

Rural Connections: Challenges and Opportunities in America's Heartland

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Founded in 1971, [TRIP](http://www.tripnet.org)® of Washington, DC, is a nonprofit organization that researches, evaluates and distributes economic and technical data on surface transportation issues. TRIP is sponsored by insurance companies, equipment manufacturers, distributors and suppliers; businesses involved in highway and transit engineering and construction; labor unions; and organizations concerned with efficient and safe surface transportation.

Executive Summary

America's rural heartland plays a vital role as home to a significant share of the nation's population, many of its natural resources and popular tourist destinations, and as the primary source of the energy, food and fiber that supports America's economy and way of life. The strength of the nation's rural economy relies greatly on the quality of its transportation system, particularly its roadways, which link rural America with the rest of the U.S. and to markets in other countries. The economy of rural America, which supports the quality of life for the approximately 46 million Americans living in rural areas, rides on the quality and connectivity of the rural transportation system. But roads, highways and bridges in the nation's heartland face a number of significant challenges: they lack adequate capacity, they fail to provide needed levels of connectivity to many communities, they are not built to adequate standards to accommodate growing freight travel in many corridors, rural roads and bridges have significant deficiencies, they lack many desirable safety features, and they experience serious traffic crashes at a rate far higher than all other roads and highways. This report looks at the condition, use and safety of the nation's rural transportation system, particularly its roads, highways and bridges, and identifies needed improvements.

The following are the key findings of the report.

Rural America plays a vital role as home to a significant share of the nation's population, natural resources and tourist destinations. It is also the primary source of the energy, food and fiber that drive the U.S. economy.

- Rural America is defined as counties that do not contain an urban area with a population of 50,000 or greater, or counties that lack a large commuting flow to a county containing at least one urban area with a population of 50,000 or greater.
- Rural America is home to approximately 46 million people, accounting for approximately 15 percent of the nation's population. Rural America contains roughly 72 percent of the land in the U.S. and is home to the vast majority of the nation's 2.2 million farms.
- The nation's rural population declined slightly between 2010 and 2012 – a loss of 44,000 residents, or 0.09 percent -- as rural areas recovered from the Great Recession. During this same time period urban America experienced a two percent population increase.
- Population did increase in some rural areas from 2010 to 2012. This population increase occurred primarily in rural counties with significant recreational opportunities, or areas that have been impacted by the ongoing energy boom, particularly in the Northern Great Plains.
- The movement of retiring baby boomers to rural America is likely to continue in the future as aging Americans seek out communities that offer affordable housing, small-town quality of life and desirable natural amenities, while often located within a short drive of larger metropolitan areas.

- Eighty-six percent of trips taken by Americans to visit rural areas are for leisure purposes.
- Popular tourism activities in rural America include hiking, golfing, biking, hunting, fishing and water sports. Rural areas are also home to beaches, national and state parks, wineries, orchards and other national amenities.
- The amount of rural tourism in a region is tied partly to the level of highway access.

The quality of life in America’s small communities and rural areas and the health of the nation’s rural economy is highly reliant on the quality of the nation’s transportation system, particularly its roads, highways and bridges. America’s rural transportation system provides the first and last link in the supply chain from farm to market while supporting the tourism industry and enabling the production of energy, food and fiber.

- The annual value of agricultural production in the U.S. increased by 33 percent from \$297 billion in 2007 to \$395 billion in 2012.
- While farming accounts for just six percent of all jobs in rural America, for every person employed in farming there are seven more jobs in agribusiness, including wholesale and retail trade, processing, marketing, production, and distribution.
- A [United States Department of Agriculture](#) (USDA) report found that “an effective transportation system supports rural economies, reducing the prices farmers pay for inputs such as seeds and fertilizers, raising the value of their crops and greatly increasing market access.”
- Trucks provide the majority of transportation for agricultural products, accounting for 46 percent of total ton miles of travel compared to 36 percent by rail and 12 percent by barge.
- Trucks account for the vast majority of transportation for perishable agricultural items, carrying 91 percent of ton miles of all fruit, vegetables, livestock, meat, poultry and dairy products in the U.S.
- The [Council of State Governments](#) recently found that “rural highways provide many benefits to the nation’s transportation system, including serving as a bridge to other states, supporting the agriculture and energy industries, connecting economically challenged citizens in remote locations to employers, enabling the movement of people and freight and providing access to America’s tourist attractions.”
- Transportation is becoming an even more critical segment of the food distribution network. While food demand is concentrated mostly in urban areas, food distribution is the most dispersed segment of the economy.

- A report by the [Pacific Economic Cooperation Council](#) recommends that governments improve the quality of their transportation systems serving the movement of goods from rural to urban regions as a strategy to lower food costs and increase economic prosperity.
- A report on agricultural transportation by the [USDA](#) found it likely that market changes and shifts in consumer preferences would further increase the reliance on trucking to move U.S. agricultural products.

The condition and quality of the nation's highway system plays a critical role in providing access to America's many tourist destinations, particularly its scenic parks and recreational areas, which are mostly located in rural areas.

- Travel and tourism related spending in the U.S. in 2013 totaled \$1.5 trillion. In 2013, 8.1 million Americans were employed in tourism-related jobs.
- America's national parks, which are largely located in rural areas, received 274 million visitors in 2013, many in personal vehicles.

Travel loads on America's rural roads are increasing dramatically due to the booming energy extraction sector. This has been driven by increases in domestic oil and gas extraction, largely as a result of advancements in hydraulic fracturing (fracking), which has greatly increased the accessibility of shale oil and gas deposits, as well as the increased production of renewable energy such as wind and solar.

- Ethanol production in the U.S. increased from 1.7 billion gallons in 2000 to 13.3 billion gallons in 2012. Federal mandates require that production of renewable fuels, including biofuels and cellulosic fuels, reach 36 billion gallons per year by 2022.
- The U.S. production of liquid fuels, including crude oil and natural gas, has increased 34 percent from 2000 to 2014, increasing liquid fuel's share of overall U.S. energy production, from 47 to 54 percent between 2000 and 2014 (includes coal and nuclear).
- The U.S. production of renewable energy, including wind and solar, has increased 48 percent from 2000 to 2014, increasing renewable energy's share of overall U.S. energy production from 8.3 to 10.6 percent from 2000 and 2014 (includes coal and nuclear).
- The development of significant new oil and gas fields in numerous areas, particularly in the North Central Plains, and increased agricultural production, are placing significantly increased traffic loads by large trucks on non-Interstate rural roads, which often have not been constructed to carry such high load volumes. .
- The average travel per-lane mile by large trucks on major, non-arterial rural roads in the U.S. increased by 16 percent from 2000 to 2012.

Rural Transportation Challenge: Connectivity

The potential for additional economic growth in many rural areas is being impeded by the failure to significantly modernize the nation's rural transportation system and provide for adequate connectivity. This lack of connectivity is preventing economic growth and reducing quality of life for rural residents.

- Sixty-six cities of 50,000 or more in the U.S. do not have direct access to the Interstate Highway System. A list of the 66 cities can be found in [Appendix A](#).
- Since the routes for the Interstate Highway System were designated in 1956, the nation's population has nearly doubled from - 165 million to 318 million.
- The abandonment of more than 100,000 miles of rail lines in recent decades, mostly in rural areas, has reduced access in many rural communities and increased reliance on trucking for freight movement.
- A report by the [American Association of State Highway and Transportation Officials](#) found that connectivity is particularly poor in rural portions of Western states because of the significant distance between Interstate highway routes and the lack of adequate rail service.
- Only 60 percent of rural counties nationwide have public transportation available and 28 percent of those have very limited service.

Rural Transportation Challenge: Safety

Traffic fatalities on the nation's rural roads occur at a rate nearly three times higher than all other roads. A disproportionate share of fatalities take place on rural roads compared to the amount of traffic they carry.

- Rural roads have a traffic fatality rate that is nearly three times higher than all other roads. In 2012, non-Interstate rural roads had a traffic fatality rate of 2.21 deaths for every 100 million vehicle miles of travel, compared to a fatality rate on all other roads of 0.78 deaths per 100 million vehicle miles of travel.
- Crashes on the nation's rural, non-Interstate routes resulted in 16,161 fatalities in 2012, accounting for nearly half – 48 percent – of the nation's 33,561 traffic deaths in 2012.
- Rural, non-Interstate routes accounted for 25 percent of all vehicle miles of travel in the U.S. in 2012.
- After years of decreases, the rate of fatalities and the number of fatalities on rural non-Interstate roads increased in 2012. The rate of traffic fatalities on the nation's rural non-Interstate roads decreased from 2.61 traffic fatalities per 100 million vehicle miles of

travel in 2005 to 2.14 in 2011, before increasing to 2.21 in 2012. Similarly the number of traffic fatalities on the nation's rural non-Interstate roads decreased from 20,333 in 2005 to 15,668 in 2011 before increasing to 16,161 in 2012.

- While fatality rates on all roads have decreased in recent years, the drop in the fatality rate on rural roads has lagged behind that of all other roads from 2005 to 2012. From 2005 to 2012, the fatality rate on all roads, excluding non-Interstate rural roads, decreased by 26 percent (1.05 fatalities per 100 million vehicle miles of travel to .78). However, during the same timeframe, the traffic fatality rate on rural, non-Interstate routes declined by only 15 percent (2.61 fatalities per 100 vehicle miles of travel to 2.21).
- The chart below shows the twenty states that led the nation in the number of rural non-Interstate traffic deaths in 2012. Data for all states is available in [Appendix B](#).

STATE	2012 RURAL NON-INTERSTATE TRAFFIC DEATHS
Texas	1,509
California	1,042
North Carolina	844
Florida	841
South Carolina	637
Pennsylvania	636
Ohio	587
New York	569
Kentucky	535
Georgia	524
Tennessee	521
Indiana	463
Alabama	462
Missouri	441
Oklahoma	420
Michigan	408
Arkansas	382
Mississippi	372
Wisconsin	371
Illinois	344

- The chart below shows the twenty states with the highest rate of rural non-Interstate traffic fatalities per 100 million miles of travel and the fatality rate per 100 million vehicle miles of travel on all other roads in the state in 2012. Data for all states is available in [Appendix C](#).

STATE	NON-INTERSTATE RURAL	ALL OTHER ROADS
South Carolina	3.99	0.68
Florida	3.35	0.95
West Virginia	2.80	0.99
Texas	2.76	1.03
Arkansas	2.71	0.87
Tennessee	2.68	0.95
Arizona	2.66	1.11
Kentucky	2.64	0.78
California	2.61	0.63
Pennsylvania	2.60	0.91
Oklahoma	2.52	0.92
Hawaii	2.48	0.89
North Carolina	2.44	0.64
Montana	2.40	0.95
North Dakota	2.33	0.77
Kansas	2.26	0.74
South Dakota	2.21	0.74
Ohio	2.15	0.63
New York	2.13	0.59
Indiana	2.09	0.56

Inadequate or a lack of desirable roadway safety features, longer emergency vehicle response times and the higher speeds traveled on rural roads compared to urban roads are factors in the higher traffic fatality rate found on rural, non-Interstate routes.

- Rural roads are more likely than urban roads to have roadway features which reduce safety, including narrow lanes, limited shoulders, sharp curves, exposed hazards, pavement drop-offs, steep slopes and limited clear zones along roadsides.

- Because many rural routes have been constructed over a period of years, they often have inconsistent design features for such things as lane widths, curves, shoulders and clearance zones along roadsides.
- Rural roads are more likely than urban roads to be two-lane routes. Seventy percent of the nation's urban non-freeway arterial and collector roads have two-lanes, compared to 94 percent of rural non-freeway, arterial and collector routes having two-lanes.
- Rural roads are more likely than urban roads to have narrow lanes. A desirable lane width for collector and arterial roadways is at least 11 feet. However, 24 percent of rural collector and arterial roads have lane widths of 10 feet or less, compared to 18 percent of urban collector and arterial roads with lane widths of 10 feet or less.
- Most head-on crashes on rural, non-Interstate roads are likely caused by a motorist making an unintentional maneuver as a result of driver fatigue, being distracted or driving too fast in a curve.
- While driver behavior is a significant factor in traffic crash rates, both safety belt usage and impaired driving rates are similar in their involvement rate as a factor in urban and rural traffic crashes.

Numerous roadway safety improvements can be made to reduce serious crashes and traffic fatalities. These improvements are designed largely to keep vehicles from leaving the correct lane and to reduce the consequences of a vehicle leaving the roadway.

- The type of safety design improvements that are appropriate for a section of rural road will depend partly on the amount of funding available and the nature of the safety problem on that section of road.
- Low-cost safety improvements include installing rumble strips along the centerline and sides of roads, improving signage and pavement/lane markings including higher levels of retroreflectivity, installing lighting, removing or shielding roadside obstacles, using chevrons and post-mounted delineators to indicate roadway alignment along curves, adding skid resistant surfaces at curves and upgrading or adding guardrails.
- Moderate-cost improvements include adding turn lanes at intersections, resurfacing pavements and adding median barriers.
- Moderate to high-cost improvements include improving roadway alignment, reducing the angle of curves, widening lanes, adding or paving shoulders, adding intermittent passing lanes or adding a third or fourth lane.
- Systemic installation of cost effective safety solutions and devices in rural areas helps to improve safety not just by targeting individual safety problem points on a road, but also making entire segments safer by improving those roadway segments that exhibit the characteristics that typically result in fatal or serious-injury crashes.

Rural Transportation Challenge: Deficient Conditions

The nation's rural roads, highways and bridges have significant deficiencies.

- In 2012, 15 percent of the nation's major rural roads (arterials and collectors) were rated in poor condition and another 40 percent were rated in fair condition.
- The chart below shows the twenty states with the greatest percentage of major rural roads in poor condition in 2012. Rural pavement conditions for all states can be found in [Appendix D](#).

STATE	PERCENT POOR
Connecticut	35
Rhode Island	33
West Virginia	33
Hawaii	32
Michigan	32
Kansas	30
Oklahoma	29
Maine	28
Mississippi	25
Arkansas	23
Missouri	23
Washington	22
New Mexico	21
Alabama	21
Vermont	21
Alaska	20
New Hampshire	18
Virginia	18
Wisconsin	17
Pennsylvania	17

- In 2013, 12 percent of the nation's rural bridges were rated as structurally deficient. A bridge is structurally deficient if there is significant deterioration of the bridge deck,

supports or other major components. Structurally deficient bridges are often posted for lower weight or closed to traffic, restricting or redirecting large vehicles, including commercial trucks, school buses and emergency services vehicles.

- In 2013, 10 percent of the nation’s rural bridges were rated as functionally obsolete. Bridges that are functionally obsolete no longer meet current highway design standards, often because of narrow lanes, inadequate clearances or poor alignment.
- The chart below shows the twenty states with the highest share of rural bridges rated structurally deficient in 2013. Rural bridge conditions for all states can be found in [Appendix E](#).

STATE	PERCENT STRUCTURALLY DEFICIENT
Pennsylvania	25
Rhode Island	25
Iowa	22
South Dakota	21
Oklahoma	20
Hawaii	19
Nebraska	19
North Dakota	17
Maine	16
Louisiana	16
Missouri	15
New Hampshire	15
Mississippi	14
North Carolina	14
New Jersey	14
Wyoming	14
New York	14
Michigan	14
West Virginia	13
California	13

Transportation Opportunities in Rural America

America must adopt transportation policies that improve rural transportation connectivity, safety and conditions to provide the nation's small communities and rural areas with a level of safe and efficient access that will support quality of life and enhance economic productivity.

The following recommendations by TRIP for an improved rural transportation system are also based partially on findings and recommendations made by the American Association of State Highway and Transportation Officials (AASHTO), the National Highway Cooperative Research Program (NCHRP), the Council of State Governments (CSG) and the Ports-to-Plains Alliance.

Improve access and connectivity in America's small communities and rural areas

- ✓ Widen and extend key highway routes, including Interstates, to increase connectivity to smaller and emerging communities to facilitate access to jobs, education and healthcare while improving access for agriculture, energy, manufacturing, forestry, tourism and other critical segments of the rural economy.
- ✓ The [NCHRP report](#) found that the construction of an additional 30,000 lane miles of limited access highways, largely along existing corridors, is needed to address the nation's need for increased rural connectivity.
- ✓ Modernize major two-lane roads and highways so they can accommodate increased personal and commercial travel.
- ✓ Improve public transit service in rural America to provide improved mobility for people without access to private vehicles.

Improve rural traffic safety

- ✓ Adequately fund needed rural roadway safety improvements and provide enhanced enforcement, education and improved emergency response to reduce the rate of rural traffic fatalities.
- ✓ Implement cost-effective roadway safety improvements, including rumble strips, shoulder improvements, lane widening, curve reductions, skid resistant surfaces at curves, passing lanes, intersection improvements and improved signage, pavement markings and lighting, guardrails and barriers, and improved shielding of obstacles.

Improve the condition of rural roads, highways and bridges

- ✓ Adequately fund local and state transportation programs to insure sufficient preservation of rural roads, highways and bridges to maintain transportation service and accommodate large truck travel, which is needed to support the rural economy.

The federal government is a critical source of funding for rural roads, highways and bridges. However, current federal transportation funding will expire on September 30, 2014.

- MAP-21(Moving Ahead for Progress in the 21st Century Act), approved by Congress in July 2012, increased funding flexibility for states and streamlined project approval processes to improve the efficiency of state and local transportation agencies in providing needed transportation improvements.
- MAP-21, which expires on September 30, 2014, does not provide sufficient long-term revenues to support the current level of federal surface transportation investment.
- The impact of inadequate federal surface transportation revenues could be felt as early as this summer, when federal funding for road, highway and bridge projects is likely to be delayed because the balance in the [Highway Account of the federal Highway Trust Fund](#) is expected to drop below \$1 billion. This delay and uncertainty in funding will likely result in the postponement of numerous projects.
- Nationwide federal funding for highways is expected to be cut by almost 100 percent from the current investment level for the fiscal year starting October 1, 2014 (FY 2015) unless Congress provides additional transportation revenues. This is due to a cash shortfall in the Highway Trust Fund as projected by the [Congressional Budget Office](#).
- If Congress decides to provide additional revenues into the federal Highway Trust Fund in tandem with authorizing a new federal surface transportation program, a number of technically feasible revenue options have been identified by the [American Association of State Highway and Transportation Officials](#).

All data used in this report is the most current available. Sources of information for this report include: The Federal Highway Administration (FHWA), the National Highway Traffic Safety Administration (NHTSA), the National Cooperative Highway Research Program (NCHRP), the American Association of State Highway and Transportation Officials(AASHTO), the United States Department of Agriculture (USDA), the Council of State Governments (CSG) and the U.S. Census Bureau.

Introduction

America's rural heartland is a vital part of the country, serving as a place to live and visit, and as a cultural and economic resource. The nation's rural transportation system plays a critical role in supporting the economy of rural America, particularly its agriculture, energy, manufacturing and tourism sectors, and connecting the nation's heartland to its urban regions.

Roads, bridges and highways are the backbone of the nation's rural transportation system, supporting its growing economy and providing daily mobility for residents, businesses and visitors. The level of safety and efficiency, and the condition of the nation's rural roads and bridges, all play a critical role in the quality of life in rural and urban America. The nation's rural transportation system provides mobility for rural residents and visitors while linking America's urban areas with the source of much of its food supply, energy and other natural resources.

The importance of rural transportation is likely to increase in the future as more people choose to live in rural America and the reliance on roads to transport products and people to and from rural areas increases. Making needed improvements to the nation's rural transportation system will be critical in supporting the quality of life and economic development of rural America and the entire nation.

America's Heartland

Roughly 46 million people - approximately 15 percent of the nation's population - live in nonmetropolitan counties. These rural counties include 72 percent of the land in the U.S. and are

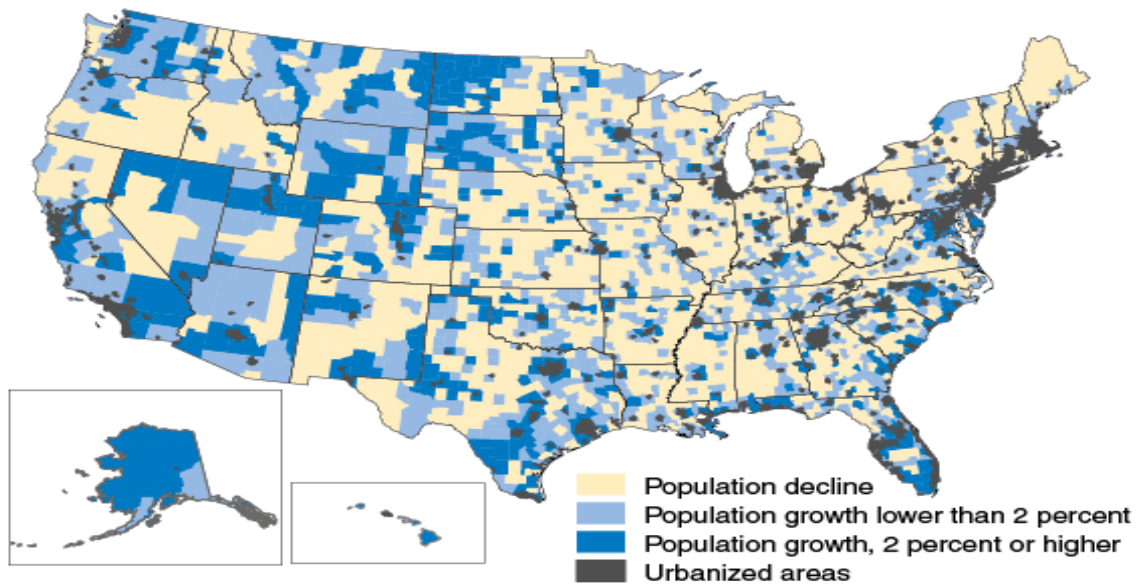
home to the vast majority of the nation's 2.2 million farms.¹ Nonmetropolitan counties are defined as counties that lack an urban area with at least 50,000 residents, or that lack a large commuting flow to a county with at least one urban area with a population of 50,000 or more.

The nation's rural population decreased slightly between 2010 and 2012 - a loss of 44,000 residents or 0.09 percent - largely in response to the slow rate of recovery from the Great Recession.² During that same time the population of urban counties in the U.S. increased by approximately two percent.³

Population trends in rural areas have been uneven, with population increases occurring largely in areas impacted by the energy boom, particularly in the Northern Great Plains, and regions with significant recreational opportunities.

Chart 1. Rural Population Change 2010-2012 by County

Great Plains energy boom attracts new residents while areas of population decline expand in Eastern States



Note: Map shows population change from April 2010 to July 2012 as a percentage of the 2010 census population.

Source: USDA, Economic Research Service using data from the U.S. Census Bureau.

Growth in rural areas, particularly in the South and West, has also been fueled by significant domestic and international migration to regions that offer affordable housing, small-town quality of life and desirable natural amenities or climate, yet are within commuting distances of larger metropolitan areas.⁴ A continued movement of retiring baby boomers to rural America is considered likely as aging Americans seek out communities that have these qualities.⁵

The [United States Department of Agriculture](#) (USDA) notes that many rural areas have experienced recent growth as a result of the arrival of many people who have moved into a region for non-economic reasons.⁶ While some of these recent arrivals to rural America are retired, most of them are still of working age. Increased geographic employment flexibility, largely as a result of improved technology, has also allowed many people to move or build second homes in rural areas that are close to desirable recreation areas.

Transportation’s Critical Importance to the Rural Economy

The quality of life in America’s small communities and rural areas, and the health of the nation’s rural economy, from the production and transport of energy, food and fiber to attracting tourism, is highly reliant on the quality of the nation’s transportation system. This is especially true of America's rural roads, highways and bridges, which provide the first and last link in the supply chain from farm to market and other retail outlets.

A [USDA](#) report found that “an effective transportation system supports rural economies, reducing the prices farmers pay for inputs such as seeds and fertilizers, raising the value of their crops and greatly increasing market access. The economics of rural areas are intertwined. As

agriculture thrives, so does its supporting communities. An efficient system of freight transportation is an important foundation for a vibrant rural economy, including rural manufacturing.”⁷

While farming accounts for just six percent of all jobs in rural America, for every person employed in farming there are seven more jobs in agribusiness, including wholesale and retail trade, processing, marketing, production and distribution.⁸

The economic importance of agriculture continues to grow, with the value of agricultural production in the U.S. increasing 33 percent from 2007 to 2012, from \$297 billion to \$395 billion.⁹ Trucks provide the majority of transportation for agricultural products, accounting for 46 percent of total ton-miles of travel compared to 36 percent by rail and 12 percent by barge.¹⁰ Trucks account for the vast majority of transportation for perishable agricultural items, carrying 91 percent of ton-miles of all fruit, vegetables, livestock, meat, poultry and dairy products in the U.S.¹¹

A report from [The Council of State Governments](#) found that “rural highways provide many benefits to the nation’s transportation system, including serving as a bridge to other states, supporting the agriculture and energy industries, connecting economically challenged citizens in remote locations to employers, enabling the movement of people and freight and providing access to America’s tourist attractions.”¹²

The importance of a good rural transportation system to the efficiency of a region’s economic performance is increasing as food distribution becomes increasingly dependent on reliable transportation. A report by the [Pacific Economic Cooperation Council](#) found that transportation is becoming an even more critical segment of the food distribution network as food distribution is the most dispersed segment of the economy, while food demand is

concentrated mostly in urban areas. The report recommends that governments improve the quality of their transportation systems serving the movement of goods from rural to urban regions as a strategy to lower food costs and increase economic prosperity.¹³

A report on agricultural transportation by the [USDA](#) found it likely that market changes and changes in consumer preferences would further increase the reliance on trucking to move U.S. agricultural products. The USDA report found that future foreign demand for U.S. agricultural products will increasingly be for processed products, such as flour, which rely on increased domestic transportation. Consumer demands in the U.S. and the need for greater traceability of where and how an agricultural product was produced will also increase the need for smaller, time-sensitive delivery. The USDA report found that for agricultural products, “movements toward lower volumes of trait-specific commodities will likely favor trucks as the primary mode of transport.”¹⁴

The condition and quality of the nation’s highway system also plays a critical role in providing access to America’s many tourist destinations, particularly its scenic parks and recreational areas, which are mostly located in rural areas. Travel and tourism related spending in the U.S. in 2013 totaled \$1.5 trillion in 2013 and 8.1 million people were employed in tourism-related jobs in 2013.¹⁵ The nation’s national parks, which are largely located in rural areas, received 274 million visitors in 2013, many in personal vehicles.¹⁶

Increases in domestic oil and gas extraction, largely as a result of advancements in hydraulic fracturing (fracking), have greatly increased the accessibility of shale oil and gas deposits. This increase, along with the heightened production of renewable energy such as wind and solar, are increasing the travel loads on the nation’s rural highways.

Ethanol production in the U.S. increased from 1.7 billion gallons in 2000 to 13.3 billion gallons in 2012. Federal mandates require that production of renewable fuels, including biofuels and cellulosic fuels, reach 36 billion gallons per year by 2022.¹⁷

The U.S. production of liquid fuels, including crude oil and natural gas, has increased 34 percent from 2000 to 2014, increasing liquid fuel's share of overall U.S. energy production from 47 to 54 percent from 2000 and 2014 (includes coal and nuclear).¹⁸

The U.S. production of renewable energy, including wind and solar, has increased 48 percent from 2000 to 2014, increasing renewable energy's share of overall U.S. energy production from 8.3 to 10.6 percent from 2000 and 2014 (includes coal and nuclear).¹⁹

The development of significant new oil and gas fields in numerous areas, particularly in the North Central Plains, and increased agricultural production are placing significantly increased traffic loads by large trucks on non-Interstate rural roads. Oftentimes, these roads have not been constructed to carry such high load volumes.

The average travel per-lane mile by large trucks on major, non-arterial rural roads in the U.S. increased by 16 percent from 2000 to 2012.²⁰

For many Americans, the primary reason to visit rural communities is to access tourist activities. America's rural landscape boasts activities including hiking, golfing, biking, hunting, fishing and water sports, while attracting visitors through its beaches, national and state parks, wineries, orchards and other national amenities. A poll by the Travel Industry of America Association found that 86 percent of trips taken by Americans to visit a rural area were for leisure purposes.²¹ The viability of rural tourism in a region is also tied partly to the level of highway access.²²

Rural Transportation Challenge: Connectivity

Growing economic activity in rural America combined with the failure to significantly expand the nation's rural transportation system, particularly its network of modern highways, has resulted in a lack of adequate connectivity. This lack of mobility and connectivity is impeding the potential for economic growth in many rural areas.

The Interstate Highway System is the most critical highway link for commerce and intercity travel in rural America. But, many rural and smaller communities in the U.S. are not adequately served by the Interstate system. Since the routes for the Interstate Highway System were designated in 1956, the nation's population has nearly doubled from 165 million to 318 million and is projected to increase to 420 million people by 2050.²³

A report by the [American Association of State Highway and Transportation Officials](#) (AASHTO) found that 66 areas in the United States with populations of at least 50,000 people are not connected to the Interstate System (see Appendix A).²⁴ This lack of connection to the nation's major highway system reduces the economic competitiveness of these communities and their surrounding rural areas. "Maintaining connectivity is essential not only to serve rural communities, but also to support the shifting agricultural and energy extraction and production needs of a growing population and economy," the report found.²⁵

The report by AASHTO also found that connectivity is particularly poor in rural portions of Western states because of the significant distance between Interstate highway routes and the lack of adequate rail service.²⁶ The lack of connectivity in rural America has been exacerbated by the continued reduction in the areas served by railroads as a result of the abandonment of un-

profitable or lightly used rail lines. Over the last few decades, more than 100,000 miles of rail lines have been abandoned, mostly in rural areas, reducing access in many rural communities and increasing reliance on trucking for freight movement.²⁷

This loss of rail service reduces transport options, particularly for farmers, and a lack of adequate rural public transit greatly impacts people without access to private vehicles, including those with lower incomes and the 9.6 million older people who live in rural America.²⁸ Rural transit, which often takes the form of specialized services such as van pools tailored to access employment and healthcare, often fails to meet the needs of rural Americans. Only 60 percent of rural counties nationwide have public transportation available and 28 percent of those have very limited service.²⁹

Rural Transportation Challenge: Safety

Traffic crashes are a major source of fatalities in the U.S., particularly in rural America. The nation's rural, non-Interstate roads have the highest rate of traffic fatalities. Rural Interstate routes were excluded from the safety analysis in this report because they are built to very high safety standards, and do not have the significant traffic safety problems common on many rural roads.

In 2012, traffic crashes claimed the lives of 33,561 people in the U.S. Traffic crashes on the nation's non-Interstate rural roads resulted in 16,161 fatalities in 2012, 48 percent of all traffic fatalities in the U.S. This is despite the fact that the nation's non-Interstate rural roads carried only 25 percent of all vehicle miles of travel in 2012.³⁰

The fatality rate on rural non-Interstate routes in 2012 was 2.21 deaths for every 100 vehicle miles of travel, nearly three times higher than the fatality rate of 0.78 fatalities per 100 million vehicle miles of travel on all other routes.³¹ The overall fatality rate for all U.S. roads in 2012 was 1.13 fatalities per 100 vehicle miles of travel.³² The five states with the largest number of fatalities as a result of crashes on rural, non-Interstate roads in 2012 were Texas, California, North Carolina, Florida and South Carolina. State-by-state data on the number of traffic fatalities occurring on rural, non-Interstate routes in 2012 and their share of overall fatalities and vehicle miles of travel can be found in [Appendix B](#).

Chart 2. States with most fatalities in crashes on non-Interstate, rural roads in 2012.

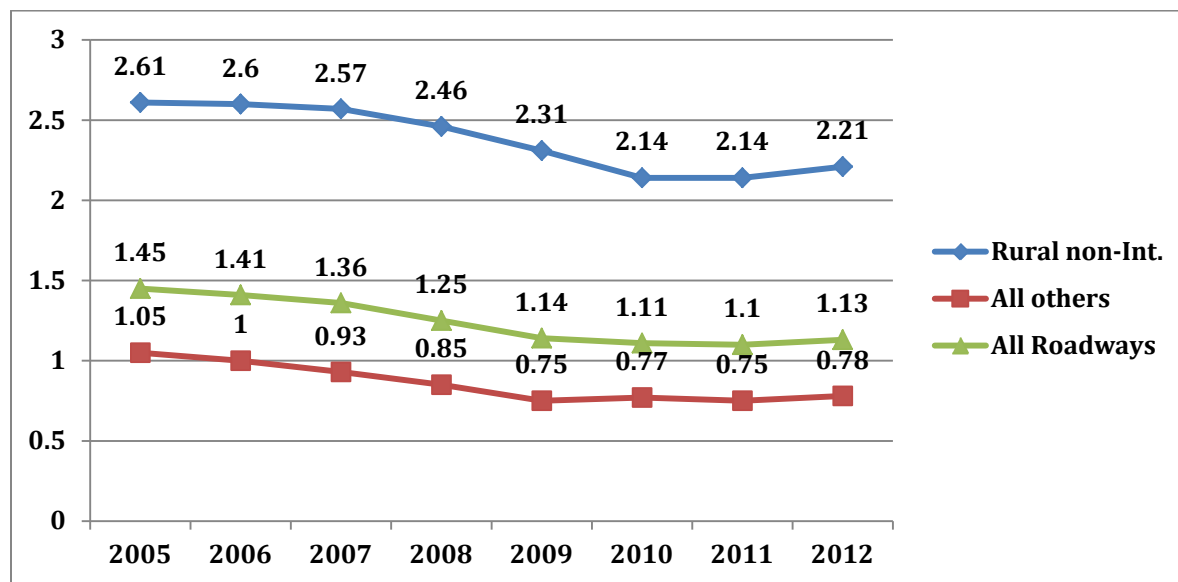
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Wisconsin	371
Illinois	344

Source: TRIP analysis of National Highway Traffic Safety Administration data

While overall fatality rates have decreased in recent years, the fatality rate on rural, non-Interstate roads has declined at a slower rate. From 2005 to 2012, the fatality rate on rural, non-Interstate routes declined by 15 percent, from 2.61 fatalities per 100 vehicle miles of travel to 2.21³³. The fatality rate on all other roads decreased 26 percent from 2005 to 2012, from 1.05 fatalities per 100 million vehicle miles of travel to 0.78.³⁴

Chart 3. Fatalities per 100 million vehicle miles of travel for all roads, rural, non-Interstate routes and all other routes, 2005 to 2012.

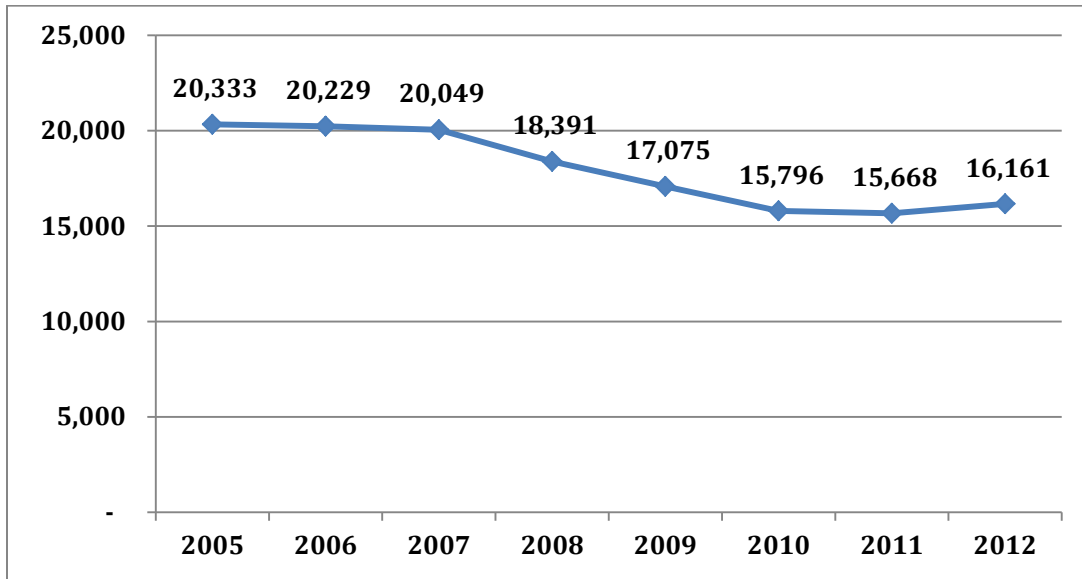


Source: TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data

After years of decreases, the rate of fatalities and the number of fatalities on rural non-Interstate roads increased in 2012. The rate of traffic fatalities on the nation’s rural non-Interstate roads decreased from 2.61 traffic fatalities per 100 million vehicle miles of travel in 2005 to 2.14 in 2011 before increasing to 2.21 in 2012. Similarly the number of traffic fatalities

on the nation’s rural non-Interstate roads decreased from 20,333 in 2005 to 15,668 in 2011 before increasing to 16,161 in 2012.

Chart 3. Number of fatalities on rural, non-Interstate roads from 2005 to 2012



Source: TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data

The state with the highest rate of traffic fatalities on its non-Interstate, rural routes in 2012 was South Carolina, with 3.99 traffic fatalities per every 100 million vehicle miles of travel.³⁵ Florida, West Virginia, Texas and Arkansas experienced the next highest rates of traffic fatalities on their non-Interstate, rural roads. State-by-state data on traffic fatality rates on rural, non-Interstate routes and all other routes can be found in [Appendix C](#).

Chart 4. States with highest rate of traffic fatalities on rural, non-Interstate routes per 100 million vehicle miles of travel in 2012 and fatality rate on all other roads in the state in 2012

STATE	NON-INTERSTATE RURAL	ALL OTHER ROADS
South Carolina	3.99	0.68
Florida	3.35	0.95
West Virginia	2.80	0.99
Texas	2.76	1.03

Arkansas	2.71	0.87
Tennessee	2.68	0.95
Arizona	2.66	1.11
Kentucky	2.64	0.78
California	2.61	0.63
Pennsylvania	2.60	0.91
Oklahoma	2.52	0.92
Hawaii	2.48	0.89
North Carolina	2.44	0.64
Montana	2.40	0.95
North Dakota	2.33	0.77
Kansas	2.26	0.74
South Dakota	2.21	0.74
Ohio	2.15	0.63
New York	2.13	0.59
Indiana	2.09	0.56

Source: TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data

Traffic Safety Factors

Key factors that contribute to fatal traffic crashes include the following: human behavior, safety features of the vehicle, emergency response times, medical care of the victims and the safety design of the roadway.³⁶ Human behavioral issues can include the use of safety belts, driver impairment due to alcohol or drugs, distracted or drowsy driving, and speeding. Because rural roads have fewer intersections than urban roads and are more likely to provide travel between urban areas, they often have higher speed limits than many urban routes. Because rural traffic crashes often occur in more remote locations than urban crashes, emergency medical care

following a serious accident is often slower, contributing to a higher traffic fatality rate on rural roads.

Traffic fatality rates on rural roads are also higher than on urban roads, partly because rural roads are less likely to have adequate safety features and are more likely than urban roads to have two lanes. Seventy percent of the nation's non-freeway, urban roads are two-lane routes, while 94 percent of rural, non-freeway roads are two-lane routes.³⁷

Rural routes have often been constructed over a period of years. As a result they often have inconsistent design features for such things as lane widths, curves, shoulders and clearance zones along roadways.³⁸ Many rural roads have been built with narrow lanes, limited shoulders, excessive curves and steep slopes alongside roadways.³⁹

While a desirable lane width for collector and arterial roadways is at least 11 feet, 24 percent of rural collector and arterial roads have lane widths of 10 feet or less, compared to 18 percent of urban collector and arterial roads with lane widths of 10 feet or less.⁴⁰ With passenger vehicle, heavy truck and commercial farming traffic increasing, the safety inadequacies of these rural roads are contributing to the higher rate of fatal crashes on rural roads.

The vast majority of rural, non-interstate traffic fatalities – 91 percent – occur on two-lane roads.⁴¹ A report on head-on collisions by the [National Cooperative Highway Research Program](#) found that “most head-on crashes are likely to result from a motorist making an ‘unintentional’ maneuver – the driver falls asleep, is distracted, or travels too fast in a curve.”⁴²

Making Rural Roads Safer

A report on rural road safety by the [United States General Accounting Office](#) (GAO) found that several factors hinder efforts to improve rural road safety. The GAO noted that these challenges include the large number of rural roads and the relatively low volume of traffic they carry, combined with the high cost of some desirable improvement. The GAO also found federal highway funding cannot be used on many rural roads, most of which are the responsibility of local governments, which may have limited resources.⁴³

A variety of design improvements can help improve rural road safety. The goal of these improvements is to keep vehicles in the correct lane and minimize the consequences of vehicles leaving the roadway.

The type of safety design improvements that are appropriate for a section on rural road will depend partly on the amount of funding available and the nature of the safety problem on that section of road. Several studies have classified rural safety improvements by both their effectiveness and their cost. These improvements include:

LOW COST:

Rumble strips – Rumble strips are raised or grooved patterns constructed on the roadway's shoulder. They have been found to reduce run off the road crashes by between 25 to 43 percent.⁴⁴

Centerline rumble strips – Several states have started to install centerline rumble strips to alert drivers who may be encroaching or have strayed into an opposing lane.

Improved signage and pavement markings including higher levels of retroreflectivity – Traffic signs and pavement markings represent the first line of crucial information for drivers

and can help improve night-time visibility. Signs with greater retroreflectivity, more visible pavement markings and raised, reflective lane markings can all assist drivers to stay on a roadway, particularly at night.

Lighting – [A recent study of the addition of street lighting](#) at 49 isolated rural intersections in Minnesota found that nighttime crashes decreased by 35 percent after the addition of lighting.⁴⁵

Removing or shielding road-side obstacles – Trees, large rocks, utility poles, heavy mail boxes and other road-side objects can be shielded, moved or moved away from the road to reduce the likelihood of a vehicle leaving the roadway from striking these objects.

Upgrade or add guardrails – Adding or improving guardrails has been found to reduce traffic fatality rates by between 50-58 percent.⁴⁶

Chevrons and post-mounted delineators along curves – The use of chevrons or post-mounted delineators to indicate roadway alignment have been found to be effective in reducing crashes at curves by providing drivers with better visual cues about the presence and geometry of a curve.⁴⁷

MODERATE COST:

Install median barriers – Median barriers have been found to reduce traffic fatality rates by 65 percent.⁴⁸

Adding turn lanes at intersections – The addition of left turn lanes at rural intersections was found to reduce crashes by between 33 and 48 percent.⁴⁹ The addition of right turn lanes at intersections was found to reduce crashes by between eight and 26 percent.⁵⁰

Resurfacing pavements - Resurfaced pavements have been found to result in a 25 percent reduction in fatal crashes.⁵¹

MODERATE TO HIGH COST:

Add or pave shoulders – Paving or widening shoulders has been found to reduce traffic fatality rates by 10 to 35 percent, depending on the width of the widening and the location.⁵²

Improved roadway alignment – Realigning roadways has been found to average a 50 percent reduction in traffic fatality rates.⁵³

Construct intermittent passing lanes or two-way left-turn lane – Adding passing lanes has been found to reduce traffic fatality rates by 20 percent and the addition of a two-way left-turn lane has been found to reduce traffic fatality rates by 30 percent.⁵⁴

Widen lanes – Making lanes wider has been found to reduce traffic fatality rates by eight to 10 percent.⁵⁵

Add lanes – [A report on the likely safety benefit](#) of converting two-lane rural roads into four-lanes routes, found that traffic accident rates would be reduced by between 40 to 60 percent.⁵⁶

The use of Roadway Safety Assessments (RSAs) is a proven approach that can improve safety on rural roads. Improved data collection on rural road safety can help to identify roadway segments with dangerous characteristics.

Systemic installation of cost effective safety solutions and devices in rural areas helps to improve safety not just by targeting problem points on a road, but also making entire segments safer by improving those roadway segments that exhibit the characteristics that typically result in fatal or serious-injury crashes.

Rural Transportation Challenge: Road Conditions

The life cycle of America's rural roads is greatly affected by the ability of the responsible transportation agency to perform timely maintenance and upgrades to ensure that road and

highway surfaces last as long as possible. The pavement condition of the nation’s major roads is evaluated and classified as being in poor, fair or good condition.

In 2012, 15 percent of the nation’s major rural roads were rated in poor condition and another 40 percent were rated in fair condition.⁵⁷ Roads rated poor may show signs of deterioration, including rutting, cracks and potholes. In some cases, poor roads can be resurfaced but often are too deteriorated and must be reconstructed. Roads rated in fair condition may show signs of significant wear and may also have some visible pavement distress. Most pavements in fair condition can be repaired by resurfacing, but some may need more extensive reconstruction to return them to good condition.

Connecticut leads the nation in the share of major rural roads with pavements in substandard condition with more than a third – 35 percent – of major rural roads rated in poor condition.⁵⁸ Connecticut is followed by Rhode Island, West Virginia, Hawaii and Michigan as states with the highest share of major rural roads with pavements in poor condition. Rural pavement conditions for all states can be found in [Appendix D](#).

Chart 5. States with Highest Share of Major Rural Roads Rated in Poor Condition

STATE	PERCENT POOR
Connecticut	35
Rhode Island	33
West Virginia	33
Hawaii	32
Michigan	32
Kansas	30
Oklahoma	29
Maine	28
Mississippi	25
Arkansas	23

Missouri	23
Washington	22
New Mexico	21
Alabama	21
Vermont	21
Alaska	20
New Hampshire	18
Virginia	18
Wisconsin	17
Pennsylvania	17

Source: TRIP analysis of Federal Highway Administration Data.

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.⁵⁹ In the U.S., only 45 percent of major rural roads had pavements that were in good condition in 2012.⁶⁰

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.⁶¹

As the nation’s major rural roads and highways continue to age, they will reach a point where routine paving and maintenance will not be adequate to keep pavement surfaces in good condition and costly reconstruction of the roadway and its underlying surfaces will become necessary.

Rural Transportation Challenge: Bridge Conditions

The nation’s rural bridges form key links in the nation’s highway system, providing communities and individuals access to employment, schools, shopping and medical services, and facilitating commerce and access for emergency vehicles. In 2013, a total of 22 percent of the nation’s rural bridges were rated as structurally deficient or functionally obsolete.⁶²

Twelve percent of the nation’s rural bridges were rated as structurally deficient in 2013.⁶³ 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 lengthen travel time, waste fuel and reduce the efficiency of the local economy.

With a quarter of their rural bridges – 25 percent – rated structurally deficient, Pennsylvania and Rhode Island lead the nation in the share of rural bridges that are structurally deficient, followed by Iowa, South Dakota and Oklahoma.⁶⁴ Rural bridge conditions for all states can be found in [Appendix E](#).

Chart 6. States with Highest Share of Rural Bridges Rated Structurally Deficient (2013).

STATE	PERCENT STRUCTURALLY DEFICIENT
Pennsylvania	25
Rhode Island	25

Iowa	22
South Dakota	21
Oklahoma	20
Hawaii	19
Nebraska	19
North Dakota	17
Maine	16
Louisiana	16
Missouri	15
New Hampshire	15
Mississippi	14
North Carolina	14
New Jersey	14
Wyoming	14
New York	14
Michigan	14
West Virginia	13
California	13

Source: TRIP analysis of Federal Highway Administration data

Ten percent of the nation’s rural bridges were rated functionally obsolete in 2013.⁶⁵

Bridges that are functionally obsolete no longer meet current highway design standards, often because of narrow lanes, inadequate clearances or poor alignment with the approaching roadway.

The service life of bridges can be extended by performing routine maintenance such as resurfacing decks, painting surfaces, ensuring that a facility has good drainage and replacing deteriorating components. But most bridges will eventually require more costly reconstruction or major rehabilitation to remain operable.

Rural Transportation Funding

Investment in the nation's rural roads, highways and bridges is funded by local, state and federal governments. The federal government provides funding for the nation's rural transportation system largely as part MAP-21 (Moving Ahead for Progress in the 21st Century Act), the current two-year federal surface transportation program, which expires on September 30, 2014.

Federal funds for rural highway and transit improvements are provided through the federal Highway Trust Fund, which raises revenue through federal user fees, largely an 18.4 cents-per-gallon tax on gasoline and a 24.4 cents-per-gallon tax on diesel fuel. Since 2008 revenue into the federal Highway Trust Fund has been inadequate to support legislatively set funding levels so Congress has transferred approximately \$53 billion in general funds and an additional \$2 billion from a related trust fund into the federal Highway Trust Fund.⁶⁶

MAP-21, approved by Congress in July 2012, greatly increased funding flexibility for states and streamlined project approval processes to improve the efficiency of state and local transportation agencies in providing needed transportation improvements in the state. But MAP-21 did not provide sufficient long-term revenues in place to support the current level of federal surface transportation investment.

The impact of inadequate federal surface transportation revenues could be felt as early as this summer, when the balance in the [Highway Account of the federal Highway Trust Fund](#) is expected to drop below \$1 billion, which will trigger delays in the federal reimbursement to states for road, highway and bridge projects. States are expected to respond to this delay in

federal reimbursement for road, highway and bridge repairs and improvements by delaying numerous projects.⁶⁷

Nationwide, federal funding for highways is expected to be cut by almost 100 percent from the current investment level for the fiscal year starting October 1, 2014 (FY 2015) unless Congress provides additional transportation revenues. This is due to a cash shortfall in the Highway Trust Fund as projected by the [Congressional Budget Office](#).

If Congress decides to provide additional revenues into the federal Highway Trust Fund in tandem with authorizing a new federal surface transportation program, a number of technically feasible revenue options have been identified by the [American Association of State Highway and Transportation Officials](#).

Transportation Opportunities in Rural America

Providing an adequate level of safe and efficient access in America's small communities and rural areas to support quality of life and enhance economic productivity will require that the nation adopt transportation policies that will improve rural transportation connectivity, safety and conditions.

The following recommendations by TRIP for an improved rural transportation system are also based partially on recommendations and findings of the American Association of State Highway and Transportation Officials (AASHTO), the National Cooperative Highway Research Program (NCHRP), the Council of State Governments (CSG) and the Ports-to-Plains Alliance.

Improve access and connectivity in America's small communities and rural areas

- ✓ Widen and extend key highway routes, including Interstates, to increase connectivity to smaller and emerging communities to facilitate access to jobs, education and healthcare

while improving access for agriculture, energy, manufacturing, forestry, tourism and other critical segments of the rural economy.

- ✓ An [NCHRP report](#) found that the construction of an additional 30,000 lane miles of limited access highways, largely along existing corridors, is needed to address the nation's need for increased rural connectivity.
- ✓ Modernize major two-lane roads and highways so they can accommodate increased personal and commercial travel.
- ✓ Improve public transit service in rural America to provide improved mobility for people without access to private vehicles.

Improve rural traffic safety

- ✓ Adequately fund needed rural roadway safety improvements and provide enhanced enforcement, education and improved emergency response to reduce the rate of rural traffic fatalities.
- ✓ Roadway safety improvements may include rumble strips, shoulder improvements, lane widening, curve reductions, passing lanes, intersection improvements and improved signage and lighting, and improved shielding of obstacles.

Improve the condition of rural roads, highways and bridges

- ✓ Adequately fund local and state transportation programs to insure sufficient preservation of rural roads, highways and bridges to maintain transportation service and accommodate large truck travel, which is needed to support the rural economy.

Conclusion

Rural roads and bridges are a critical link in the nation's transportation system, providing access to many of its natural resources and the energy, food and fiber that drives the nation's economic engine. Rural roads and bridges play a critical role by connecting the nation's rural communities to America's urban areas, supporting commerce, commuting and tourism. But, the nation's rural transportation system, particularly its roads and bridges face significant challenges. They carry increasing levels of traffic, fail to provide adequate connectivity for many

communities, have significant deficiencies and have significantly higher rates of serious traffic crashes than other roads.

Providing the nation with a rural transportation system that will support the nation's economy and future development will require that the U.S. invest in rural transportation system that is safe, efficient, and well-maintained, and that provides adequate mobility and connectivity to the nation's rural communities.

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