3
19	Columbus	9.1
20	New Orleans	9.1
21	Denver	9.1
22	Dallas	9.1
23	Milwaukee	9.0
24	Oklahoma City	8.8
25	Tampa	8.7
26	Seattle	8.6
27	Nashville	8.5
28	Kansas City	8.5
29	Cincinnati	8.2
30	Memphis	8.1
31	New York	8.0
32	Orlando	7.8
33	Chicago	7.8
34	Washington, D.C.	7.8
35	Atlanta	7.7
36	Pittsburgh	7.5
37	Austin	7.5
38	Los Angeles	7.5
39	Minneapolis	7.2
40	Richmond	7.2
41	San Antonio	6.5
42	Houston	5.9
43	Miami	5.8
44	Riverside	5.5

Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System

Figure 15: Average Number of Days of Ozone Exceedances of 2015 Eight-Hour Ozone Standard





Strategies

Strategy: Use the Regional Ecological Framework to prioritize the protection of environmentally sensitive areas, develop mitigation strategies to protect critical areas, and direct mitigation funds towards areas of greatest restoration potential through the continued partnership with regulatory and resource agencies.

Strategy: Advance the Blue, Gray, Green Infrastructure Initiative identified in OneSTL and develop land cover classification data set for the urban locations in the region to inform transportation and infrastructure planning, water quality planning, trail planning, and greenspace enhancement.

Strategy: Coordinate the air quality and transportation planning activities in the region through the partnerships established on the Air Quality Advisory Committee and advance the committee as a forum for the exchange of information and the facilitation of the resolution of interstate air quality issues.

Strategy: Build on greenhouse gas inventory research to include more accurate sources of information, include point and non-point sources, and expand the capacity of partners to participate in region-wide and corridor specific inventories.

Strategy: Support efforts that reduce energy use such as the Clean Cities program in its pursuit to reduce petroleum consumption through the expansion of alternative fuel infrastructure, increased fuel economy in vehicles, and idle reduction measures.

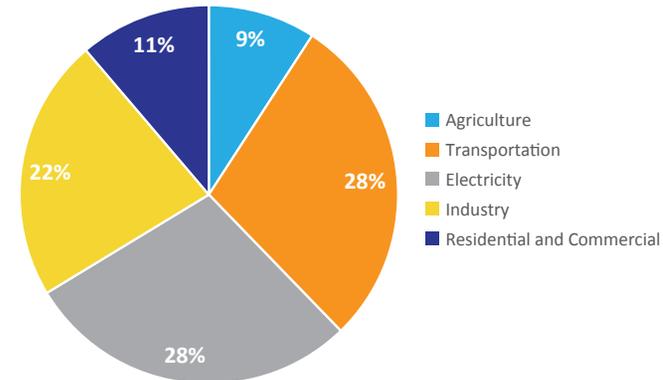
Strategy: Analyze potential impacts of extreme weather and other climate-related stressors on transportation system and the economy.

Strategy: Support vehicle electrification efforts through electric vehicle readiness planning.

Strategy: Advance deployment of sustainable infrastructure, such as solar highways and use of kinetic energy for street lighting.

Strategy: Promote the use of low emissions freight strategies, including efforts to advance platooning of trucks and incentives for efficient shipments.

Figure 16: Total U.S. Greenhouse Gas Emissions by Economic Sector in 2016



Performance Measures



Measure	Baseline: FY 2014-2017 Criteria Pollutants and Applicable Precursors	Target	
		2-year (kg/day)	4-year (kg/day)
On-Road Mobile Source Emissions			
Nitrogen Oxides (NOx)	1,202.29	151.9	152.9
Volatile Organic Compounds (VOC)	224.846	21.5	21.6
Particulate Matter (PM2.5)	32.121	6.9	6.9
Carbon Monoxide (CO)	—	15.7	201.9

	Baseline (2015)	2019	Desired Trend
Number of funded projects that impact ecologically significant or conservation opportunity areas within a ¼ mile buffer	14	11	

AIR QUALITY/ENVIRONMENTAL ASSETS

Chapter 3: Investment Plan

Connected2045 Investment Themes

The investment plan of *Connected2045*, which was developed through technical evaluation as well as public and stakeholder input, reflects the Ten Guiding Principles that comprise the centerpiece of the document. More specifically, *Connected2045's* investment priorities should be viewed thematically, rather than as a loose assortment of transportation projects without a unifying structure.

The projects in *Connected2045* **preserve and maintain** the transportation system. By prioritizing projects that keep the transportation system in good repair over those that expand it, the plan recognizes the challenges posed by aging infrastructure and diminished transportation funding.

The projects in *Connected2045* **support the regional economy**. State, regional, and local leaders agree that transportation investment should spur economic growth, create jobs, and improve access to opportunity. By giving priority to projects that improve the regional freight network, connect to employment centers, and support public transportation, the plan will assist in helping the region succeed in the economy of the 21st century.

The projects in *Connected2045* **increase safety and security**. Pedestrian, bicyclist, and motorist safety has been identified as a priority by the federal government, Illinois and Missouri, stakeholders and the public. The investment plan takes into account high accident corridors and intersections, and the plan includes numerous safety strategies.

All projects using federal transportation funds must first be identified in *Connected2045's* investment plan, or otherwise be consistent with the Plan's principles. The transportation investment plan establishes priorities for major state highway and regional transit system projects through the Plan's horizon year. As such, the Plan lists specific projects recommended for federal funding through 2045. Although the listing only incorporates state Departments of Transportation (DOT) and Metro projects, local agency projects are also subject to the purview of the long-range transportation plan (LRTP). Decisions on local projects competing for federal funds are made through the annual Transportation Improvement Program (TIP) selection process, which evaluates projects according to the Plan's principles and performance management framework.

By federal law both the LRTP investment plan and the annual TIP must be fiscally constrained—this means that reasonably anticipated revenues must be sufficient to cover all project costs, including the costs of maintaining and operating the transportation system. Applying the financial constraint ensures that the investment plan is more than merely a project wish list and provides some level of certainty concerning the nature and timing of investments. Projects considered for inclusion in the LRTP are labeled as priority or illustrative—priority projects are those that are affordable within the region's anticipated resources, whereas illustrative projects are beyond the region's financial ability. If additional funding becomes available, however, illustrative projects may advance to the priority list.

Transportation Improvement Program

The FY 2019-2023 Transportation Improvement Program as approved by the East-West Gateway Council of Governments Board of Directors in October 2018 contains 786 projects at a total cost of approximately \$2.4 billion. This TIP commits nearly 49 percent of the program (representing nearly \$1.2 billion) to preserving the existing infrastructure (resurfacing/reconstructing roads, repairing/replacing bridges, and replacing other aging transportation facilities). Approximately 4 percent (\$82.4 million) of the program is allocated to adding capacity in the form of new roads, new bridges, and new through lanes on existing roads. Projects to improve safety and/or operations of the region's transportation systems and facilities account for almost 12 percent of the total program (\$276.9 million).

Funding for transit, including MetroLink light rail, MetroBus, Call-A-Ride, equipment, facilities, and service, represents nearly 28 percent of the total program (\$660 million). Around 5 percent of the program (\$108.5 million) is for payments to retire debt from bonds, local public agencies or state DOTs for costshare projects. Other projects such as bicycle and pedestrian programs and facilities and streetscape improvements account for nearly 3 percent of the total program (\$81.5 million).

Several major projects were included in the FY 2019-2022 TIP. The following list includes major projects (over \$20 million).

Table 14: Major Projects

Project	Sponsor	Total (in millions)
I-270 – North St. Louis County Corridor – Pavement and bridges	MoDOT	\$237.5
Light rail vehicle upgrades and equipment	Bi-State Development/Metro	\$64.5
Bus and paratransit preventive maintenance program	Bi-State Development/Metro	\$60.0
GARVEE bond payback for the New Mississippi River Bridge	MoDOT	\$47.8
GARVEE bond payback for I-64 reconstruction (Spoede to Kingshighway)	MoDOT	\$46.7
I-70 – Eastbound Blanchette Bridge over Missouri River – Bridge rehabilitation	MoDOT	\$46.2
I-255 – 0.2 mi s/o Lake Blvd to 0.7 mi n/o I-64 – Resurfacing and bridge repair	IDOT	\$39.3
I-64 – 18th St to Garrison Ave – Modify interchange configuration (Jefferson/22nd) and bridge replacement	MoDOT	\$37.6
I-55/64 Collector-Distributor – Poplar St Bridge complex – Overlay and repairs to eastbound lanes	IDOT	\$33.0
I-255 at Davis Street Ferry Road – New interchange	Dupo	\$29.6
I-64 at IL 111 – Utility relocation, bridge replacement, reconstruct interchange to diamond interchange	MoDOT	\$28.5
MO 100 – US 61/67 to Big Bend Blvd – Pavement resurfacing, ADA transition plan, signal replacement	MoDOT	\$27.6

Projects Considered for Plan Inclusion

East-West Gateway considered over 60 projects, based on state DOT and Metro plans and costing more than \$9 billion, in developing the investment plan. Most projects proposed emerged as preferred alternatives from corridor and other planning studies. Also considered were 11 corridors for which no projects are identified but further study is warranted to develop projects that address existing or emerging transportation needs. Future long-range plans may consider projects identified during those corridor studies.

Based on a technical evaluation of the projects, and after applying the fiscal constraint, 25 priority projects, costing nearly \$3.5 billion, were selected for the investment plan and allocated to one of three implementation periods: 2020-2029, 2030-2039, or 2040-2045 (**Tables 15-17**). Those project costs do not include the nearly \$22 billion required over the next 25 years simply to maintain existing transportation assets and operations.

Projects that did not fit within the region’s financial resources were placed in the illustrative list, which was divided into Tier I, II, and III categories (**Tables 18-20**). Tier I designates those projects that should advance first into the priority list if additional funding becomes available.

Financial Capacity Analysis

A key component of the LRTP is the investment plan, which identifies the projects that are selected as priorities for funding during the plan period. Federal law requires that the LRTP’s investment plan be fiscally constrained. This means that reasonably anticipated revenues must be sufficient to finance all projects listed in the investment plan. Given the imbalance between available revenues and needs, the number of projects funded under the fiscal constraint is unreasonably small. The cost of simply maintaining roads, bridges, and transit assets leaves little revenue available for broader system improvements.

The extent to which needs exceed revenues is well illustrated by the additional funding required to adequately finance state roads and bridges and the regional transit system. MoDOT estimates that an additional \$745 million annually is required to meet its priority highway system needs. An Illinois Economic Policy Institute study concluded that IDOT needs an additional \$1.7 billion annually to adequately maintain its road and bridge system. Through EWG’s own calculations, Metro needs an additional \$25 million annually simply to maintain its capital assets and sustain existing operation levels. In addition, the Congressional Research Service estimates that an additional \$15 to \$25 billion annually is needed to fully fund the current levels of federal highway and transit spending through 2026.

Motor fuel taxes are a principal source of transportation funding at both the state and federal levels, especially for roads and bridges. The insufficiency of fuel tax revenues, however, is a major cause of the current financial predicament. Neither the federal government nor the states of Illinois and Missouri have passed fuel tax increases in over 25 years, although Missouri did pass a six cent fuel tax increase in 1992 that was phased in through 1996. Because of changes in vehicle fuel economy, the changing vehicle fleet, the lack of indexing and the absence of tax increases since the

early 1990s, fuel tax receipts have not kept pace with construction cost inflation. Based on the most recent Construction Cost Index, one dollar in fuel tax in 1990 is worth only 41 cents today. While there are discussions about increasing transportation funding in the state general assemblies and the U.S. Congress, action is far from certain. Council staff, therefore, has taken a conservative approach in forecasting future revenues, assuming no major new revenue infusions.

To establish the LRTP’s fiscal constraint, or the region’s capacity to fund transportation improvements, Council staff prepared forecasts of IDOT, Metro, and MoDOT revenues through the life of the plan. Both Metro and MoDOT provided baseline financial forecasts that Council staff adapted for LRTP use. The forecast for IDOT was based on data from the Illinois Comptroller’s office and IDOT’s long-range plan and multi-year improvement program. All forecasted costs and revenues are expressed in year of expenditure dollars.

Council staff estimates that the revenues available for the IDOT, Metro, and MoDOT programs will approach \$25 billion over the next 26 years. Over 90 percent of that funding will be needed for road and bridge rehabilitation or reconstruction, transit vehicle and facility replacement or rehabilitation, safety projects, and state highway and regional transit system operations. That leaves less than \$2.5 billion available for specific improvement projects.

Illinois Department of Transportation (IDOT)

IDOT will have an estimated \$3.5 billion in revenue available through 2045 (Figure 17). Approximately \$2.6 billion of the total will be dedicated to rehabilitating, reconstructing, and upgrading existing facilities, leaving less than \$900 million for major projects. That \$900 million is less than one-fourth of the \$4 billion in projects IDOT submitted for plan consideration (Figure 18).

Figure 17: IDOT Financial Capacity, 2020-2045 (year of expenditure dollars, millions)

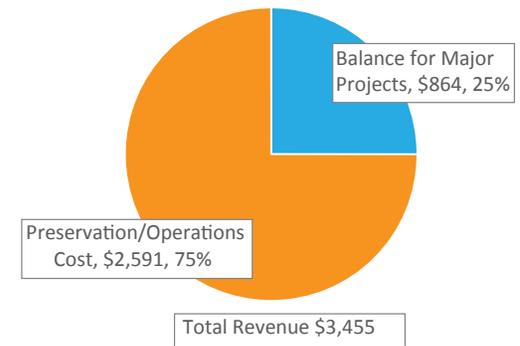


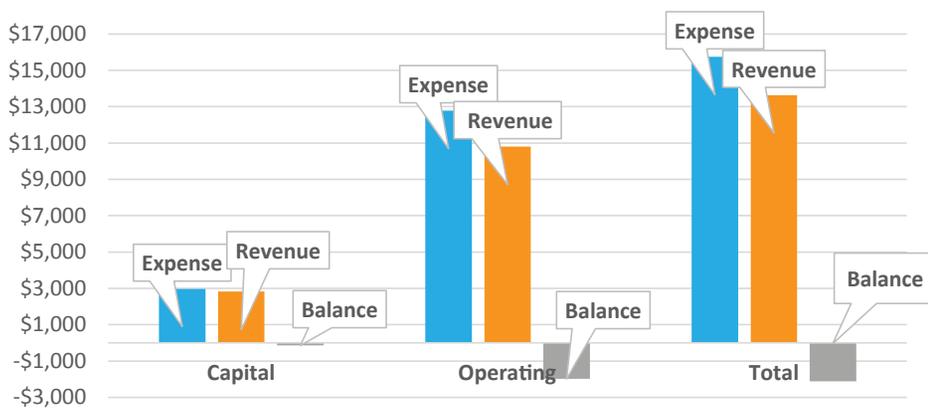
Figure 18: IDOT Financial Capacity, 2020-2045 (year of expenditure dollars, millions)



Metro Transit System

Metro is facing immediate budgetary pressures, especially on its operations side. The financial projections indicate that these will worsen over time and will ultimately lead to reduced services unless additional revenues flow into the system (Figure 19). Assuming no additional revenue, Metro will have approximately \$13.6 billion in capital and operating funds through 2045. If the system continued to function as it now is, it would require \$15.7 billion in revenue. There is, therefore, a shortfall of over \$2 billion, without any system expansion. As previously stated, Metro ultimately will need a \$25 million annual infusion of funds to maintain the system as it now operates. An additional \$50 million annually would enable Metro to both operate the system and contemplate expansion out of its own budgetary resources.

Figure 19: Metro Financial Capacity 2020-2045
(year of expenditure dollars, millions)



Although Metro's financial outlook is bleak, the LRTP does include one MetroLink expansion project among the investment priorities: the Northside/Southside MetroLink extension in the city of St. Louis. In 2017, city voters passed a half cent economic development sales tax, 60 percent of which was dedicated to funding the Northside/Southside extension. While the tax, by itself, is insufficient to fund the entire route from Natural Bridge/Grand to Jefferson/Chippewa, when coupled with potential federal funds and other city resources it is reasonable to assume that the city can generate the funding needed for Metro to construct and operate the light rail extension. It is important to note that none of the revenue currently dedicated to Metro would be used for the extension.

Missouri Department of Transportation (MoDOT)

MoDOT will have an estimated \$7.8 billion in revenue available through 2045 (Figure 20). Nearly \$6.2 billion of that amount will be dedicated to bridge and pavement rehabilitation and reconstruction, ADA improvements, safety projects, and operations, which leaves under \$1.6 billion available for major projects. That \$1.6 billion contrasts to the \$4.3 billion in projects MoDOT submitted for plan consideration (Figure 21).

Figure 20: MoDOT Financial Capacity, 2020-2045 (year of expenditure dollars, millions)

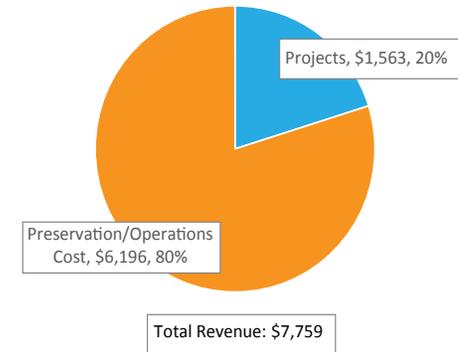
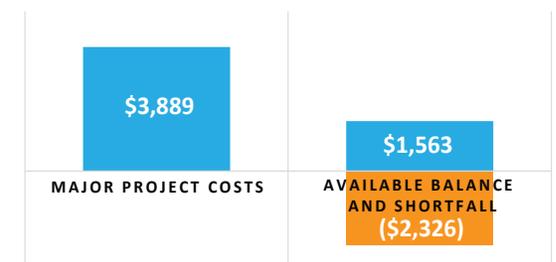


Figure 21: MoDOT Financial Capacity, 2020-2045 (year of expenditure dollars, millions)



Transportation Investment Plan

The following tables exhibit the priority investment plan for the region. Projects that can be funded within the region's financial capacity are listed as Investment Priorities; projects that cannot be funded with reasonably anticipated revenues are listed as Illustrative Projects. The first series of tables list the priority projects, categorized into three time frames: 2020-2029, 2030-2039, and 2040-2045. The next tables show the illustrative projects, broken down into Tier I through Tier III. Illustrative projects will be drawn into the investment plan if additional revenue becomes available—first Tier I projects and then Tier II and Tier III. A final table lists proposed corridor studies that are needed to identify projects for future plan consideration.

Table 15: Investment Priorities
Projects funded within the region's fiscal constraint
(year of expenditure dollars, millions)

Period: 2020-2029				
Project/Corridor	Description	County	Location	Cost (YOE)
Asset Management/Operations	Maintenance/rehabilitation/operational improvements/safety/ADA	Multicounty	Regionwide	\$2,819
Transit Operations	Maintain existing transit system	Multicounty	St. Louis/City of St. Louis/St. Clair	\$3,796
I-270*	New Mississippi River bridge	Madison/St. Louis	Over Mississippi River	\$250
I-64*	Bridge rehabilitation	City of St. Louis	Vandeventer Bridge	\$48
I-255*	Rehabilitate bridge	St. Louis	Jefferson Barracks Bridge	\$31
I-55*	Rehabilitate bridge	Jefferson/St. Louis	Over the Meramec River	\$20
MO 370*	Repair bridge	St. Louis/St. Charles	Over the Missouri River	\$36
MO 364*	Repair bridge	St. Louis/St. Charles	Over the Missouri River	\$68
MLK Bridge*	Replace bridge	City of St. Louis/St. Clair	Over the Mississippi River	\$250
I-64	Add capacity	St. Clair	Green Mount Rd. to IL 158	\$27
I-270	Improve Interstate, interchanges, and outer roads.	St. Louis	Old Halls Ferry to Hanley/Graham	\$305
I-270	Improve Interstate and interchange	St. Louis	I-170 to Lindbergh	\$99
I-70 (partial)	Add/improve outer roads, add ramps, add overpass, and improve interchanges	St. Charles	Convention Center to Cave Springs (partial)	\$35
I-70	Add capacity and rehabilitate pavement	St. Charles	MO Z to Wentzville Pkwy.	\$35
MetroLink extension	Construct new rail line (NS/SS extension)	City of St. Louis	Grand to Chippewa, via Cass or Florissant	\$774
David Hoekel Pkwy phases 2 and 3**	Construct new roadway	St. Charles	Interstate Dr. to Meyer Rd., Point Prairie Rd. to Peine Rd.	\$57
David Hoekel Pkwy phase 4 (partial)**	Construct new roadway	St. Charles	Meyer Rd. to Point Prairie Rd.	\$6

* Major bridge funded through MoDOT 'asset management major bridge' category

** locally funded

Table 16: Investment Priorities
Projects funded within the region's fiscal constraint
(year of expenditure dollars, millions)

Period: 2030-2039				
Project/Corridor	Description	County	Location	Cost (YOE)
Asset Management/Operations	Maintenance/rehabilitation/operational improvements/safety/ADA	Multicounty	Regionwide	\$3,433
Transit Operations	Maintain existing transit system	Multicounty	St. Louis/City of St. Louis/St. Clair	\$5,102
I-270	Improve Interstate and interchanges	St. Louis	McDonnell Blvd. to MO 370	\$168
I-270	Rehabilitate pavement and bridges, add capacity, modify interchanges and outer roads	St. Louis	MO H to Bellefontaine	\$123
I-270	Improve interchange	St. Louis	MO 367 Interchange	\$173
I-55	Rehabilitate pavement and bridges, add capacity, improve interchanges	Jefferson	MO Z to US 67	\$213
I-270 (partial)	Add capacity	Madison	IL 157 to Mississippi River	\$210
David Hoekel Pkwy. phase 4 (partial)**	Construct new roadway	St. Charles	Meyer Rd. to Point Prairie Rd.	\$6
David Hoekel Pkwy. phase 5**	Construct new roadway	St. Charles	Jackson Rd. to Interstate Dr.	\$13

** locally funded

Table 17: Investment Priorities
Projects funded within the region's fiscal constraint
(year of expenditure dollars, millions)

Period: 2040-2045				
Project/Corridor	Description	County	Location	Cost (YOE)
Asset Management/Operations	Maintenance/rehabilitation/operational improvements/safety/ADA	Multicounty	Regionwide	\$2,535
Transit Operations	Maintain existing transit system	Multicounty	St. Louis/City of St. Louis/St. Clair	\$3,892
I-270 (partial)	Add capacity	Madison	IL 157 to Mississippi River	\$60
I-64	Interchange improvements and add auxiliary lanes	St. Charles	MO 364 to I-70/US-61 Interchange	\$70
Rte 3 Connector	Construct new 2-lane roadway	St. Clair	Exchange Ave. intersection to IL 203	\$185
I-270	Improve interchange	St. Louis	Dorsett Rd. to MO 370	\$113
I-270	Revise interchange ramps	St. Louis	MO D Interchange	\$29
I-44	Interchange improvements	City of St. Louis	Hampton, Kingshighway, Vandeventer, and Jefferson	\$101
I-64	Revise interchange	City of St. Louis	Grand/Market Interchange	\$31
I-64	Expand eastbound I-64 from two to three lanes between 6th street and Poplar Street Bridge.	City of St. Louis	Final split	\$60

Table 18: Illustrative Projects
(year of expenditure dollars, millions)

Illustrative Tier I				
Project/Corridor	Description	County	Location	Cost (YOE)
US 61	Eliminate at-grade crossings, construct new interchange, and connect outer roads	St. Charles	I-64 to Lincoln County	\$165
I-70	Interchange improvements and straighten curve	City of St. Louis	Kienlen Ave. to Union Blvd.	\$74
I-70	Interchange improvements	City of St. Louis	Branch St. Interchange	\$8
I-70	Interchange improvements, straighten curve	St. Louis	Spring Ave. to North Hanley Rd.	\$39
I-70	Interchange improvements	City of St. Louis	Salisbury St. Interchange	\$23
MO H	Corridor and safety improvements	City of St. Louis	Adelaide to Riverview	\$49
Route 94	Add capacity	St. Charles	Sherman Dr. to Pralle Rd.	\$25
I-170	Improve interchanges	St. Louis	Scudder Ave. to Airport	\$54
I-70	Add auxiliary lane	St. Louis	Lucas and Hunt Rd. to Kienlen Ave.	\$8
I-70	Interchange improvements	City of St. Louis	Grand Ave. Interchange	\$23
I-70	Improve interchanges, straighten curve, improve airport access, replace bridges	St. Louis	Cypress Rd. to Airflight Dr.	\$89
Bus Rapid Transit	West Florissant	St. Louis/City of St. Louis	Downtown to Natural Bridge	\$59
Bus Rapid Transit	I-64	St. Louis/City of St. Louis	Downtown to Chesterfield	\$56
IL 3	Relocate, construct 4-lane roadway	Madison/St. Clair	Cahokia to Venice	\$972
Lebanon Bypass	Construct new road	St. Clair	IL 4 to US 50	\$84

Table 19: Illustrative Projects
(year of expenditure dollars, millions)

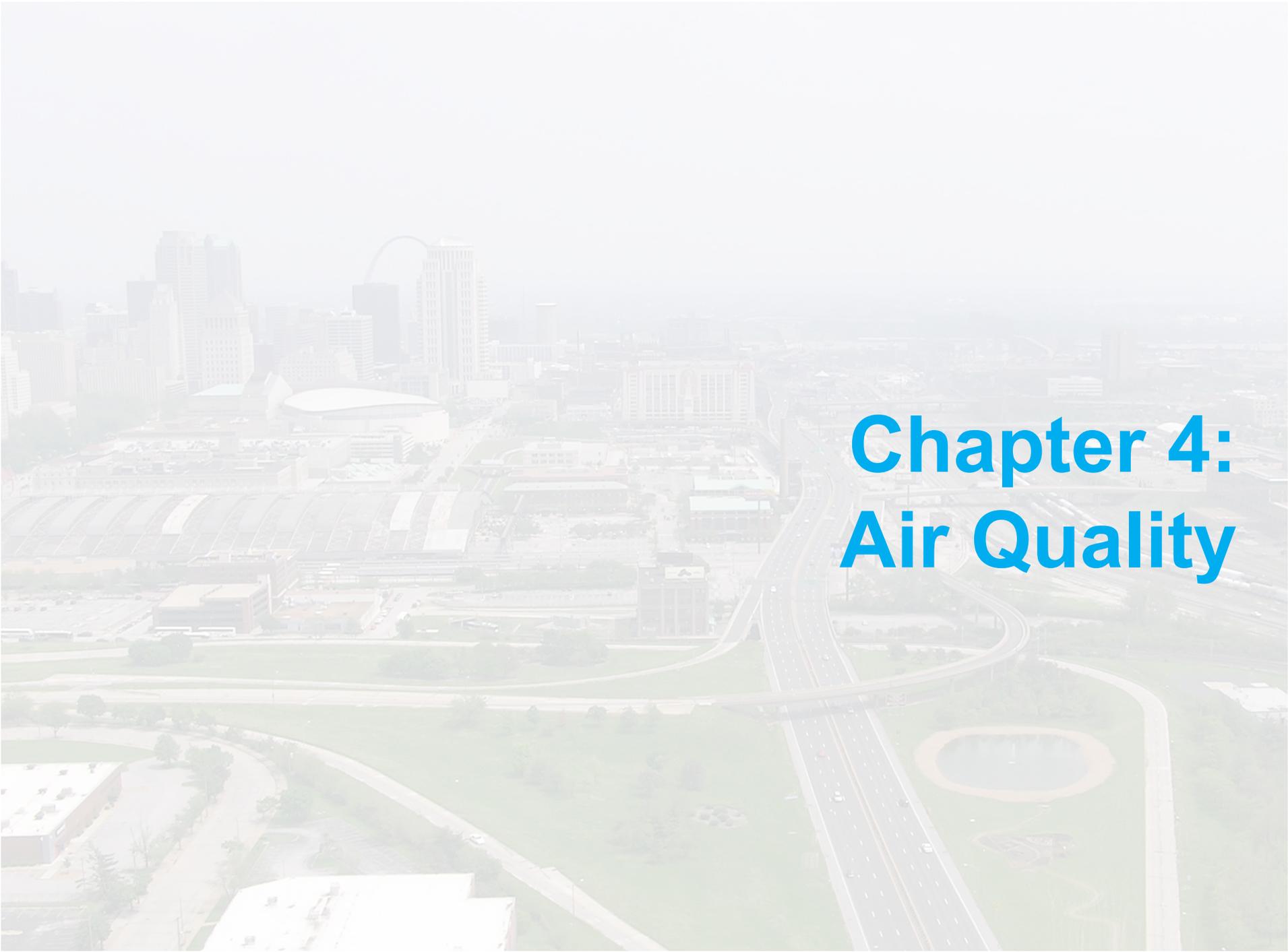
Illustrative Tier II				
Project/Corridor	Description	County	Location	Cost (YOE)
I-70	Interchange improvements	St. Louis	I-170 Interchange	\$78
I-270	Bridge replacement	St. Louis	Conway Bridge	\$29
I-270	Improve corridor, add capacity	St. Louis	I-44 to MO 30	\$194
I-270	Add lanes	St. Louis	MO 100 to I-64	\$60
I-64	Add outer road, add ramps, add capacity, and interchange improvements	St. Charles	MO K to I-70	\$70
I-70	Improve interchange, straighten curve, replace three bridges	City of St. Louis	West Florissant to Adelaide Ave.	\$64
I-70	Interchange improvements	St. Louis	US 67/Lindbergh Blvd. Interchange	\$41
I-70	Interchange improvements	St. Charles	Zumbehl Rd. Interchange	\$29
I-170	Improve Interchange	St. Louis	MO D Interchange	\$49
I-70	Improve outer road and Interchange improvements	St. Charles	TR Hughes to MO 79	\$68
I-70	Interchange improvements	St. Louis	MO 180/St. Charles Rock Rd. Interchange	\$29
I-70	Interchange improvements	St. Louis	MO 141 Interchange	\$41
I-70	Interchange improvements and straighten curve	City of St. Louis	Shreve Ave. Interchange	\$31
I-70	Add auxiliary lane	St. Charles	MO 370 to Cave Springs Rd./Truman Blvd.	\$8
I-70	Interchange improvements	St. Louis	Bermuda Rd. Interchange	\$29
I-70	Interchange improvements and straighten curve	City of St. Louis	Jennings Station Rd. to Union Blvd.	\$74
I-55/70	Add lanes	Madison	I-255 to I-270	\$486
I-70	Construct new 4-lane Interstate on new alignment, with new interchanges	St. Clair	Relocation to new Mississippi River Bridge	\$1,458

Table 20: Illustrative Projects
(year of expenditure dollars, millions)

Illustrative Tier III				
Project/Corridor	Description	County	Location	Cost (YOE)
I-70 (partial)	Add/improve outer roads, add ramps, add overpass, and improve interchanges	St. Charles	Convention Center to Cave Springs (partial)	\$80
MO 340	Construct new interchange and/or overpasses	St. Louis	Baxter	\$82
MO 21	Improve corridor	Jefferson	MO B to MO N and H	\$97
I-64	Improve interchange	St. Louis	Long Rd. interchange	\$82
MO 100	Realign; construct interchange	Franklin	MO OO to I-44 east of Gray Summit	\$193
MO 47	Improve corridor	Franklin	Washington to I-44	\$175
US 50	Upgrade roadway	Franklin	Progress Pkwy. to I-44	\$39
I-70	Add outer road, add auxiliary lane, add ramps, and interchange improvements	St. Charles	Bryan Rd. to Woodlawn Ave.	\$76
I-70	Interchange improvements	St. Charles	Cave Springs Rd./Truman Blvd. Interchange	\$29
I-70	Interchange improvements	St. Charles	MO A Interchange	\$29

Table 21: Corridor Studies

Recommended Corridor Studies			
Project/Corridor	Description	County	Location
I-44	Corridor Study	Franklin	MO 100 to Crawford Co.
Route 141	Corridor Study	Jefferson	MO 21 to MO 30
US 67	Corridor Study	Jefferson	US 61 to MO V
MO 79	Corridor Study	St. Charles	Salt River to Lincoln Co.
MO 94	Corridor Study	St. Charles	MO 364 to MO D
MO 340	Corridor Study	St. Louis	MO 100 to I-64
I-170	Corridor Study	St. Louis	MO D to I-64
I-44	Interchange Study	City of St. Louis	I-55
Various	Corridor Study	St. Louis/City of St. Louis	MO 115, MO D, MO N, MO 180, MO 100, MO 366, MO 30, MO 367
Route N	Corridor Study	St. Charles	I-64/MO 364 to Jackson Rd.
I-55 / I-64 / I-44	Corridor Study	City of St. Louis	Poplar Street Bridge and approaches



Chapter 4: Air Quality

Process

The U.S. Environmental Protection Agency (EPA) uses the term attainment area to describe those areas where air quality meets health standards for particular air borne pollutants. In 2002, the eight-county St. Louis region attained the 1979 one-hour ozone National Ambient Air Quality Standard (NAAQS), based on 2000-2002 air quality monitoring data. Both the Missouri Department of Natural Resources (MoDNR) and the Illinois Environmental Protection Agency (Illinois EPA) redesignation requests and Maintenance Plans were approved by EPA on May 12, 2003. However, as of June 15, 2004, the St. Louis area, as well as other metropolitan areas around the nation, was designated by EPA as a “moderate” non-attainment area for the new, more restrictive 1997 ozone standard. The non-attainment area included the eight-county region and Jersey County Illinois. Jersey County is outside the boundaries of EWG. In June 2012, the Illinois counties were designated by EPA as being in attainment of the 1997 ozone standard. In February 2015 EPA found the Missouri counties to be in attainment of this standard. Effective April 6, 2015 EPA revoked the 1997 ozone standard and no further Conformity Determinations for that standard were required. In July 2012, the eight-county St. Louis area was designated by EPA as a “marginal” non-attainment area for the strengthened 2008 ozone standard. EPA classified Jersey County, Illinois as attainment. EPA designated the three Illinois counties to be in attainment of this standard in March 2018 and the Missouri counties in September 2018. The Conformity Determination for the Update to *Connected2045* will be performed in relation to the 2008 ozone standard for these eight counties.

In August 2018 a portion of the St. Louis area was designated by EPA as a “marginal” non-attainment area for the new 2015 ozone standard. The non-attainment area consists of St. Charles and St. Louis counties, the City of St. Louis and Boles Township in Franklin County in Missouri and Madison and St. Clair counties in Illinois. The remaining counties

in the St. Louis area were classified as being in attainment for this standard. EWG, as the MPO, has until August 3, 2019 to perform a Conformity Determination under the 2015 ozone standard. The Conformity Determination for the Update to *Connected2045* will be performed in relation to the 2015 ozone standard for this non-attainment area.

On February 16, 2018, the U.S. Court of Appeals for the District of Columbia issued a decision in the South Coast Air Quality Management District vs. EPA case challenging EPA’s final rule for implementing the 2008 ozone National Ambient Air Quality Standard (NAAQS) or 2008 ozone NAAQS State Implementation Plan (SIP) Requirements rule. The court vacated portions of this rule but upheld EPA’s revocation of the 1997 ozone standard in 2015. In its decision, the court used the term “orphan areas” to describe those 1997 ozone standard non-attainment or maintenance areas which EPA had designated as being in attainment of the 2008 ozone standard. This decision has been under review by EPA, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). FHWA and FTA released interim guidance in April and October 2018 which delineated the conformity process for the 1997 ozone standard for the 82 orphan areas. The eight county St. Louis (MO-IL) region and Jersey County, Illinois was identified as an orphan area. EWG used this interim guidance to prepare the Conformity Determination for the FY 2019-2022 Transportation Improvement Program (TIP) and Related Amendments to *Connected2045*. Only regionally significant projects in Jersey County were affected by this interim guidance. In April 2018 EPA requested a rehearing by the court of certain aspects of the February decision. On September 14, 2018, the court agreed to stay its vacatur of the portion of the EPA rule “that exempts orphan areas from transportation conformity” until February 16, 2019 and denied the other aspects of the rehearing request. Transportation conformity for the revoked 1997 ozone standard is to be performed for orphan areas starting February 16, 2019. EPA then issued guidance in November 2018 describing

how transportation conformity determinations can be made in the total or partial orphan areas which were either in nonattainment or maintenance for the 1997 ozone standard at the time that standard was revoked in 2015. A partial orphan maintenance area is considered to be an area which was in maintenance (had attained) for the 1997 ozone standard as of March 6, 2015 but for which the non-attainment area for the 2008 ozone standard is smaller. The eight-county St. Louis (MO-IL) region and Jersey County, Illinois were identified as a partial orphan maintenance area. Jersey County is considered the orphan area because EPA found it to be in maintenance for the 1997 ozone standard and in attainment for both the 2008 and 2015 ozone standards. Regionally significant projects in Jersey County have to be part of the Conformity Determination process for the 1997 ozone standard. Through the Inter Agency Consultation process, the Illinois Department of Transportation (IDOT) indicated there is one such project in Jersey County and provided project information.

In April 2005, EPA designated the entire eight-county St. Louis region as being in non-attainment of the 1997 annual fine particle material (PM_{2.5}) standard, as well as other metropolitan areas throughout the nation. Fine particles are less than 1/30 the width of a human hair. The PM_{2.5} mobile source components of interest are direct PM_{2.5} from vehicle exhaust, brake wear and tire wear and NO_x (as a precursor to PM_{2.5} formation). The PM_{2.5} non-attainment area was made up of: Franklin, Jefferson, St. Charles and St. Louis counties and the city of St. Louis in Missouri; and Madison, Monroe and St. Clair counties in Illinois. Baldwin Township in Randolph County, Illinois is also part of this non-attainment area. In October 2018 EPA found the Missouri portion of the St. Louis region to be in attainment of the 1997 annual PM_{2.5} standard. Effective May 28, 2019, EPA found the Illinois portion of the St. Louis region and Baldwin Township in Randolph County, Illinois to be in attainment of this standard.

Under provisions of the Clean Air Act Amendments

of 1990 (CAAA), East-West Gateway, as the Metropolitan Planning Organization for the region, is the agency responsible for making the determination of conformity. The conformity finding relates to those pollutants produced by automobiles and other road-based transportation, generally described as mobile source emissions. The pollutant of concern in this region is ozone. Ozone is not, however, produced directly by automobiles. Ozone is formed when volatile organic compounds (VOCs) and oxides of nitrogen (NOx) emissions from cars and industry mix with oxygen in the lower atmosphere and in the presence of strong sunlight (temperatures of 85°F or higher).

Benchmarks against which progress is measured in meeting national goals for cleaner and healthier air are set out in the State Implementation Plans (SIPs). Preparation of SIPs is the responsibility of each state. The Determination of Conformity for the 1997 ozone standard for Jersey County, partial orphan maintenance area, is based on EPA's current transportation conformity regulation. It states that a regional emissions analysis is required starting one year after a non-attainment designation for a particular standard and is to continue until the effective date of the revocation of that standard by EPA. As the February 2018 court decision upheld EPA's revocation of the 1997 ozone standard in 2015, a regional emissions analysis using the latest emissions model and either the emissions budget test or the interim emissions test is not required. For transportation plans and TIPs, transportation conformity for the 1997 standard can be demonstrated by showing the following criteria have been met: use of latest planning assumptions as related to transportation control measures (TCMs) in approved SIPs/if there are TCMs in approved SIPs; consultation requirements; timely implementation of any approved SIP TCMs; and fiscal constraint.

The present Determination of Conformity for the 2008 and 2015 ozone standards for the Missouri part of the region is made in relation to the Early Progress Plan for the Missouri Portion of the St. Louis

Nonattainment Area for the 2008 8-Hour Ground Level Ozone National Ambient Air Quality Standard (MO Early Progress Plan). EPA found the 2008 motor vehicle emissions budgets in the MO Early Progress Plan to be adequate for Conformity Determination purposes (October 28, 2013). Conformity is also made in relation to the February 2018 Technical Correction to the Redesignation Request and Maintenance Plan for the St. Louis (Missouri) 2008 Ozone Standard (MO Maintenance Plan). EPA found the 2030 motor vehicle emissions budgets from this plan adequate for use in Conformity Determination on June 22, 2018 and approved the MO Maintenance Plan on September 20, 2018. The primary purpose of the conformity process is to ensure that for analysis years up to 2029, predicted future VOC and NOx mobile emissions resulting from planned and programmed Missouri transportation projects (the Action scenario) fall below the 2015 emissions budgets levels set out in the MO Early Progress Plan for the 2008 8-Hour Standard. For the 2030 analysis year and beyond, predicted future VOC and NOx mobile emissions resulting from planned and programmed Missouri transportation projects (the Action scenario) fall below the 2030 emissions budget levels set out in the MO Maintenance Plan.

The Determination of Conformity for the 2008 and 2015 ozone standards for the Illinois part of the region is made in relation to the 2008 and 2025 motor vehicle emission budgets contained in the Maintenance Plan for the Metro-East St. Louis Ozone Nonattainment Area for the 1997 8-Hour Ozone National Ambient Air Quality Standard-hour Attainment Determination Plan (Revised) (AQPSTR 11-03) (IL Maintenance Plan for the 1997 Standard). The IL Maintenance Plan for the 1997 Standard was approved by EPA on June 12, 2012. Conformity is also made in relation to the Maintenance Plan for the Metro East St. Louis Ozone Nonattainment Area for the 2008 Ozone National Ambient Air Quality Standard (IL 8-Hour Maintenance Plan for 2008 Standard). EPA found the 2030 motor vehicle emissions budgets from this plan adequate for use in Conformity Determination on December 26,

2017 and on March 1, 2018 approved IL 8-Hour Maintenance Plan for the 2008 Standard. The primary purpose of the conformity process is ensure that for analysis years up to 2024, predicted future VOC and NOx mobile emissions resulting from planned and programmed Illinois transportation projects (the Action scenario) fall below the 2008 emissions budget levels set out in the IL Maintenance Plan for the 1997 Standard. For analysis years occurring between 2025 and 2029, predicted future VOC and NOx mobile emissions resulting from planned and programmed Illinois transportation projects (the Action scenario) fall below the 2025 emissions budget levels set out in the IL Maintenance Plan for the 1997 Standard. With 2030 and beyond analysis years, predicted future VOC and NOx mobile emissions resulting from planned and programmed Illinois transportation projects (the Action scenario) fall below the 2030 emissions budget levels set out in the IL Maintenance Plan for the 2008 Standard.

The State of Missouri submitted the Redesignation Demonstration and Maintenance Plan for the Missouri Portion of the St. Louis Non-Attainment Area for the 1997 Annual Fine Particulate National Ambient Air Quality Standard (Missouri Annual PM2.5 Maintenance Plan) to EPA in August 2011. The Missouri Air Conservation Commission approved a technical supplement for this plan on March 2014 which included PM2.5 and NOx (as a precursor) motor vehicle emissions budgets, request for redesignation to attainment and 2008 base year emissions inventory. Effective October 2, 2018, EPA redesignated this area to attainment of the 1997 annual PM2.5 standard and approved the Missouri Annual PM2.5 Maintenance Plan. Since this area has been classified as attainment, the 1997 annual PM2.5 standard has been revoked by EPA and Conformity Determination requirements for this pollutant for the Missouri counties no longer apply. On December 6, 2018, the State of Illinois submitted a request to EPA to approve the Redesignation Demonstration and Maintenance Plan for the Illinois portion of the St. Louis Non-Attainment Area for the 1997 Annual Fine Particulate National Ambient Air Quality Standard

(Illinois Annual PM2.5 Maintenance Plan). This submission included: request for redesignation to attainment for the 1997 annual PM2.5 standard; motor vehicle emissions budgets; and 2008 emissions inventory. Effective May 28, 2019, EPA redesignated Madison, Monroe and St. Clair Counties and Baldwin Township in Randolph County, Illinois to attainment of the 1997 annual PM2.5 standard and approved the Illinois Annual PM2.5 Maintenance Plan. Since this area has been classified as attainment, the 1997 annual PM2.5 standard has been revoked by EPA and Conformity Determination requirements for this pollutant for the Illinois counties and one township no longer apply.

Air Quality Conformity Determination

Ozone

For the following ozone standards:

1997 standard (Jersey County, Illinois Partial Orphan Maintenance Area)

For the regionally significant project in Jersey County, the determination of conformity for the 1997 ozone standard is to be demonstrated by showing the following criteria delineated in the Final Conformity Rule 40 CFR Part 93 have been met: use of latest planning assumptions for Transportation Control Measures (TCMs) in approved State Implementation Plan (SIP) if TCMs are in that SIP; consultation requirements; timely implementation of any approved SIP TCMs if TCMs are in that SIP; and fiscal constraint. The conformity analysis for the 1997 ozone standard for Jersey County was shown to satisfy: inter agency and public consultation has taken place (found in Section 5 Air Quality

Conformity Determination and Documentation (8-Hour Ozone) for Update to *Connected2045*: Long Range Transportation Plan for the St. Louis Region [Conformity document]); and fiscal constraint of the regionally significant project (described in Appendix F of Conformity document). As the Illinois Maintenance Plan for the 1997 Standard does not contain any TCMs, the first and third criteria do not apply. Documentation for this item and the process to determine conformity for the 1997 ozone standard can be found in Appendix F of the Conformity document.

Table 22: Missouri Ozone Conformity Test Based on Conformity Requirements for 2008 Eight-Hour Ozone Standard Five-County Maintenance Area (U.S. tons per day)

Analysis Year	Volatile Organic Compounds		Oxides of Nitrogen	
	Action	2015 Budget	Action	2015 Budget
2025	11.56	32.70	18.19	76.70
		2030 Budget	2030 Budget	
2030	8.96	22.00	13.10	40.00
2035	7.84	22.00	11.00	40.00
2045	6.94	22.00	10.02	40.00

All tests have been passed for all years.

2008 Standard (Eight-County Maintenance Area)

Federal and state regulations require that projects included in the update to *Connected2045* must pass the following emissions test for each of the following analysis years: 2025, 2030, 2035 and 2045:

- Emissions of VOC for the five Missouri counties resulting from the plan’s 2025 implementation will be less than the 2015 budget in the MO Early Progress Plan, i.e. 32.70 tons per day in Missouri. Emissions of VOC for these Missouri counties resulting from the plan’s 2030, 2035 and 2045 implementation will be less than the 2030 budget in the MO Maintenance Plan, i.e. 22.00 tons per day (**Table 22**). Emissions of VOC for the three Illinois counties resulting from the plan’s 2025 implementation will be less than the 2025 budget in the IL Maintenance Plan for the 1997 Standard, i.e. 5.68 tons per day. Emissions of VOC for these Illinois counties resulting from the plan’s 2030, 2035 and 2045 implementation will be less than the 2030 budget in the IL Maintenance Plan for the 2008 Standard, i.e. 9.05 tons per day (**Table 23**).
- Emissions of NOx for the five Missouri counties resulting from the plan’s 2025 implementation will be less than the 2015 budgets in the MO Early Progress Plan, i.e. 76.70 tons per day. Emissions of NOx for these Missouri counties resulting from the plan’s 2030, 2035 and 2045 implementation will be less than the 2030 budgets in the MO Maintenance Plan, i.e. 40.00 tons per day (**Table 22**). Emissions of NOx for the three Illinois counties resulting from the plan’s 2025 implementation will be less than the 2025 budget in the IL Maintenance Plan for the 1997 Standard, i.e. 15.22 tons per day. Emissions of NOx for these Illinois counties resulting from the plan’s 2030, 2035 and 2045 implementation will be less than the 2030 budget in the IL Maintenance Plan for the 2008 Standard, i.e. 16.68 tons per day (**Table 23**).

2015 Standard (Non-Attainment Area)

Federal and state regulations require that projects included in the update to *Connected2045* must pass the following emissions test for each of the following analysis years, 2020, 2025, 2030, 2035 and 2045:

- Emissions of VOC for the Missouri counties (St. Charles and St. Louis counties, City of St. Louis and Boles Township in Franklin County) resulting from the plan’s 2020 and 2025 implementation will be less than the 2015 budget in the MO Early Progress Plan, i.e. 32.70 tons per day. Emissions of VOC for these Missouri counties resulting from the plan’s 2030, 2035 and 2045 implementation will be less than the 2030 budget in the MO Maintenance Plan, i.e. 22.00 tons per day (**Table 24**). Emissions of VOC for the Illinois counties (Madison and St. Clair counties) resulting from the plan’s 2020 implementation will be less than the 2008 budget in the IL Maintenance Plan for the 1997 Standard, i.e. 17.27 tons per day. Emissions of VOC for the Illinois counties resulting from the plan’s 2025 implementation will be less than the 2025 budget in the IL Maintenance Plan for the 1997 Standard, i.e. 5.68 tons per day. Emissions of VOC for the two Illinois counties resulting from the plan’s 2030, 2035 and 2045 implementation will be less than the 2030 budget in the IL Maintenance Plan for the 2008 Standard, i.e. 9.05 tons per day (**Table 25**).
- Emissions of NOx for the Missouri counties resulting from the plan’s 2020 and 2025 implementation will be less than the 2015 budgets in the MO Early Progress Plan, i.e. 76.70 tons per day. Emissions of NOx for the Missouri counties resulting from the plan’s 2030, 2035 and 2045 implementation will be less than the 2030 budgets in the MO Maintenance Plan, i.e. 40.00 tons per day (**Table 24**). Emissions of NOx for the Illinois counties resulting from the plan’s 2020 implementation will be less than the 2008 budget in the IL Maintenance Plan for the 1997

Table 23: Illinois Ozone Conformity Test Based on Conformity Requirements for 2008 Eight-Hour Ozone Standard Three-County Maintenance Area (U.S. tons per day)

Analysis Year	Volatile Organic Compounds		Oxides of Nitrogen	
	Action	2025 Budget	Action	2025 Budget
2025	5.49	5.68	7.86	15.22
			2030 Budget	
2030	4.16	9.05	5.66	16.68
2035	3.44	9.05	4.65	16.68
2045	3.05	9.05	4.40	16.68

All tests have been passed for all years.

Standard, i.e. 52.57 tons per day. Emissions of NOx for the Illinois counties resulting from the plan’s 2025 implementation will be less than the 2008 budget in the IL Maintenance Plan for the 1997 Standard, i.e. 15.22 tons per day. Emissions of NOx for the Illinois counties resulting from the plan’s 2030, 2035 and 2045 implementation will be less than the 2030 budget in the IL Maintenance Plan for the 2008 Standard, i.e. 16.68 tons per day (**Table 25**).

Based on the conformity regional emissions analysis for ozone conducted as part of the long-range plan development, as shown in the following tables, the projects and programs included in the Update to *Connected2045* are found to be in conformity with the requirements of the Clean Air Act Amendments of 1990, the relevant sections of the Final Conformity Rule 40 CFR Part 93, and the Missouri State Conformity Regulations 10 CSR 10-5.480. The finding is documented in the companion report, Air Quality Conformity Determination and Documentation (8-Hour Ozone) for Update to *Connected2045*: Long Range Transportation Plan for the St. Louis Region.

Table 24: Missouri Ozone Conformity Test Based on Conformity Requirements for 2015 Eight-Hour Ozone Standard Three-County and One-Township Non-Attainment Area

(U.S. tons per day)

Analysis Year	Volatile Organic Compounds		Oxides of Nitrogen	
	Action	2015 Budget	Action	2015 Budget
2020	13.12	32.70	24.65	76.70
2025	9.84	32.70	15.36	76.70
		2030 Budget		2030 Budget
2030	7.61	22.00	11.01	40.00
2035	6.64	22.00	9.20	40.00
2045	6.95	22.00	10.03	40.00

All tests have been passed for all years.

Table 25: Illinois Ozone Conformity Test Based on Conformity Requirements for 2015 Eight-Hour Ozone Standard Two-County Non-Attainment Area

(U.S. tons per day)

Analysis Year	Volatile Organic Compounds		Oxides of Nitrogen	
	Action	2008 Budget	Action	2008 Budget
2020	6.91	17.27	11.74	52.57
		2025 Budget		2025 Budget
2025	5.16	5.68	7.42	15.22
		2030 Budget		2030 Budget
2030	3.90	9.05	5.33	16.68
2035	3.33	9.05	4.52	16.68
2045	2.87	9.05	4.16	16.68

All tests have been passed for all years.

inside back cover



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