

# **Moving Kansas Forward:**

## **The Condition and Funding of Kansas’ Roads, Highways & Bridges**

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Prepared by:

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Founded in 1971, 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

Kansas' extensive system of roads, highways and bridges provides the state's residents, visitors and businesses with a high level of mobility. As the backbone that supports the Sunflower State's economy, Kansas' surface transportation system provides for travel to work and school, visits to family and friends, and trips to tourist and recreation attractions.

As Kansas looks to rebound from the current economic downturn, the state will need to modernize its surface transportation system by improving the physical condition of its transportation network and by enhancing the system's ability to provide efficient and reliable mobility for residents, visitors and businesses. Making needed improvements to Kansas's roads, highways, bridges and transit could provide a significant boost to the state's economy by creating jobs and stimulating long-term economic growth as a result of enhanced mobility.

The federal government is an essential source of funding for the ongoing modernization of Kansas' roads, highways, bridges and transit. But recent declines in federal transportation revenues are making it more difficult for the state to maintain and improve its transportation system.

Approved in February 2009, the American Recovery and Reinvestment Act provides approximately \$348 million in stimulus funding for highway and bridge improvements and \$31 million for public transit improvements in Kansas. This funding can serve as a down payment on needed road, highway, bridge and transit improvements, but it is not sufficient to allow the state to proceed with numerous projects needed to enhance its surface transportation system. Meeting Kansas' need to repair, expand and maintain its system of roads, highways, bridges and transit will require a significant, long-term boost in transportation funding at the federal, state or local levels.

This year, Congress will deliberate over a long-range federal surface transportation program. The current program, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), expires on September 30, 2009. The level of funding and the provisions of a future federal surface transportation program will have a significant impact on future highway and bridge conditions and safety as well as level of transit service in Kansas, which, in turn, will affect the state's ability to improve quality of life and enhance economic development opportunities.

**Kansas faces a \$6.4 billion gap over the next 10 years in needed funding to allow the state to maintain the condition of its major roads, highways and bridges and to relieve traffic congestion and enhance economic development opportunities by expanding key sections of the state's roadway system and making improvements to the state's public transit system.**

- The Transportation-Leveraging Investments in Kansas Task Force (T-LINK), which included business, government and industry leaders, concluded in January 2009 that over the next 10 years, Kansas will have an annual shortfall in surface transportation funding of \$640 million, based on the investment level recommended by T-LINK.

- Unless Kansas is able to close its transportation funding gap, the task force concluded that the condition of the state's roads, highways and bridges will deteriorate, traffic congestion will worsen and economic development opportunities in the state will be lost.
- If Kansas is able to fully fund its transportation program at the level recommended by T-LINK, it would be able to maintain roads, highways and bridges in their current condition and fund approximately half of the road and highway capacity expansions recommended in the report to relieve traffic congestion and support statewide economic opportunities.
- At current investment levels, T-LINK found that traffic congestion in the state will worsen. By 2030, the miles of urban highways that are congested in Kansas will increase by two-and-a-half times, from 105 miles to 265 miles. And miles of rural highways in the state experiencing periodic congestion will more than triple during the same time, increasing from 535 miles to 1,725 miles.

**The federal surface transportation program is an essential source of funding for the construction, maintenance and improvement of Kansas' system of roads, highways, bridges and public transit. The American Recovery and Reinvestment Act will further provide a helpful boost to surface transportation funding in the state.**

- The current federal surface transportation program expires on September 30, 2009 and needs to be reauthorized by this date or funding under the program will cease.
- The level of funding and the provisions of a future federal surface transportation program will have a significant impact on future highway, bridge and transit conditions, levels of traffic congestion, and safety in Kansas. The future condition of Kansas' surface transportation system will have a critical effect on the state's ability to improve its residents' quality of life and to enhance economic development opportunities.
- From 1998 to 2008, Kansas received approximately \$4 billion in federal funding for road, highway and bridge improvements, and \$278 million for public transit, a total of approximately \$4.3 billion.
- Federal funds provide 32 percent of revenues used annually by the Kansas Department of Transportation to pay for road, highway and bridge construction, repairs and maintenance.
- Federal funds provide 36 percent of the revenue used annually to pay for the operation of and capital improvements to the state's public transit systems, which includes the purchase and repair of vehicles and the construction of transit facilities.
- The American Recovery and Reinvestment Act provides approximately \$348 million in stimulus funding for highway and bridge improvements and \$31 million for public transit improvements in Kansas.

- Due to inadequate revenue being collected into the Federal Highway Trust Fund, federal funding for highways and transit in Kansas may be cut significantly starting October 1, 2009. The Congressional Budget Office estimates that Kansas' federal highway dollars will be cut by 38 percent in FY 2010 unless Congress takes steps to eliminate the shortfall in the Federal Highway Trust Fund.

**Without a significant boost in federal or state transportation funding, Kansas will be unable to move forward with numerous projects needed to improve traffic safety, enhance economic development opportunities, relieve traffic congestion and maintain overall conditions. The rapid increase in the cost of key materials needed for highway and bridge construction also threatens the state's ability to fund needed projects. This report includes a list of needed transportation projects that cannot move forward unless additional transportation funding is secured.**

- Unless additional funding can be secured, numerous projects to modernize and expand key segments and interchanges of the state's highway network can not proceed. These projects include the following: US-69 from Pittsburg to I-44 at the Oklahoma state line, the Northwest Wichita bypass from K-96 to US-54, US-69 in Kansas City from 119<sup>th</sup> St. to I-435 and I-235 in Wichita at the US-54 and Central Avenue interchanges. A full list of needed highway improvements that cannot move forward is included in this report.
- Unless the state can secure additional transportation funding, significant bridge repairs and replacements cannot proceed. These projects include the following: the I-70 Polk-Quincy Viaduct in downtown Topeka, the US-24 bridge over Huntress Creek in Clay County, and K-25 bridge over the North Fork of Sappa Creek in Rawlins County. A full list of needed bridge improvements that cannot move forward is included in this report.
- Needed "mega projects" in Kansas that are unlikely to proceed without a boost in federal, state or local funding include the I-35/I-435/K-10 interchange in Kansas City and the I-235/Kellogg/Central interchange complex in Wichita.
- Further compounding Kansas' transportation funding shortfall is the escalation of the cost of roadway improvements due to rapid increases in the price of key materials needed for highway and bridge construction. Over the five-year period from May 2004 to May 2009 the average cost of materials used for highway construction, including asphalt, concrete, steel, lumber and diesel has increased 37 percent.

**Although overall pavement conditions in Kansas are relatively good, some deficiencies exist and must be repaired. This report identifies the sections of Kansas roads and highways that are most in need of repair or replacement.**

- Of the 11,215 miles of state maintained roads and highways in Kansas, 74 miles (less than one percent) were in poor condition in 2009 and 665 miles (six percent) of state-maintained roads were in mediocre condition.

- While pavement surfaces in the state have generally been maintained in good condition through routine resurfacing, numerous sections of Kansas' roadways are reaching an age when they will require more costly repairs and reconstruction.
- Driving on roads in need of repair costs Kansas' motorists \$628 million annually – \$318 per driver –in extra vehicle operating costs, including accelerated vehicle depreciation, additional repair costs and increased fuel consumption and tire wear.
- Included in this report is a list of segments of deteriorated roadway in the state that are most in need of repair or replacement. The following are the top ten segments on that list.

	Route	County/City	From	To	Length	Work Needed
1	U-81	Sedgwick	6	8	2	Resurface
2	U-24	Osborne	31	34.1	3.1	Address Transverse Cracking
3	U-83	Seward	3	5	2	Resurface
4	I-70	Sherman	0	12	12	Heavy Rehab
5	K-31	Osage	16.2	22.9	6.7	Rehab
6	K-27	Stanton	13.1	24.1	11	Address Transverse Cracking
7	I-435	Wyandotte	0.4	4	3.6	Address Transverse Cracking
8	U-24	Leavenworth	0	9.3	9.3	Address Transverse Cracking
9	I-435	Johnson	13	16.1	3.1	Address Transverse Cracking
10	U-69	Crawford	10	12	2	Address Transverse Cracking

**One in five bridges in Kansas is structurally deficient or functionally obsolete. Deficient bridges impact commercial and personal mobility as well as safety. This report contains a list of bridges in the state with the lowest sufficiency rating.**

- Eleven percent of Kansas' bridges are rated as structurally deficient, showing significant deterioration to decks and other major components. 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 restricted to carrying lower weight vehicles or are closed if they are found to be unsafe.
- The classification of a bridge as "structurally deficient" does not mean the structure is unsafe. Kansas' bridge safety inspection program ensures that each bridge is safe for vehicles weighing less than the posted weight limit. If the inspection determines a bridge to be unsafe for vehicles, the bridge is closed or posted for lower weight vehicles until repaired or replaced.
- Nine percent of Kansas' bridges are functionally obsolete. Functionally obsolete bridges are those that do not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand. These bridges are not automatically rated as structurally deficient, nor are they inherently unsafe.

- Bridge deficiencies have an impact on mobility and safety. 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 clearances and poorly aligned bridge approaches reduce traffic safety. Redirected trips lengthen travel time, waste fuel and reduce the efficiency of the local economy.
- The overall rating for bridges is determined based on deck, substructure and superstructure conditions, as well as the amount of traffic carried by the bridge and the length of a detour that would be required if the bridge were closed.
- This report contains a list of Kansas’ most-heavily traveled structurally deficient bridges, with average daily traffic (ADT) of at least 1,000 vehicles. The following chart lists the ten Kansas bridges with the lowest overall ratings.

Rank	Route	Closest City	Route or feature intersected	ADT	Year built
1	56	Rural	110 MILE CREEK DRAINAGE	2,810	1926
2	77	Rural	BIG BLUE RIVER	2,630	1950
3	59	Atchison	MO RIV, MOPACRR,RD	9,020	1938
4	54	Rural	CLEAR CREEK	8,300	1969
5	24	Rural	UNION PACIFIC RAILROAD	8,600	1957
6	40	Lawrence	NB ACCESS TO KTA 59	29,200	1956
7	70	Kansas City	PACIFIC AVENUE	42,000	1959
8	400	Dodge	ARKANSAS RIVER DRAINAGE	14,200	1932
9	40	Lawrence	ACCESS KTA TO SB 59	26,400	1956
10	99	Rural	EAGLE CREEK	1,920	1934

**Due to increases in population, economic growth and vehicle travel, Kansas’ system of roads and bridges is under more stress than ever.**

- Kansas’ population increased 13 percent since 1990, from 2.5 million in 1990 to 2.8 million residents in 2008. Kansas’ population is expected to increase to 3.1 million residents by 2025.
- Vehicle travel on Kansas’ major highways increased 27 percent between 1990 and 2008, rising from 22.8 billion vehicle miles traveled in 1990 to 29 billion vehicle miles traveled in 2008.
- Vehicle travel in the state is expected to increase by 30 percent by 2025.
- Kansas has also experienced significant economic growth since 1990. From 1990 to 2008, Kansas’ gross domestic product (GDP), a measure of the state’s economic output, increased by 45 percent, when adjusted for inflation.

**An average of 431 people were killed each year in crashes on Kansas' roads from 2004 to 2008. Improving safety features on Kansas' roads and highways would likely result in a decrease in traffic fatalities in the state. Roadway design is an important factor in approximately one-third of fatal and serious traffic accidents.**

- A total of 2,156 people were killed in Kansas in traffic accidents from 2004 to 2008, an average of 431 fatalities per year.
- In 2008, Kansas had a traffic fatality rate of 1.33 fatalities per 100 million vehicle miles traveled, slightly higher than the national average of 1.27.
- Where appropriate, highway improvements such as removing or shielding obstacles, adding or improving medians, adding rumble strips, widening lanes, widening and paving shoulders, upgrading roads from two lanes to four lanes, and installing better road markings and traffic signals can reduce traffic fatalities and accidents while improving traffic flow to help relieve congestion.
- Motor vehicle crashes cost Kansas \$1.9 billion per year, \$701 for each resident, in medical costs, lost productivity, travel delays, workplace costs, insurance costs and legal costs.
- The Federal Highway Administration has found that every \$100 million spent on needed highway safety improvements will result in 145 fewer traffic fatalities over a 10-year period.

**Two congressionally appointed commissions and a national organization representing state transportation departments have recommended a broad overhaul of the Federal Surface Transportation Program to improve mobility, safety and the physical condition of the nation's surface transportation system by significantly boosting funding, consolidating the program into fewer categories, speeding up project delivery and requiring greater accountability in project selection.**

- The National Surface Transportation Policy and Revenue Study Commission (NSTPRSC) and the National Surface Transportation Infrastructure Financing Commission (NSTIFC) were created by Congress to examine the current condition and future funding needs of the nation's surface transportation program, develop a plan to insure the nation's surface transportation system meets America's future mobility needs and to recommend future funding mechanisms to pay for the preservation and improvement of the nation's roads, highways, bridges and public transit systems.
- The NSTPRSC concluded that it is critical to the future quality of life of Americans that the nation create and sustain the preeminent surface transportation system in the world, one that is well-maintained, safe and reliable.
- The NSTIFC found that the U.S. faces a \$2.3 trillion funding shortfall over the next 25 years in maintaining and making needed improvements to the nation's surface transportation system.

- The NSTIFC found that the use of motor fuel fees is not sustainable as a primary source of funding for the nation's surface transportation system because of the shift to a variety of fuel sources and more fuel efficient vehicles.

**Key recommendations of the Commissions and of the American Association of State Highway Transportation Officials (AASHTO) include:**

**Program format:**

- Allocate funding through outcome-based, performance-driven programs supported by cost/benefit evaluations rather than political earmarking (NSTPRSC).
- Consolidate the more than 100 current transportation funding programs into 10 programs focused on key areas of national interest, including congestion relief, preservation of roads and bridges, improved freight transportation, improved roadway safety, improved rural access, improved environmental stewardship, and the development of environmentally-friendly energy sources (NSTPRSC).
- Speed up project development processes to reduce the excessive time required to move projects from initiation to completion by better coordinating the development and review process for transportation projects (NSTPRSC).
- Develop a future federal surface transportation program that would be accountable for results, would make investments based on community needs and would deliver projects on time and on budget (AASHTO).
- Provide a federal surface transportation program that is based on state-driven performance measures and is focused on six objectives of national interest: preservation and renewal, interstate commerce, safety, congestion reduction and connectivity for urban and rural areas, system operations, and environmental protection (AASHTO).

**Funding:**

- Shift the collection of federal surface transportation revenues from fuel taxes to mileage-based fees, which would charge motorists a fee based on the number of miles driven, with full deployment of a comprehensive system in place by 2020 (NSTIFC).
- Ensure that once implemented, mileage-based fees were indexed to inflation and that they and any other federal transportation charges were set at a rate that would provide enough revenue to provide adequate federal funding to ensure that the nation achieve an integrated national transportation system that is less congested and safer and that promotes increased productivity, stronger national competitiveness, and improved environmental outcomes (NSTIFC).
- Failure to address the immediate funding shortfall and provide adequate long-term funding for surface transportation will lead to unimaginable levels of congestion, reduced safety, costlier goods and services, eroded quality of life and diminished economic competitiveness (NSTIFC).

- In the short term, significantly boost the current federal motor fuel tax and index it to inflation to support increased federal surface transportation investment (NSTIFC).
- Expand the ability to use additional surface transportation funding sources including tolling, state investment banks and public-private partnerships as a supplement to primary sources of funding such as motor fuel fees and eventually a mileage-based fee (NSTIFC).

**The efficiency of Kansas' transportation system, particularly its highways, is critical to the health of the state's economy. Businesses depend on an efficient and reliable transportation system to move products and services. A key component in business efficiency and success is the level and ease of access to customers, markets, materials and workers.**

- Every year, \$95 billion in goods are shipped annually from sites in Kansas and another \$87 billion in goods are shipped annually to sites in Kansas, mostly by truck.
- Seventy-three percent of the goods shipped annually from sites in Kansas are carried by trucks and another six percent are carried by courier services, which use trucks for part of the deliveries. Similarly, 78 percent of the goods shipped to sites in Kansas are carried by trucks and another 11 percent are carried by courier services.
- Commercial trucking in Kansas is projected to increase 30 percent by 2020.
- Businesses have responded to improved communications and greater competition by moving from a push-style distribution system, which relies on low-cost movement of bulk commodities and large-scale warehousing, to a pull-style distribution system, which relies on smaller, more strategic and time-sensitive movement of goods.
- Increasingly, companies are looking at the quality of a region's transportation system when deciding where to re-locate or expand. Regions with congested or poorly maintained roads may see businesses relocate to areas with a smoother, more efficient transportation system.

*All data used in the report is the latest available. Sources of information for this study include the U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA), the U.S. Census Bureau, the National Highway Traffic Safety Administration (NHTSA), the Texas Transportation Institute (TTI), the Reason Foundation, the Bureau of Transportation Statistics (BTS), the Kansas Transportation Finance Commission and the Kansas Department of Transportation.*

## **Introduction**

Kansas' system of roads and bridges provides the state's 2.8 million residents and its visitors with a high level of mobility. The state's extensive system of roads and bridges serves as the backbone of Kansas' economy and enables residents and visitors to go to work, visit family and friends, move goods to market, and frequent tourist and recreational attractions.

The continued improvement and expansion of Kansas' highway transportation system is crucial to providing a safer, more efficient transportation system, while improving the economic livelihood of the state and accommodating future growth.

As the nation looks to rebound from the current economic downturn, the improvement of Kansas' transportation system could play an important role in improving the state's economic well being by providing critically needed jobs in the short term and by improving the productivity and competitiveness of the state's businesses in the long term.

While state and local governments are responsible for maintaining most of Kansas' roadways, bridges and public transit systems, the federal government plays a significant role in funding the repairs and improvements of many of the state's most heavily used roads, highways, bridges and public transit systems. As Kansas faces the challenge of preserving and improving its transportation system, the future level of federal highway funding will be a critical factor in whether the state's residents, businesses and visitors continue to enjoy access to a safe and efficient transportation network.

This report examines the condition, use and safety of Kansas' roads, highways, bridges and public transit systems, the level of federal funding in the maintenance and improvement of the state's surface transportation system and the future mobility needs of the state. Lists are included of highway, bridge and transit projects that have been completed with the help of

federal funding, and needed transportation projects that will require significant federal funding to proceed.

## **Population and Travel Trends in Kansas**

Kansas residents enjoy modern lifestyles that rely on a high level of personal and commercial mobility. Increases in both the state's population and the amount of travel of its residents and visitors have led to additional demands being placed on Kansas' surface transportation system, particularly its key highways and roads. It is critical that Kansas develop and maintain a transportation system that can accommodate future growth in population, vehicle travel and economic development.

Kansas' population reached 2.8 million in 2008, increasing 13 percent since 1990, when the state's population was approximately 2.5 million.<sup>1</sup> The state's population is expected to increase to 3.1 million by 2025.<sup>2</sup>

Significant population and economic growth in Kansas have resulted in a corresponding increase in vehicle travel in the state. From 1990 to 2008, annual vehicle miles of travel (VMT) in Kansas increased by 27 percent, from 22.8 billion annual VMT to 29 billion VMT.<sup>3</sup> Vehicle travel in Kansas is expected to increase by 30 percent by 2025 to approximately 39 billion annual VMT.<sup>4</sup>

Kansas has also experienced significant economic growth since 1990. From 1990 to 2008, Kansas' gross domestic product (GDP), a measure of the state's economic output, increased by 45 percent, when adjusted for inflation.

## Bridge Conditions in Kansas

Kansas' 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 regularly to determine their overall condition and to identify bridges that are in need of repair or replacement. Bridges are rated on a scale that takes into account structural adequacy, serviceability, how essential the bridge is for public use, and the importance of the bridge to public transportation in the area. The individual components of the bridge, including the deck, substructure and superstructure are also rated. These figures combine into an overall bridge sufficiency rating.

Eleven percent of the bridges (20 feet or longer) in Kansas were rated structurally deficient in 2008.<sup>5</sup> A bridge is structurally deficient if there is significant deterioration of the bridge deck, supports or other major components. Bridges that are structurally deficient may be posted for lower weight limits or closed if their condition warrants such action. Deteriorated bridges can have a significant impact on daily life. Restrictions on vehicle weight may cause many vehicles – especially emergency vehicles, commercial trucks, school buses and farm equipment – to use alternate routes to avoid posted bridges. Redirected trips also lengthen travel time, waste fuel and reduce the efficiency of the local economy.

Nine percent of Kansas' bridges (20 feet or longer) were rated as functionally obsolete in 2008.<sup>6</sup> Bridges that are functionally obsolete no longer meet current highway design standards, often because of narrow lanes, inadequate clearances or poor alignment. The following chart

details the number and percentage of structurally deficient and functionally obsolete bridges in Kansas.

**Chart 1. Bridge Conditions in Kansas**

<b>BRIDGE CONDITION</b>	<b>NUMBER OF BRIDGES</b>	<b>PERCENTAGE OF BRIDGES</b>
Structurally Deficient	2,877	11%
Functionally Obsolete	2,319	9%
Total Deficient Bridges	5,196	
Total Number of Bridges	25,514	

**Source: 2008 National Bridge Inventory**

The Kansas Department of Transportation has provided a list of the 50 bridges in the state that have the lowest overall rating. The overall rating for bridges is determined based on deck, substructure and superstructure conditions, as well as the amount of traffic carried by the bridge and the length of a detour that would be required if the bridge was closed.

**Chart 2. Kansas bridges with lowest overall rating.**

<b>Rank</b>	<b>Route</b>	<b>Closest City</b>	<b>Route or feature intersected</b>	<b>Daily Traffic</b>	<b>Year built</b>
1	56	Rural	110 MILE CREEK DRAINAGE	2,810	1926
2	77	Rural	BIG BLUE RIVER	2,630	1950
3	59	Atchison	MO RIV, MOPACRR,RD	9,020	1938
4	54	Rural	CLEAR CREEK	8,300	1969
5	24	Rural	UNION PACIFIC RAILROAD	8,600	1957
6	40	Lawrence	NB ACCESS TO KTA 59	29,200	1956
7	70	Kansas City	PACIFIC AVENUE	42,000	1959
8	400	Dodge	ARKANSAS RIVER DRAINAGE	14,200	1932
9	40	Lawrence	ACCESS KIA TO SB 59	26,400	1956
10	99	Rural	EAGLE CREEK	1,920	1934
11	4	Rural	COW CREEK DRAINAGE	1,220	1951
12	70	Rural	LOCAL ROAD	15,100	1959
13	36	Rural	PRAIRIE DOG CR DRAINAGE	2,340	1954
14	15	Rural	REPUBLICAN RIVER DRN	2,680	1931
15	56	Baldwin City	EAST FORK TAUY CREEK	5,030	1929

**Source: KDOT response to TRIP survey**

Chart 2. Kansas bridges with lowest overall rating (continued)

Rank	Route	Closest City	Route or feature intersected	Daily Traffic	Year built
16	70	Kansas City	KANSAS RIVER,3 RR,5 ST	26,950	1907
17	13	Rural	CEDAR CREEK	1,840	1960
18	169	Rural	ABANDONED ATSF RR	3,510	1954
19	247	Rural	I-70 HWY (KTA)	1,270	1956
20	54	Kingman	S F NINNESCAH RIV DRG	10,000	1929
21	36	Rural	NORTON RES DRAIN	1,005	1943
22	69	Rural	MARAIS DES CYGNES R DRG	4,470	1924
23	160	Rural	CAMP CREEK	1,020	1924
24	281	Rural	SELLENS CREEK	1,270	1935
25	70	Rural	SMOKY HILL RIVER DRAIN	10,300	1963
26	24	Rural	BOURBONAIS CREEK	4,690	1931
27	209	Rural	I-70 HWY (KTA)	1,060	1956
28	35	Emporia	URB1109, LINCOLN ST	20,400	1965
29	92	Leavenworth	MISSOURI RIVER, MOPAC RR	11,400	1954
30	99	Rural	HOMER CREEK	1,090	1931
31	152	Rural	MARAIS DES CYGNES RIVER	2,290	1938
32	0	Rural	I-35 HWY (KTA)	4,420	1956
33	56	Ellinwood	ARKANSAS RIVER DRAINAGE	4,700	1931
34	56	Rural	MIDDLE FRK TAUY CR DRG	4,490	1929
35	169	Kansas City	UP RR, LOCAL STREET	21,800	1924
36	69	Rural	MARAIS DES CYGNES RIVER	4,470	1950
37	166	Rural	ARKANSAS RIVER	3,360	1937
38	110	Rural	N F BLK VERMILLION R DRN	1,100	1940
39	143	Salina	MULBERRY CREEK DRAINAGE	12,500	1934
40	24	St. Marys	COLLEGE CREEK	7,370	1929
41	196	Rural	DIAMOND CREEK	2,000	1949
42	81	Wichita	I135 HWY WL-EL	25,100	1961
43	114	Rural	DRY BRANCH	12,500	1928
44	70	Rural	LOCAL ROAD	15,400	1961
45	4	Rural	ROCK CREEK	6,000	1961
46	169	Rural	MKT RAILROAD (ABANDONED)	7,260	1948
47	50	Garden City	Drainage Ditch	13,300	1953
48	69	Rural	NORTH SUGAR CREEK DRG.	2,935	1927
49	54	Rural	SPRING CREEK DRAINAGE	2,790	1929
50	59	Rural	WAKARUSA RIVER DRAINAGE	10,100	1929

Source: Kansas Department of Transportation

## **Kansas Road Conditions**

The life cycle of Kansas' roads is greatly affected by the state's ability to perform timely maintenance and upgrades to ensure that structures last as long as possible. Although overall pavement conditions in Kansas are relatively good, the state's ability to maintain the system in its current condition may decline in the coming years, unless additional transportation funding is secured.

Pavement failure is caused by a combination of traffic, moisture and climate. Moisture often works its way into road surfaces and the materials that form the road's foundation. Road surfaces at intersections are even more prone to deterioration because the slow-moving or standing loads occurring at these sites subject the pavement to higher levels of stress. It is critical that roads are fixed before they require major repairs because reconstructing roads costs approximately four times more than resurfacing them.<sup>7</sup>

Of the 11,215 miles of state-maintained roads and highways in Kansas, 74 miles (less than one percent) were in poor condition in 2009 and 665 miles (six percent) of state-maintained roads were in mediocre condition.

While Kansas' pavement surfaces have generally been maintained in good condition through routine resurfacing, numerous sections of the state's roadways are reaching an age when they will require more costly repairs and reconstruction.

Driving on roads in need of repair costs Kansas' motorists \$628 million annually – \$318 per driver – in extra vehicle operating costs, including accelerated vehicle depreciation, additional repair costs and increased fuel consumption and tire wear. 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.<sup>8</sup>

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 AAA's vehicle operating cost estimates and then using the HDM model to estimate the additional vehicle operating costs being paid by drivers as a result of substandard roads.<sup>9</sup>

The following chart lists the 10 segments of deteriorated roadway in the state that are most in need of repair or replacement.

**Chart 4: Kansas roadways most in need or repair or replacement:**

	Route	County/City	From	To	Length	Work Needed
<b>1</b>	U-81	Sedgwick	6	8	2	Resurface
<b>2</b>	U-24	Osborne	31	34.1	3.1	Address Transverse Cracking
<b>3</b>	U-83	Seward	3	5	2	Resurface
<b>4</b>	I-70	Sherman	0	12	12	Heavy Rehab
<b>5</b>	K-31	Osage	16.2	22.9	6.7	Rehab
<b>6</b>	K-27	Stanton	13.1	24.1	11	Address Transverse Cracking
<b>7</b>	I-435	Wyandotte	0.4	4	3.6	Address Transverse Cracking
<b>8</b>	U-24	Leavenworth	0	9.3	9.3	Address Transverse Cracking
<b>9</b>	I-435	Johnson	13	16.1	3.1	Address Transverse Cracking
<b>10</b>	U-69	Crawford	10	12	2	Address Transverse Cracking

Source: Kansas Department of Transportation

### Traffic Safety in Kansas

An average of 431 people were killed each year in motor vehicle accidents in Kansas from 2004 through 2008, according to the National Highway Transportation Safety Administration.<sup>10</sup> In those five years, a total of 2,156 people lost their lives on Kansas' roads.

**Chart 5. Traffic fatalities in Kansas from 2003 – 2007**

Year	Fatalities
2004	459
2005	428
2006	468
2007	416
2008	385

Source: National Highway Traffic Safety Administration.

In 2008, Kansas had a traffic fatality rate of 1.33 fatalities per 100 million vehicle miles traveled, slightly higher than the national average of 1.27.<sup>11</sup>

Motor vehicle crashes cost Kansas \$1.9 billion per year, \$701 for each resident, in medical costs, lost productivity, travel delays, workplace costs, insurance costs and legal costs.

Three major factors associated with fatal vehicle accidents are driver behavior, vehicle characteristics and roadway design. It is estimated that roadway design is an important factor in

one-third of fatal and serious traffic accidents. Improving safety on Kansas’ roads and highway system can be achieved through further improvements in vehicle safety; improvements in driver, pedestrian and bicyclist behavior; and a variety of improvements in roadway safety features.

Where appropriate, roadway improvements such as adding turn lanes, removing or shielding obstacles, adding or improving medians, widening lanes, widening and paving shoulders, improving intersection layout, and providing better road markings and upgrading or installing traffic signals could reduce the severity and occurrences of serious traffic crashes. The Federal Highway Administration has found that every \$100 million spent on needed highway safety improvements will result in 145 fewer traffic fatalities over a 10-year period.<sup>12</sup>

Roads with poor geometry, insufficient clear distances, without turn lanes, inadequate shoulders for the posted speed limits, or poorly laid out intersections or interchanges, pose greater risks to motorists, pedestrians and bicyclists.

The following chart shows the correlation between specific needed road improvements and the reduction of fatal accident rates nationally.

**Chart 6. Reduction in fatal accident rates after roadway improvements<sup>13</sup>**

Type of Improvement	Reduction in Fatal Accident Rates after Improvements
New Traffic Signals	53%
Turning Lanes and Traffic Signalization	47%
Widen or Modify Bridge	49%
Construct Median for Traffic Separation	73%
Realign Roadway	66%
Remove Roadside Obstacles	66%
Widen or Improve Shoulder	22%

**Source: TRIP analysis of U.S. Department of Transportation data**

## **Importance of Transportation to Economic Growth**

The new culture of business demands that an area have well-maintained and efficient roads, highways and bridges if it is to remain economically competitive. The advent of modern national and global communications and the impact of free trade in North America and elsewhere have resulted in a significant increase in freight movement. Consequently, the quality of a region's transportation system has become a key component in a business' ability to compete locally, nationally and internationally.

Businesses have responded to improved communications and the greater necessity to cut costs with a variety of innovations including just-in-time delivery, increased small package delivery, demand-side inventory management and by accepting customer orders through the Internet. The result of these changes has been a significant improvement in logistics efficiency as businesses move away from a push-style distribution system, which relies on large-scale warehousing of materials, to a pull-style distribution system, which relies on smaller, more strategic movement of goods. These improvements have made mobile inventories the norm, resulting in the nation's trucks literally becoming rolling warehouses.

Highways are vitally important to continued economic development in Kansas. 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 state's highways and major arterial roads. An analysis of commodity transport by the U.S. Bureau of Transportation Statistics (BTS) and the U.S. Census Bureau underscored the economic importance of Kansas' road system. The BTS report found that 73 percent of the \$95 billion in goods shipped annually

from sites in Kansas are transported on highways and another six percent are carried by courier services, which use trucks for part of their deliveries.<sup>14</sup> Similarly, 78 percent of the \$87 billion in goods shipped annually to sites in Kansas are carried by trucks and another 11 percent are carried by courier services.<sup>15</sup>

Trucking is a crucial part of Kansas' economy, as commercial trucks move goods from sites across the state to markets inside and outside the state. Commercial truck travel in Kansas is expected to increase significantly over the next decade. Based on federal projections, TRIP estimates that commercial trucking will increase by 30 percent in Kansas by 2020.<sup>16</sup>

## **Transportation Funding in Kansas**

In August 2008, Kansas Governor Kathleen Sebelius created a 35-member task force of business, government and community leaders from across the state to examine the state of transportation in Kansas and to develop a set of recommendations for meeting the state's future transportation needs.

After hosting a series of regional consultation meetings and gathering information on the state's transportation system, the Transportation-Leveraging Investments in Kansas Task Force (T-LINK) found that Kansas faces a \$6.4 billion gap over the next 10 years in needed funding to allow the state to maintain the condition of its major roads, highways and bridges and to relieve traffic congestion and enhance economic development opportunities by expanding key sections of the state's roadway system and making improvements to the state's public transit system.<sup>17</sup>

In January 2009, T-LINK concluded that unless the state is able to close its transportation funding gap, the condition of the state's roads, highways and bridges will deteriorate, traffic congestion will worsen and economic development opportunities in the state will be lost.

If Kansas is able to fully fund its transportation program at the level recommended by T-LINK, it would be able to maintain roads, highways and bridges in their current condition and fund approximately half of the road and highway capacity expansions recommended by T-LINK to relieve traffic congestion and support economic opportunities in Kansas.<sup>18</sup>

At current investment levels, the T-LINK report found that traffic congestion in the state will worsen. By 2030, the miles of urban highways that are congested in Kansas will increase by two-and-a-half times, from 105 miles today to 265 miles. Miles of rural highways in the state experiencing periodic congestion will more than triple, increasing from 535 miles to 1,725 miles.<sup>19</sup>

The state's insufficient transportation funds have left many needed projects unable to proceed until additional funding is available. According to the Kansas Department of Transportation, numerous projects will not be able to move forward unless additional funding is made available to the state. These projects include critical bridge replacement or rehabilitation as well as the reconstruction and preservation of key roadways and highways.

Unless the state can secure additional transportation funding, significant bridge repairs and replacements can not proceed. These projects include the I-70 Polk-Quincy Viaduct in downtown Topeka, the US-24 bridge over Huntress Creek in Clay County, and K-25 bridge over the North Fork of Sappa Creek in Rawlins County.

**Chart 7. Significant bridge replacements that could not proceed unless additional funding was made available to the state.**

Route	County	Route or feature intersected	ADT	Cost	Reason for Improvement
K-25	Rawlins	North Fork Sappa Creek	1,000	5	Preservation
US-50	Edwards	Arkansas River	2,000	7	Preservation
US-24	Topeka, Shawnee	BNSF RR	10,000	39	Preservation, safety
US-24	Shawnee	Topeka Blvd	15,000	10	Preservation, safety, economic development
K-10	Lawrence, Douglas	BNSF RR	30,000	8	Preservation
K-47	Neosho	Neosho River	2,000	6	Preservation
K-84	Graham	South Fork Solomon River	500	4	Preservation
US-24	Clay	Huntress Crk. and Abandoned RR	2,000	7	Preservation
I-70 (Polk-Quincy Viaduct)	Topeka, Shawnee	Downtown	34,000	100	Preservation, safety, economic development
K-47	Crawford	Second Cow Crk. and Clear Crk.	2,000	3	Preservation
K-177	Strong City, Chase	Fox Creek	1,000	2	Preservation
K-25	Thomas	North Fork Solomon River	1,000	1	Preservation
K-42	Kingman	Rose Bud Creek	500	2	Preservation
US-24	Shawnee	Bourbonais Creek	6,000	2	Preservation
K-181	Osborne	Carr Creek Drainage	500	1	Preservation
K-47	Crawford	First Cow Creek	2,000	2	Preservation
US-160	Attica, Harper	Camp Creek	1,000	1	Preservation
US-166	Montgomery	Bee Creek	4,000	2	Preservation
US-24	Shawnee	Ensign Creek	6,000	1	Preservation
U-81	Sumner	Ninnescah River Drainage	2,000	1	Preservation

Source: Kansas Department of Transportation

Unless additional funding can be secured, numerous projects to expand and modernize key sections of the state's highway network cannot proceed. These projects include US-69 from Pittsburg to I-44 at the Oklahoma state line, the Northwest Wichita bypass from K-96 to US-54, US-69 in Kansas City from 119<sup>th</sup> St. to I-435., and I-235 in Wichita at the US-54 and Central Avenue interchange.

**Chart 8. Significant reconstruction of existing roadway/highway that could not proceed unless additional funding was made available to the state.**

Route Name	County	From	To	Length (Mi.)	Daily Traffic	Cost (mil)	Project benefit
K-27	Wallace	Wallace-Greely County Line	Wallace-Sherman County Line	31	1,000	71	Preservation, safety
US-69	Cherokee	Pittsburg	I-44 (Missouri)	28	6,000	850	Preservation, economic development
K-96	Reno & Rice	Nickerson	Sterling	18	3,000	42	Preservation, safety
US-83	Haskell, Finney, & Scott	Sublette	Scott City	72	3,000	166	Preservation, safety
K-254 (NW Wichita Bypass)	Sedgwick	K-96	US-54	8	25,000	400	Congestion relief, economic development
US-54 (Goddard Bypass)	Sedgwick	K-254 (Northwest Bypass)	west of Goddard	5	18,000	50	Congestion relief, economic development
US-54	Pratt	Pratt	Cairo	6	5,000	43	Preservation, safety
US-54	Kingman	Cunningham	K-14	9	5,000	63	Preservation, safety
K-18	Riley	Ogden	Manhattan	8	20,000	75	Preservation, economic development
US-69 (Pittsburg Bypass)	Crawford & Cherokee	K-103	north of Alma	6	10,000	50	Preservation, congestion relief
US-69	K.C. Metro, Johnson	119th St	I-435	4	80,000	250	Preservation, congestion relief
K-4 (Oakland Expressway)	Topeka, Shawnee County	US-40	NE 54th St	7	8,000	100	Safety, congestion relief
I-435	K.C. Metro, Johnson	I-35, K-10 Interchanges	---	2	120,000	500	Safety, congestion relief
I-70	K.C. Metro, Wyandotte	K-7 Interchange	---	1	25,000	150	Congestion relief, economic development
K-7	Johnson	K-7 and Johnson Drive	---	0.2	20,000	29	Safety, congestion relief
I-35	K.C. Metro, Johnson	New Interchange in Gardner	---	1	30,000	50	Congestion relief, economic development
I-235	Wichita, Sedgwick	US-54, Central Ave. Interchanges	---	2	45,000	200	Preservation, congestion relief
I-135	Wichita, Sedgwick	I-235, K-254, K-96 Interchanges	---	15	40,000	150	Preservation, congestion relief
US-50	Harvey	Anderson Ave	Old Main St	2	10,000	40	Safety, congestion relief

Source: Kansas Department of Transportation.

Needed “mega projects” in Kansas that are unlikely to proceed without a boost in federal, state or local funding include the I-35/I-435/K-10 interchange in Kansas City and the I-235/Kellogg/Central interchange complex in Wichita.<sup>20</sup>

## **Future Federal Surface Transportation Program**

Transportation funding in Kansas comes from a variety of sources, including state-generated and federal funds. The federal government is an important source of funding for the ongoing modernization of Kansas’ roads, highways, bridges and public transit system.

Federal funds provide 32 percent of revenues used annually by the Kansas Department of Transportation to pay for road, highway and bridge construction, repairs and maintenance. Similarly, federal funding provides 36 percent of the revenue used to pay for the operation of and capital improvements to the state’s public transit systems, which includes the purchase and repair of vehicles and the construction of transit facilities.

To ensure that federal funding for highways and public transit in Kansas and throughout the nation continues beyond the expiration of the current federal surface transportation program, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), Congress will need to approve new long-term federal surface transportation legislation by September 30, 2009.

Approved in February 2009, the American Recovery and Reinvestment Act provides approximately \$348 million in stimulus funding for highway and bridge improvements and \$31 million for public transit improvements in Kansas, a total of \$379 million. This funding can serve as a down payment on needed road, highway, bridge and transit improvements, but it is

still not sufficient to allow the state to proceed with numerous projects needed to modernize its surface transportation system.

The crafting of a new federal highway and transit program will occur during a time when the nation's surface transportation program faces numerous challenges, including significant levels of deterioration, increasing traffic congestion, a high number of traffic deaths, increasing construction costs and a decline in revenues going into the Federal Highway Trust Fund.

Due to inadequate revenue being collected into the Federal Highway Trust Fund, federal funding for highways and transit in Kansas may be cut significantly starting October 1, 2009. The Congressional Budget Office estimates that Kansas' federal highway dollars will be cut by 38 percent in FY 2010 unless Congress takes steps to eliminate the shortfall in the Federal Highway Trust Fund.

Recent declines in federal surface transportation revenues, as well as significant increases in the cost of transportation construction materials, will likely make it more difficult for Congress to authorize a new federal surface transportation program that adequately funds needed improvements to the nation's roads, highways, bridges and public transit systems.

Over the five-year period from May 2004 to May 2009, the average cost of materials used for highway construction – including asphalt, concrete, steel, lumber and diesel – increased by 37 percent.

## **Recommendations for the Nation's Surface Transportation System**

When Congress approved SAFETEA-LU in 2005, it recognized the tremendous challenge the nation would continue to face in maintaining and improving its highway and transit systems in order to meet the country's future mobility needs. The 2005 legislation stipulated that

two national commissions be created to examine the condition of the nation's surface transportation system and its future needs, and to make recommendations about the future of the nation's surface transportation program.

The National Surface Transportation Policy and Revenue Study Commission (NSTPRSC) was created by Congress to examine the current condition and future funding needs of America's surface transportation program, develop a plan to ensure the nation's surface transportation system meets the nation's future mobility needs, and to examine funding alternatives for adequately funding the nation's future highway and transit needs.

Comprised of transportation officials, business leaders and members of academia, the Commission held numerous field hearings, was advised by a panel of transportation experts, commissioned numerous reports and held 12 executive sessions in preparing its report.

In January, 2008 the NSTPRSC released its findings. The Commission found that at the current level of investment in surface transportation in the U.S., the nation's highways and bridges would further deteriorate, traffic casualties would increase and traffic congestion would increase, jeopardizing the nation's economic leadership due to an erosion of transportation reliability.<sup>21</sup> The Commission concluded that it is critical to the future quality of life of Americans that the nation create and sustain the preeminent surface transportation system in the world, one that is well-maintained, safe and reliable.<sup>22</sup>

The Commission recommended a broad overhaul of the Federal Surface Transportation Program that would significantly boost funding, consolidate the program into fewer funding categories, speed up the project delivery process, require greater accountability in project selection and expand the use of alternate funding sources.

Key recommendations by the Commission include:

- ✓ Allocate funding through outcome-based, performance-driven programs supported by cost/benefit evaluations rather than political earmarking.
- ✓ Consolidate the more than 100 current transportation funding programs into 10 programs focused on key areas of national interest, including congestion relief, preservation of roads and bridges, improved freight transportation, improved roadway safety, improved rural access, improved environmental stewardship and the development of environmentally-friendly energy sources.
- ✓ Speed up the project development process to reduce the excessive time required to move projects from initiation to completion by better coordinating the development and review process for transportation projects.
- ✓ Significantly boost federal funding for surface transportation. Options for increasing federal surface transportation revenues include reduced evasion of federal motor fuel taxes, moving costs of exemptions from motor fuel fees to the general fund, indexing the motor fuel tax, increasing the motor fuel tax, additional tolling, congestion pricing, increased use of public-private partnerships and freight fees.

Similarly, the National Surface Transportation Infrastructure Financing Commission (NSTIFC) was created by Congress to re-envision the way the federal government funds and finances the nation's surface transportation infrastructure. Comprised of individuals from diverse backgrounds, including economics, finance, government, industry, law and public policy, the NSTIFC sought out the best ideas, the latest data and the strongest research before deliberating over a variety of potential financing options.

In February, 2009, the NSTIFC released its findings. The NSTIFC found that the U.S. faces a \$2.3 trillion funding shortfall through 2035 in maintaining and making needed improvements to the nation's surface transportation system.<sup>23</sup> The Commission found that

failure to address the immediate funding shortfall and provide adequate long-term funding for the nation's surface transportation system will lead to unimaginable levels of congestion, reduced safety, costlier goods and services, and eroded quality of life and diminished economic competitiveness.<sup>24</sup>

The Commission found that the current federal surface transportation funding structure, which relies primarily on taxes imposed on petroleum-derived vehicle use, is not sustainable. Instead, the Commission recommended that the nation's future surface transportation investment be funded largely by a charge on motorists based on the number of miles driven. The NSTIFC recommended that a full deployment of a mileage-based federal transportation fee be completed by 2020 and that the federal motor fuel tax eventually be phased out as revenue from a federal motor fuel fee was replaced by a mileage fee.<sup>25</sup> Once implemented, the NSTIFC recommended that mileage charges be set at a rate that would provide enough revenue to provide adequate federal funding to ensure that the nation achieve an integrated national transportation system that is less congested and safer and that promotes increased productivity, stronger national competitiveness, and improved environmental outcomes.<sup>26</sup> The NSTIFC also recommended that in the short term, the nation's federal motor fuel tax be boosted significantly and indexed to inflation to allow the federal surface transportation program to be funded at an adequate level until the transition to a mileage-based federal transportation fee.

Another organization that has presented a vision for the nation's future surface transportation program is the American Association of State Highway and Transportation Officials (AASHTO), which represents the nation's state transportation departments.

AASHTO has recommended that a future federal surface transportation program be developed that would be accountable for results, would make investments based on community needs and would deliver projects on time and on budget. AASHTO has also called for a federal

surface transportation program that is based on state-driven performance measures and focused on six objectives of national interest: preservation and renewal, interstate commerce, safety, congestion reduction and connectivity for urban and rural areas, system operations and environmental protection.

## **Conclusion**

As Kansas looks to enhance and build a thriving, growing and dynamic state, it is essential that the Sunflower State is able to provide a 21st century network of roads, highways, bridges and public transit that can accommodate the mobility demands of a modern society.

Insuring that the state's economy fully recovers and that the quality of life in Kansas is enhanced by a well-maintained, safe and efficient system of roads, highways, bridges and public transit, however, will require a boost in funding from either local, state or federal governments.

It is critical that Kansas develop and maintain a surface transportation system that can accommodate the state's growth in population, vehicle travel and economic development. Further modernization of Kansas' system of roads, bridges and public transit is crucial to providing a safer, more efficient transportation system, while improving the quality of life and economic livelihood of the state's residents.

The state has an immediate need to move forward with numerous projects to improve Kansas' roads, highways, bridges and transit systems, but without a substantial boost in funding, many of these projects will not be able to proceed. Completing these projects would increase mobility, better support commerce and tourism, enhance economic development and improve traffic safety statewide, boosting the quality of life for Kansas' residents and visitors alike.

The federal stimulus package (ARRA) has provided a helpful down payment on an improved transportation system. However, without a substantial boost in federal or state surface transportation funding, numerous needed projects to expand capacity and upgrade the condition of Kansas's roads, bridges, highways and transit will not move forward, hampering the state's ability to enhance not only mobility, but also economic development statewide. The future provisions and funding levels of the next federal surface transportation program will be a critical factor in whether Kansas is able to reap the benefits of a modern surface transportation system.

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## Endnotes

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<sup>1</sup> U.S. Census data.

<sup>2</sup> Ibid

<sup>3</sup> U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 2006.

<sup>4</sup> TRIP estimate based on analysis of FHWA data.

<sup>5</sup> Federal Highway Administration – National Bridge Inventory.

<sup>6</sup> Ibid.

<sup>7</sup> Selecting a Preventative Maintenance Treatment for Flexible Pavements. R. Hicks, J. Moulthrop. Transportation Research Board. 1999. Figure 1.

<sup>8</sup> Highway Development and Management: Volume Seven. Modeling Road User and Environmental Effects in HDM-4. Bennett, C. and Greenwood, I. 2000.

<sup>9</sup> Your Driving Costs. American Automobile Association, 2006.

<sup>10</sup> U.S. Department of Transportation - Federal Highway Administration: Highway Statistics, National Highway Traffic Safety Administration, 2004-2008 [www.fhwa.dot.gov](http://www.fhwa.dot.gov) and [www-fars.nhtsa.dot.gov](http://www-fars.nhtsa.dot.gov).

<sup>11</sup> Ibid.

<sup>12</sup> Highway Safety Evaluation System, 1996 Annual Report on Highway Safety Improvement Programs, U.S. Department of Transportation.

<sup>13</sup> Highway Safety Evaluation System; 1996 Annual Report on Highway Safety Improvement Programs; U.S. Department of Transportation.

<sup>14</sup> 2002 Commodity Flow Survey, U.S. Census Bureau – Bureau of Transportation Statistics. [www.census.gov](http://www.census.gov).

<sup>15</sup> Ibid.

<sup>16</sup> U.S. Department of Transportation: Office of Freight Management and Operations. [www.fhwa.dot.gov](http://www.fhwa.dot.gov).

<sup>17</sup> Ibid. EX-3.

<sup>18</sup> Ibid. EX-3.

<sup>19</sup> Ibid. P. 12.

<sup>20</sup> New Approaches for Transportation: Final Recommendations of the T-Link Task Force (2009). P. 13.

<sup>21</sup> National Surface Transportation Policy and Revenue Study Commission. Transportation for Tomorrow, December 2007. P. 3.

<sup>22</sup> Ibid. \*P. 7.

<sup>23</sup> Paying Our Way. February, 2009. The National Transportation Infrastructure Financing Commission. P3. Summary Findings.

<sup>24</sup> Ibid. P. 12.

<sup>25</sup> Paying Our Way. February, 2009. The National Transportation Infrastructure Financing Commission.

<sup>26</sup> Ibid. P. 12.