Keeping Maine Mobile:

PROVIDING A MODERN, SUSTAINABLE TRANSPORTATION SYSTEM IN THE PINE TREE STATE

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TRIP | A National Transportation Research Nonprofit

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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.

EXECUTIVE SUMMARY

Mobility, accessibility and connectivity are critical factors in a state's quality of life and economic competitiveness. The growth and development of a state or region hinges on efficient and safe access to employment, customers, commerce, recreation, education and healthcare via multiple transportation modes. The quality of life and the pace of a state's economic growth are directly tied to the condition, efficiency, safety and resiliency of its transportation system.

Nearly $7 billion in investment by the Maine Department of Transportation (MaineDOT) since 2018 has been vital in addressing the state's need to preserve roads and bridges, improve traffic safety and improve reliability for personal and commercial travel. In the state's FY 2024-25 budget, agencies supported by highway funds received an additional $165 million per year, which represents a significant step forward in providing sustainable and predictable funding that will allow MaineDOT to plan and implement needed improvements to the transportation infrastructure.

However, Maine continues to face significant transportation challenges. In order to continue to make needed improvements, the state will require continued, sustained and predictable funding to invest in Maine's infrastructure, rather than relying on a return to one-time or shorter-term funding infusions.

TRIP's "Keeping Maine Mobile" report examines the condition, use, safety and efficiency of Maine's surface transportation system and the impact of additional transportation funding. The report also looks at the challenges the state faces to accommodate future transportation growth, maintain the existing system, and sustain adequate state transportation investment despite the funding impacts of highway construction cost inflation, increasing fuel efficiency standards, and the adoption of electric vehicles. Sources of information for this report include the Maine Department of Transportation, 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), and the National Highway Traffic Safety Administration (NHTSA).

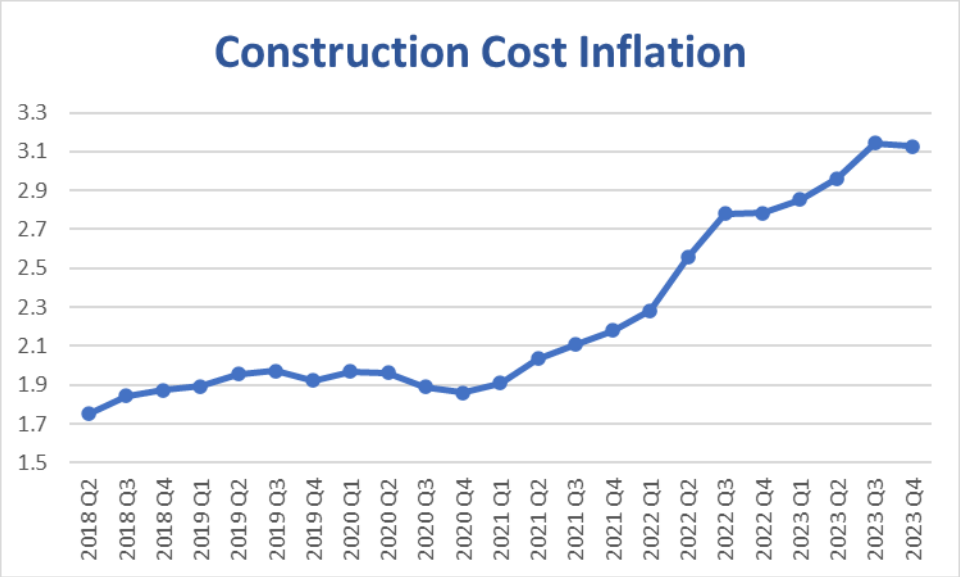
MAINE TRANSPORTATION FUNDING

Maine's roads, highways and bridges are funded by investments from local, state and federal governments. In addition to state transportation funding, the Infrastructure Investment and Jobs Act (IIJA), signed into law on November 2021, will provide $1.3 billion in federal funds to the state for highway and bridge investments in Maine over five years, representing a 29 percent increase in annual federal funding for roads and bridges in the state over the previous federal surface transportation program. Federal funds currently support 41 percent of the revenue used by MaineDOT to fund highway and bridge improvements.

The ability of revenue from Maine's and the federal motor fuel tax -- as well as other sources of state and federal transportation funding -- to keep pace with Maine's future transportation needs is likely to erode as a result of increasing vehicle fuel efficiency, the increasing use of electric vehicles and inflation in highway construction costs.

The average fuel efficiency of U.S. passenger vehicles increased from 20 miles per gallon in 2010 to 24.5 miles per gallon in 2020. Average fuel efficiency is expected to increase another 31 percent by 2030, to 32 miles per gallon, and increase 51 percent by 2040, to 37 miles per gallon. The share of electric vehicles of total passenger vehicle sales in the U.S. is expected to increase to five percent in 2023 and to 60 percent by 2040, by which time electric vehicles will represent approximately 30 percent of the nation's passenger vehicle fleet.

The Federal Highway Administration's national highway construction cost index, which measures labor and materials cost, increased by 43 percent in 2022 and 2023 and by 68 percent since the beginning of 2021.



THE HIDDEN COSTS OF DEFICIENT ROADS

Driving on Maine roads that are deteriorated, congested and that lack some desirable safety features costs Maine drivers a total of $1.6 billion each year. TRIP has calculated the cost to the average motorist in the state's largest urban areas 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. The chart below details the cost of deficient roads statewide and for the average driver in the state's largest urban areas.

Location	VOC	Congestion	Safety	TOTAL
Bangor	$521	$739	$564	$1,824
Lewiston-Auburn	$434	$612	$440	$1,486
Portland	$439	$747	$339	$1,525
Maine Statewide	**$646 Million**	**$300 Million**	**$641 Million**	**$1.6 Billion**

MAINE ROADS PROVIDE A ROUGH RIDE

Due to inadequate state and local funding, 19 percent of major state and locally-maintained roads and highways in Maine are in poor condition. Driving on rough roads costs the average Maine driver $609 annually in additional vehicle operating costs – a total of $637 million statewide. The chart below details pavement conditions on major roads in the state's largest urban areas and statewide.

Location	Poor	Fair	Good
Bangor	18%	27%	54%
Lewiston-Auburn	14%	26%	60%
Portland	18%	33%	50%
Maine Statewide	**19%**	**35%**	**47%**

MAINE BRIDGE CONDITIONS

Fifteen percent (388 of 2,518) of Maine's bridges are rated in poor/structurally deficient condition, the fourth highest share in the nation. Bridges that are rated poor/structurally deficient have significant deterioration of the bridge deck, supports or other major components. Sixty percent of the state's bridges are rated in fair condition and the remaining 25 percent are in good condition. The chart below details bridge conditions statewide and in the state's largest urban areas.

	Poor/Structurally Deficient		Fair		Good		Total Bridges
	Number	Share	Number	Share	Number	Share	
Bangor	54	18%	184	61%	63	21%	301
Lewiston	14	10%	65	48%	56	41%	135
Portland	41	12%	212	62%	91	26%	344
Maine Statewide	**388**	**15%**	**1,504**	**60%**	**626**	**25%**	**2,518**

When measured by area, the share of Maine bridges in poor condition is lower. Of the nearly 1.3 million square meters of bridge area in the state, 11 percent are in poor/structurally deficient condition, 61 percent are in fair condition, and 28 percent are in good condition.

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 Maine, 59 percent of the state's bridges were built in 1969 or earlier, the fifth highest share in the U.S.

MAINE ROADS ARE INCREASINGLY CONGESTED

Due to the Covid-19 pandemic, vehicle travel in Maine dropped by as much as 40 percent in April 2020 (as compared to vehicle travel during the same month the previous year). By 2023, vehicle miles of travel (VMT) in Maine had rebounded to one percent above pre-pandemic levels in 2019.

Congested roads choke commuting and commerce and cost Maine drivers $300 million each year in the form of lost time and wasted fuel. The chart below details the estimated 2024 annual number of hours lost to traffic congestion by the average motorist in each urban area, as well as the annual cost to each average driver in lost time and wasted fuel.

Location	Hours Lost	Congestion Cost
Bangor	28	$739
Lewiston-Auburn	22	$612
Portland	28	$747

MAINE TRAFFIC SAFETY AND FATALITIES

From 2019 to 2023, 792 people were killed in traffic crashes in Maine, an average of 158 fatalities each year. In 2023, Maine had 0.89 traffic fatalities for every 100 million miles traveled, lower than the national average of 1.26. The fatality rate per 100 million miles of travel on Maine's rural, non-Interstate roads in 2022 was more than three times higher than all other roads in the state (1.80 vs. 0.57). And although 55 percent of travel in the state takes place on Maine's rural, non-Interstate roads, 79 percent of fatalities occur on its rural, non-Interstate roads.

Nationwide, traffic fatalities began to increase dramatically in 2020 even as vehicle travel rates plummeted due to the COVID-19 pandemic, and the number of fatalities continued to increase in 2021. The number of fatalities in Maine increased 17 percent from 2019 to 2022, from 157 to 183, before

falling to 135 in 2023. The state's fatality rate per 100 million VMT increased 20 percent between 2019 and 2022, from 1.06 to 1.27, before falling to 0.89 in 2023.

MAINE TRAFFIC FATALITY AND FATALITY RATES 2019-2023					
	2019	2020	2021	2022	2023
Traffic Fatalities	157	164	153	183	135
Fatalities per 100M VMT	1.06	1.25	1.07	1.27	0.89

Traffic crashes imposed a total of $1.9 billion in economic costs in Maine in 2023; traffic crashes in which a lack of adequate roadway safety features, while not the primary factor, were likely a contributing factor imposed $641 million in economic costs. The chart below details the average number of people killed annually in traffic crashes in the state's largest urban areas between 2018 and 2022, and the cost of traffic crashes per driver.

Location	Average Fatalities 2018-2022	Safety Costs per Diver
Bangor	18	$564
Lewiston-Auburn	10	$440
Portland	21	$339

IMPROVING CONDITIONS, TRAVEL RELIABILITY AND SAFETY IN MAINE

Since 2018 Maine has invested $6.8 billion in highway and bridge improvements, including improvements to 6,200 highway miles and another 4,420 miles underway, and repairs to 366 bridges with active plans to repair another 289 bridges. Maine has also completed $155.8 million in bridge and rail line improvements on its railroad system, with another $69.5 million in improvements underway. And the state has invested $30.7 million in port improvements at the International Marine Terminal in Portland, with $12.3 million in additional investments underway. This investment will also allow the state to make various safety, mobility and bike/pedestrian improvements, in addition to improving rail lines and port improvements at the Portland International Marine Terminal.

In the state's FY 2024-25 budget, agencies supported by highway funds received an additional $165 million per year, which represents a significant step forward in providing sustainable and predictable funding that will allow MaineDOT to plan and implement needed improvements to the transportation infrastructure. If the state is to continue to make needed improvements, Maine will require continued, sustained and predictable funding to invest in its surface transportation system, rather than relying on a return to one-time or shorter-term funding infusions.

Using a combination of programs and projects, the Maine Department of Transportation is taking steps to address the state's safety, traffic congestion and reliability challenges. These efforts are aimed at improving the efficiency and safety of the state's transportation system.

MaineDOT's efforts to improve safety and travel reliability include the following:

- The development of Maine's Strategic Highway Safety Plan in cooperation with State and local police departments, Maine Bureau of Highway Safety, Maine Bureau of Motor Vehicles, Maine Turnpike Authority, Maine Motor Transport Association, Maine Emergency Medical Services, and AAA, Norther New England. This plan identifies focus areas where safety improvements can be implemented to reduce serious injuries and fatalities. As a result of this plan, numerous

projects have been completed, are underway, or planned to mitigate safety deficiencies that will work towards a reduction in serious injuries and fatalities in Maine.

- Implementation of "Roadway Safety Audits" done in conjunction with municipalities, public safety, and others to identify safety deficiencies that can be addressed as stand-alone projects or done in conjunction with other planned work.
- Intelligent Transportation Systems (ITS) and traffic signal improvements in Maine, including the following:
    - The creation of MaineDOT's Transportation Management Center (TMC), which gathers real-time information and provides that information to the travelling public.
    - Deployment of ITS devices to fully automate and integrate road sensors, probe data, phone data, and Roadway Weather Information Systems (RWIS) to automate the process of providing real-time, reliable information.
    - Deployment of Changeable Message Signs (CMS) to communicate with the traveling public.
    - Installation and upgrade of traffic signals in Maine. These technology deployments allow MaineDOT to detect traffic signal control related issues in real time and remotely from the department's Transportation Management Center (TMC), identify potential causes, and quickly dispatch staff as needed. It will also minimize the impacts of traffic signal control malfunction and allow motorists to travel more efficiently and safely throughout Maine.
- Traffic Incident Management (TIM) is a planned, coordinated, and multidisciplinary process to detect, respond to, and clear traffic incidents to restore traffic flow quickly and safely. Maine has deployed a "Service Patrol" along I-295 and I-95 to address TIM.
- MaineDOT's State Transit Plan is an update to the 2015 Statewide Strategic Transit Plan. The Plan reviews existing conditions and needs to help identify potential system efficiencies, practices, and alternatives appropriate for Maine, and new modes and approaches for providing needed public transportation in rural Maine. The plan results in annual programming of operation and capital improvements on over-the-road public transportation, addressing passenger rail and ferry service.
- Projects underway to increase capacity include the I-395/Route 9 Connector in Brewer and Eddington, which is currently under construction, and the Presque Isle bypass which is in design and set to be advertised in 2025.
- Bicycle and Pedestrian efforts include safety improvements, preservation to existing facilities, expansion of existing facilities, new infrastructure, and modifications to existing infrastructure through MaineDOT's Complete Streets and/or Road Diet initiatives.
- Efforts to improve freight movements in Maine include the establishment of the allotted Critical Urban and Rural Fright Miles that Maine is allotted through IIJA, which allows them to be eligible for FHWA National Freight Program Funding and grants that are specific to freight. In addition, Maine has invested in the International Marine Terminal in Portland, Maine to expand imports and exports while minimizing the number of trucks traveling through the interstate system in Maine. Maine has also worked with neighboring states and private companies to invest in and improve the current freight rail system to ensure its continued success.

TRANSPORTATION AND ECONOMIC DEVELOPMENT

In 2022 Maine's freight system moved 91 million tons of freight, valued at $87 billion. From 2022 to 2050, freight moved annually in Maine by trucks is expected to increase 56 percent by weight and 81 percent by value (inflation-adjusted dollars). The TRIP report also found that 15 percent of travel on

Maine's Interstate highways and 16 percent of travel on its rural Interstate highways is by combination trucks. This anticipated growth in freight transport in Maine, and the rest of the U.S., is a result of further economic growth, changing business and retail models, increasing international trade, and rapidly changing consumer expectations that place an emphasis on faster deliveries, often of smaller packages or payloads.

According to a report by the American Road & Transportation Builders Association, the design, construction and maintenance of transportation infrastructure in Maine supports approximately 18,400 full-time jobs across all sectors of the state economy. These workers earn $609 million annually. Approximately 283,000 full-time jobs in Maine in key industries like tourism, retail sales, agriculture and manufacturing are completely dependent on the state's transportation network.

Sources of information for this report include the Federal Highway Administration (FHWA), the Maine Department of Transportation (MaineDOT), 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), and the National Highway Traffic Safety Administration (NHTSA). Coverage page photo credit: Shutterstock.

INTRODUCTION

Maine'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. Modernizing Maine's transportation system is critical to quality of life and economic competitiveness in the Pine Tree State. Inadequate transportation investment, which will result in deteriorated transportation facilities and diminished access, will negatively affect Maine's economic competitiveness and quality of life.

To accommodate population and economic growth, maintain its level of economic competitiveness and achieve further economic growth, Maine 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 Maine'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 Maine's roads, highways and bridges, and the state'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), and the National Highway Traffic Safety Administration (NHTSA).

In addition to statewide data, the TRIP report includes regional data for the Bangor, Lewiston-Auburn and Portland 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 MAINE

Maine 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.

Maine's population grew to approximately 1.4 million residents in 2023, a nine percent increase since 2000.[2] Maine had approximately 1.1 million licensed drivers in 2022.[3] From 2000 to 2021, Maine's gross domestic product (GDP), a measure of the state's economic output, increased by 27 percent, when adjusted for inflation.[4] U.S. GDP increased 48 percent during the same period.[5]

In 2023, the state's transportation system carried 15 billion annual vehicle miles of travel (VMT), a six percent increase since 2000.[6] Due to the Covid-19 pandemic, vehicle travel in Maine dropped by as much as 40 percent in April 2020 (as compared to vehicle travel during the same month the previous year), but rebounded to one percent above 2019's pre-Covid levels in 2023.[7]

CONDITION OF MAINE ROADS

The life cycle of Maine's roads 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

Maine 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.

Statewide, 19 percent of Maine's major locally and state-maintained roads are in poor condition.[8] Thirty-five percent of Maine's major roads are in fair condition and the remaining 47 percent are in good condition.[9]

Twenty-two percent of Maine's major locally and state-maintained urban roads and highways have pavements rated in poor condition and 39 percent are in fair condition.[10] The remaining 39 percent Maine's major urban roads are rated in good condition.[11]

Eighteen percent of Maine's major locally and state-maintained rural roads and highways have pavements rated in poor condition and 33 percent are in fair condition.[12] The remaining 48 percent of Maine's rural roads are rated in good condition.[13]

The chart below details pavement condition on major locally and state-maintained roads in the state's largest urban areas and statewide.

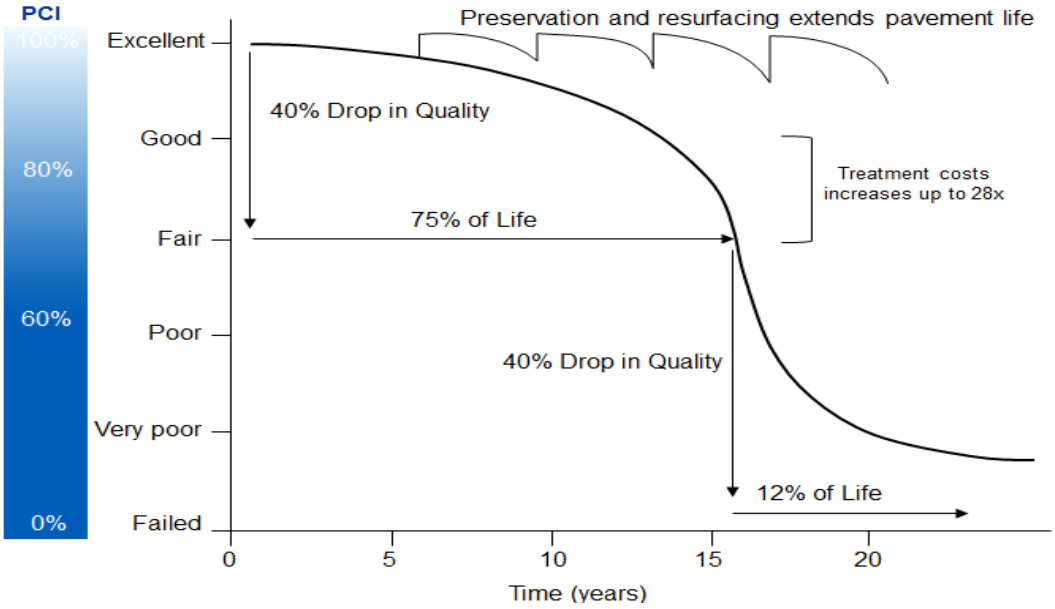
Chart 1. Pavement conditions on major roads in Maine's largest urban areas and statewide.

Location	Poor	Fair	Good
Bangor	18%	27%	54%
Lewiston-Auburn	14%	26%	60%
Portland	18%	33%	50%
Maine Statewide	**19%**	**35%**	**47%**

Source: TRIP analysis of Federal Highway Administration data.

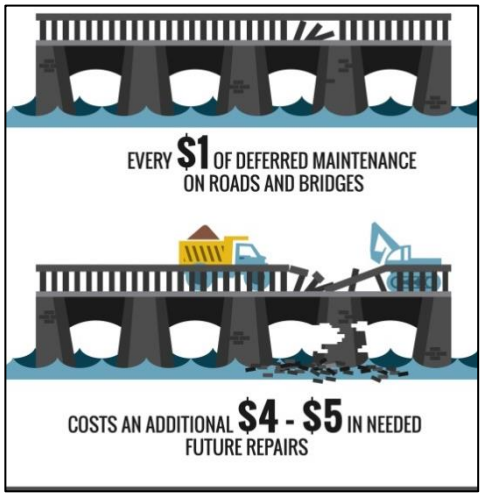
Pavement failure is caused by a combination of traffic, moisture and climate. Moisture often works its way into road surfaces and the materials that form the road's foundation. Road surfaces at intersections are more prone to deterioration because the slow-moving or standing loads occurring at these 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.[14] 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 2. 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.[15]



THE COST TO 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 Maine motorists as a result of deteriorated road conditions is $646 million annually, an average of $609 per driver statewide.[16] The chart below details additional VOC per motorist in the state's largest urban areas.

Chart 3. Vehicle operating costs per motorist as a result of driving on deteriorated roads.

Location	VOC
Bangor	$521
Lewiston-Auburn	$434
Portland	$439
Maine Statewide	**$646 Million**

Source: TRIP estimates.

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.[17] 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.

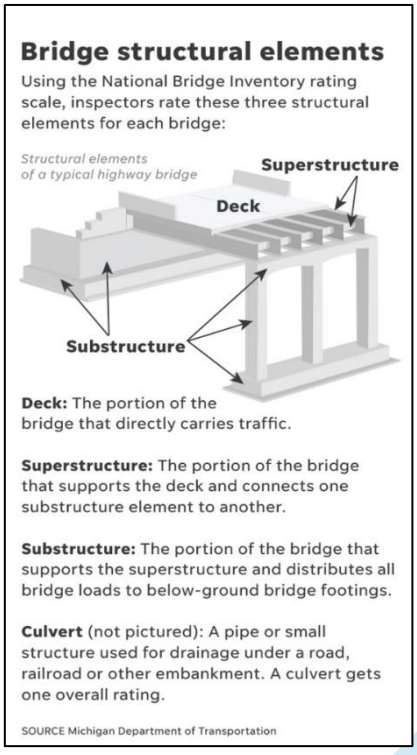
TRIP's additional VOC estimate is based on taking the average number of miles driven annually by a motorist, calculating current VOC based on AAA's driving cost estimates and then using the HDM model to estimate the additional VOC paid by drivers as a result of substandard roads.[18] Additional research 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 MAINE

Maine'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.

FIfteen percent (388 of 2,518) of Maine's locally and state-maintained bridges are rated in poor/structurally deficient condition, the fourth highest share in the U.S.[19] This includes all bridges that are 20 feet or more in length. A bridge is deemed poor/structurally deficient if there is significant deterioration of the bridge deck, supports or other major components.

Bridges that are poor/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.



Sixty percent of Maine's locally and state-maintained bridges have been rated in fair condition.[20] A fair rating indicates that a bridge's structural elements are sound but minor deterioration has occurred to the bridge's deck, substructure or superstructure. The remaining 25 percent of the state's bridges are rated in good condition.[21]

The chart below shows the condition of bridges statewide and in Maine's largest urban areas.

Chart 4. Bridge conditions statewide and in Maine's largest urban areas.

	Poor/Structurally Deficient		Fair		Good		Total Bridges
	Number	Share	Number	Share	Number	Share	
Bangor	54	18%	184	61%	63	21%	301
Lewiston	14	10%	65	48%	56	41%	135
Portland	41	12%	212	62%	91	26%	344
Maine Statewide	**388**	**15%**	**1,504**	**60%**	**626**	**25%**	**2,518**

Source: TRIP analysis of Federal Highway Administration National Bridge Inventory (2024).

When measured by area, the share of Maine bridges in poor condition is lower. Of the nearly 1.3 million square meters of bridge area in the state, 11 percent is in poor/structurally deficient condition, 61 percent is in fair condition, and 28 percent is in good condition.[22]

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 Maine, 59 percent of the state's bridges were built in 1969 or earlier, the fifth highest share in the nation.[23]

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

TRAFFIC SAFETY IN MAINE

A total of 792 people were killed in Maine traffic crashes from 2019 to 2023, an average of 158 fatalities per year.[24] Maine had 0.89 traffic fatalities for every 100 million miles traveled in 2023, lower than the national average of 1.26.[25]

The fatality rate per 100 million miles of travel on Maine's rural, non-Interstate roads in 2022 was more than three times higher than all other roads in the state (1.80 vs. 0.57).[26] And although 55 percent of travel in the state takes place on Maine's rural, non-Interstate roads, 79 percent of fatalities occur on rural, non-Interstate roads.[27]

Nationwide, traffic fatalities began to increase dramatically in 2020 even as vehicle travel rates plummeted due to the COVID-19 pandemic, and the number of fatalities continued to increase in 2021. The number of fatalities in Maine increased 17 percent from 2019 to 2022, from 157 to 183, before falling to 135 in 2023. [28] The state's fatality rate per 100 million VMT increased 20 percent between 2019 and 2022, from 1.06 to 1.27, before falling to 0.89 in 2023.

Chart 5. Traffic fatalities and fatality rates in Maine 2019 – 2023.

MAINE TRAFFIC FATALITY AND FATALITY RATES 2019-2023					
	2019	2020	2021	2022	2023
Traffic Fatalities	157	164	153	183	135
Fatalities per 100M VMT	1.06	1.25	1.07	1.27	0.89

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

The significant increase in traffic fatalities since the onset of the pandemic appears largely related to increased risks being taken by drivers. In an October 2021 report, the National Highway Traffic Safety Administration found that "after the declaration of the public health emergency in March 2020, driving patterns and behaviors in the United States changed significantly. Of the drivers who remained on the roads, some engaged in riskier behavior, including speeding, failure to wear seat belts, and driving under the influence of alcohol or drugs."[29]The AAA Foundation for Traffic Safety (AAAFTS) drew similar conclusions about the role of increased risks being taken by drivers during the pandemic. A survey taken of drivers in October and November 2020 by the AAAFTS asked whether their level of driving had decreased, remained the same or increased since the beginning of COVID-19 related restrictions, and whether the motorist had engaged in a variety of risky driving behaviors in the previous 30 days.[30] In a February 2022 brief about the survey, the AAAFTS noted that drivers who maintained or increased their pre-COVID travel levels indicated that they were more likely to engage in risky driving behavior, including speeding, not wearing a seat belt, being impaired and driving aggressively. "It is possible that many of the individuals who were willing to travel—and even increase their travel—despite the health risks associated with the pandemic were already more willing than average to take other risks," the AAAFTS report found.[31]

In early 2022 the U.S. Department of Transportation adopted a comprehensive National Roadway Safety Strategy, a roadmap for addressing the nation's roadway safety crisis based on a Safe System approach that acknowledges the following: humans make mistakes and are physically vulnerable; traffic deaths and serious injuries are unacceptable; traffic deaths and serious injuries need to be reduced by the provision of a redundant transportation system that reduces or minimizes crashes and ensures that, if crashes do occur, they do not result in serious injury or death.[32]

Chart 6. The Safe System Approach

Source: US Department of Transportation.

The Safe System approach, which is also being adopted by state and local transportation agencies has five objectives:

- Safer People: Encourage safe, responsible behavior by people who use our roads, and create conditions that prioritize their ability to reach their destination unharmed.
- Safer Roads: Design roadway environments to mitigate human mistakes and account for injury tolerances, to encourage safer behaviors, and to facilitate safe travel by the most vulnerable users.
- Safer Vehicles: Expand the availability of vehicle systems and features that help to prevent crashes and minimize the impact of crashes on both occupants and non-occupants.
- Safer Speeds: Promote safer speeds in all roadway environments through a combination of thoughtful, context-appropriate roadway design, targeted education and outreach campaigns, and enforcement.
- Post-Crash Care: Enhance the survivability of crashes through expedient access to emergency medical care, while creating a safe working environment for vital first responders and preventing secondary crashes through robust traffic incident management practices.

Improving safety on the nation's roadways will require that additional steps are taken to make further progress in achieving the Safe System's objectives. NHTSA, which provides states with roadway safety grants, requires states to submit annually a state highway safety plan. The state plans outline numerous steps states are taking to improve traffic safety. Elements of these state roadway safety plans aimed at addressing the Safe System objectives include:

- Safer People: education on speeding, impaired or disadvantaged driving; education on safe pedestrian and bicycling behavior; education on driving safely around large commercial vehicles; enforcement of commercial driver license and vehicle weight requirements; extension of safety belt laws and their enforcement to include all passenger vehicle occupants; enhancing enforcement action of speeding, impaired, aggressive and distracted driving, particularly at high-risk locations; increase penalties, particularly for repeat offender drivers; and increased enforcement at work zones.
- Safer Roads: converting intersections to roundabouts; removing or shielding roadside objects; the addition of left-turn lanes at intersections; improved signalization and lighting at intersections; adding or improving median barriers; improved roadway lighting; adding centerline or shoulder rumble strips; improving pedestrian and bicycle facilities, including sidewalks and bike lanes and providing pedestrian crossing islands; improved work zone safety measures; wider lanes and paved shoulders; upgrading roads from two lanes to four lanes; providing or improving lane markings; updating rail crossings; eliminating vertical pavement drop-offs; and providing large truck parking spaces.
- Safer Vehicles: Support the development, testing and deployment of connected and autonomous vehicle technology such as collision avoidance, lane departure avoidance systems and turning detection systems.
- Safer Speeds: Where appropriate, provide roadway features to encourage safer speeds, including traffic roundabouts and curb extensions; improved signage and dynamic speed signing at high-risk locations; education on the consequences of speeding; and increased speeding enforcement, particularly at high-risk locations.

- Post-Crash Care: Reduce crash response time including the use of emergency vehicle preemption technology; improve emergency response to multi-vehicle or hazardous material crashes; and increase access to level one or two trauma centers for seriously-injured crash victims.

The chart below shows the average number of people killed in traffic crashes in the state's largest urban areas between 2018 and 2022 and the cost of traffic crashes per driver. 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.[33]

Chart 7. Average fatalities between 2018 and 2022 and the annual cost of crashes per driver.

Location	Average Fatalities 2018-2022	Safety Costs per Diver
Bangor	18	$564
Lewiston-Auburn	10	$440
Portland	21	$339

Source: TRIP analysis of NHTSA data.

Three major factors are associated with fatal vehicle crashes: driver behavior, vehicle characteristics and roadway features. 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.

Traffic crashes in Maine imposed a total of $1.9 billion in economic costs in 2023.[34] TRIP estimates that roadway features, while not the primary factor, were likely a contributing factor in approximately one-third of all fatal traffic crashes, resulting in $641 million in economic costs in Maine in 2022.[35] 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.[36]

The U.S. has a $146 billion backlog in needed roadway safety improvements, according to a 2017 report from the AAA Foundation for Traffic Safety. The report found implementing these cost-effective and needed roadway safety improvements on U.S. roadways would save approximately 63,700 lives and reduce the number of serious injuries as a result of traffic crashes by approximately 350,000 over 20 years.

TRAFFIC CONGESTION IN MAINE

While traffic congestion is largely constrained to the state's urban areas, increasing congestion on Maine's major highways and roads hampers the state's ability to support economic development and quality of life by reducing the reliability and efficiency of personal and commercial travel, including the transport of goods and services. Traffic congestion robs commuters of time and money and imposes increased costs on businesses, shippers and manufacturers, which are often passed along to consumers. Increased levels of congestion can also reduce the attractiveness of a location when a company is considering expansion or deciding where to locate a new facility.

Based on a 2019 report on urban mobility by the Texas Transportation Institute that analyzes urban traffic congestion levels and provides estimates on the amount of time and the value of lost time and wasted fuel as a result of traffic congestion, TRIP has estimated in the following chart the average

number of hours lost annually for each driver and the per-driver cost of lost time and wasted fuel due to congestion in 2024 in each of Maine's largest urban areas.

Chart 8. Annual hours lost to congestion and congestion costs per driver.

Location	Hours Lost	Congestion Cost
Bangor	28	$739
Lewiston-Auburn	22	$612
Portland	28	$747

Source: TRIP analysis of Texas Transportation Institute Urban Mobility Report

Based on the TTI report, TRIP estimates that the total cost of traffic congestion in Maine in the form of lost time and wasted fuel is $300 million annually.[37] Increasing congestion on Maine's major highways and roads hampers the state's ability to support economic development and quality of life by reducing the reliability and efficiency of personal and commercial travel, including the transport of goods and services

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 Maine. 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.

The amount of freight transported in Maine and the rest of the U.S. is expected to increase significantly as a result of economic growth, changing business and retail models, increasing international trade, and rapidly changing consumer expectations that place an emphasis on faster deliveries, often of smaller packages or payloads.

In 2022 Maine's freight system moved 91.1 million tons of freight, valued at $87.1 billion.[38] From 2022 to 2050, freight moved annually in Maine by trucks is expected to increase 56 percent by weight and 81 percent by value (inflation-adjusted dollars). Fifteen percent of travel on Maine's Interstate highways and 16 percent of travel on its rural Interstate highways is by combination trucks.

The ability of the nation's freight transportation system to efficiently and safely accommodate the growing demand for freight movement could be hampered by inadequate transportation capacity, a lack of adequate safety features on some transportation facilities, institutional barriers to enhancing the nation's freight facilities, a lack of adequate funding for needed improvements to the freight network and a shortage of drivers.

The need to improve the U.S. freight network is occurring at a time when the nation's freight delivery system is being transformed by advances in vehicle autonomy, manufacturing, warehousing and supply chain automation, increasing e-commerce, and the growing logistic networks being developed by Amazon and other retail organizations in response to the demand for a faster and more responsive delivery and logistics cycle.

Investments in transportation improvements in Maine play a critical role in the state's economy. A report by the American Road & Transportation Builders Association found that the design, construction and maintenance of transportation infrastructure supports the equivalent of approximately 18,000 full-time jobs across all sectors of the state economy, earning these workers approximately $609 million annually.[39] These jobs include approximately 9,000 full-time jobs directly involved in transportation infrastructure construction and related activities. Spending by employees and companies in the transportation design and construction industry supports an additional 9,200 full-time jobs in Maine.[40] Transportation construction in Maine contributes an estimated $111 million annually in state and local income, corporate and unemployment insurance taxes and the federal payroll tax.[41]

Approximately 283,000 full-time jobs in Maine 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 $10.1 billion in wages and contribute an estimated $1.8 billion in state and local income, corporate and unemployment insurance taxes, and the federal payroll tax.[42]

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 access has a significant impact on the competitiveness of a region's economy.

TRANSPORTATION FUNDING IN MAINE

Investment in Maine'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.

Maine's roads, highways and bridges are funded by investments from local, state and federal governments. In addition to state transportation funding, the Infrastructure Investment and Jobs Act (IIJA), signed into law on November 2021, will provide $1.3 billion in federal funds to the state for highway and bridge investments in Maine over five years, representing a 29 percent increase in annual federal funding for roads and bridges in the state over the previous federal surface transportation program.[43] Federal funds currently support 41 percent of the state's transportation department spending on highway and bridge improvements.[44]

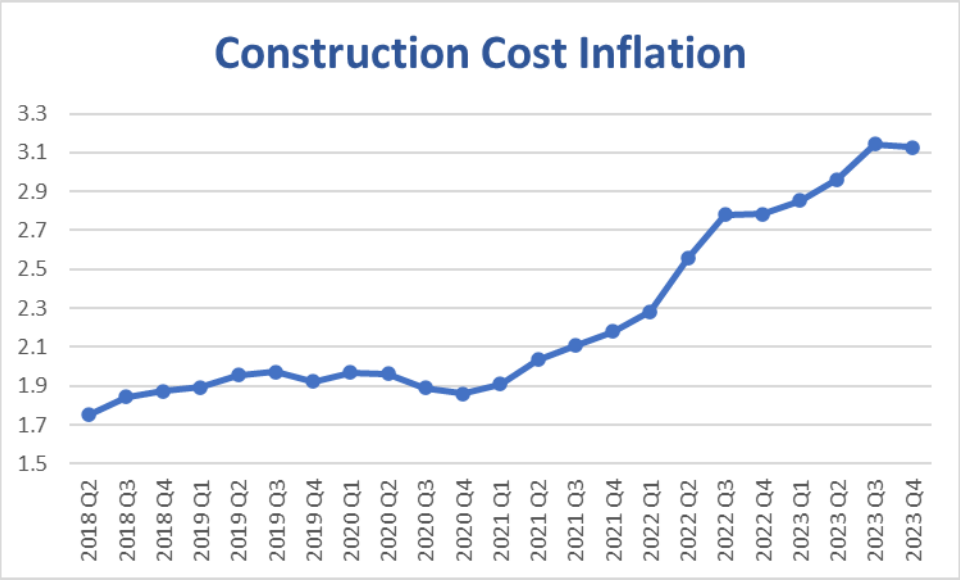
Most federal funds for highway and transit improvements in Maine are provided by federal highway user fees, largely an 18.4 cents-per-gallon tax on gasoline and a 24.4 cents-per-gallon tax on diesel fuel (additional revenue is generated by fees on the sale of large trucks, a highway use tax levied on vehicles in excess of 55,000 pounds and a tax on the sale of large truck tires).

The ability of revenue from Maine's and the federal motor fuel tax -- as well as other sources of state and federal transportation funding -- to keep pace with the state's future transportation needs is likely to erode as a result of increasing vehicle fuel efficiency, the increasing use of electric vehicles and inflation in highway construction costs.

The average fuel efficiency of U.S. passenger vehicles increased from 20 miles per gallon in 2010 to 24.5 miles per gallon in 2020. Average fuel efficiency is expected to increase another 31 percent by 2030, to 32 miles per gallon, and increase 51 percent by 2040, to 37 miles per gallon.[45] The share of electric vehicles of total passenger vehicle sales in the U.S. is expected to increase to five percent by 2023 and 60 percent by 2040, by which time electric vehicles will represent approximately 30 percent of the passenger vehicle fleet.[46]

The Federal Highway Administration's national highway construction cost index, which measures labor and materials cost, increased by 43 percent in 2022 and 2023 and increased 68 percent since the beginning of 2021. [47]

Chart 9. FHWA's national highway construction cost index.



Source: Federal Highway Administration.

According to the Status of the Nation's Highways, Bridges, and Transit, 24th Edition, submitted to Congress by the United States Department of Transportation (USDOT) in 2021, the nation faces a $1 trillion backlog in needed repairs and improvements to the nation's roads, highways and bridges.[48] This backlog includes $556 billion for highway rehabilitation; $132 billion for bridge rehabilitation; $181 billion for system expansion and $143 billion for system enhancement.[49] The USDOT report found that the nation's current $107 billion annual investment in roads, highways and bridges by all levels of government should be increased by 55 percent to $166 billion annually to improve the conditions of roads, highways and bridges, relieve traffic congestion and improve traffic safety.[50]

The USDOT report also found that the nation faces a $105 billion backlog in needed repairs and improvements to its transit systems.[51] The USDOT report found that the nation's current $18.8 billion annual investment in transit repairs and improvements by all levels of government should be increased by 30 percent to $24.7 billion annually to improve the condition and expand the service of the nation's transit systems.[52]

Highway and bridge spending multiplies through the economy by stimulating additional output. A 2021 macroeconomic analysis by IHS Markit found that that every dollar spent on highway and bridge improvements results in $3.4 dollars in combined direct, indirect and induced output from

industries throughout the economy, resulting in a multiplier for highway and bridge investment of 3.4.[53]

PROGRESS IN IMPROVING CONDITIONS, TRAVEL RELIABILITY AND SAFETY IN MAINE

Nearly $7 billion in investment by the Maine Department of Transportation (MaineDOT) since 2018 has been vital in addressing the state's need to preserve roads and bridges, improve traffic safety and improve reliability for personal and commercial travel. In the state's FY 2024-25 budget, highway fund supported agencies received an additional $165 million per year, which represents a significant step forward in providing sustainable and predictable funding that will allow MaineDOT to plan and implement needed improvements to the transportation infrastructure.[54]

However, Maine continues to face significant transportation challenges. In order to continue to make needed improvements, the state will require continued, sustained and predictable funding to invest in Maine's infrastructure, rather than relying on a return to one-time or shorter-term funding infusions.

Since 2018 Maine has invested $6.8 billion in highway and bridge improvements, including improvements to 6,200 highway miles and another 4,420 miles underway, and repairs to 366 bridges with active plans to repair another 289 bridges.[55] Maine has also completed $155.8 million in bridge and rail line improvements on its railroad system, with another $69.5 million in improvements underway.[56] And the state has invested $30.7 million in port improvements at the International Marine Terminal in Portland, with $12.3 million in additional investments underway.[57] This investment will also allow the state to make various safety, mobility and bike/pedestrian improvements.

Using a combination of programs and projects, the Maine Department of Transportation is taking steps to address the state's safety, traffic congestion and reliability challenges. These efforts are aimed at improving the efficiency and safety of the state's transportation system.

MaineDOT's efforts to improve safety and travel reliability include the following:

- The development of Maine's Strategic Highway Safety Plan in cooperation with State and local police departments, Maine Bureau of Highway Safety, Maine Bureau of Motor Vehicles, Maine Turnpike Authority, Maine Motor Transport Association, Maine Emergency Medical Services, and AAA, Norther New England.[58] This plan identifies focus areas where safety improvements can be implemented to reduce serious injuries and fatalities. As a result of this plan, numerous projects have been completed, are underway, or planned to mitigate safety deficiencies that will work towards a reduction in serious injuries and fatalities in Maine.[59]
- Implementation of "Roadway Safety Audits" done in conjunction with municipalities, public safety, and others to identify safety deficiencies that can be addressed as stand-alone projects or done in conjunction with other planned work.
- Intelligent Transportation Systems (ITS) and traffic signal improvements in Maine, including the following:
    - The creation of MaineDOT's Transportation Management Center (TMC), which gathers real-time information and provides that information to the travelling public.[60]
    - Deployment of ITS devices to fully automate and integrate road sensors, probe data, phone data, and Roadway Weather Information Systems (RWIS) to automate the process of providing real-time, reliable information.[61]
    - Deployment of Changeable Message Signs (CMS) to communicate with the traveling public.[62]

    - Installation and upgrade of traffic signals in Maine. These technology deployments allow MaineDOT to detect traffic signal control related issues in real time and remotely from the department's Transportation Management Center (TMC), identify potential causes, and quickly dispatch staff as needed. It will also minimize the impacts of traffic signal control malfunction and allow motorists to travel more efficiently and safely throughout Maine.[63]
- Traffic Incident Management (TIM) is a planned, coordinated, and multidisciplinary process to detect, respond to, and clear traffic incidents to restore traffic flow quickly and safely. Maine has deployed a "Service Patrol" along I-295 and I-95 to address TIM.[64]
- MaineDOT's State Transit Plan is an update to the 2015 Statewide Strategic Transit Plan. The Plan reviews existing conditions and needs to help identify potential system efficiencies, practices, and alternatives appropriate for Maine, and new modes and approaches for providing needed public transportation in rural Maine. The plan results in annual programming of operation and capital improvements on over-the-road public transportation, addressing passenger rail and ferry service.
- Projects underway to increase capacity include the I-395/Route 9 Connector in Brewer and Eddington, which is currently under construction, and the Presque Isle bypass which is in design and set to be advertised in 2025.[65]
- Bicycle and Pedestrian efforts include safety improvements, preservation to existing facilities, expansion of existing facilities, new infrastructure, and modifications to existing infrastructure through MaineDOT's Complete Streets and/or Road Diet initiatives.[66]
- Efforts to improve freight movements in Maine include the establishment of the allotted Critical Urban and Rural Fright Miles that Maine is allotted through IIJA, which allows them to be eligible for FHWA National Freight Program Funding and grants that are specific to freight.[67] In addition, Maine has invested in the International Marine Terminal in Portland, Maine to expand imports and exports while minimizing the number of trucks traveling through the interstate system in Maine. Maine has also worked with neighboring states and private companies to invest in and improve the current freight rail system to ensure its continued success.

IMPROVING TRANSPORTATION SAFETY, RESILIENCY AND EFFICIENCY

Recognizing that extreme weather, sea level change, and changes in environmental conditions may threaten the condition and longevity of the nation's transportation infrastructure, transportation agencies have begun to assess vulnerabilities and consider the resilience of their transportation assets during the transportation planning process. Transportation agencies across the country have begun to incorporate resilience in asset management plans, addressing resilience in project development and design and optimizing operations and maintenance practices.[68]

Based on the importance of maximizing the level and safety of mobility provided by its transportation system, transportation agencies are adopting Transportation Systems Management and Operations (TSMO) practices and incorporating improved resiliency into their transportation network. While a TSMO program does not eliminate the need for capacity expansions along some routes, it helps enhance the mobility of an existing corridor as much as possible.

A TSMO program adopts an integrated set of strategies to improve traffic flow and safety on a portion of a roadway, including work zone management, traffic incident management, freight management, traveler information, traffic signal coordination, ramp management, transit management and improved bicycle and pedestrian crossings.[69] The benefits of TSMO can include reduced traffic congestion, reduced fuel consumption and reduced emissions.

CONCLUSION

As Maine 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 and allow for economic recovery and growth.

Maine 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 Maine's roads, highways, bridges and transit systems will not be able to proceed without a boost in local, state or federal transportation funding. If Maine 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: Bangor – Penobscot County; Lewiston-Auburn – Androscoggin County; Portland – Cumberland County.
[2] U.S. Census Bureau (2023).
[3]Highway Statistics (2022). Federal Highway Administration. DL-1C.
[4] TRIP analysis of Bureau of Economic Analysis data (2023). https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=1&isuri=1
[5] Ibid.
[6] U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 2019 and analysis of Federal Highway Administration Traffic Volume Trends (2021) https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm
[7] Federal Highway Administration – Traffic Volume Trends. https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm
[8] Federal Highway Administration (2022).
[9] Ibid.
[10] Ibid.
[11] Ibid.
[12] Ibid.
[13] Ibid.
[14] Selecting a Preventative Maintenance Treatment for Flexible Pavements. R. Hicks, J. Moulthrop. Transportation Research Board. 1999. Figure 1.
[15] Pavement Maintenance, by David P. Orr, PE Senior Engineer, Cornell Local Roads Program, March 2006.
[16] TRIP calculation.
[17] Highway Development and Management: Volume Seven. Modeling Road User and Environmental Effects in HDM-4. Bennett, C. and Greenwood, I. 2000.
[18] Your Driving Costs. American Automobile Association. 2023.
[19] Federal Highway Administration National Bridge Inventory. 2024.
[20] Ibid.
[21] Ibid
[22] Ibid.
[23] TRIP analysis of Federal Highway Administration National Bridge Inventory data (2023).
[24] Federal Highway Administration National Highway Traffic Safety Administration, 2019-2023.
[25] TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data (2023).
[26] TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data (2022).
[27] Ibid.
[28] TRIP analysis of National Highway Traffic Safety Administration and Federal Highway Administration data (2019-2023).
[29] Continuation of Research on Traffic Safety During the COVID-19 Public Health Emergency: January-June 2021. U.S. Department of Transportation National Highway Traffic Safety Administration.
[30] Self-Reported Risky Driving in Relation to Changes in Amount of Driving During the COVID-19 Pandemic. February 2022. AAA Foundation for Traffic Safety.
[31] Ibid.
[32] U.S. Department of Transportation National Roadway Safety Strategy, 2022. https://www.transportation.gov/NRSS
[33] 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

[34] TRIP estimate based on NHTSA report "The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised), 2016. P. 146.
[35] Ibid.
[36] 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
[37] TRIP estimate based on the 2019 Urban Mobility Report by the Texas Transportation Institute and 2023 Federal Highway Administration traffic volume trends data.
[38] TRIP analysis of Federal Highway Administration's Freight Analysis Framework data (2023). Data is for 2022. https://faf.ornl.gov/fafweb/
[39] American Road & Transportation Builders Association (2015). The 2015 U.S. Transportation Construction Industry Profile. https://www.transportationcreatesjobs.org/pdf/Economic_Profile.pdf
[40] Ibid.
[41] Ibid
[42] Ibid.
[43] Federal Highway Administration (2024). Bipartisan Infrastructure Law. Additional analysis by TRIP. https://www.fhwa.dot.gov/bipartisan-infrastructure-law/funding.cfm
[44] Ibid.
[45] KPMG. (2019). Evaluating Sustainable Transportation Funding Options.
[46] BloombergNEF (2019) New Energy Outlook 2019. https://about.bnef.com/new-energy-outlook/
[47] Federal Highway Administration (2023). National Highway Construction Cost Index. https://www.fhwa.dot.gov/policy/otps/nhcci/
[48] United States Department of Transportation (2021). 24th Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance. Executive Summary, Chapter 7. 24th Ed. Status of the Nation's Highways, Bridges, and Transit Conditions and Performance Report - Policy | Federal Highway Administration (dot.gov)
[49] Ibid.
[50] Ibid.
[51] United States Department of Transportation (2021). 24th Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance. Executive Summary, Chapter 7. 24th Ed. Status of the Nation's Highways, Bridges, and Transit Conditions and Performance Report - Policy | Federal Highway Administration (dot.gov)
[52] Ibid.
[53] IHS Markit (2021). Economic Impacts of Transportation Infrastructure. ARTBA_EIA_IIJA_Report_Sept2021.pdf
[54] MaineDOT response to TRIP survey, 2024.
[55] Ibid.
[56] Ibid.
[57] Ibid.
[58] Ibid.
[59] Ibid.
[60] Ibid.
[61] Ibid.
[62] Ibid.
[63] Ibid.
[64] Ibid.
[65] Ibid.
[66] Ibid.
[67] Ibid.
[68] Federal Highway Administration (2019). Resilience. https://www.fhwa.dot.gov/environment/sustainability/resilience/
[69] Federal Highway Administration (2019). What is TSMO? https://ops.fhwa.dot.gov/tsmo/index.htm#q1