FUTURE MOBILITY IN MAINE:

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 highway transportation issues. TRIP is sponsored by insurance companies, equipment manufacturers, distributors and suppliers; businesses involved in highway engineering, construction and finance; labor unions; and organizations concerned with an efficient and safe highway transportation network.

Executive Summary

Maine's extensive system of roads and bridges provides the state's 1.3 million residents and visitors with a high level of mobility. As the backbone of Maine's surface transportation system, roads and bridges play a central role in the state's economy. Maine's extensive highway transportation system enables the state's residents and visitors to go to work, visit family and friends, move goods to market, and frequent tourist attractions.

It is critical that Maine develops and maintains a modern transportation system that can accommodate future growth in population, vehicle travel, tourism and economic development. Improving and maintaining the condition of the state's roads and bridges, as well as modernizing Maine's key highways, is critical in providing the state's residents with a high quality of life.

Maine faces a $2.2 billion shortfall over the next ten years in funding for needed road, highway and bridge repairs and improvements.

- According to the Maine Department of Transportation (MaineDOT), from 2007 to 2016, $5.4 billion is needed to allow the state to significantly improve road and bridge conditions, make reasonable roadway safety improvements, address needed traffic congestion relief and enhance economic development opportunities. However, MaineDOT estimates that anticipated highway funding levels during this time period will be only $3.2 billion.

- Numerous road, highway and bridge improvement projects that are currently needed to improve physical conditions, improve traffic safety, enhance economic development opportunities and relieve traffic congestion are unfunded through at least 2012.

- Some of the needed, but currently unfunded projects in Maine include: improvements to Interstate 295 in the Portland area to relieve traffic congestion and improve safety; an improved connector between Interstate 95 and Route 9 near the Canadian border crossing at Calais to improve the movement of goods and people in this corridor; improvements to portions of US Route 1 to relieve seasonal congestion; improvements to Route 2 in the White Mountains region to improve traffic safety; and the improvement of several significant Maine bridges.

- The cost of roadway improvements is escalating because the price of key materials needed for highway and bridge construction has increased rapidly. Over the last three years, the average cost of materials used for highway construction, including asphalt, concrete, steel, lumber and diesel has increased by 33 percent.

Nearly one-third – 32 percent -- of major roads in Maine are in poor and mediocre condition, providing motorists with a rough ride.

- In 2005 (the latest year for which data is available), 12 percent of Maine's roads were rated in poor condition and 20 percent of the state's roads were rated in mediocre condition.

- Roads rated poor may show signs of deterioration, including rutting, cracks and potholes. Roads rated in mediocre condition may show signs of significant wear and may also have some visible pavement distress. Most pavements in mediocre condition can be repaired by resurfacing, but some may need more extensive reconstruction to return them to good condition.
- Roads in need of repair cost each Maine motorist an average of $285 annually in extra vehicle operating costs - $286 million state-wide. These costs include accelerated vehicle depreciation, additional vehicle repair costs, increased fuel consumption and increased tire wear.
- A desirable goal for state and local organizations that are responsible for road maintenance is to have 75 percent of major roads in good condition. Only 48 percent of Maine's major roads are in good condition.
- The following is a list of the five sections of heavily traveled roads in Maine with the worst pavement conditions. A list of the 25 sections of Maine's heavily traveled roadways with the worst pavement conditions is in the body of the report.

Rank	Route Name	County/Closest City	Description	Length (Miles)	Daily Traffic
1	State Route 7	Dexter	Beginning 0.1 of a mile North of Mechanic Street and extending north 1.4 miles.	1.4	7,773
2	US Route 1A	Hampden	Beginning at Route 9 and extending northeast 2.6 miles to 0.8 of a mile North of Wheeldon Street.	2.6	6,327
3	WEBSTER ST	Lewiston	Beginning 0.1 of a mile East of Pond Road and extending northwest 2.2 miles to Route 126.	2.2	8,206
4	US Route 1	Wells	Beginning at the South junction of Route 9/109 and extending North 1.8 miles to 0.1 of a mile South of the Route 1 Bypass.	1.8	12,240
5	State Route 117	Norway	Beginning 0.3 mile northeast of the Ottis Grove Road and extending North 2.8 miles to 0.2 mile South of Route 118.	2.8	4,147

- In 2006, Maine DOT restricted 1,850 miles of state highways to carrying only lighter vehicles due to structural inadequacies of the roads exacerbated by the annual freeze-thaw cycle. Restricting roads to use only by lighter vehicles has a detrimental impact on the state's economy because it increases shipping costs, particularly for the timber, manufacturing and agricultural sectors.
- Maine has fallen behind in a commitment made in 1999 to upgrade all state arterial highways to modern design standards for features including lane widths, shoulders and intersections by 2009. Today, only a third of the needed arterial roadway improvements have been made. At the current rate of arterial modernization, it will take another 17 years to fully upgrade the remaining 197 miles of state arterial highways that have yet to be improved.

Approximately a third -- 34 percent – of bridges in Maine show significant deterioration or do not meet current design standards. This includes all bridges that are 20 feet or more in length and are maintained by state, local and federal agencies.

- Fourteen percent of Maine's bridges were structurally deficient in 2006 (the latest year for which data is available). 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 commercial trucks and emergency services vehicles.
- Twenty percent of Maine's bridges were functionally obsolete in 2006. Bridges that are functionally obsolete no longer meet current highway design standards, often because of narrow lanes, inadequate clearances or poor alignment.
- Nearly half – 49 percent -- of Maine's bridges are 50 or more years old. Most bridges are designed to last approximately 50 years before requiring significant repairs.
- The overall condition of Maine's bridges is likely to worsen because the current level of funding for bridge repairs and replacement is inadequate to keep pace with the rate of bridge deterioration in the state. MaineDOT estimates that it needs to replace or significantly repair 32 bridges per year in order to keep the current share of bridges that are deficient from increasing. But at current funding levels, MaineDOT estimates that it only has adequate funding to replace or significantly repair 14 bridges per year.
- MaineDOT estimates that the current cost of needed repairs for extraordinary bridges in the state is $323 million over the next 15 years. An extraordinary bridge is defined as a bridge that is at least 500 feet in length and requires at least $5 million in upgrades.
- The following is a list of the most deficient bridges in Maine, carrying at least 2,500 vehicles per day that are structurally deficient. A list of the 30 most heavily traveled structurally deficient bridges in included in the report. Bridges have been rated by level of deficiency.

Rank	City	Route Carried	Feature Intersected	Daily Traffic
1	Ellsworth	Route 180	Graham Lake Outlet	3,058
2	Millinocket	Granite Street	Millinocket Stream	2,513
3	Turner/Leeds	Route 219	W. Channel Androscoggin River	3,168
4	Brunswick	US 201	Androscoggin River	18,907
5	Peru	N. Main	Androscoggin River	5,794

Increases in population and vehicle travel have placed additional stress on Maine's highway transportation system, resulting in traffic congestion on key urban and summer travel routes.

- Maine's population reached approximately 1.3 million in 2006, an increase of approximately 100,000 people since 1990.
- Vehicle travel in Maine increased by 26 percent from 1990 to 2005 – from 11.9 billion vehicle miles traveled in 1990 to 14.9 billion vehicle miles traveled in 2005.
- TRIP estimates that vehicle travel in Maine will increase by approximately 25 percent by the year 2020, to 18.6 billion miles annually.
- The following is a list of the 10 roadway sections in Maine, 2 miles or longer, that have the highest levels of traffic congestion, based on level-of-service, with F indicating the highest level of traffic congestion (a full explanation of the level-of-service grading can be found in the text of the report). A list of the 25 roadways in Maine that have the most traffic congestion can also be found in the body of the report.

Route	City	Length (mi)	Daily Traffic	LOS
I-295 SB	South Portland, Portland	4.0	34,064	F
I-295 NB	South Portland, Portland	3.5	35,327	F
US 1	Belfast, Searsport	9.1	13,174	F/E
US 1	Wiscasset, Edgecomb	5.1	18,826	F/E
SR 26	Oxford, Norway, Paris	5.1	17,190	F/E
US 1A	Holden	4.0	19,932	F/E
US 302	Westbrook, Windham	5.5	13,948	F/E
US 202	Gray	5.2	12,561	F/E
SR 9/111	Biddeford, Saco	2.0	17,369	F/E
US 202	Winthrop, Manchester, Augusta	6.3	18,118	F/E/D

Traffic fatalities on Maine's rural, non-Interstate roads occur at a rate nearly four times greater than traffic fatalities on all other roads in Maine. Improving safety features on Maine's roads and highways would result in fewer fatal traffic accidents in the state.

- On average, nearly 200 people were killed each year in motor vehicle accidents in Maine from 2001 to 2005. There were 978 traffic fatalities in Maine from 2001 to 2005.
- In 2005, the traffic fatality rate on Maine's rural, non-Interstate routes was 1.59 fatalities per 100 million vehicle miles of travel compared to 0.43 fatalities per 100 million vehicle miles of travel on all other roads in Maine.
- A desirable lane width for collector and arterial roadways is at least 11 feet. Yet nearly half of Maine's non-Interstate routes – 45 percent – have lanes widths of 10 feet or less.
- In Maine in 2005, 80 percent of traffic fatalities occurred on rural, non-Interstate routes. Rural non-Interstates in Maine carried 57 percent of all traffic in 2005.

- There are several factors associated with vehicle accidents that result in fatalities, including driver behavior, vehicle characteristics and roadway design. It is estimated that roadway design is an important factor in one-third of all fatal traffic accidents.
- Highway improvements such as adding turn lanes, removing or shielding obstacles, adding medians, widening lanes, widening and paving shoulders, improving intersection layouts, providing better road markings, and installing or upgrading traffic signals could reduce the severity of serious traffic crashes.
- The Federal Highway Administration has found that every $100 million spent on needed highway safety improvements will result in 145 fewer traffic fatalities over a 10-year period.

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

- Eighty-seven percent of the $32 billion worth of commodities delivered annually to and from sites in Maine is transported on the state's highways.
- Commercial trucking in Maine is projected to increase 52 percent by 2020.
- 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 transportation system.
- 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.

Sources of information for this study include the U.S. Department of Transportation, the Federal Highway Administration (FHWA), the U.S. Census Bureau, the National Highway Traffic Safety Administration (NHTSA), the Texas Transportation Institute (TTI), the National Bridge Inventory (NBI), and the Maine Department of Transportation (MaineDOT).

Introduction

Maine's system of roads, highways and bridges are the most critical transportation link for the state's 1.3 million residents and visitors, providing access to homes, employment, shopping and recreation. Today, with population and travel continuing to increase in the Pine Tree State, the continued modernization of Maine's roads, highways and bridges is crucial to providing a safer, more efficient transportation system, while improving the economic livelihood of the state and accommodating future growth. Improved roads, highways and bridges would enhance Maine's residents with greater mobility and traffic safety, which would improve personal and commercial productivity and boost tourism and economic development statewide.

This report examines the condition, use, safety and funding of Maine's roads and bridges, as well as the state's ability to meet future mobility and traffic safety needs. Sources of information for this study include the U.S. Department of Transportation, the Maine Department of Transportation (MaineDOT), the Federal Highway Administration (FHWA), the U.S. Census Bureau, the National Highway Traffic Safety Administration (NHTSA), and the Texas Transportation Institute (TTI).

Population and Travel Trends in Maine

Maine residents rely on a high level of personal and commercial mobility. Continued growth in the state's population and a significant increase in the miles traveled by the state's residents and visitors have created growing demand on Maine's key highways and roads. It is critical that Maine provide and maintain a modern transportation system that can accommodate future growth in population, tourism, vehicle travel and economic development.

Maine's population has increased by eight percent since 1990, reaching approximately 1.3 million residents in 2005, an increase of approximately 100,000 people since 1990.[1] The population of Maine is projected to increase to approximately 1.4 million persons by 2030.[2]

Steady economic growth, population growth and the annual influx of tourists and other visitors to the Pine Tree State have contributed to a significant increase in vehicle travel in the state. From 1990 to 2005, annual vehicle miles of travel in Maine increased by 26 percent, from 11.9 billion annual miles of travel to 14.9 billion miles of travel.[3] Based on population and other lifestyle trends, TRIP estimates that travel on Maine's roads and highways will increase by another 25 percent by 2020, to 18.6 billion annual vehicle miles of travel.

Condition of Maine's Roads

In 2005 (the latest year for which data is available), 32 percent of Maine's major roads were rated in poor or mediocre condition, providing motorists with a rough ride.[4] Twelve percent of Maine's major roads were rated in poor condition and 20 percent were rated in mediocre condition.[5] Roads rated poor may show signs of deterioration, including rutting, cracks and potholes. In some cases, poor roads can be resurfaced, but often are too deteriorated and must be reconstructed. Roads rated in mediocre condition may show signs of significant wear and may also have some visible pavement distress. Most pavements in mediocre condition can be repaired by resurfacing, but some may need more extensive reconstruction to return them to good condition.

The lifecycle of Maine's roads is greatly affected by the state's ability to perform timely maintenance and upgrades to ensure that road and highway surfaces last as long as possible. The pavement condition of the state's major roads is evaluated and classified as being in poor, mediocre, fair or good condition. A desirable goal for state and local organizations that are responsible for road maintenance is to keep 75 percent of major roads in good condition.[6] In Maine, 48 percent of the state's major roads were in good condition in 2005.[7]

Pavement failure is caused by a combination of traffic, moisture and climate. Moisture often works its way into road surfaces and the materials that form the road's foundation. Road surfaces at intersections are even more prone to deterioration because the slow-moving or standing loads occurring at these sites subject the pavement to higher levels of stress. It is critical that roads are fixed before they require major repairs because reconstructing roads costs approximately four times more than resurfacing them.[8]

The Maine Department of Transportation (MaineDOT) has identified the 25-most deteriorated sections of state roadways that are in immediate need of repair. The five most deteriorated sections of state roads are in Dexter, Hampden, Oxford and Lewiston. [9]

Chart 1. Heavily traveled sections of roads and highways in Maine that have significant pavement deterioration and are in need of repair.

Rank	Route Name	County/Closest City	Description	Length (Miles)	Daily Traffic
1	State Route 7	Dexter	Beginning 0.1 of a mile North of Mechanic Street and extending north 1.4 miles.	1.4	7,773
2	US Route 1A	Hampden	Beginning at Route 9 and extending northeast 2.6 miles to 0.8 of a mile North of Wheeldon Street.	2.6	6,327
3	WEBSTER ST	Lewiston	Beginning 0.1 of a mile East of Pond Road and extending northwest 2.2 miles to Route 126.	2.2	8,206
4	US Route 1	Wells	Beginning at the South junction of Route 9/109 and extending North 1.8 miles to 0.1 of a mile South of the Route 1 Bypass.	1.8	12,240
5	State Route 117	Norway	Beginning 0.3 mile northeast of the Ottis Grove Road and extending North 2.8 miles to 0.2 mile South of Route 118.	2.8	4,147
6	State Route 3	Bar Harbor	Beginning 1.5 miles south of Breakneck Road and extending south 1.1 miles to Brewer Avenue.	1.0	10,507
7	US Route 202	Manchester	Beginning 0.1 of a mile East of Granite Hill Road and extending 1.8 miles to Old Winthrop Road.	1.8	22,464
8	State Route 22	Gorham	Beginning 0.4 of mile East of the Saco Road and extending West 1.5 miles to Route 114	1.5	19,213
9	US Route 2	Rumford	Beginning at Franklin Street and extending East 1.1 miles to the Mexico town line	1.1	8,765
10	US Route 202	Sanford	Beginning at Boyd Street and extending North 2 miles to 0.5 of a mile West of Bennett Rd.	2.0	11,179
11	State Route 11	Naples	Beginning 0.1 mile North of Route 35 and extending northeast 3.3 miles to the Batty Road.	3.3	5,281
12	State Route 22	Westbrook	Beginning at the Portland city line and extending West 2.5 miles to 0.4 of a mile east of the Saco Road.	2.5	10,874
13	US Route 302	Westbrook	Beginning 0.1 of a mile North of Elmwood Ave. and extending northwest 1.6 miles to Ridge Rd.	1.6	13,826
14	COLLEGE ST	Lewiston	Beginning at Montello Street and extending southwest 1.2 miles to Campus Ave	1.2	6,040
15	US Route 1	Ogunquit	Beginning at the York town line and extending north 2.30 miles to the Wells town line.	2.3	12,638
16	State Route 4	Livermore Falls	Beginning at Bridge Street and extending north 1.11 miles to Pineau Street.	1.1	10,718
17	State Route 26	Gray	Beginning 0.30 mile South of the Hadlock Road and extending North 6.6 miles to the Long Hill Road.	6.6	6,777
18	State Route 236	Berwick	Beginning at High Street and extending North 1.7 miles to 0.10 of a mile North of Power House Road.	1.7	5,244
19	State Route 26	Poland	Beginning 0.2 miles northwest of Hinds Road and extending North 3.9 miles to Brown Road.	3.9	7,593
20	State Route 26	Poland	Beginning at the Brown Road and extending North 1.1 miles to 0.10 of a mile South of the Mechanic Falls town line.	1.1	7,398
21	State Route 3	Bar Harbor	Beginning 0.8 miles East of Norway Drive and extending south 1.2 miles to .7 miles South of Sandy Point Rd	1.2	8,715
22	US Route 1	Searsport	Beginning at the Savage Road and extending northeast 1.8 miles to Station Avenue.	1.8	11,658

23	State Route 4	Jay	Beginning at Pineau Street and extending North 1.2 miles to 0.1 of a mile South of Tweedie Street.	1.2	10,711
24	US Route 1	Blaine	Beginning 0.2 of a mile South of the Bubar Road and extending North 1.4 miles to Park Street	1.4	6,778
25	US Route 1	Lincolnville	Beginning at Hemmingway Lane and extending north 1.3 miles to 0.2 of a mile south of Route 173.	1.4	7,446

Source: Maine Department of Transportation

Each spring, MaineDOT also posts weight restrictions on a significant portion of the state's road system, prohibiting large trucks from using those roads. This is due to structural inadequacies exacerbated by the annual freeze-thaw cycle. Roads that are restricted to carrying lighter vehicles have a detrimental effect on Maine's economy by making it makes it more difficult and more costly for timber companies, construction firms, boat builders, aquaculture farmers and manufactured home companies to operate as well as deliver their products to the marketplace.[10] In 2006, MaineDOT posted weight restrictions on 1,850 miles of state-aid highways, predominately in rural areas.[11]

Maine also faces a significant challenge in modernizing its major roads and highways. In 1999 MaineDOT was directed to complete the improvement of all of the state's arterial highways to modern design standards for elements such as lane widths, shoulders and intersections. Yet today, only a third of the needed arterial roadway improvements have been made. At the current rate of arterial modernization, it will take another 17 years to fully upgrade the remaining 197 miles of state arterial highways that have yet to be upgraded.[12]

The Cost to Motorists of Roads in Inadequate Condition

TRIP has calculated the additional cost to motorists of driving on roads in poor or unacceptable condition. When roads are in poor condition, which may include potholes, rutting or rough surfaces, the cost to operate and maintain a vehicle increases. These additional vehicle operating costs include accelerated vehicle depreciation, additional vehicle repair costs, increased fuel consumption and increased tire wear. TRIP estimates that additional vehicle operating costs borne by Maine motorists as a result of poor road conditions is $286 million annually, or $285 per motorist.

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.[13]
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 region's driver, calculating current vehicle operating costs based on AAA's 2006 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.[14] 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.

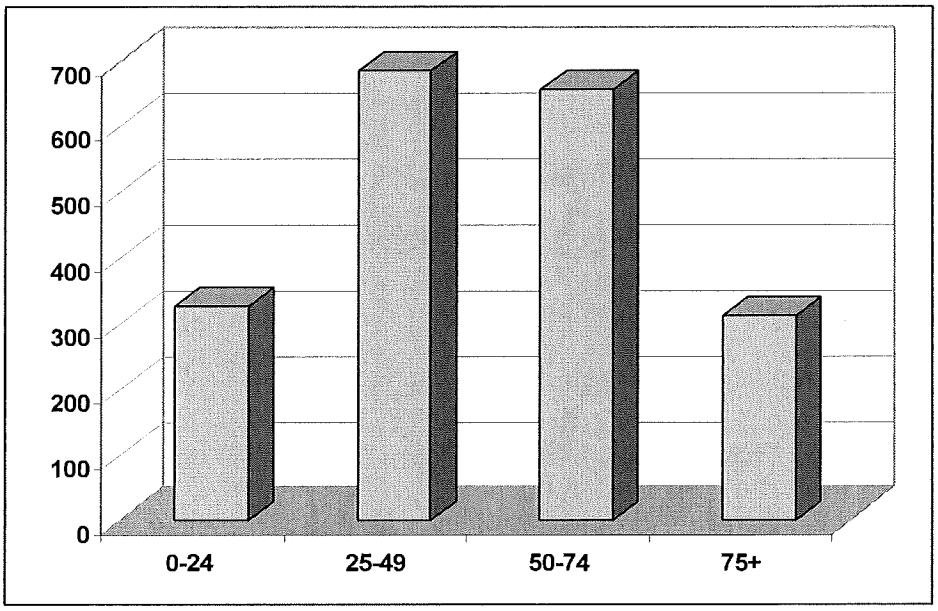
In 2006, the latest year for which data is available, approximately a third – 34 percent – of Maine's bridges (20 feet or longer) were rated as deficient. Fourteen percent of Maine's bridges (20 feet or longer) were rated structurally deficient.[15] A bridge is structurally deficient if there is significant 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.

Twenty percent of Maine's bridges were rated functionally obsolete in 2006.[16] Bridges that are functionally obsolete no longer meet current highway design standards, often because of narrow lanes, inadequate clearances or poor alignment.

Nationally, 12 percent of bridges were rated as structurally deficient and 13 percent were rated as functionally obsolete in 2006.[17]

Maine's bridges are also aging. According to the Maine Department of Transportation, approximately half of the state's bridges (49 percent) are 50 or more years old.[18] Many bridges are designed to last approximately 50 years before needing significant repairs. Many current bridges were built during the Great Depression era and the immediate years after World War II. The following charts illustrate the age of Maine's bridges.

Chart 2. Number of Maine Bridges by age



Source: Maine Department of Transportation

MaineDOT has identified the 30 most heavily traveled structurally deficient bridges in Maine (carrying at least 2,500 vehicles per day).[19] These bridges, many of which cross rivers, are crucial to personal and commercial mobility.

Chart 3. The 30 most heavily-traveled structurally deficient bridges in Maine (carrying at least 2,500 vehicles per day).

Rank	City	Route Carried	Feature Intersected	Daily Traffic
1	Ellsworth	Route 180	Graham Lake Outlet	3,058
2	Millinocket	Granite Street	Millinocket Stream	2,513
3	Turner	Route 219	W. Channel Androscoggin River	3,168
4	Brunswick	US 201	Androscoggin River	18,907
5	Peru	N. Main	Androscoggin River	5,794
6	Kennebunk	US 1	Kennebunk River	12,480
7	Naples	Route 11-302	Chutes River	12,900
8	Clinton	Routes 11 & 100	12-Mile Stream	6,405
9	Norridgewock	Routes 201A & 8	Kennebec River	6,913
10	Hollis	Route 35	Saco River	2,850
11	Kennebunk	Route 9	Kennebunk River	11,470
12	Leeds	219	Dead River	3,030
13	Fryeburg	Route 302	Little Pond	3,800
14	Richmond	Route 197	Kennebunk River	3,270
15	Portland	Route 1	Presumpscot River	15,630
16	Kittery	US Route 1	Piscataqua River NH Road	10,780
17	Old Town	US #2	E. Channel Penobscot River	15,630
18	Orland	175	Orland River	2,646
19	Falmouth	Routes 26 & 100	2 of 4 Franklin Stramps	13,370
20	Thomaston	River Road	St. George River	3,820
21	Fryeburg	Route 113	Saco River	3,326
22	Kenduskeag	Stetson Road	Kenduskeag Stream	3,187
23	Prospect	US 1 & 3	Penobscot River	7,910
24	Deer Isle	Route 15	Eggemoggin Reach	3,174
25	Washburn	Route 228	Salmon Brook	2,713
26	Portland	Veranda Street	CNR R	5,030
27	Dover-Foxcroft	Essex Rd. SA 7	Piscataquis River	2,884
28	Scarborough	Route 9	B&M RR & Depot St. Ext.	5,380
29	Yarmouth	Route 115	MC RR	4,030
30	South Portland	Payne (ME.Mall)Road	Ramps to & From Maine Turnpike	12,040

Source: Maine Department of Transportation

The overall condition of Maine's bridges is likely to worsen as the current level of funding for major bridge repair and replacement is inadequate to keep pace with bridge deterioration rates. MaineDOT estimates that it needs to replace or significantly repair 32 bridges per year, just to keep the current share of bridges that are deficient from increasing. But at current funding levels, MaineDOT estimates that it only has adequate funding to replace or significantly repair 14 bridges per year.[20]

Maine also faces a significant challenge in funding significant repairs for some of its largest and most critical bridges. MaineDOT estimates that the current cost of needed repairs for extraordinary bridges is $323 million.[21] An extraordinary bridge is defined as a bridge that is at least 500 feet in length and requires at least $5 million in upgrades.

Traffic Congestion in Maine

Traffic congestion in Maine is a growing burden in some urban areas and summer destination areas, and threatens to impede the state's economic development. Congested highways often carry traffic volumes that result in significant delays. Highways that carry high levels of traffic are also more vulnerable to experiencing significant traffic delays as a result of traffic accidents or other incidents. Congestion has created key chokepoints in the Portland region and popular summer destinations such as Acadia National Park.

The region's major highways and streets are rated based on their level of service using letter grades A, B, C, D, E or F. Roads rated D, E, or F are considered moderately to severely congested. The following is a definition of each level of service designation:

Chart 4. Traffic level of service classification.

A	Free flow of traffic with operation of individual vehicles largely unaffected by presence of other vehicles
B	Stable flow of traffic with slight decline in freedom to maneuver
C	Stable flow of traffic, but vehicle operation is significantly affected by presence of other vehicles in traffic stream
D	Crowded roadway with some decline in speeds. Large number of vehicles restrict mobility and stable traffic flow
E	Unstable, slow traffic flow with virtually no gaps in traffic stream, subject to traffic flow breakdowns
F	Stop-and-go traffic with low speeds and little or poor maneuverability

MaineDOT has provided the following list of the 25 most-congested sections of Maine roads and highways with a length of 2 miles or more. The level of mobility provided by these routes has a significant impact on both daily commuters and seasonal visitors to the state.

Chart 5. The 25 most-congested sections of roadway in Maine, based on level of service (LOS) ratings.

Route	City	Length (mi)	Daily Traffic	LOS
I-295 Southbound	South Portland, Portland	4.0	34,064	F
I-295 Northbound	South Portland, Portland	3.5	35,327	F
US 1	Belfast, Searsport	9.1	13,174	F/E
US 1	Wiscasset, Edgecomb	5.1	18,826	F/E
SR 26	Oxford, Norway, Paris	5.1	17,190	F/E
US 1A	Holden	4.0	19,932	F/E
US 302	Westbrook, Windham	5.5	13,948	F/E
US 202	Gray	5.2	12,561	F/E
SR 9/111	Biddeford, Saco	2.0	17,369	F/E
US 202	Winthrop, Manchester, Augusta	6.3	18,118	F/E/D
SR 3	Ellsworth, Trenton, Bar Harbor	8.3	13,096	E
US 302	Windham, Raymond, Casco	6.4	15,752	E
SR 236	Kittery, Eliot	6.3	15,039	E
US 1	Rockport, Camden	6.6	14,018	E
US 1A	Ellsworth	5.7	14,083	E
SR 4	Turner	5.7	13,986	E
US 1	Waldoboro, Warren	6.5	12,018	E
US 201	Farmingdale, Hallowell	4.6	16,596	E
SR 236	South Berwick	4.0	15,039	E
US 1	Arundel	4.3	12,821	E
US 1	Thomaston	3.9	14,069	E
SR 196	Topsham	3.7	12,487	E
US 1	Ellsworth	2.4	18,650	E
SR 26	Gray	3.0	13,939	E
US 202	Sanford, Alfred	2.4	12,107	E

Traffic Safety in Maine

There are three major factors associated with fatal vehicle accidents: driver behavior, vehicle characteristics and roadway design. It is estimated that roadway design is an important factor in one-third of all fatal traffic accidents. From 2001 to 2005, approximately 200 people have been killed each year in motor vehicle accidents in Maine; 978 people were killed in traffic accidents between 2001 and 2005 in Maine, according to the National Highway Transportation Safety Administration.[22]

Roads that have poor geometry, or are too narrow, or have insufficient clearance, pose greater risks to motorists, pedestrians and bicyclists. Roads that lack turn lanes, have inadequate shoulders for the posted speed limits, or have poorly laid out intersections or interchanges also have increased rates of serious traffic accidents. Rural roads especially often lack safety features comparable to urban roads; in Maine, more than half (57 percent) of all vehicle travel takes place on rural, non-Interstate routes.[23] Since rural roads also have fewer intersections than urban roads and are more likely to provide travel between urban areas, they also often have higher speed limits than many urban routes. In Maine, 80 percent of traffic fatalities occur on rural, non-Interstate routes.[24] The traffic fatality rate on Maine's rural, non-Interstate routes is nearly four times greater than the fatality rate on all other roads in the state (1.59 fatalities per 100 million vehicle miles of travel versus 0.43 fatalities).[25]

Rural routes often have been constructed over a period of years and as a result may have inconsistent design features for lane widths, curves, shoulders and clearance zones along roadways.[26] Many rural roads have been built with narrow lanes, limited shoulders, excessive

curves and steep slopes alongside roadways.[27] Rural roads are less likely than urban roads to have adequate lane widths. While a desirable lane width for collector and arterial roadways is at least 11 feet, in Maine, 45 percent of non-Interstate major roads and highways have lane widths of 10 feet or less.[28] With passenger vehicle, heavy truck and commercial farming traffic increasing, the safety inadequacies of these rural roads are contributing to the higher rate of fatal accidents on rural roads.

Improving safety on Maine's highway system 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. Roadway improvements 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 could reduce the severity of serious traffic crashes. The Federal Highway Administration has found that every $100 million spent on needed highway safety improvements will result in 145 fewer traffic fatalities over a 10-year period.[29]

The following chart shows the average reduction in fatal accident rates experienced over a 20-year period on sections of roadways where the following types of needed safety improvements were made.[30]

Chart 6. Reduction in fatal accident rates after roadway improvements.

Type of Improvement	Reduction in Fatal Accident Rates after Improvements
New Traffic Signals	53%
Turning Lanes and Traffic Signalization	47%
Widen or Modify Bridge	49%
Construct Median for Traffic Separation	73%
Realign Roadway	66%
Remove Roadside Obstacles	66%
Widen or Improve Shoulder	22%

Source: TRIP analysis of U.S. Department of Transportation data

Importance of Transportation to Economic Growth

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

Businesses have responded to improved communications and the greater necessity to cut costs with a variety of innovations including just-in-time delivery, increased small package delivery, demand-side inventory management and by accepting customer orders through the Internet. The result of these changes has been a significant improvement in logistics efficiency as firms move away 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. An analysis of commodity transport by the U.S. Bureau of Transportation Statistics (BTS) and U.S. Census Bureau underscored the economic importance of Maine's road system. The BTS report found that in Maine, 87 percent of the $32 billion in products shipped annually to and from sites in the state are transported on highways.[31]

Trucking is a crucial part of Maine's economy, as commercial trucks move goods from sites across the state to markets inside and outside the state. Commercial truck travel in Maine is expected to increase significantly over the next two decades. Based on federal projections, TRIP estimates that commercial trucking will increase by 52 percent in Maine by the year 2020.[32]

Highway Funding in Maine

Highways, roads and bridges in Maine are built and maintained largely by state and local governments. Road and bridge improvements in Maine are funded through a number of revenue sources, including state motor fuel user fees, state motor vehicle registration fees and the Federal Highway Trust Fund. Maine's state gasoline user fee is 26.8 cents-per-gallon, while the federal gasoline user fee is 18.4 cents per gallon.[33]

Increased highway funding is crucial to meeting Maine's transportation needs. MaineDOT has identified numerous key highway and bridge projects that are currently unfunded through at least 2012.[34] These projects are critical to the state's future mobility, traffic safety and economic growth. The projects are listed below.

Chart 7. Unfunded Key Highway and Bridge Projects in Maine

Facility	Project Title	Why Needed	Type of Project	Cost (in millions)	Description/Purpose
Highway	I-295 Corridor in Cumberland County	Mobility	Highway Improvement	**100**	This is a series of projects aimed at improving mobility & safety along a segment of the I-295 Interstate through Maine's largest metropolitan area.
Highway	Aroostook North-South Improvements	Economic Development/ Mobility	Highway Improvement, New Alignment	**40**	MaineDOT is currently completing a tiered Environmental Assessment on a series of projects that will improve access and promote economic growth in Maine's northern-most County
Highway	I-395 / Route 9 Connector	Mobility	Highway Improvement, New Alignment	**80**	This project is intended to improve the connection between Route I-95 and Route 9, leading to the new border crossing at Calais, Maine. This is an important economic connection with Maine's Downeast Region and Canada's Maritime Provinces.
Highway	Wiscasset - Route 1	Mobility	Highway Improvement, New Alignment	**70**	This project is intended to alleviate a severe seasonal congestion problem on US Route 1. This portion of US Route 1 is part of the National Highway System and is of significant economic importance to Maine's Midcoast Region.
Highway	Biddeford - Sanford, Route 111	Safety and Mobility	Highway Improvement	**10**	Route 111 is two lane highway that services several rapidly growing urban centers in Maine. Upgrades would improve safety and alleviate congestion on this highway.
Highway/Bridge	Skowhegan Second River Crossing over Kennebec River Routes 201 & 2	Mobility	New Alignment	**60**	Skowhegan is a crossroads of two important National Highway System routes of economic importance. These are Route 201, trending north-south and Route 2, trending east-west. The geography and historic downtown make this cross road inefficient. This project may result in the construction of a new bridge and truck route around the Skowhegan downtown area.

Bridge	Bath Viaduct US Route 1 over Maine Central RR and multiple city streets	Mobility and Economic Development	Bridge Improvement	**40**	This project is on an elevated structure on Route 1 that serves as the approach to the Sagadahoc Bridge over the Kennebec River in Bath. This is the only crossing of the Kennebec in this area.
Highway	Ellsworth Mobility Improvements Routes 1 & 3	Mobility	Highway Improvement	**10**	Ellsworth is the principal service center and gateway to the Acadia National Park and the Down East regions of Maine. Improvements here would enhance mobility and relieve congestion on this critical corridor
Bridge	Route 1 Veterans Memorial Bridge over Fore River	System Preservation	Bridge Replacement	**30**	This project would improve structural deficiencies on Veterans Memorial Bridge on Route 1 in Portland.
Highway/Bridge	Bethel Gilead Route 2	Mobility and Safety	Highway Improvement	**10**	This portion of US Route 2 is located in the rugged terrain of the White Mountains and needs to be brought up to modern highway standards. This project will correct a number of safety deficiencies on this section of US Route 2 near Maine's Border with New Hampshire.
Bridge	Beals Island Bridge carrying Great Wass Island Rd	System Preservation	Bridge Improvement	**25**	This project will make important structural improvements to Beals Island Bridge. This Bridge is the only access for the nearly 700 residents of Beals Island and other seasonal visitors.
Bridge	Route 1 Veterans Memorial Bridge over the Presumpscot River	System Preservation	Bridge Improvement	**25**	This project would improve structural deficiencies on Veterans Memorial Bridge on Route 1 in Portland.
Highway	Lewiston-Auburn Downtown Connector	Mobility and Economic Development	New Alignment	**20**	This project is intended to improve the connection between Route I-95 and the downtown centers of Lewiston and Auburn. It is intended to support the master plans for downtown redevelopment.
Bridge	Route 197 bridge over the Kennebec River	System Preservation	Bridge Rehabilitation	**25**	This project will make important structural improvements to Kennebec River Bridge in Richmond. This is the only crossing of the Kennebec between Bath and Gardiner.
Bridge	Route 1 Veterans Memorial Bridge over the Piscataqua River	System Preservation	Bridge Rehabilitation	**18**	This project will make important structural improvements to Veterans Memorial Bridge between Kittery, Maine and Portsmouth, New Hampshire. Costs reflects Maine share only.
Bridge	Sarah Mildred Long Bridge	System Preservation	Bridge Rehabilitation	**20**	This project will make important structural improvements to the Sarah Mildred Long Bridge between Maine & New Hampshire..
Highway	US Route 202 from Manchester to Augusta	Safety and Mobility	Highway Improvement	**15**	This project makes mobility and safety improvements to US Route 202 between Manchester & Augusta. This is an important commuter and business route between Maine's second largest urban area

					of Lewiston/Auburn and the capital city of Augusta and is operating at capacity.
Bridge	Carlton Bridge over the Kennebec River	System Preservation	Bridge Rehabilitation	**12**	This project makes necessary structural improvements to the railroad structure carrying Safe Handling Rail, Inc. over the Kennebec River.
Bridge	Routes 8 & 201A covered bridge over Kennebec River	System Preservation	Bridge Replacement	**13**	This project will make important functional improvements replacing the structurally deficient covered bridge carrying routes 8 and 201A over the Kennebec River.

Source: Maine Department of Transportation

Maine faces a transportation funding shortfall of approximately $2.2 billion from 2007 to 2016. According to the MaineDOT, from 2007 to 2016, $5.4 billion is needed to allow the state to significantly improve road and bridge conditions, make reasonable roadway safety improvements and address needed traffic congestion relief. However, MaineDOT estimates that anticipated funding levels during this time period will be only $3.2 billion.

Another factor that will make it even more difficult for Maine to fund needed roadway improvements is the escalating costs of materials used for highway construction. Over the past three years, the average cost of materials used for highway construction, including asphalt, concrete, steel, lumber and diesel fuel has increased by 33 percent.[35]

Conclusion

Maine's extensive system of roads and bridges provides its residents and visitors with a high level of mobility. As the backbone of the Pine Tree State's transportation system, roads and bridges play a central role in the state's economy.

A modernized highway system in Maine is critical to the state's ability to accommodate future growth safely and efficiently as the state's population increases and visitors continue to enjoy Maine's beaches and national parks. Increased highway funding would permit MaineDOT to complete numerous highway and bridge projects to improve mobility and traffic safety statewide, boosting the quality of life for residents and visitors alike.

Endnotes

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