MARYLAND TRANSPORTATION BY THE NUMBERS:

Meeting the State's Need for Safe and Efficient Mobility

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TRIP
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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.

Ten Key Transportation Numbers in Maryland

$6.2	TRIP estimates that Maryland roadways that lack some desirable safety features, have inadequate capacity to meet travel demands or have poor pavement conditions cost the state's residents approximately $6.2 billion annually in the form of additional vehicle operating costs, the cost of lost time and wasted fuel due to traffic congestion and traffic crashes.
$1,781 **$2,195**	Driving on roads that are congested, deteriorated and that lack some desirable safety features costs the average Baltimore area driver $1,781 annually due to deficient roads, while deficient roads cost the average Washington, DC area driver $2,195 annually.
41% **66%** **62%**	Forty-one percent of Maryland's major locally and state-maintained roads and highways are either in poor or mediocre condition. Sixty-six percent of Baltimore-area major locally and state- maintained urban roads are in poor or mediocre condition and 62 percent of Washington urban area major locally and state-maintained urban roads are in poor or mediocre condition.
579 **2,897**	From 2006 to 2010, an average of 579 people were killed annually in Maryland traffic crashes, a total of 2,897 fatalities over the five year period.
2 ½	The fatality rate on Maryland's non-interstate rural roads is nearly two-and-a-half times higher than on all other roads in the state (1.67 fatalities per 100 million vehicle miles of travel vs. 0.69).
1 / 4	A total of one-fourth of Maryland bridges are in need of repair, improvement or replacement. Seven percent of the state's bridges are structurally deficient and 18 percent are functionally obsolete.
39 % **20 %**	Vehicle miles of travel in Maryland increased 39 percent from 1990 to 2011 and are expected to increase another 20 percent by 2030.
3,856,604	There are 3,856,604 licensed drivers in Maryland.
81 %	Eighty-one percent of goods shipped annually from sites in Maryland travel by truck.
$1.00 = $5.20	The Federal Highway Administration estimates that each dollar spent on road, highway and bridge improvements results in an average benefit of $5.20 in the form of reduced vehicle maintenance costs, reduced delays, reduced fuel consumption, improved safety, reduced road and bridge maintenance costs, and reduced emissions as a result of improved traffic flow.

Executive Summary

Maryland's extensive system of roads, highways and bridges provides the state's residents, visitors and businesses with a high level of mobility. This transportation system forms the backbone that supports the state's economy. Maryland's surface transportation system enables the state's residents and visitors to travel to work and school, visit family and friends, and frequent tourist and recreation attractions while providing its businesses with reliable access to customers, materials, suppliers and employees.

As Maryland looks to retain its businesses, maintain its level of economic competitiveness and achieve further economic growth, the state 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 and reliable mobility for motorists and businesses. Making needed improvements to Maryland's roads, highways and bridges 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.

With a current unemployment rate of 6.6 percent and with the state's population continuing to grow, Maryland must improve its system of roads, highways and bridges to foster economic growth and keep businesses in the state. In addition to economic growth, transportation improvements are needed to ensure safe, reliable mobility and quality of life for all Maryland residents. Meeting Maryland's need to modernize and maintain its system of roads, highways and bridges will require a significant boost in local, state and federal funding.

An inadequate transportation system costs Maryland residents a total of $6.2 billion every year in the form of additional vehicle operating costs (VOC), congestion-related delays and traffic crashes.

- TRIP estimates that Maryland roadways that lack some desirable safety features, have inadequate capacity to meet travel demands or have poor pavement conditions cost the state's residents approximately $6.2 billion annually in the form of additional vehicle operating costs, the cost of lost time and wasted fuel due to traffic congestion and traffic crashes.

- TRIP has calculated the annual cost to Maryland residents of driving on roads that are deteriorated, congested and lack some desirable safety features both statewide and in the state's two largest urban areas (estimates for the Washington, DC area include the entire urban area). The following chart shows the cost breakdown for these areas.

Location	VOC	Congestion	Safety	TOTAL
Baltimore Metro Area	$594	$908	$279	$1,781
Washington Metro Area	$578	$1,398	$219	$2,195
Statewide Total	$1.5 billion	$3.4 billion	$1.3 billion	$6.2 billion

Population and economic growth in Maryland have resulted in increased demands on the state's major roads and highways, leading to increased wear and tear on the transportation system.

- Maryland's population reached 5.9 million in 2012, a 23 percent increase since 1990, when the state's population was approximately 4.8 million. Maryland had 3,856,604 licensed drivers in 2011.

- Vehicle miles traveled in Maryland increased by 39 percent from 1990 to 2011 – jumping from 40.5 billion vehicle miles traveled (VMT) in 1990 to 56.2 billion VMT in 2011.

- By 2030, vehicle travel in Maryland is projected to increase by another 20 percent.

- From 1990 to 2011, Maryland's gross domestic product, a measure of the state's economic output, increased by 54 percent, when adjusted for inflation.

Forty-one percent of major locally and state-maintained roads and highways in Maryland have pavement surfaces in poor or mediocre condition, providing a rough ride and costing motorist in the form of additional vehicle operating costs.

- Twenty-one percent of Maryland's major roads and highways have pavements in poor condition, while an additional 20 percent of the state's major roads are rated in mediocre condition. Fifteen percent are rated in fair condition and the remaining 44 percent are rated in good condition.

- The pavement data in this report for all arterial roads and highways is provided by the Federal Highway Administration, based on data submitted annually by the Maryland Department of Transportation (MDOT) on the condition of major state and locally maintained roads and highways in the state.

- In the Baltimore urban area, 37 percent of major locally and state-maintained roads are rated in poor condition and 29 percent are rated in mediocre condition. Twelve percent of Baltimore's major urban roads are rated in fair condition and 22 percent are rated in good condition.

- In the Washington, DC urban area, 35 percent of major locally and state-maintained roads are rated in poor condition and 27 percent are rated in mediocre condition. Eighteen percent of Washington DC's major urban roads are rated in fair condition and 20 percent are rated in good condition.

- Roads rated in poor condition 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 mediocre condition may show signs of significant wear and may also have some visible pavement distress. Most pavements in mediocre condition can be repaired by resurfacing, but some may need more extensive reconstruction to return them to good condition.

- Driving on rough roads costs Maryland motorist a total of $1.5 billion annually in extra vehicle operating costs. Costs include accelerated vehicle depreciation, additional repair costs, and increased fuel consumption and tire wear.

- Driving on rough roads costs the average Baltimore motorist $594 annually in extra vehicle operating costs. The average motorist in the Washington, DC area loses $578 annually due to driving on deteriorated roads.

One fourth of locally and state-maintained bridges in Maryland show significant deterioration or do not meet current design standards often because of narrow lanes, inadequate clearances or poor alignment. This includes all bridges that are 20 feet or more in length.

- Seven percent of Maryland's bridges are 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 and emergency services vehicles.

- Eighteen percent of Maryland's bridges are functionally obsolete. Bridges that are functionally obsolete no longer meet current highway design standards, often because of narrow lanes, inadequate clearances or poor alignment.

Significant levels of traffic congestion cause significant delays in Maryland, particularly in its larger urban areas, choking commuting and commerce.

- According to the Texas Transportation Institute (TTI), the average driver in the Baltimore urban area loses $908 each year in the cost of lost time and wasted fuel as a result of traffic congestion. The average commuter in the Baltimore urban area loses 41 hours each year stuck in congestion.

- TTI calculates that the average driver in the Washington, DC urban area loses $1,398 each year in the cost of lost time and wasted fuel as a result of traffic congestion. The average Washington, DC commuter loses 67 hours each year stuck in congestion.

Maryland's traffic fatality rate on rural, non-Interstate routes is nearly two and a half times higher than that on all other roads and highways in the state. Improving safety features on Maryland's roads and highways would likely result in a decrease in the state's traffic fatalities and serious crashes. Roadway features are likely a contributing factor in approximately one-third of all fatal and serious traffic crashes.

- Between 2006 and 2010, a total of 2,897 people were killed in traffic crashes in Maryland, an average of 579 fatalities per year.

- Maryland's overall traffic fatality rate of 0.88 fatalities per 100 million vehicle miles of travel in 2010 is lower than the national average of 1.11.

- The fatality rate on Maryland's rural non-Interstate roads was 1.67 fatalities per 100 vehicle miles of travel in 2010, nearly two-and-a-half times higher than the 0.69 fatality rate in 2010 on all other roads and highways in the state.

- The national fatality rate on rural non-Interstate roads was 2.14 fatalities per 100 vehicle miles of travel in 2010, higher than the 0.77 fatality rate in 2010 on all other roads and highways in the U.S.

- The cost of serious traffic crashes in Maryland in 2011, in which roadway features were likely a contributing factor, was approximately $1.3 billion.

- Roadway features which 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. The cost of serious crashes includes lost productivity, lost earnings, medical costs and emergency services.

- Several factors are associated with vehicle crashes that result in fatalities, including driver behavior, vehicle characteristics and roadway features. TRIP estimates that roadway features are a contributing factor in approximately one-third of fatal traffic crashes.

- Where appropriate, highway improvements can reduce traffic fatalities and crashes while improving traffic flow to help relieve congestion. Such improvements include removing or shielding obstacles; adding or improving medians; improved lighting; adding rumble strips, wider lanes, wider and paved shoulders; upgrading roads from two lanes to four lanes; and better road markings and traffic signals.

- Investments in rural traffic safety have been found to result in significant reductions in serious traffic crashes. A 2012 report by the Texas Transportation Institute (TTI) found that improvements completed recently by the Texas Department of Transportation 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). TTI estimates that the improvements on these roads are likely to save 880 lives over the next 20 years.

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

- Annually, $131 billion in goods are shipped from sites in Maryland and another $205 billion in goods are shipped to sites in Maryland, mostly by truck.

- Eighty-one percent of the goods shipped annually from sites in Maryland are carried by trucks and another 14 percent are carried by courier services or multiple mode deliveries, which include trucking.

- Businesses have responded to improved communications and greater competition by moving from a push-style distribution system, which relies on low-cost movement of bulk commodities and large-scale warehousing, to a pull-style distribution system, which relies on smaller, more strategic and time-sensitive movement of goods.

- Increasingly, companies are looking at the quality of a region's transportation system when deciding where to re-locate or expand. Regions with congested or poorly maintained roads may see businesses relocate to areas with a smoother, more efficient and more modern transportation system.

- Site Selection magazine's 2010 survey of corporate real estate executives found that transportation infrastructure was the third most important selection factor in site location decisions, behind only work force skills and state and local taxes.

- A 2007 analysis by the Federal Highway Administration found that every $1 billion invested in highway construction would support approximately 27,800 jobs, including approximately 9,500 in the construction sector, approximately 4,300 jobs in industries supporting the construction sector, and approximately 14,000 other jobs induced in non-construction related sectors of the economy.

- The Federal Highway Administration estimates that each dollar spent on road, highway and bridge improvements results in an average benefit of $5.20 in the form of reduced vehicle maintenance costs, reduced delays, reduced fuel consumption, improved safety, reduced road and bridge maintenance costs and reduced emissions as a result of improved traffic flow.

Sources of information for this report include the Maryland Department of Transportation (MDOT), the Federal Highway Administration (FHWA), the Bureau of Transportation Statistics (BTS), the U.S. Census Bureau, the Texas Transportation Institute (TTI) and the National Highway Traffic Safety Administration (NHTSA).

Introduction

Maryland's roads, highways and bridges form vital transportation links for the state's residents, visitors and businesses, providing daily access to homes, jobs, shopping, natural resources and recreation. Today, with the state hoping to foster quality of life improvements and economic competitiveness, the modernization of Maryland's transportation system is crucial, particularly to critical areas of the state's economy including tourism, agriculture and manufacturing.

As the U.S. and Maryland look to rebound from the recent economic downturn, the preservation and modernization of the state's transportation system could play an important role in retaining Maryland's economic competitiveness and improving Maryland's economic well-being by providing critically needed jobs in the short term and by improving the productivity and competitiveness of the state's businesses in the long term. And as Maryland faces the challenge of preserving and modernizing its transportation system, the future level of federal, state and local transportation funding will be a critical factor in whether the state's residents and visitors continue to enjoy access to a safe and efficient transportation network.

This report examines the condition, use and safety of Maryland's roads, highways and bridges, federal, state and local funding needs, and the future mobility needs of the state. Sources of information for this study include the Maryland Department of Transportation (MDOT), the Federal Highway Administration (FHWA), the U.S. Census Bureau, the Texas Transportation Institute (TTI), the Bureau of Transportation Statistics (BTS), and the National Highway Traffic Safety Administration (NHTSA).

Population, Travel and Economic Trends in Maryland

Maryland residents and businesses require a high level of personal and commercial mobility. Population increases and economic growth in the state have resulted in an increase in the demand for mobility as well as an increase in vehicle miles of travel (VMT). To foster a high quality of life and spur economic growth in Maryland, it will be critical that the state provide a safe and modern transportation system that can accommodate future growth in population, tourism, recreation and vehicle travel.

Maryland's population grew to 5.9 million residents in 2012, a 23 percent increase since 1990, when the state's population was approximately 4.8 million.[1] Maryland has 3,856,604 licensed drivers.[2] From 1990 to 2011, Maryland's gross domestic product (GDP), a measure of the state's economic output, increased by 54 percent, when adjusted for inflation.[3]

From 1990 to 2011, annual vehicle miles of travel in Maryland increased by 39 percent, from 40.5 billion miles traveled annually to 56.2 billion miles traveled annually.[4] Based on population and other lifestyle trends, TRIP estimates that travel on Maryland's roads and highways will increase by another 20 percent by 2030.[5]

Condition of Maryland's Roads

The life cycle of Maryland's roads is greatly affected by the state's ability to perform timely maintenance and upgrades to ensure that road and highway surfaces last as long as possible. The pavement condition of the state's major roads – generally roads other than neighborhood roads or minor local roads --is evaluated and classified as being in poor, mediocre, fair or good condition.

Throughout the state, approximately 41 percent of major locally and state- maintained roads and highways have deficient pavements, providing motorists with a rough ride.[6] Twenty-one percent of Maryland's major roads and highways have pavements rated in poor condition.[7] Another 20 percent of Maryland's major roads are rated in mediocre condition, while 15 percent are rated in fair condition and the remaining 44 percent are rated in good condition.[8]

The pavement data in this report for all arterial roads and highways is provided by the Federal Highway Administration, based on data submitted annually by the Maryland Department of Transportation (MDOT) on the condition of major state and locally maintained roads and highways in the state.

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 mediocre 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.

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.[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.

In the Baltimore urban area, 37 percent of major locally and state- maintained roads are rated in poor condition, 29 percent are rated in mediocre condition, 12 percent are rated in fair condition and 22 percent are rated in good condition.[10]

Thirty-five percent of major urban locally and state- maintained roads in the Washington, DC urban area are rated in poor condition, 27 percent are rated in mediocre condition, 18 percent are rated in fair condition and 20 percent are rated in good condition.[11]

The Costs to Motorists of Roads in Inadequate Condition

TRIP has calculated the additional cost to motorists of driving on roads in poor or unacceptable condition. When roads are in poor condition – which may include potholes, rutting or rough surfaces – the cost to operate and maintain a vehicle increases. These additional vehicle operating costs include accelerated vehicle depreciation, additional vehicle repair costs, increased fuel consumption and increased tire wear. TRIP estimates that additional vehicle operating costs borne by Maryland motorists as a result of poor road conditions is $1.5 billion annually.

Driving on rough roads costs the average motorist in the Baltimore area $594 annually in extra vehicle operating costs, while the average motorist in the Washington, DC area loses $578 each year.

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 vehicle operating cost estimate is based on taking the average number of miles driven annually by a motorist, calculating current vehicle operating costs based on AAA's 2012 vehicle operating costs and then using the HDM model to estimate the additional vehicle operating costs 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 into TRIP's vehicle operating cost methodology.

Bridge Conditions in Maryland

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

One fourth of Maryland's locally and state- maintained bridges (20 feet or longer) are currently rated as structurally deficient or functionally obsolete.

Seven percent of Maryland's locally and state- maintained bridges are rated as structurally deficient.[14] A bridge is structurally deficient if there is significant deterioration of the bridge deck, supports or other major components. Bridges that are structurally deficient may be posted for lower weight limits or closed if their condition warrants such action. Deteriorated bridges can have a significant impact on daily life. Restrictions on vehicle weight may cause many vehicles – especially emergency vehicles, commercial trucks, school buses and farm equipment – to use alternate routes to avoid posted bridges. Redirected trips also lengthen travel time, waste fuel and reduce the efficiency of the local economy.

Eighteen percent of Maryland's locally and state- maintained bridges are rated functionally obsolete.[15] 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, 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 Congestion in Maryland

Commuting and commerce in Maryland are constrained by growing traffic congestion, which will increase in the future unless additional highway and transit capacity is provided. Vehicle travel in Maryland has increased dramatically in recent years, without a corresponding increase in roadway lane miles. As a result, the state's roads have become increasingly congested, choking commuting and commerce.

According to the Texas Transportation Institute (TTI), the average driver in the Baltimore urban area loses $908 each year in the cost of lost time and wasted fuel as a result of traffic congestion. [16] The average commuter in the Baltimore urban area loses 41 hours each year stuck in congestion. [17]

TTI calculates that the average driver in the Washington, DC urban area loses $1,398 each year in the cost of lost time and wasted fuel as a result of traffic congestion.[18] The average Washington, DC commuter loses 67 hours each year stuck in congestion.[19]

The total cost of traffic congestion annually in Maryland is $3.4 billion in lost time and wasted fuel.[20]

Traffic Safety in Maryland

A total of 2,897 people were killed in motor vehicle crashes in Maryland from 2006 through 2010, an average of 579 fatalities per year.[21]

Chart 1. Traffic fatalities in Maryland from 2006 – 2010.

Year	***Fatalities***
2006	652
2007	614
2008	591
2009	547
2010	493
Total	**2,897**

Source: National Highway Traffic Safety Administration

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.

Maryland's overall traffic fatality rate of 0.88 fatalities per 100 million vehicle miles of travel in 2010 is lower than the national average of 1.11.[22] Maryland's traffic fatality rate on rural, non-Interstate routes is nearly two and a half times higher than the rate on all other roads and highways in the state. The fatality rate on Maryland's non-Interstate rural roads was 1.67 fatalities per 100 vehicle miles of travel in 2010, 142 percent higher than the 0.69 fatality rate in 2010 on all other roads and highways in the state.[23] The national fatality rate on rural non-Interstate roads was 2.14 fatalities per 100 vehicle miles of travel in 2010, higher than the 0.77 fatality rate in 2010 on all other roads and highways in the U.S.[24] And, while 19 percent of vehicles miles of travel in Maryland in 2010 occurred on rural, non-Interstate routes, 36 percent of all traffic fatalities in the state in 2010 occurred on rural, non-Interstate roads.[25]

The cost of serious traffic crashes in Maryland in 2010, in which roadway features were likely a contributing factor, was approximately $1.3 billion.[26] In the Baltimore urban area, the cost of serious traffic crashes in which roadway features were likely a contributing factor is approximately $279 per motorist.[27] The cost of serious traffic crashes in the Washington, DC urban area in which roadway features were likely a contributing factor is approximately $219 per motorist.[28]

Improving safety on Maryland'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 the Texas Transportation Institute (TTI) found that improvements completed recently by the Texas Department of Transportation 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). TTI estimates that the improvements on these roads are likely to save 880 lives over the next 20 years.[29]

Importance of Transportation to 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. The advent of modern national and global communications and the impact of free trade in North America and elsewhere have resulted in a significant increase in freight movement. Consequently, the quality of a region's transportation system has become a key component in a business'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 by accepting customer orders through the Internet. 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 Maryland, particularly to the state's tourism, lumber, agriculture and manufacturing sectors. 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, $131 billion in goods are shipped from sites in Maryland and another $205 billion in goods are shipped to sites in Maryland, mostly by trucks.[30] Eighty-one percent of the goods shipped annually from sites in Maryland are carried by trucks and another 14 percent are carried by courier services or multiple-mode deliveries, which include trucking.[31]

The cost of road and bridge improvements are more than offset by the reduction of user costs associated with driving on rough roads, the improvement in business productivity, the reduction in delays and the improvement in traffic safety. The Federal Highway Administration estimates that each dollar spent on road, highway and bridge improvements results in an average benefit of $5.20 in the form of reduced vehicle maintenance costs, reduced delays, reduced fuel consumption, improved safety, reduced road and bridge maintenance costs and reduced emissions as a result of improved traffic flow.[32]

Site Selection magazine's 2010 survey of corporate real estate executives found that transportation infrastructure was the third most important selection factor in site location decisions, behind only work force skills and state and local taxes.

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.

Increasing investment in the state's roads, highways and bridges will also assist the state's economy by creating jobs. A 2007 analysis by the Federal Highway Administration found that every $1 billion invested in highway construction would support approximately 27,800 jobs, including approximately 9,500 in the construction sector, approximately 4,300 jobs in industries supporting the construction sector, and approximately 14,000 other jobs induced in non-construction related sectors of the economy.[33]

Conclusion

As Maryland looks to build and enhance a thriving, growing and dynamic state, it will be critical that it is able to provide a 21st century network of roads, highways and bridges that can accommodate the mobility demands of a modern society.

As the nation looks to fully rebound from the recent economic downturn, the U.S. 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 and reliable

mobility for motorists and businesses. Making needed improvements to Maryland's roads, highways and bridges could 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.

Without a substantial boost in federal, state and local highway funding, numerous projects to improve the condition and expand the capacity of Maryland's roads, highways and bridges will not be able to proceed, hampering the state's ability to improve the condition of its transportation system and to enhance economic development opportunities in the state.

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Endnotes

[1] U.S. Census Bureau (2012).
[2] Highway Statistics (2011). Federal Highway Administration. DL-1C
[3] TRIP analysis of Bureau of Economic Analysis data.
[4] U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 1990 and 2011.
[5] TRIP calculation based on U.S. Census and Federal Highway Administration data.
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[7] Ibid.
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[14] Federal Highway Administration (2012). National Bridge Inventory.

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[19] Ibid.
[20] TRIP estimate based on analysis of FHWA and TTI data.
[21] TRIP analysis of National Highway Traffic Safety Administration data (2012).
[22] TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data (2012).
[23] Ibid.
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[31] Ibid.
[32] FHWA estimate based on its analysis of 2006 data. For more information on FHWA's cost-benefit analysis of highway investment, see the 2008 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance.
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