

***Meeting Missouri's Future Mobility Needs:
A Report Card on the Condition, Use and Safety of
Missouri's System of Roads and Bridges***

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Founded in 1971, The Road Information Program (TRIP)® of Washington, DC is a nonprofit organization that researches, evaluates and distributes economic and technical data on highway transportation issues. TRIP is sponsored by insurance companies, equipment manufacturers, distributors and suppliers; businesses involved in highway engineering, construction and finance; labor unions; and organizations concerned with an efficient and safe highway transportation network.

Executive Summary

Missouri's roads and bridges tie small town to big city, providing the state's 5.6 million residents and its visitors with a high level of mobility. This road and bridge system enables the state's residents and visitors to go to work, visit family and friends, move goods to market, and frequent tourist attractions. As the backbone of the state's transportation system, roads and bridges play a central role in the state's economy.

This report analyzes trends in the condition, use and safety of Missouri's major roads and bridges, and grades the state's highway system based on this evaluation.

Missouri is a growing state with rapidly increasing vehicle travel and a traffic fatality rate higher than the national average. Highway travel, especially by heavy trucks, has contributed to wear and tear on Missouri's roads and bridges. Six out of 10 of Missouri's major roads are in need of repair or reconstruction, while four out of 10 of its bridges 20 feet or longer are in need of repair or replacement. Driving on poor roads costs Missouri motorists billions a year in extra vehicle operating costs.

Federal highway funding for Missouri in 2003 would be cut by 10 to 15 percent (as much as \$97 million) under current Congressional proposals. Increased state and local highway funding is needed to make the necessary road and bridge improvements statewide.

TRIP has assigned the following letter grades to Missouri's highway system:

	Grade	Comment
Safety	C-	<i>Missouri has a higher traffic fatality rate than the national average. More than 1,000 people were killed in Missouri in motor vehicle crashes in 2000. Roadway conditions are a significant factor in the occurrence of traffic fatalities.</i>
Roads	D	<i>Missouri has the third-worst road conditions in the United States, with six out of 10 of its major roads in need of immediate repair or reconstruction. Poor road conditions cost Missouri drivers billions annually in extra vehicle operating costs.</i>
Bridges	D	<i>Missouri has the second-highest percentage of deficient bridges in the United States, leading to significant detours for emergency response vehicles, school buses and commercial trucks.</i>
Congestion	C+	<i>Continuing growth in highway travel is causing increased urban traffic congestion, primarily in St. Louis and Kansas City.</i>
Funding	C-	<i>Current Congressional proposals would cut federal highway funding to Missouri by as much as \$97 million in 2003. Increased state and local funding is needed to make needed road and bridge improvements statewide.</i>

The key findings of this report are:

Missouri's traffic fatality rate is higher than the national average. Roadway safety improvements have been shown to help reduce traffic-related deaths.

- A total of 6,870 people were killed in motor vehicle accidents in Missouri from 1995 through 2000. In 2000 alone, 1,157 people died in motor vehicle crashes.
- Missouri's traffic fatality rate per 100 million vehicle miles of travel (VMT) is 1.72, while the national average is 1.52.
- Reducing Missouri's traffic fatality rate to the national average would save 134 lives per year.
- Roadway conditions are a factor in an estimated 30 percent of traffic fatalities nationwide.
- The Federal Highway Administration (FHWA) has found that every \$100 million spent on highway safety improvements will result in 145 fewer traffic fatalities over a 10-year period.

Increasing vehicle travel, especially by heavy commercial trucks, on Missouri's major roads continues to cause considerable wear and tear, costing Missouri drivers billions in extra vehicle operating costs per year.

- Vehicle miles of travel (VMT) in Missouri increased by 32 percent between 1990 and 2000, from 51 billion miles to 67 billion miles. Commercial truck travel accounted for 12 percent of all vehicle travel in the state in 2000.
- Commercial truck travel is projected to increase by 89 percent in the Midwest, including Missouri, by the year 2020, according to Federal Highway Administration (FHWA) forecasts.
- Vehicle miles of travel (VMT) in Missouri are projected to increase another 40 percent by 2020, reaching 94 billion miles.
- Missouri has the third-worst roads in the nation, with 59 percent of its major roads in either poor or mediocre condition, and requiring immediate repair or reconstruction.
- Driving on roads in need of repair or reconstruction costs Missouri motorists a total of \$2 billion annually, or \$520 each, in extra vehicle operating costs (EVOC).

Missouri's bridges are also under considerable strain due to increasing levels of highway travel. Bridge deficiencies may require state officials to restrict vehicle weights on bridges.

- Missouri has the second-worst bridges in the nation, with 26 percent of its bridges 20 feet or longer structurally deficient.
- A bridge is structurally deficient if there is significant deterioration of the bridge deck, supports or other major components. Bridges that are structurally deficient are often posted for lower weight or are closed if they are found to be unsafe.
- Restrictions on vehicle weight may cause many vehicles – especially emergency vehicles, commercial trucks, school buses and farm equipment – to use alternate routes to avoid these bridges.

Increasing highway travel and population growth, combined with an inadequate amount of new road capacity, is generating high levels of urban traffic congestion in Missouri and costing Missouri drivers millions in delays and wasted fuel.

- 35 percent of Missouri's major urban roads carry a high volume of traffic and are considered congested because they are often carrying more traffic than they were designed to handle.
- Missouri's VMT increased by a rate 30 times that of lane miles during the 1990s. Total lane miles in the state increased one percent from 1990 to 2000, from 247,798 miles to 251,209 miles.
- Missouri experienced a 10 percent increase in population between 1990 and 2001 from 5.1 million to 5.6 million residents. Missouri's population is projected to increase another 13 percent by 2025, reaching 6.3 million.
- Annual delay per rush hour driver increased by 127 percent in the St. Louis urban area in the 1990s, from 19 to 43 hours.
- Annual delay per rush hour driver increased by 171 percent in the Kansas City urban area in the 1990s, from 7 to 19 hours.
- Annual cost due to traffic congestion in St. Louis in 2000 was \$805 million.
- Annual cost due to traffic congestion in Kansas City in 2000 was \$245 million.

Increased investment in Missouri's road and bridge system would help improve pavement and bridge conditions, improve traffic safety and alleviate traffic congestion. With expected cuts in federal highway funding in 2003, increased state and local funding will be necessary to make needed road and bridge improvements.

- Current Congressional proposals would cut federal highway funding to the states by 10 to 15 percent in 2003, or by as much as \$97 million in Missouri. Federal highway funding for Missouri in 2002 was \$647 million.

Sources of information for this study include the Federal Highway Administration (FHWA), the Texas Transportation Institute (TTI), the U.S. Census Bureau and the Missouri Department of Transportation (MoDOT).

Introduction

This report looks at the condition, use and safety of Missouri's roads and bridges, as well as the state's ability to meet future mobility needs.

Missouri is a growing state with increasing vehicle travel and a traffic fatality rate higher than the national average. The state ranks third-worst in the nation in road conditions, and second-worst in bridge conditions, and is experiencing increased urban traffic congestion. Driving on poor roads costs Missouri motorists billions a year in extra vehicle operating costs. Road and bridge improvements statewide would help improve traffic safety and relieve traffic congestion.

Missouri stands to lose nearly \$100 million in federal highway funds in the coming fiscal year under current Congressional proposals, so local and state funding is crucial to any improvements to the state's highway system.

Sources of information for this study include the Federal Highway Administration (FHWA), the Texas Transportation Institute (TTI), the U.S. Census Bureau and the Missouri Department of Transportation (MoDOT).

Travel Growth in Missouri

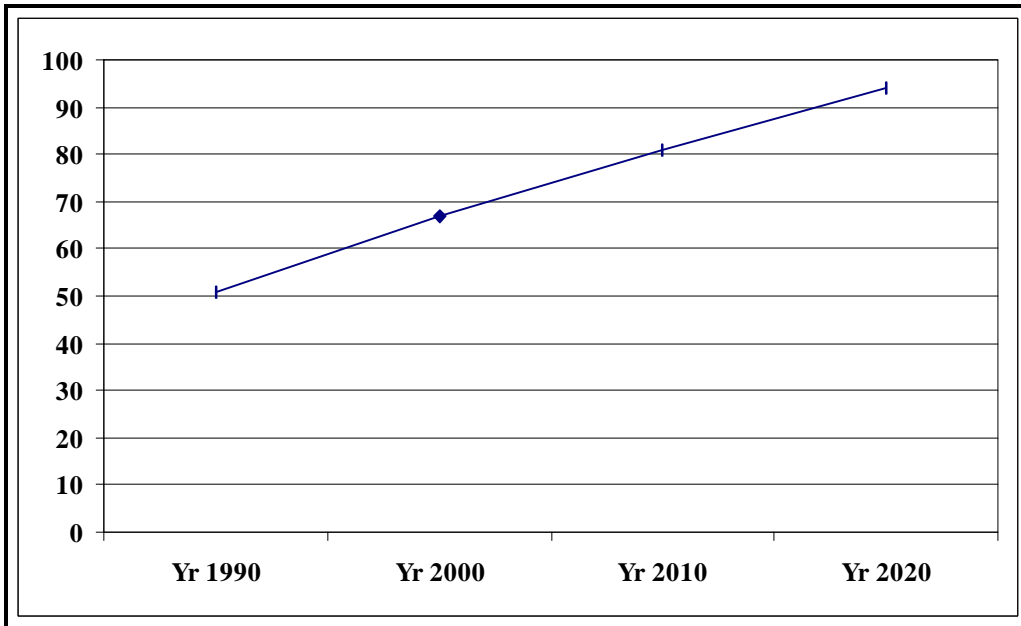
Missouri residents enjoy modern lifestyles that rely on personal and commercial mobility; combined with population growth, such mobility demands produce ever-increasing levels of travel statewide.

Highway travel in the state increased by 16 billion miles in the 1990s, as vehicle miles of travel (VMT) in Missouri increased from 51 billion in 1990 to 67 billion miles in 2000, a 32 percent hike, according to the Federal Highway Administration (FHWA). In addition, commercial trucking comprises a significant portion of vehicle travel in the state, accounting for 12 percent of all vehicle travel in Missouri in 2000.

Missouri's population reached 5.6 million in 2000, up from 5.1 million a decade earlier, a 10 percent jump. The Census Bureau projects that Missouri's population will increase another 13 percent by 2025, climbing to 6.3 million residents.

Based on these population and other lifestyle trends, TRIP estimates that vehicle travel in Missouri will increase by 40 percent over the next two decades, to 94 billion miles annually by 2020.

Chart 1. Vehicles miles of travel (VMT) growth in Missouri, 1990-2020 (in billions)

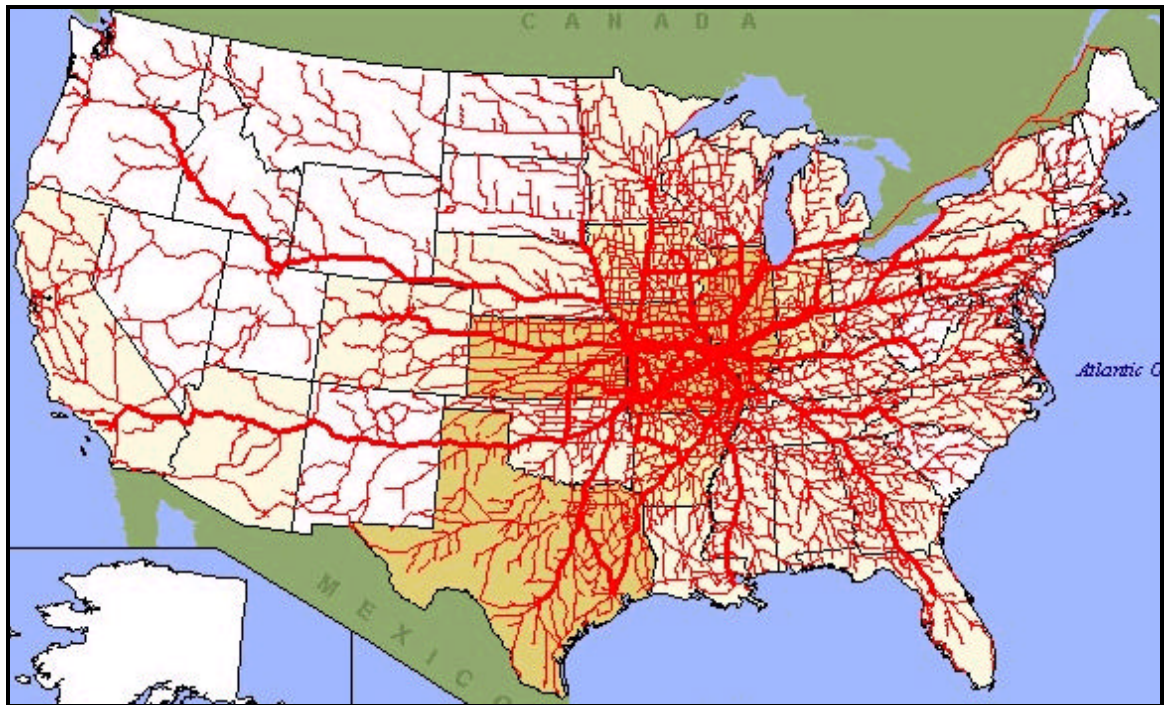


Source: TRIP analysis of Federal Highway Administration (FHWA) data

Truck travel is expected to increase significantly in Missouri and surrounding states over the next 20 years. The Federal Highway Administration forecasts that commercial truck travel in the Midwest, including Missouri, will increase by 89 percent by the year 2020.

The following chart illustrates the truck freight traffic flows starting and finishing in Missouri, showing the volume levels along specific highways (indicated by the width of the route). The chart includes truck freight traffic flows for international and domestic freight movement, both imports and exports.

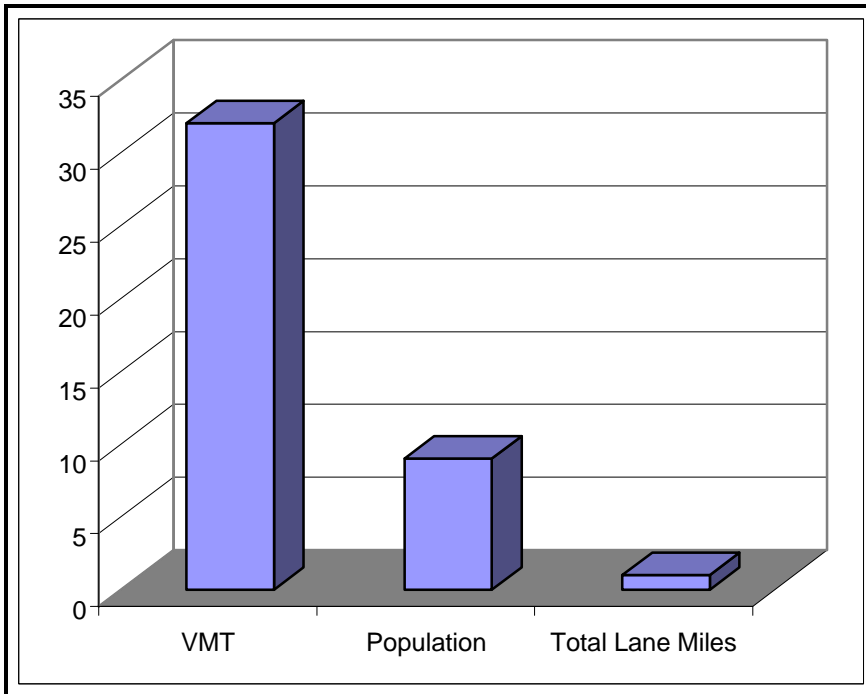
Chart 2. Truck freight flows to and from Missouri



Source: Office of Freight Management and Operations, Federal Highway Administration

Capacity expansion that would help alleviate mounting urban traffic congestion has lagged behind these rising levels of highway travel. Missouri's VMT increased by a rate 30 times that of lane miles during the 1990s. Total lane miles in the state increased only one percent from 1990 to 2000, from 247,798 miles to 251,209 miles, according to the FHWA.

Chart 3. Percent Increase in VMT, Population and Lane Miles in Missouri, 1990-2000



Source: TRIP analysis of FHWA and U.S. Census Bureau data

Personal Travel in Missouri

Highways are crucial to mobility in Missouri, since U.S. Census data shows that 92 percent of Missourians either drive alone or carpool in their private vehicles to work.

The continued increase in highway travel in Missouri is also consistent with the findings of the Nationwide Personal Transportation Study (NPTS), which found that average daily trips-per-person increased 10 percent nationally between 1990 and 1995. The NPTS found that people are living further from their jobs, and that their work commutes often include several other stops, such as day care, schools, and shopping or social engagements. The study also found that older Americans are increasingly mobile

and that current lifestyles can be expected to fuel growing future demand for additional highway mobility.

The increase in driving reflects the tremendous reliance of Missouri residents on highways, not only for local neighborhood trips, but also for longer trips. Data from the 1995 American Travel Survey (ATS), conducted by the U.S. Department of Transportation (DOT), indicate that Missouri residents depend significantly on the state's road system for their long-distance trips. The ATS found that of trips longer than 100 miles, one-way, beginning and ending in Missouri, 86 percent were in private highway vehicles, 12 percent were by commercial air and less than one percent were by bus or rail.

Economic Importance of Roads

Highways are also vitally important to continued economic development in Missouri. A 1997 analysis of commodity transport by the U.S. Bureau of Transportation Statistics (BTS) pointed out the economic importance of the state's road system. The BTS report found that in Missouri, 80 percent of the \$148 billion in products shipped annually from sites in the state were transported on highways.

There is a strong correlation between economic development and increased mobility in Missouri. As the economy expands, creating more jobs and increasing consumer confidence, the demand for consumer and business products grows. In turn,

manufacturers ship greater quantities of goods to market to meet this demand, a process that adds to truck traffic on the nation's highways and major arterial roads.

Condition of Missouri's Roads

The lifecycle of Missouri's roads is greatly affected by the state's ability to perform timely maintenance to ensure that structures last as long as possible. The pavement condition of the state's major roads are evaluated and classified as being in poor, mediocre, fair or good condition. Roads rated poor are badly cracked or broken. In some cases, poor roads can be resurfaced, but often are too deteriorated and must be reconstructed. A desirable goal for state and local organizations that are responsible for road maintenance is to keep 75 percent of major roads in good condition.

It is critical that roads are fixed before they require major repairs because reconstructing roads cost four to five times more than resurfacing them. Based on 2000 data supplied by state and local governments, FHWA reports that 59 percent of Missouri's major roads are in either poor or mediocre condition (21 percent in poor condition and 38 percent in mediocre condition). Missouri has the third-highest percentage of major roads in poor or mediocre condition in the country. In addition, 28 percent of major roads in the St. Louis metropolitan region are in poor condition, and 24 percent are in poor condition in the Kansas City area.

Bridge Conditions in Missouri

Missouri's bridges form key links in the state's highway system, providing communities and individuals access to employment, schools, shopping and medical facilities, as well as facilitating commerce and access for emergency vehicles.

The state's bridges are inspected on a regular basis. Based on inspection data for 2001, 26 percent of bridges in the state that are twenty feet or longer, are in need of repair or replacement because they have significant deterioration and have been rated structurally deficient. Missouri has the second-highest percentage of bridges rated structurally deficient in the country.

A bridge is structurally deficient if there is significant deterioration of the bridge deck, supports or other major components. Bridges that are structurally deficient are often posted for lower weight or are closed if they are found to be unsafe.

Bridge deficiencies have an impact on mobility and safety within the state. Restrictions on vehicle weight may cause many vehicles – especially emergency vehicles, commercial trucks, school buses and farm equipment – to use alternate routes to avoid these bridges. Narrow bridge lanes, inadequate underclearances and poorly aligned bridge approaches reduce traffic safety. Redirected trips lengthen travel time, waste fuel and reduce the efficiency of the local economy.

Vehicle Operating Costs

Motorists incur additional vehicle operating costs as roads deteriorate; these costs rise as vehicle travel increases on roads in need of repair or reconstruction.

Additional vehicle operating costs have been calculated in the Highway Development and Management Model (HDM), which is recognized by the U.S. Department of Transportation and more than 100 other countries as the definitive analysis of the impact of road conditions on vehicle operating costs. The HDM report is based on numerous studies that have measured the impact of various factors, including road conditions, on vehicle operating costs.

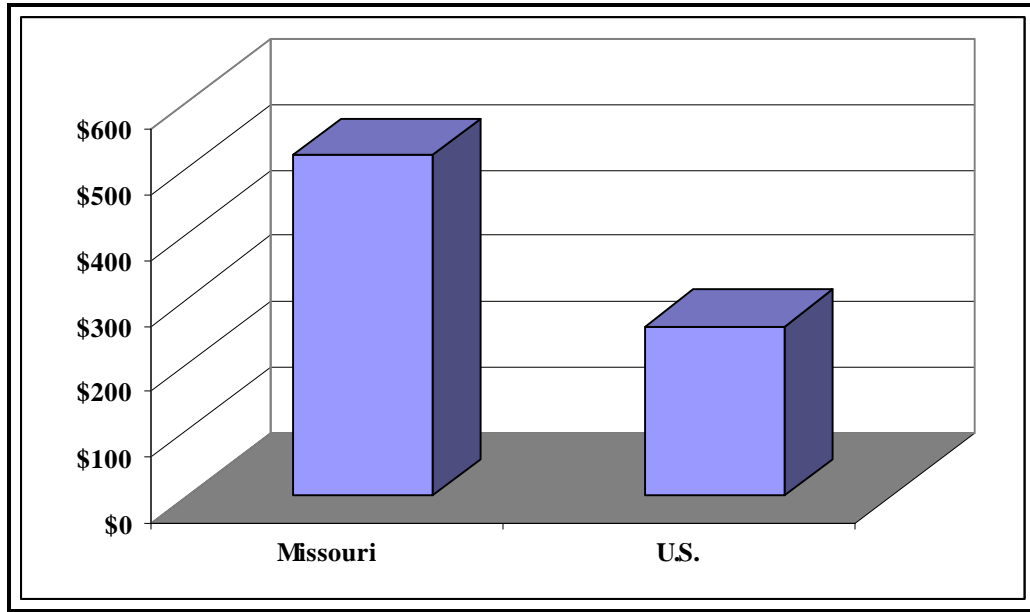
The HDM study found that road deterioration increases ownership, repair, fuel and tire costs. The report found that deteriorated roads accelerate the pace of depreciation of vehicles and the need for repairs because the stress on the vehicle increases in proportion to the level of roughness of the pavement surface. Similarly, tire wear and fuel consumption increase as roads deteriorate since there is less efficient transfer of power to the drive train and additional friction between the road and the tires.

TRIP's additional vehicle operating cost estimate is based on taking the average number of miles driven annually by a region's driver, calculating current vehicle operating costs based on the Automobile Association of America's 2001 vehicle operating costs and then using the HDM model to estimate the additional vehicle operating costs being paid by drivers as a result of substandard roads. Additional

research on the impact of road conditions on fuel consumption by the Texas Transportation Institute (TTI) is also factored into the TRIP vehicle operating cost methodology.

TRIP estimates that driving on roads in need of repair costs Missouri's motorists \$2 billion a year in extra vehicle operating costs -- \$520 per driver. The national average is \$259 per driver.

Chart 4. Extra Vehicle Operating Costs Per Driver in Missouri and the U.S.



Source: TRIP data

Traffic Congestion Relief

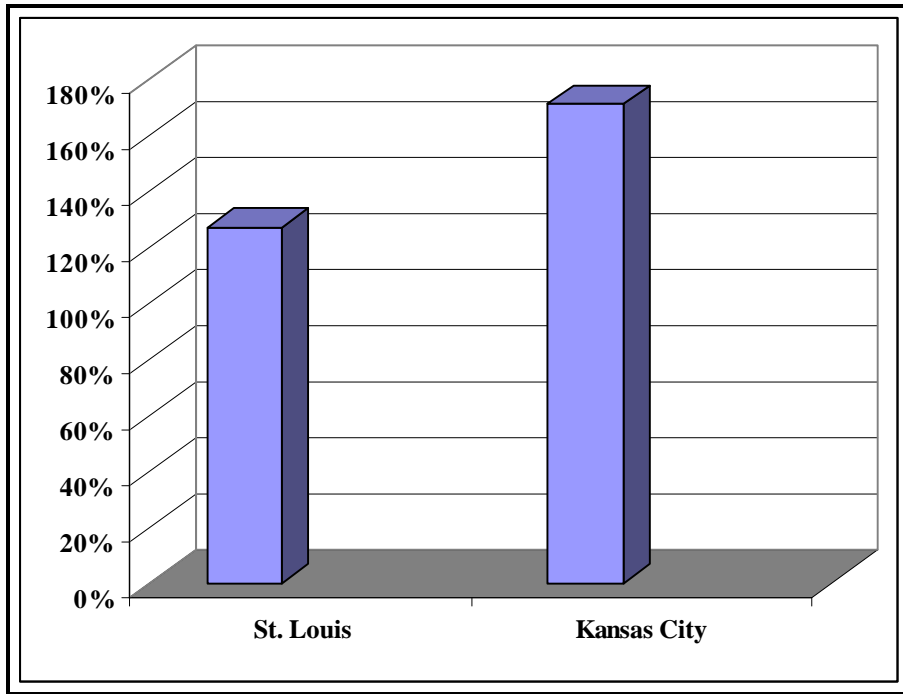
An analysis of Federal Highway Administration data finds that 35 percent of Missouri's urban Interstates, freeways and other major routes are high volume roads, often-carrying more traffic than they were designed to carry.

In Missouri, 603 out of 1,743 miles, of the state's major roads carry a high volume of traffic. A high volume of traffic for freeways and Interstates is considered 60,000 vehicles per day. For non-freeway major roads – Missouri's other principal arterials -- a high volume of traffic is considered to be 20,000 vehicles a day, based on FHWA reports. Freeways can carry a higher amount of traffic before they are considered congested because they do not have signalized intersections and traffic is able to enter and exit freeways with less disruption to through traffic.

Urban traffic congestion continues to hinder mobility and increase costs in the state's major cities, St. Louis and Kansas City, according to the 2002 Urban Mobility Report published by the Texas Transportation Institute (TTI), which is affiliated with Texas A & M University. The report found that the annual delay per rush hour driver in the St. Louis urban area increased by 127 percent from 1990 to 2000, from 19 hours to 43 hours. Over the same time period, the annual delay per rush hour driver in the Kansas City metro region increased by 171 percent, from 7 hours to 19 hours. Delays and wasted fuel caused by delays add up to millions in extra costs to St. Louis and Kansas City motorists. In St. Louis the annual traffic congestion cost in 2000 was \$805 million, or

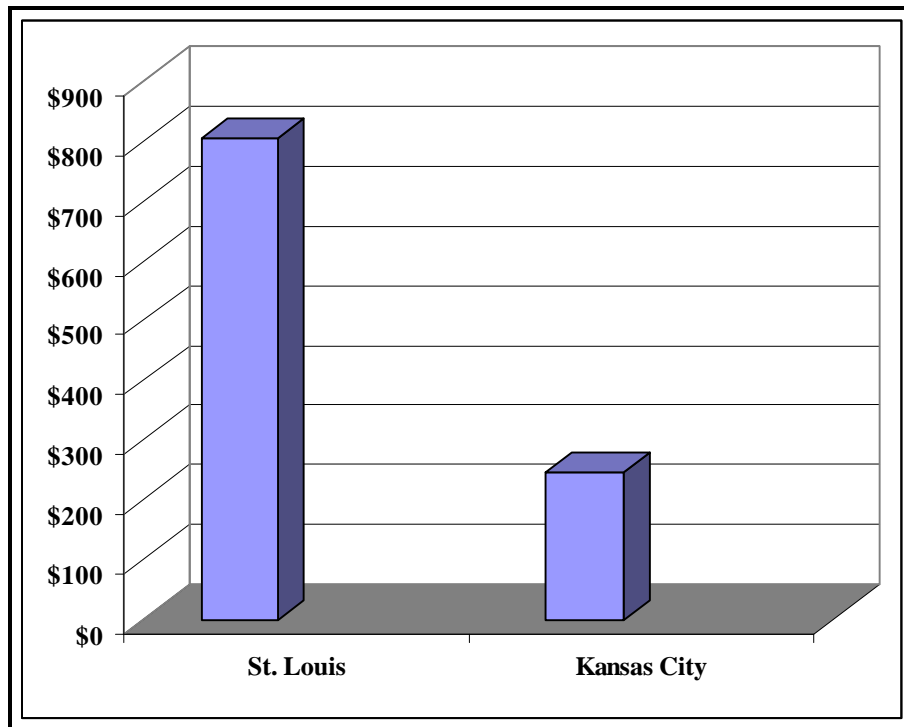
\$840 per rush hour driver. In Kansas City, the total congestion cost in 2000 was \$245 million annually, or \$365 per rush hour driver.

Chart 5. Increase in Annual Traffic Congestion Delays in St. Louis and Kansas City, 1990 to 2000



Source: TRIP analysis of Texas Transportation Institute (TTI) data

Chart 6. Annual Traffic Congestion Costs in St. Louis and Kansas City, 2000 (millions)



Source: TRIP analysis of Texas Transportation Institute (TTI) data

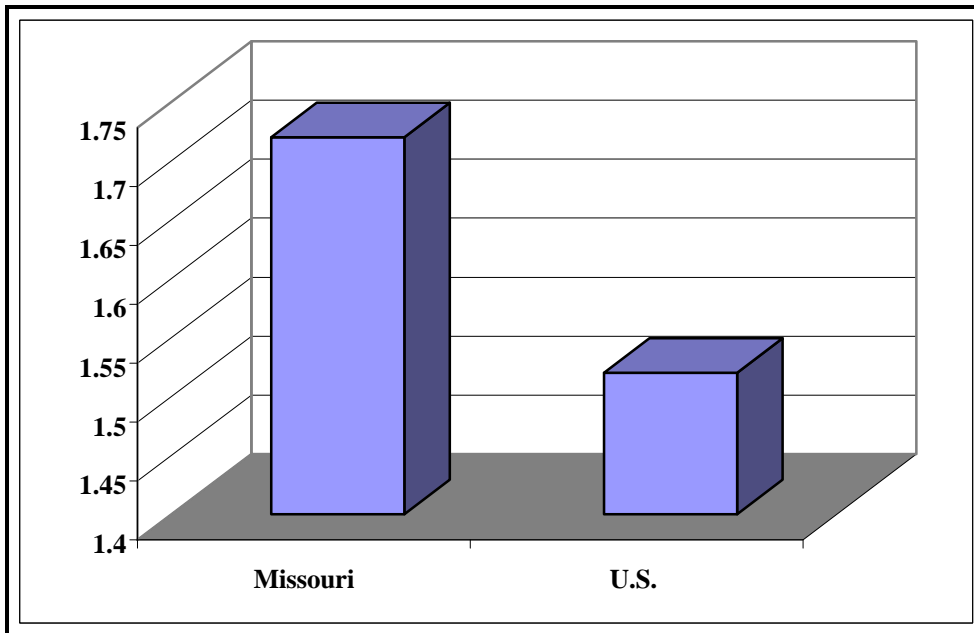
Congestion-related delays are increasing commute times in Missouri. The average commute in Missouri in 2000 was 23.8 minutes, up 10 percent from 21.6 minutes in 1990, according to the U.S. Census Bureau. In St. Louis, average commute times jumped 10 percent in the 1990s, from 23.2 minutes to 25.5 minutes, while they increased seven percent in Kansas City, from 21.5 minutes to 22.9 minutes, over the same time period. These delays meant that commuters in St. Louis spent an additional 19 hours annually in 2000 getting to work, while Kansas City commuters needed an extra 12 hours during the same year, compared to 2000.

Traffic Safety

The level of highway safety is influenced by three factors: driver behavior, vehicle characteristics and roadway design, such as lane width, number of lanes, traffic separation and highway alignment. The condition and design of a road or bridge can have a significant impact on safety. Factors such as the number of lanes, whether median barriers exist, the width of lanes and shoulders, the angle of curves, whether pavements are in good condition, and whether intersections have turn lanes have significant impact on overall safety. Roadway conditions are a factor in an estimated 30 percent of traffic fatalities nationwide.

Missouri's traffic fatality rate per 100 million VMT of 1.72 is higher than the national average of 1.52. A total of 6,870 people were killed in motor vehicle accidents in Missouri from 1995 through 2000. In 2000 alone, 1,157 people died in motor vehicle crashes statewide, the FHWA reported. If Missouri's traffic fatality rate was reduced to the national average, it would save approximately 134 lives annually.

Chart 7. Traffic Fatality Rates per 100 million VMT in Missouri and the U.S.



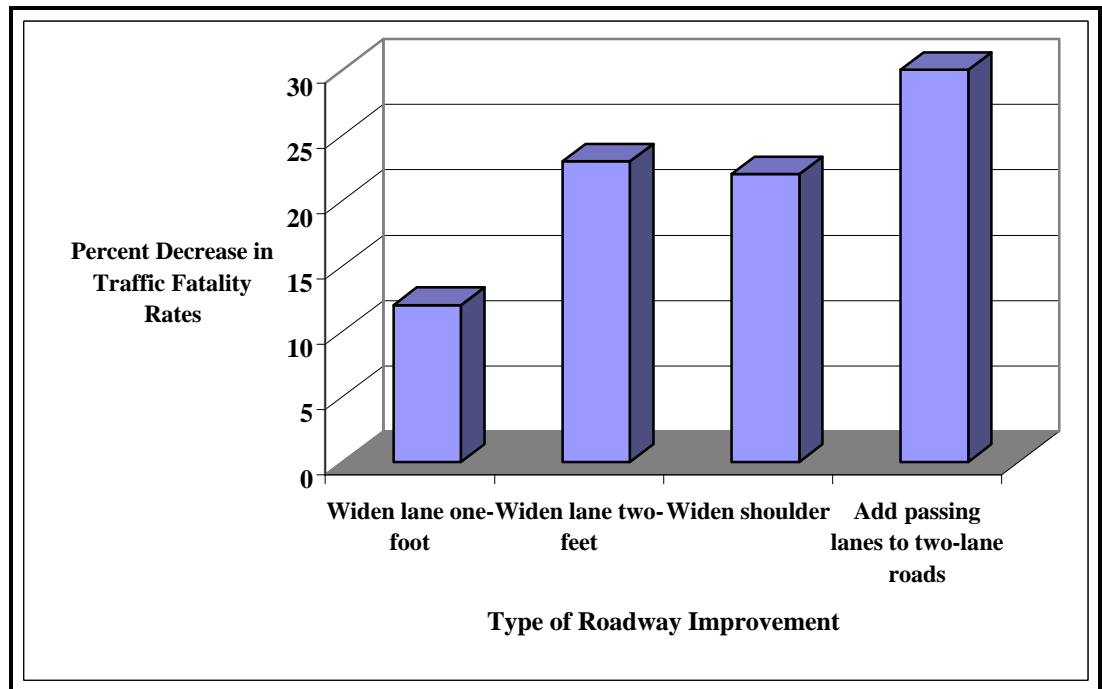
Source: TRIP analysis of FHWA data

Increased investment in road and bridge repairs can help save lives in Missouri. The FHWA has found that every \$100 million spent on highway safety improvements will result in 145 fewer traffic fatalities over a 10-year period. Highway improvements such as widening lanes and shoulders, adding or improving medians and upgrading roads from two lanes to four lanes can reduce traffic fatalities and accidents. Widening a lane by one foot can reduce accidents by 12 percent. Widening a lane by two feet reduces accidents by 23 percent. Widening a shoulder has been found to reduce fatal accidents by 20 percent. Also, adding intermittent passing lanes to two-lane roads have reduced fatalities by 30 percent.

Studies have also shown that four-lane roads are safer than two-lane roads. More than 77 percent of all fatal crashes in the U.S. occur on two-lane roads while only 14 percent

of fatal crashes occur on roads with four or more lanes. In Missouri, 62 percent of major roads, excluding Interstates, are two-lanes.

Chart 8. How Roadway Improvements Reduce Traffic Fatality Rates



Source: TRIP analysis of FHWA data

Highway Funding

Increased investment in Missouri’s road and bridge system would help improve pavement and bridge conditions, improve traffic safety and alleviate traffic congestion. Road and bridge improvements in Missouri are funded through a number of revenue sources, including the state motor fuels tax and the Federal Highway Trust Fund. Funds generated through federal motor taxes are deposited in the Highway Trust Fund and then

distributed to the states based on formula. States depend on federal highway funding to finance a significant portion of their highway programs.

The federal motor fuels tax is 18.4 cents per gallon. The state motor fuels tax is 17 cents per gallon. These are user fees, paid by motorists who travel Missouri's roads and bridges.

In 2002, Missouri received \$647 million in federal highway funds. However, current Congressional proposals would reduce federal highway funding to the states by 10 to 15 percent in 2003, which would cut Missouri's share by as much as \$97 million. Faced with these possible federal cuts, increased state and local funding will be necessary to make needed road and bridge improvements in Missouri.

On August 6, Missouri residents will vote on Proposition B, which, if passed, would generate \$483 million annually over 10 years for transportation improvements statewide. Proposition B would provide \$364 million for road and bridge improvements on the state system, \$61 million for other transportation modes, including public transit, and \$6 million for biodiesel and ethanol producers. Missouri cities and counties would also receive \$52 million for local transportation improvements.

Proposition B would increase Missouri's state motor fuels tax by four cents, from 17 cents to 21 cents, and the state's general sales tax by a half-cent, from 4.225 to 4.725

percent. If approved, these changes would take effect Jan. 1, 2003 and continue through June 30, 2013.

Conclusion

Missouri has an opportunity to dramatically improve the safety of its highway system by investing in needed road and bridge improvements. With expected federal highway funding cuts, increases in state and local investment are needed to improve pavement and bridge conditions, alleviate urban traffic congestion and improve traffic safety statewide.

Missouri has a significant challenge to overcome. The state must try to meet the mobility needs of a growing population and commercial trucking that is a fundamental part of the state's economic development, while at the same time reducing the high number of traffic fatalities on its roads. More than 1,000 people were killed in motor vehicle accidents in 2000. Studies indicate that improving road and bridge conditions can help save lives.

Missouri stands to lose nearly \$100 million in federal highway funds in the coming fiscal year under current Congressional proposals, so local and state funding is crucial to any improvements to the state's highway system.