MASSACHUSETTS TRANSPORTATION BY THE NUMBERS:

Meeting the State's Need for Safe and Efficient Mobility

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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 Massachusetts

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	Driving on deficient roads costs Massachusetts motorists a total of		
\$8.3 billion	\$8.3 billion annually in the form of additional vehicle operating		
\$1 013 TRIP has calculated the cost to the average motorist in			
\$1,913	TRIP has calculated the cost to the average motorist in		
\$1,608	Massachusetts' largest urban areas in the form of additional VOC,		
\$1.642	congestion-related delays and traffic crashes. The average Boston		
\$1 733	driver loses \$1,913 each year; each South Coast area motorist loses		
φ1,755	\$1,608 annually; each Springfield motorist loses \$1,642 annually;		
	and each Worcester driver loses \$1,733.		
339	On average 339 people were killed annually in Massachusetts		
1,697	traffic crashes from 2008 to 2012, a total of 1,697 fatalities over the		
,	five year period.		
	The fatality rate on Massachusetts' non-interstate rural roads is		
3.5X	more than three and a half times higher than that on all other roads		
	in the state (2.07 fatalities per 100 million vehicle miles of travel		
	vs. 0.58).		
\$212 billion	Annually, \$212 billion in goods are shipped from sites in		
\$196 billion	Massachusetts and another \$196 billion in goods are shipped to		
· · · · · · · · · · · · · · · · · · ·	sites in Massachusetts, mostly by truck.		
	A total of 52 percent of Massachusetts bridges are in need of repair,		
52 %	improvement or replacement. Nine percent of the state's bridges are		
	structurally deficient and 43 percent are functionally obsolete.		
53 hours	The average driver in the Boston urban area loses 53 hours each		
22 hours	year as a result of traffic congestion; each South Coast area driver		
28 hours	loses 22 hours annually; each Springfield area driver loses 28 hours		
20 hours	annually; and each Worcester area motorist loses 33 hours each		
55 nours	year.		
	An analysis by the Federal Highway Administration found that		
\$1 billion=	every \$1 billion invested in highway construction would support		
27.800 jobs	approximately 27,800 jobs.		
	Last year the Massachusetts legislature approved the Transportation		
\$400 million	Finance Act of 2013 which provides an additional \$600 million		
\$400 mmmon	annually for improvements to the state's roads bridges rails and		
	public transit systems which still falls \$400 million short of the \$1		
	billion needed annually in additional state transportation funding		
	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		
\$1.00 = \$5.20	maintenance costs reduced delays reduced fiel consumption		
	improved safety reduced road and bridge maintenance costs and		
	reduced emissions as a result of improved traffic flow		

Executive Summary

Massachusetts' extensive system of roads, bridges, highways and public transit provides the state's residents, visitors and businesses with a high level of mobility. This transportation system, which also includes pedestrian and bicycle facilities, forms the backbone that supports the state's economy. Massachusetts' 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 Massachusetts 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 Massachusetts' 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.

Massachusetts 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 residents. Meeting Massachusetts' need to modernize and maintain its system of roads, highways and bridges will require a significant boost in local, state and federal funding.

Last year the Massachusetts legislature approved the Transportation Finance Act of 2013 which is anticipated to provide an additional \$600 million annually for improvements to the state's roads, bridges, rails and public transit systems. This infusion of additional funding has allowed the Bay State to move forward with numerous projects for improvements to the state's roads, highways, bridges, rail lines and public transit systems, but falls \$400 million short of the estimated \$1 billion in additional annual transportation investment needed in the state.

The federal government is another critical source of funding for Massachusetts' surface transportation system. Congress recently approved an eight-month extension of the federal surface transportation program, MAP-21 (Moving Ahead for Progress in the 21st Century Act), which provides the state with road, highway, bridge and transit funding through May 31, 2015.

Meeting Massachusetts' need to further improve and modernize its system of roads, rails and public transit will for require that the recent state funding boost is maintained and that a long-term, reliably funded, federal surface transportation program is approved. An inadequate transportation system costs Massachusetts residents a total of \$8.3 billion every year in the form of additional vehicle operating costs (VOC), congestion-related delays and traffic crashes.

- TRIP estimates that Massachusetts 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 \$8.3 billion annually in the form of additional vehicle operating costs (including accelerated vehicle depreciation, additional repair costs, and increased fuel consumption and tire wear), the cost of lost time and wasted fuel due to traffic congestion, and the financial cost of traffic crashes.
- TRIP has calculated the average cost to drivers in the state's largest urban areas as a result of driving on roads that are deteriorated, congested and lacking some desirable safety features. The chart below details the costs to drivers in the Boston, Springfield and Worcester urban areas.

Location	VOC	Congestion	Safety	TOTAL
Boston	\$468	\$1,147	\$298	\$1,913
South Coast	\$429	\$425	\$754	\$1,608
Springfield	\$514	\$575	\$553	\$1,642
Worcester	\$541	\$677	\$515	\$1,733
Massachusetts	\$2.3 Billion	\$3.9 Billion	\$2.1 Billion	\$8.3 Billion

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

- Massachusetts' population reached approximately 6.6 million residents in 2012, a ten percent increase since 1990. Massachusetts had 4,733,936 licensed drivers in 2012.
- Vehicle miles traveled (VMT) in Massachusetts increased by 21 percent from 1990 to 2012 from 46.1 billion VMT in 1990 to 55.9 billion VMT in 2012.
- By 2030, vehicle travel in Massachusetts is projected to increase by another 15 percent.
- From 1990 to 2012, Massachusetts' gross domestic product, a measure of the state's economic output, increased by 45 percent, when adjusted for inflation.

A lack of adequate state and local funding has resulted in one-fifth of major roads and highways in Massachusetts having pavement surfaces in poor condition, providing a rough ride and costing motorist in the form of additional vehicle operating costs (VOC).

• Nineteen percent of Massachusetts' major roads and highways have pavements in poor condition, while an additional 64 percent of the state's major roads are rated in mediocre or fair condition and the remaining 17 percent are rated in 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.
- Driving on rough roads costs all Massachusetts motorists a total of \$2.3 billion annually in extra VOC. Costs include accelerated vehicle depreciation, additional repair costs, and increased fuel consumption and tire wear.
- The chart below details the percentage of major roads in poor, mediocre, fair and good condition in the state's major urban areas:

Location	Poor	Mediocre	Fair	Good
Boston	7%	81%	4%	9%
South Coast	2%	86%	1%	11%
Springfield	13%	74%	3%	10%
Worcester	21%	62%	5%	13%

More than half of locally and state-maintained bridges in Massachusetts 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.

- Nine percent of Massachusetts' 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.
- Forty-three percent of Massachusetts' 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.
- In the Boston urban area, ten percent of bridges are structurally deficient and 54 percent are functionally obsolete. Eleven percent of bridges in the South Coast area are structurally deficient and 40 percent are functionally obsolete; eight percent of bridges in the Springfield urban area are structurally deficient, while 47 percent are functionally obsolete. In the Worcester urban area, seven percent of bridges are structurally deficient and an additional 40 percent are functionally obsolete.

Improving safety features on Massachusetts' roads and highways would likely result in a decrease in the state's traffic fatalities and serious crashes. It is estimated that roadway features are likely a contributing factor in approximately one-third of all fatal and serious traffic crashes.

• Between 2008 and 2012 a total of 1,697 people were killed in traffic crashes in Massachusetts, an average of 339 fatalities per year.

• The chart below details the average number of fatalities in each of Massachusetts' largest urban areas from 2010 to 2012 as well as the annual cost of traffic crashes to the average motorist in each area.

Location	Avg. Fatalities	Safety Cost
Boston	107	\$298
South Coast	50	\$754
Springfield	31	\$553
Worcester	50	\$515

- Massachusetts' overall traffic fatality rate of 0.62 fatalities per 100 million vehicle miles of travel in 2012 is lower than the national traffic fatality rate of 1.13.
- The fatality rate on Massachusetts' rural non-Interstate roads was 2.07 fatalities per 100 million vehicle miles of travel in 2012, more than three and a half times the 0.58 fatality rate on all other roads and highways in the state.
- 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. 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 likely 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 <u>Texas Transportation Institute</u> (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.

Increasing levels of traffic congestion cause significant delays in Massachusetts, 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.

- Increasing levels of congestion add significant costs to consumers, transportation companies, manufacturers, distributors and wholesalers and can reduce the attractiveness of a location to a company to consider expansion or even to locate a new facility. Congestion costs can also increase overall operating costs for trucking and shipping companies, leading to revenue losses, lower pay for drivers and employees, and higher consumer costs.
- The chart below details the average annual number of hours lost to congestion by each motorist in Massachusetts' largest urban areas, as well as the annual congestion cost per driver in the form of lost time and wasted fuel.

Location	Hours Lost	Congestion Cost
Boston	53 Hours	\$1,147
South Coast	22 Hours	\$425
Springfield	28 Hours	\$575
Worcester	33 Hours	\$677

The efficiency of Massachusetts' transportation system, particularly its highways, is critical to the health of the state's economy. Businesses are increasingly reliant on an efficient and dependable 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, \$212 billion in goods are shipped from sites in Massachusetts and another \$196 billion in goods are shipped to sites in Massachusetts, mostly by truck.
- Seventy percent of the goods shipped annually from sites in Massachusetts are carried by trucks and another 23 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.

- Highway accessibility was ranked the number one site selection factor in a 2011 survey of corporate executives by <u>Area Development Magazine</u>.
- 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 <u>Federal Highway Administration</u> 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.

Massachusetts' roads, highways, bridges and public transit systems are funded by local, state and federal governments. The 2013 boost in state funding helped close the gap in state transportation funding needs. But improving the state's transportation system will require a continued strong state transportation program and approval of a long-term, reliably funded federal transportation program.

- In 2013 the Massachusetts legislature passed the Transportation Finance Act of 2013 which is projected to raise an estimated \$600 million annually. However, this muchneeded infusion of additional funding falls \$400 million short of fully addressing additional funding needs – estimated at \$1 billion per year over the next 20 years – for Massachusetts' roads, rails, and public transit systems.
- A <u>report released earlier this year by Transportation for Massachusetts</u> found that the 2013 state funding package has been very helpful in providing additional funds for the state's public transit agencies as well as more than 75 additional road and bridge projects in the state, including the I-91 Viaduct in Springfield.
- Signed into law in July 2012, MAP-21 (Moving Ahead for Progress in the 21st Century Act), has improved several procedures that in the past had delayed projects, MAP-21 does not address long-term funding challenges facing the federal surface transportation program.
- Congress recently approved an eight-month extension of the federal surface transportation program, on which states rely for road, highway, bridge and transit funding. The program, initially set to expire on September 30, 2014, will now run through May 31, 2015.

Sources of information for this report include the Federal Highway Administration (FHWA), the Bureau of Transportation Statistics (BTS), the U.S. Census Bureau, the American Association of State Highway and Transportation Officials (AASHTO), the Texas Transportation Institute (TTI) and the National Highway Traffic Safety Administration (NHTSA). All data used in the report is the latest available.

Introduction

Massachusetts' roads, highways, bridges and public transit systems 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 Bay State striving to foster quality of life improvements and economic competitiveness, the modernization of Massachusetts' transportation system is crucial, particularly to critical areas of the state's economy including tourism, agriculture, manufacturing, entertainment, and financial services.

As the U.S. and Massachusetts look to sustain long-term economic growth, the preservation and modernization of the state's transportation system could play an important role in retaining Massachusetts' economic competitiveness and improving its 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. As Massachusetts 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. Meeting Massachusetts' need to modernize and maintain its system of roads, highways and bridges will require significant local, state and federal funding.

Last year the Massachusetts legislature approved a boost in state transportation funding, which is anticipated to raise an additional \$600 million annually for the state's roads, rails and public transit systems. However, this will still be approximately \$400 million short of fully addressing additional funding needs – estimated at \$1 billion per year over the next 20 years.¹

Congress recently approved an eight-month extension of the federal surface transportation program, MAP-21 (Moving Ahead for Progress in the 21st Century Act), on which states rely for road, highway, bridge and transit funding, through May 31 2015.

Making progress in addressing Massachusetts need to improve its surface transportation system will require that the recent boost in state transportation funding is fully implemented and that an adequately funded, long-term federal surface transportation program is approved by Congress.

This report examines the condition, use and safety of Massachusetts' roads, highways and bridges, federal, state and local funding needs, and the future mobility needs of the state.

Population, Travel and Economic Trends in Massachusetts

Massachusetts' 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 Massachusetts, 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.

Massachusetts' population grew to approximately 6.6 million residents in 2012, a ten percent increase since 1990.² Massachusetts had 4,733,936 licensed drivers in 2012.³ From 1990 to 2012, Massachusetts' gross domestic product (GDP), a measure of the state's economic output, increased by 45 percent, when adjusted for inflation.⁴

From 1990 to 2012, annual VMT in Massachusetts increased by 21 percent, from 46.1 billion miles to 55.9 billion miles.⁵ Based on population and other lifestyle trends, TRIP estimates that travel on Massachusetts' roads and highways will increase by another 15 percent by 2030.⁶

Condition of Massachusetts' Roads

The life cycle of Massachusetts' roads is greatly affected by the state and local government's ability to perform timely maintenance and upgrades to ensure that road and highway surfaces last as long as possible.

Nineteen percent of Massachusetts' major roads and highways have pavements rated in poor condition. ⁷ Another 64 percent of Massachusetts' major roads are rated in mediocre or fair condition and the remaining 17 percent are rated in good condition.⁸

The chart below details the percentage of major roads in poor, mediocre, fair and good condition in each of the state's major urban areas.

Location	Poor	Mediocre	Fair	Good
Boston	7%	81%	4%	9%
South Coast	2%	86%	1%	11%
Springfield	13%	74%	3%	10%
Worcester	21%	62%	5%	13%

Chart 1. Pavement conditions of major roads in Massachusetts' largest urban areas.

Source: TRIP analysis of Federal Highway Administration data.

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 MassDOT on the condition of major state and locally maintained roads and highways in the state. 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 to five 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.

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 (VOC) include accelerated vehicle depreciation, additional vehicle repair costs, increased fuel consumption and increased tire wear. TRIP estimates that additional vehicle operating costs borne by Massachusetts motorists as a result of poor road conditions is \$2.3 billion annually.¹⁰

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.¹¹

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 2013 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.¹² 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 Massachusetts

Massachusetts' 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.

More than half of Massachusetts' locally and state- maintained bridges (20 feet or longer) are currently rated as structurally deficient or functionally obsolete.

Nine percent of Massachusetts' locally and state maintained bridges are rated as structurally deficient.¹³ 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.

Forty-three percent of Massachusetts' locally and state maintained bridges are rated functionally obsolete.¹⁴ 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.

In the Boston urban area, ten percent of bridges are structurally deficient and 54 percent are functionally obsolete.¹⁵ Eleven percent of the bridges in the South Coast area are structurally deficient and 40 percent are functionally obsolete while eight percent of bridges in the Springfield urban area are structurally deficient and 47 percent are functionally obsolete.¹⁶ In the Worcester urban area, seven percent of bridges are structurally deficient and an additional 40 percent are functionally obsolete.¹⁷

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 Massachusetts

A total of 1,697 people were killed in motor vehicle crashes in Massachusetts from 2008 through 2012, an average of 339 fatalities per year.¹⁸

Year	Fatalities
2008	363
2009	334
2010	314
2011	337
2012	349
Total	1,697

Chart 2. Traffic fatalities in Massachusetts from 2008 – 2012.

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.

Massachusetts' overall traffic fatality rate of 0.62 fatalities per 100 million vehicle miles of travel in 2012 is lower than the national average of 1.13.¹⁹ The fatality rate on Massachusetts' non-Interstate rural roads was 2.07 fatalities per 100 million vehicle miles of travel in 2012, more than three and a half times the fatality rate of 0.58 on all other roads and highways in the state.²⁰

The chart below details the average number of fatalities in each of Massachusetts' largest urban areas from 2010 to 2012 as well as the annual cost of traffic crashes to the average motorist in each area.

Location	Avg. Fatalities	Safety Cost
Boston	107	\$298
South Coast	50	\$754
Springfield	31	\$553
Worcester	50	\$515

Chart 3. Average annual fatalities from 2010-2012 and per-driver annual cost of traffic crashes.

Source: National Highway Traffic Safety Administration.

Improving safety on Massachusetts' 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 <u>Texas Transportation Institute</u> (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.²¹

Traffic Congestion in Massachusetts

Traffic congestion causes significant delays in Massachusetts, 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.

The chart below details the average annual number of hours lost to congestion by each motorist in Massachusetts' largest urban areas, as well as the annual congestion cost per driver in the form of lost time and wasted fuel.

Location	Hours Lost	Congestion Cost
Boston	53 Hours	\$1,147
South Coast	22 Hours	\$425
Springfield	28 Hours	\$575
Worcester	33 Hours	\$677

Chart 4. Average annual hours lost and cost of congestion per motorist.

Source: Texas Transportation Institute Urban Mobility Report, 2012.

Increasing levels of traffic congestion add significant costs to consumers, transportation companies, manufacturers, distributors and wholesalers. The increased levels of congestion can reduce the attractiveness of a location to a company to consider expansion or even to locate a new facility. And, the costs associated with congestion can increase overall operating expenses for trucking and shipping companies, leading to revenue losses, lower pay for employees, and higher consumer costs.

Transportation Funding

Investment in Massachusetts' roads, highways and bridges is funded by local, state and federal governments.

In 2013 the Massachusetts legislature passed the Transportation Finance Act of 2013 which is projected to raise an estimated \$600 million annually. However, this much-needed infusion of additional funding falls \$400 million short of fully addressing additional funding needs – estimated at \$1 billion per year over the next 20 years – for making needed improvements to Massachusetts' roads, rails, and public transit systems.

A <u>report released earlier this year by Transportation for Massachusetts</u> found that the 2013 state funding package has been very helpful in providing additional funds for the state's public transit agencies as well as more than 75 additional road and bridge projects in the state, including the I-91 Viaduct in Springfield.

The federal government provides funding for the state's 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 May 31, 2015.

Signed into law in July 2012, MAP-21 (Moving Ahead for Progress in the 21st Century Act), has improved several procedures that in the past had delayed projects, MAP-21 does not address long-term funding challenges facing the federal surface transportation program. Congress recently approved the Highway and Transportation Funding Act of 2014, an eight-month extension of the federal surface transportation program on which states rely for road, highway, bridge and transit funding. The program, initially set to expire on September 30, 2014, will now run through May 31, 2015. In addition to extending the current authorization of the

highway and public transportation programs, the legislation will transfer nearly \$11 billion into the Highway Trust Fund (HTF) to preserve existing levels of highway and public transportation investment through the end of May 2015.

Increasing investment in the state's roads, highways and bridges could boost Massachusetts' economy by creating jobs. A <u>2007 analysis by the Federal Highway</u> <u>Administration_</u>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.²²

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. 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, demandside 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 Massachusetts, particularly to the state's tourism, agriculture, manufacturing, entertainment, and financial services industries. 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, \$212 billion in goods are shipped from sites in Massachusetts and another \$196 billion in goods are shipped to sites in Massachusetts, mostly by trucks.²³ Seventy percent of the goods shipped annually from sites in Massachusetts are carried by trucks and another 23 percent are carried by courier services or multiple-mode deliveries, which include trucking.²⁴

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 <u>Federal Highway Administration</u> 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.²⁵

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 Highway accessibility was ranked the number one site selection factor in a 2011 survey of corporate executives by <u>Area Development Magazine</u>.²⁶

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.

Conclusion

As Massachusetts 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, bridges and public transit systems that can accommodate the mobility demands of a modern society.

And as the nation looks to sustain long-term economic growth, 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 Massachusetts' roads, highways, bridges, public transit and pedestrian and bicycle routes 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 substantial and reliable federal, state and local transportation funding, numerous projects to improve the condition and expand the capacity of Massachusetts' roads, rails and public transit systems 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

⁸ <u>Ibid.</u>

⁹ Selecting a Preventative Maintenance Treatment for Flexible Pavements. R. Hicks, J. Moulthrop. Transportation Research Board. 1999. Figure 1.

¹⁰ TRIP calculation

¹¹ Highway Development and Management: Volume Seven. Modeling Road User and Environmental Effects in HDM-4. Bennett, C. and Greenwood, I. 2000. ¹² Your Driving Costs. American Automobile Association. 2013.

¹³ Federal Highway Administration (2013). National Bridge Inventory.

 16 Ibid.

¹⁷ Ibid.

¹⁸ TRIP analysis of National Highway Traffic Safety Administration data (2013).

¹⁹ TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data (2013). ²⁰ <u>Ibid</u>.

²¹ Adding Highway Shoulders, Width, Reduce Crash Numbers and Save Lives (August 9, 2012). Texas Transportation Institute.

²² Federal Highway Administration, 2008. Employment Impacts of Highway Infrastructure Investment. ²³ Bureau of Transportation Statistics (2010), U.S. Department of

Transportation. 2007 Commodity Flow Survey, State Summaries.

http://www.bts.gov/publications/commodity_flow_survey/2007/states/

Ibid.

²⁵ 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.

²⁶ Area Development Magazine (Winter, 2012). 26th Annual Survey of Corporate Executive Results.

¹ Keeping On Track, Our Progress in Reforming and Funding Transportation since Passage of the Massachusetts Transportation Finance Act of 2013 (2014). P. 1. Transportation for Massachusetts.

² U.S. Census Bureau (2013).

³ Highway Statistics (2012). Federal Highway Administration. DL-1C

⁴ TRIP analysis of Bureau of Economic Analysis data.

⁵ U.S. Department of Transportation - Federal Highway Administration: Highway

Statistics 1990 and 2012.

⁶ TRIP calculation based on U.S. Census and Federal Highway Administration data.

⁷ Federal Highway Administration (2013). Pavement condition data is for 2012.

¹⁴ <u>Ibid.</u>

¹⁵ Ibid.