Mobile Transportation by the Numbers

MEETING THE REGION'S NEED FOR SAFE, SMOOTH AND EFFICIENT MOBILITY

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TRIP
a national transportation research group

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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 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.

MOBILE AREA KEY TRANSPORTATION FACTS

THE HIDDEN COSTS OF DEFICIENT MOBILE ROADS

Driving on Mobile area roads that are deteriorated, congested and that lack some desirable safety features costs the average driver $1,576 each year in the form of additional vehicle operating costs (VOC) as a result of driving on rough roads, the cost of lost time and wasted fuel due to congestion, and the financial cost of traffic crashes. Statewide, Alabama drivers lose $5.3 billion each year as a result of driving on deficient roads. In addition to the statewide report, TRIP has also prepared regional reports for the Anniston-Oxford-Gadsden, Birmingham, Florence, Decatur-Huntsville, Mobile, Montgomery and Tuscaloosa urban areas.

MOBILE ROADS PROVIDE A ROUGH RIDE

Due to inadequate state and local funding, 32 percent of major roads and highways in the Mobile area are in poor or mediocre condition. Fourteen percent of the area's major urban roads are in poor condition and 18 percent are in mediocre condition. Sixteen percent of Mobile area roads are in fair condition and 52 percent are in good condition. Driving on rough roads costs the average driver in the Mobile area $425 annually in extra vehicle operating costs, including accelerated vehicle depreciation, additional vehicle repair costs, increased fuel consumption and increased tire wear. Throughout the state driving on deteriorated roads costs Alabama drivers a total of $2 billion each year.

MOBILE AREA BRIDGE CONDITIONS

Four percent of bridges (33 of 941) in the Mobile area are structurally deficient, meaning there is significant deterioration of the bridge deck, supports or other major components. Most bridges are designed to last 50 years before major overhaul or replacement, although many newer bridges are being designed to last 75 years or longer. In Alabama, 49 percent of the state's bridges were built in 1969 or earlier.

MOBILE DRIVERS WASTE TIME AND FUEL ON CONGESTED ROADS

Traffic congestion costs the average Mobile area driver $744 each year in the form of lost time and wasted fuel. The average Mobile area driver loses 32 hours each year – four full work days - stuck in congestion. Congested roads choke commuting and commerce and cost Alabama drivers $1.5 billion each year in the form of lost time and wasted fuel.

MOBILE TRAFFIC SAFETY AND FATALITIES

From 2015 to 2017, on average, 106 people were killed annually in traffic crashes in the Mobile area. Each Mobile area driver loses an average of $407 annually in the financial cost of traffic crashes in which roadway features were likely a contributing factor, including work and household productivity losses, property damage, medical costs, rehabilitation costs, legal and court costs, congestion costs, and emergency services. Throughout the state, traffic crashes in which roadway features were likely a contributing factor imposed $1.8 billion in economic costs in 2017.

TRANSPORTATION AND ECONOMIC DEVELOPMENT

The health and future growth of Alabama's economy is riding on its transportation system. Each year, $432 billion in goods are shipped to, from and within sites in Alabama, mostly by truck. Increases in passenger and freight movement will place further burdens on the state's already deteriorated and congested network of roads and bridges.

The design, construction and maintenance of transportation infrastructure in Alabama support 65,068 full-time jobs across all sectors of the state economy. These workers earn $2.1 billion annually. Approximately 940,000 full-time jobs in Alabama in key industries like tourism, retail sales, agriculture and manufacturing are completely dependent on the state's transportation network.

TRANSPORTATION FUNDING IN ALABAMA

The buying power of the state's 18 cents-per-gallon fuel tax, last raised in 1992, has been more than cut in half by inflation and increased fuel economy. The vast majority of Alabama's current transportation budget is devoted to preserving the existing system, leaving only $150 million available each year for new projects that would address congestion or expand the system to accommodate population and travel growth, and promote economic development. A 2019 report by the University of Alabama's Alabama Transportation Institute and Alabama Transportation Policy Research Center found that, through 2040, Alabama should be spending a minimum of $600 million annually on additional roadway capacity to allow the state to be economically competitive. An annual investment of $800 million in additional roadway capacity would optimize Alabama's economic opportunities.

ATRIP (the Alabama Transportation Rehabilitation and Improvement Program) provided Alabama with more than $1.3 billion in borrowed dollars, beginning in 2013, to address needed improvements that would not have been possible with the available revenue. The use of approximately $200 million annually in ATRIP funds, which concluded in 2017, as well as additional debt incurred to finance the reconstruction of the elevated interstate and bridges in Birmingham's Central Business District, has resulted in the state's annual highway debt service increasing to $114 million in 2018, a level it will stay at for the next 19 years. This annual level of state highway debt service is up from $13.6 million in 2011.

INTRODUCTION

The Mobile area's roads, highways and bridges form vital transportation links for residents, visitors and businesses, providing daily access to homes, jobs, shopping, natural resources and recreation. Modernizing Alabama's transportation system is critical to quality of life and economic competitiveness in the Mobile area and in the Yellowhammer State as a whole. Inadequate transportation investment, which will result in deteriorated transportation facilities and diminished access, will negatively affect Alabama's economic competitiveness and quality of life.

To accommodate population and economic growth, maintain its level of economic competitiveness and achieve further economic growth, Alabama will need to maintain and modernize its roads, highways and bridges by improving the physical condition of its transportation network and enhancing the system's ability to provide efficient, reliable and safe mobility for residents, visitors and businesses. Making needed improvements to Alabama's roads, highways, bridges and transit systems could also provide a significant boost to the state's economy by creating jobs in the short term and stimulating long-term economic growth as a result of enhanced mobility and access.

This report examines the condition, use and safety of the Mobile area's roads, highways and bridges, and the area's future mobility needs. Sources of information for this report include the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), the Bureau of Transportation Statistics (BTS), the U.S. Census Bureau, the Texas Transportation Institute (TTI), the American Road & Transportation Builders Association (ARTBA), the National Highway Traffic Safety Administration (NHTSA), and the Public Affairs Research Council of Alabama (PARC).

In addition to the statewide report, TRIP has also prepared regional reports for the Anniston-Oxford-Gadsden, Birmingham, Florence, Decatur-Huntsville, Mobile, Montgomery and Tuscaloosa urban areas. An urban area is defined as a region's municipalities and surrounding suburbs for pavement condition and congestion data; bridge and traffic fatality data include a region's major counties.[1]

POPULATION, TRAVEL AND ECONOMIC TRENDS IN ALABAMA

Mobile area motorists and businesses require a high level of personal and commercial mobility. To foster quality of life and spur continued economic growth, it is critical that the state provide a safe

and modern transportation system that can accommodate future growth in population, tourism, business, recreation and vehicle travel.

Alabama's population grew to approximately 4.9 million residents in 2018, a 10 percent increase since 2000.[2] Alabama had approximately 3.9 million licensed drivers in 2016.[3] From 2000 to 2017, Alabama's gross domestic product (GDP), a measure of the state's economic output, increased by 23 percent, when adjusted for inflation.[4] U.S. GDP increased 37 percent during the same period.[5] In 2017, the state's transportation system carried 70.7 billion annual vehicle miles of travel (VMT), a 25 percent increase since 2000, and an increase of nine percent since 2013.[6]

CONDITION OF MOBILE AREA ROADS

The life cycle of a roadway system is greatly affected by the state and local governments' ability to perform timely maintenance and upgrades to ensure that road and highway surfaces last as long as possible.

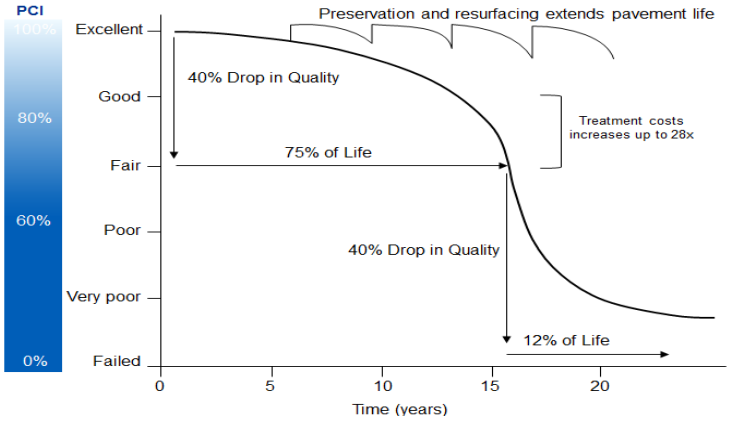
The pavement data in this report, which is for all arterial and collector roads and highways, is provided by the Federal Highway Administration (FHWA), based on data submitted annually by the Alabama Department of Transportation on the condition of major state and locally maintained roads and highways. Pavement data for Interstate highways and other principal arterials is collected for all system mileage, whereas pavement data for minor arterial and all collector roads and highways is based on sampling portions of roadways as prescribed by FHWA to insure the data collected is adequate to provide an accurate assessment of pavement conditions on these roads and highways.

In the Mobile area, 32 percent of major roads and highways are in poor or mediocre condition. Fourteen percent of the area's major urban roads are in poor condition and 18 percent are in mediocre condition.[7] Sixteen percent of Mobile area roads are in fair condition and 52 percent are in good condition.[8]

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 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.[9] As roads and highways continue to age, they will reach a point of deterioration

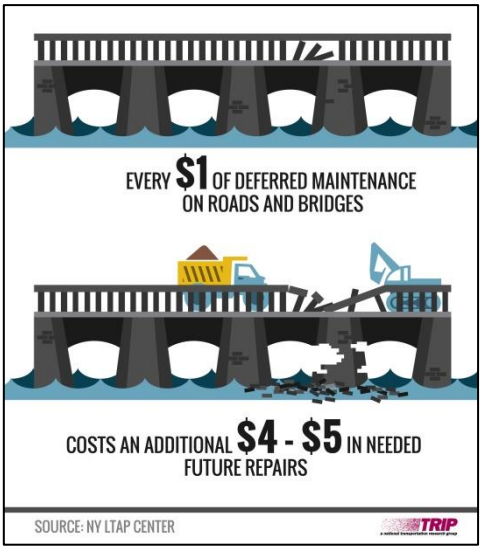
where routine paving and maintenance will not be adequate to keep pavement surfaces in good condition and costly reconstruction of the roadway and its underlying surfaces will become necessary.

Chart 1. Pavement Condition Cycle Time with Treatment and Cost



Source: North Carolina Department of Transportation (2016). 2016 Maintenance Operations and Performance Analysis Report

Long-term repair costs increase significantly when road and bridge maintenance is deferred, as road and bridge deterioration accelerates later in the service life of a transportation facility and requires more costly repairs. A report on maintaining pavements found that every $1 of deferred maintenance on roads and bridges costs an additional $4 to $5 in needed future repairs.[10]



THE COST TO MOBILE AREA MOTORISTS OF ROADS IN INADEQUATE CONDITION

TRIP has calculated the additional cost to motorists of driving on roads in poor, mediocre or fair condition. When roads are in poor, mediocre or fair condition – which may include potholes, rutting or rough surfaces – the cost to operate and maintain a vehicle increases. These additional vehicle operating costs (VOC) include accelerated vehicle depreciation, additional vehicle repair costs, increased fuel consumption and increased tire wear. TRIP estimates that additional VOC borne by the average driver in the Mobile area is $425 annually – a total of $2 billion statewide.[11]

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.[12] 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 VOC estimate is based on taking the average number of miles driven annually by a motorist, calculating current VOC based on AAA's 2017 VOC and then using the HDM model to estimate the additional VOC paid by drivers as a result of substandard roads.[13] Additional research on the impact of road conditions on fuel consumption by the Texas Transportation Institute (TTI) is also factored in to TRIP's vehicle operating cost methodology.

MOBILE AREA BRIDGE CONDITIONS

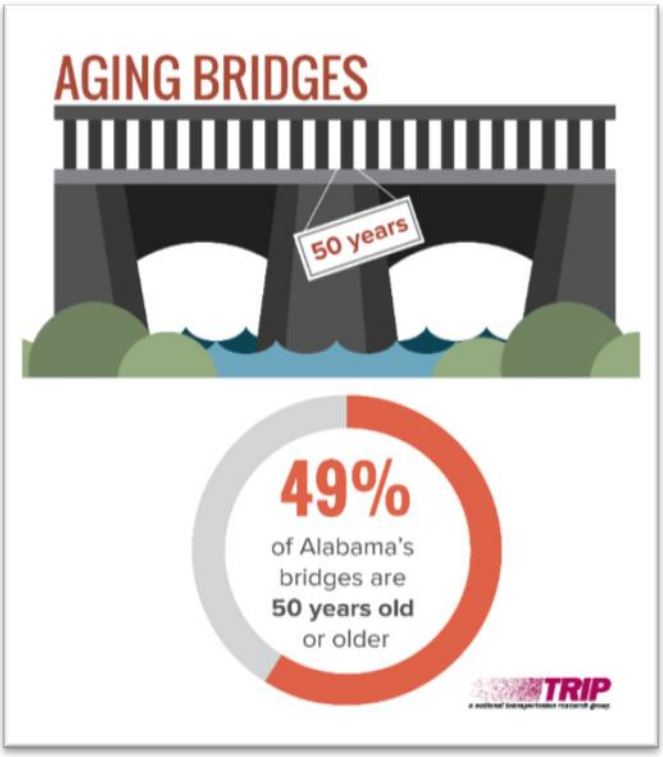
Bridges in the Mobile area form key links in the region's highway system, providing communities and individuals access to employment, schools, shopping and medical facilities, and facilitating commerce and access for emergency vehicles.

In the Mobile area, four percent (33 of 941) of locally and state-maintained bridges are rated structurally deficient.[14] Statewide, seven percent (1,200 of 16,129) of bridges are structurally deficient.[15] This includes all bridges that are 20 feet or more in length.

A bridge is rated 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. Bridges rated fair have been found to have some minor deterioration of the bridge deck, supports or other major components.

Most bridges are designed to last 50 years before major overhaul or replacement, although many newer bridges are being designed to last 75 years or longer. In Alabama, 49 percent of the state's bridges were built in 1969 or earlier.[16]

The service life of bridges can be extended by performing routine maintenance such as resurfacing decks, painting surfaces, insuring 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.



TRAFFIC SAFETY IN THE MOBILE AREA

From 2015-2017, on average, 106 people were killed in traffic crashes each year in the Mobile area. [17] Three major factors are associated with fatal vehicle crashes: driver behavior, vehicle characteristics and roadway features. It is estimated that roadway features are likely a contributing factor in approximately one-third of fatal traffic crashes. Roadway features that impact safety include the number of lanes, lane widths, lighting, lane markings, rumble strips, shoulders, guard rails, other shielding devices, median barriers and intersection design.

Alabama's overall traffic fatality rate of 1.34 fatalities per 100 million vehicle miles of travel in 2017 is higher than the national average of 1.16.[18] The traffic fatality rate on the state's rural roads is disproportionately high. The fatality rate on Alabama's non-interstate rural roads is more than two and a half times that on all other roads in the state (2.38 fatalities per 100 million vehicle miles of travel vs. 0.87).[19]

The average driver in the Mobile area loses $407 each year in the financial cost of traffic crashes in which roadway features were likely a contributing factor.[20] According to a 2015 National Highway Traffic Safety Administration (NHTSA) report, the economic costs of traffic crashes includes

work and household productivity losses, property damage, medical costs, rehabilitation costs, legal and court costs, congestion costs and emergency services.[21] Traffic crashes in Alabama imposed a total of $5.5 billion in economic costs in 2017.[22] TRIP estimates that roadway features were likely a contributing factor in approximately one-third of all fatal traffic crashes, resulting in $1.8 billion in economic costs in 2017.[23]

Improving safety on Alabama's roadways 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. The severity of serious traffic crashes could be reduced through roadway improvements, where appropriate, 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. Roads with poor geometry, with insufficient clear distances, without turn lanes, having inadequate shoulders for the posted speed limits, or poorly laid out intersections or interchanges, pose greater risks to motorists, pedestrians and bicyclists.

Investments in rural traffic safety have been found to result in significant reductions in serious traffic crashes. A 2012 report by TTI found that improvements completed recently by TxDOT that widened lanes, improved shoulders and made other safety improvements on 1,159 miles of rural state roadways resulted in 133 fewer fatalities on these roads in the first three years after the improvements were completed (as compared to the three years prior).[24] TTI estimates that the improvements on these roads are likely to save 880 lives over 20 years.[25]

TRAFFIC CONGESTION IN THE MOBILE AREA

Increasing levels of traffic congestion cause significant delays in Alabama, particularly in its larger urban areas, choking commuting and commerce. Traffic congestion robs commuters of time and money and imposes increased costs on businesses, shippers and manufacturers, which are often passed along to the consumer. Increased levels of congestion can also reduce the attractiveness of a location to a company when considering expansion or where to locate a new facility.

In the Mobile area, the average driver loses $744 each year in the form of lost time and wasted fuel as a result of traffic congestion.[26] The average Mobile area driver loses 32 hours each year stuck in traffic congestion.[27]

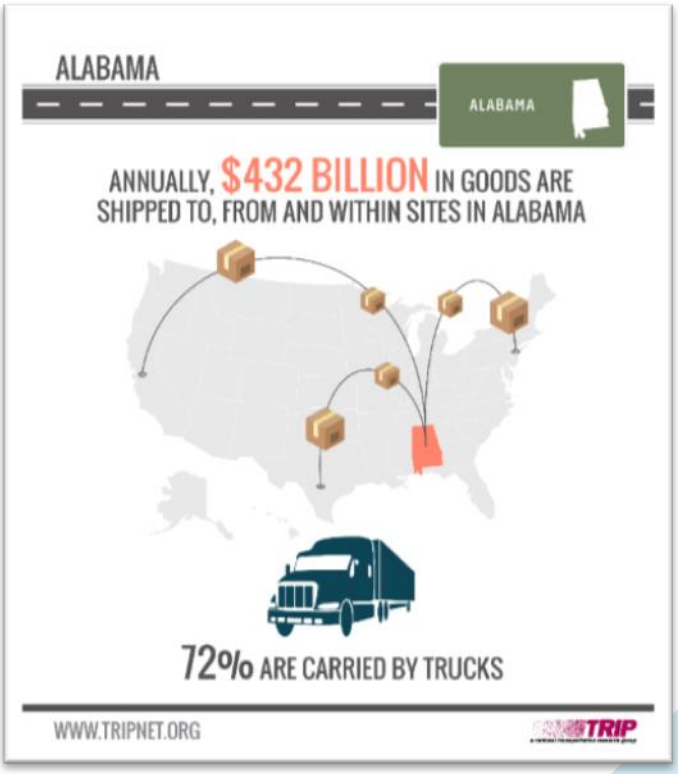
Based on TTI methodology, TRIP estimates the value of lost time and wasted fuel in Alabama is approximately $1.5 billion a year.

TRANSPORTATION AND ECONOMIC GROWTH

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

Businesses have responded to improved communications and the need to cut costs with a variety of innovations including just-in-time delivery, increased small package delivery, demand-side inventory management and e-commerce. The result of these changes has been a significant improvement in logistics efficiency as firms move 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 Alabama. 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.



Every year, $432 billion in goods are shipped to, from and within sites in Alabama, mostly by trucks.[28] Seventy-two percent of the goods shipped annually to and from sites in Alabama are carried by trucks and another 12 percent are carried by courier services or multiple-mode deliveries, which include trucking.[29]

The design, construction and maintenance of transportation infrastructure in Alabama play a critical role in the state's economy, supporting the equivalent of 65,068 full-time jobs across all sectors of the state economy, earning these workers approximately $2.1 billion annually.[30] These jobs include 32,415 full-time jobs directly involved in transportation infrastructure construction and related activities. Spending by employees and companies in the transportation design and construction industry support an additional 32,653 full-time jobs in Alabama.[31] Transportation construction in Alabama contributes an estimated $381.6 million annually in state and local income, corporate and unemployment insurance taxes and the federal payroll tax.[32]

More than 940,000 full-time jobs in Alabama in key industries like tourism, retail sales, agriculture and manufacturing are dependent on the quality, safety and reliability of the state's transportation infrastructure network. These workers earn $33.8 billion in wages and contribute an estimated $6.2 billion in state and local income, corporate and unemployment insurance taxes and the federal payroll tax.[33]

Local, regional and state economic performance is improved when a region's surface transportation system is expanded or repaired. This improvement comes as a result of the initial job creation and increased employment created over the long-term because of improved access, reduced transport costs and improved safety.

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 and more modern transportation system. Highway accessibility was ranked the number one site selection factor in a 2017 survey of corporate executives by Area Development Magazine. Labor costs and the availability of skilled labor, which are both impacted by a site's level of accessibility, were rated second and third, respectively.[34]

TRANSPORTATION FUNDING IN ALABAMA

Investment in Alabama's roads, highways and bridges is funded by local, state and federal governments. A lack of sufficient funding at all levels will make it difficult to adequately maintain and improve the state's existing transportation system.

Inflation and increased fuel economy have decreased the ability of the Alabama's fuel tax revenue to provide for the needs of a transportation system that is carrying significantly more vehicle travel and experiencing increased wear and tear and added congestion as a result. Alabama's fuel tax

was last raised in 1992. Only eight other states have gone as long without an increase.[35] Revenue from the state's 18 cent-per-gallon fuel tax has not kept pace with inflation. When adjusted for inflation, Alabama collects half of what it did in the early 1990s. In 1992, when the state's fuel tax was last raised, the yield of per-gallon fuel taxes per 100 miles driven was $1.06, but declined to $0.53 in 2016 when adjusted for inflation.[36]

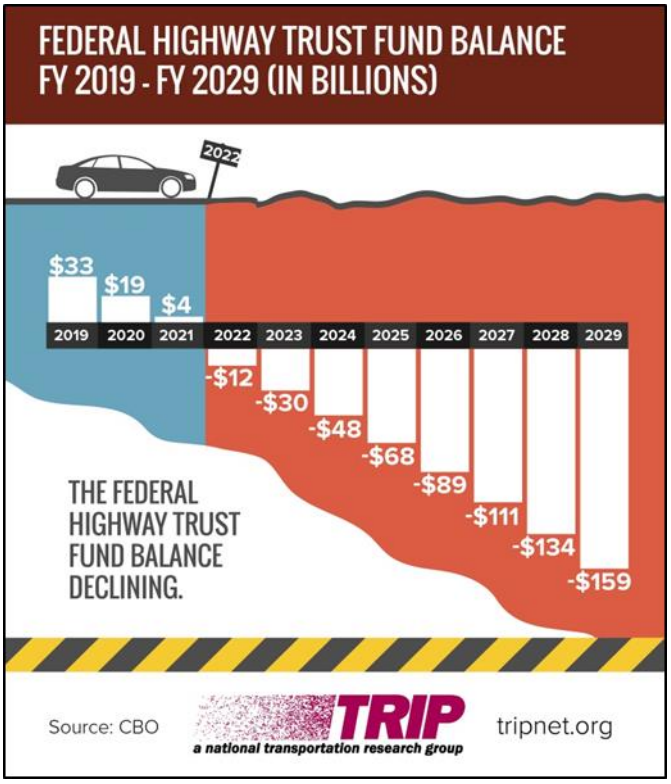
An increasingly large share of ALDOT's budget has been devoted to preserving the existing system of roads and bridges, leaving only $150 million available each year for new projects that would address congestion or expand the system to accommodate population and travel growth and promote economic development.[37] ALDOT and communities around the state have identified major transportation projects across Alabama that would help to ease congestion and create economic development opportunities. These projects include the 53-mile Northern Beltline around Birmingham; more than $1 billion in identified expansion needs in Huntsville; a new Mobile Bay Bridge and Bayway; an outer highway loop for Montgomery; Tuscaloosa's Eastern Bypass; a bypass around Dothan; and, an extension of I-85 across West Alabama. At least an additional $10 billion in large-scale projects have been identified, but only $150 million a year will be available.[38]

A 2019 report by the University of Alabama's Alabama Transportation Institute and Alabama Transportation Policy Research Center found that, through 2040, Alabama should be spending a minimum of $600 million annually on additional roadway capacity to allow the state to be economically competitive. An annual investment of $800 million in additional roadway capacity would optimize Alabama's economic opportunities.[39]

Through ATRIP (the Alabama Transportation Rehabilitation and Improvement Program), first introduced in 2012 and enacted in 2013, the state secured more than $1.3 billion in borrowed dollars to address needed improvements that would not have been possible with the available revenue. However, the state will see a significant drop in available transportation funding now that the borrowing authority has been exhausted and the state must devote additional funds to repaying the debt.

The use of approximately $200 million annually in ATRIP funds, which concluded in 2017, as well as additional debt incurred to finance the reconstruction of the elevated interstate and bridges in Birmingham's Central Business District, has resulted in the state's annual highway debt service increasing to $114 million in 2018, a level it will stay at for the next 19 years.[40] This annual level of state highway debt service is up from $13.6 million in 2011.[41]

The federal government is a critical source of funding for Alabama's roads, highways, bridges and transit systems and provides a significant return in road and bridge funding based on the revenue generated in the state by the federal motor fuel tax.



Most federal funds for highway and transit improvements in Alabama are provided by federal highway 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.[42]

Signed into law in December 2015, the Fixing America's Surface Transportation Act (FAST Act), provides modest increases in federal highway and transit spending. The five-year bill also provides states with greater funding certainty and streamlines the federal project approval process. But, the FAST Act does not provide adequate funding to meet the nation's need for highway and transit improvements and does not include a long-term and sustainable funding source.

The five-year, $305 billion FAST Act will provide a boost of approximately 15 percent in highway funding and 18 percent in transit funding over the duration of the program, which expires in 2020.[43] In addition to federal motor fuel tax revenues, the FAST Act will also be funded by $70 billion in U.S. general funds, which will rely on offsets from several unrelated federal programs including the Strategic Petroleum Reserve, the Federal Reserve and U.S. Customs.

According to the 2015 Status of the Nation's Highways, Bridges and Transit: Conditions and Performance report submitted by the United States Department of Transportation (USDOT) to Congress, the nation faces an $836 billion backlog in needed repairs and improvements to the nation's roads, highways and bridges.[44] The USDOT report found that the nation's current $105 billion investment in roads, highways and bridges by all levels of government should be increased by 35

percent to $142.5 billion annually to improve the conditions of roads, highways and bridges, relieve traffic congestion and improve traffic safety.

CONCLUSION

As Alabama works to enhance its thriving, growing and dynamic state, it will be critical that it is able to address the most significant transportation issues by providing a 21st century network of roads, highways, bridges and transit that can accommodate the mobility demands of a modern society.

Alabama will need to modernize its surface transportation system by improving the physical condition of its transportation network and enhancing the system's ability to provide efficient, safe and reliable mobility for residents, visitors and businesses. Making needed improvements to the state's roads, highways, bridges and transit systems would provide a significant boost to the economy by creating jobs in the short term and stimulating long-term economic growth as a result of enhanced mobility and access.

Numerous projects to improve the condition and expand the capacity of Alabama's roads, highways, bridges and transit systems will not be able to proceed without a substantial boost in state or local transportation funding. If Alabama is unable to complete needed transportation projects it will hamper the state's ability to improve the condition and efficiency of its transportation system or enhance economic development opportunities and quality of life.

# # #

ENDNOTES

[1] Bridge condition data and safety data for each urban area includes the counties noted: Anniston-Oxford-Gadsden: Calhoun and Etowah Counties; Birmingham: Jefferson County; Florence: Lauderdale County; Decatur-Huntsville: Madison, Morgan and Limestone Counties; Mobile: Mobile and Baldwin Counties; Montgomery: Montgomery County; Tuscaloosa: Tuscaloosa County.
[2] U.S. Census Bureau (2017).
[3]Highway Statistics (2016). Federal Highway Administration. DL-1C.
[4] TRIP analysis of Bureau of Economic Analysis data.
[5] Ibid.
[6] U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 2000 and 2017 and analysis of Federal Highway Administration Traffic Volume Trends (2017) https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm
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[8] Ibid.
[9] Selecting a Preventative Maintenance Treatment for Flexible Pavements. R. Hicks, J. Moulthrop. Transportation Research Board. 1999. Figure 1.
[10] Pavement Maintenance, by David P. Orr, PE Senior Engineer, Cornell Local Roads Program, March 2006.
[11] TRIP calculation.
[12] Highway Development and Management: Volume Seven. Modeling Road User and Environmental Effects in HDM-4. Bennett, C. and Greenwood, I. 2000.
[13] Your Driving Costs. American Automobile Association. 2017.
[14] Federal Highway Administration National Bridge Inventory. 2017.
[15] Ibid.
[16] TRIP analysis of Federal Highway Administration National Bridge Inventory data (2018).
[17] Federal Highway Administration National Highway Traffic Safety Administration, 2014-2016.
[18] TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data (2018). Data is for 2017.
[19] TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data (2017).
[20] TRIP estimate based on NHTSA report "The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised), 2016. P. 146.
[21] The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised) (2015). National Highway Traffic Safety Administration. P. 1. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013
[22] TRIP estimate based on NHTSA report "The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised), 2016. P. 146.
[23] Ibid.
[24] Adding Highway Shoulders, Width, Reduce Crash Numbers and Save Lives (August 9, 2012). Texas Transportation Institute. https://tti.tamu.edu/2012/08/09/tti-study-analyzes-roadway-improvements/
[25] Ibid.
[26] TRIP estimates based on Texas Transportation Institute Urban Mobility Report.
[27] Ibid
[28] TRIP analysis of Bureau of Transportation Statistics, U.S. Department of Transportation. 2016 Commodity Flow Survey, State Summaries.
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[30] American Road & Transportation Builders Association (2015). The 2015 U.S. Transportation Construction Industry Profile. https://www.transportationcreatesjobs.org/pdf/Economic_Profile.pdf
[31] Ibid.
[32] Ibid
[33] Ibid.

[34] Area Development Magazine (2018). 32nd Annual Survey of Corporate Executives: Availability of Skilled Labor New Top Priority. http://www.areadevelopment.com/Corporate-Consultants-Survey-Results/Q1-2018/32nd-annual-corporate-survey-14th-annual-consultants-survey.shtml

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[36] Ibid.

[37] Ibid

[38] Ibid

[39] "Addressing Alabama's Transportation Infrastructure: Roads and Bridges." University of Alabama's Alabama Transportation Policy Research Center. January 2019.

[40] Ibid

[41] Ibid

[42] "Surface Transportation Reauthorization and the Solvency of the Highway Trust Fund," presentation by Jim Tymon, American Association of State Highway and Transportation Officials (2014).

[43] 2015 "Fixing America's Surface Transportation Act." (2015) American Road and Transportation Builders Association. http://www.artba.org/newsline/wp-content/uploads/2015/12/ANALYSIS-FINAL.pdf

[44] United States Department of Transportation (2015). 2015 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance. Executive Summary, Chapter 8. https://www.fhwa.dot.gov/policy/2015cpr/es.cfm#8h