

MAKING THE GRADE IN MICHIGAN:

**An Analysis of the Ability of Michigan's Transportation System
to Meet 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

Michigan's extensive system of roads and bridges provides the state's 10.1 million residents and its visitors with a high level of mobility. As the backbone of Michigan's surface transportation system, roads and bridges play a central role in the state's economy. Michigan'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 Michigan develop and maintain a modern transportation system that can accommodate future growth in population, vehicle travel and economic development. Improving and maintaining the condition of the state's roads and bridges, as well as modernizing Michigan's key highways, is critical in providing the state's residents with a high quality of life. This report looks at the condition, traffic congestion levels, traffic safety rates and the unmet funding needs of major roads and highways in Michigan. The deficiencies cited in this report are not a reflection of the effectiveness of state and local transportation agencies, but of a lack of adequate funding.

TRIP has assigned the following letter grades to the components comprising Michigan's highway system. An explanation of the criteria used to assign the letter grades can be found in Appendix A.

	GRADE	COMMENT
Roads	D	<i>Approximately 38 percent of Michigan's major roads and highways have pavements in poor or mediocre condition. In 2004 (the latest year for which data is available), 14 percent of Michigan's roads were rated in poor condition, and an additional 24 percent were rated in mediocre condition.</i>
Bridges	D	<i>Bridge conditions in Michigan are below desirable standards. Sixteen percent of Michigan's bridges are rated as structurally deficient and 12 percent are functionally obsolete.</i>
Congestion	C	<i>Vehicle travel in Michigan increased 27 percent from 1990 to 2004, creating increased stress on the state's roads. Nearly a third (31 percent) of Michigan's urban Interstates and other highways or freeways are considered congested, because they carry a level of traffic that is likely to result in delays during peak travel hours. With a 25 percent increase in vehicle travel anticipated in the state by 2020, traffic congestion will likely worsen unless the state significantly improves its transportation system.</i>
Safety	C-	<i>An average of 1,286 people were killed annually in traffic accidents in Michigan from 2000 through 2004. The number of traffic fatalities in Michigan has declined each year from 2000 to 2004. The fatality rate on Michigan's rural, non-Interstate roads is more than three times the fatality rate on other roads in the state. In 2004, Michigan had a traffic fatality rate of 12.8 fatalities per 100,000 population. Roadway safety features such as widened lanes, added or improved medians, improved intersection design, paved shoulders and added rumble strips, where appropriate, can reduce the number of traffic fatalities and serious accidents.</i>

ROADS

Road conditions in Michigan are below desirable standards. Approximately 38 percent of the state's major roads and highways have pavements in poor or mediocre condition.

- Fourteen percent of Michigan's major roads are rated in poor condition, and an additional 24 percent are in mediocre condition. This includes Interstates, highways, connecting urban arterials, and key urban streets that are maintained by state, county or municipal governments.
- Roads rated in poor condition often have significant rutting, potholes or other visible signs of deterioration. Roads in poor condition typically need to be resurfaced or reconstructed. Roads rated in mediocre condition 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.
- Nationwide, 13 percent of major roads are rated in poor condition and 21 percent are rated in mediocre condition.
- Forty-seven percent of Michigan's major roads are in good condition, significantly lower than the 75 percent for which state and local organizations strive.

BRIDGES

Bridge conditions in Michigan are below desirable standards. Twenty-eight percent of the state's bridges are structurally deficient or functionally obsolete. This includes all state, local and municipal bridges 20 feet and longer.

- Sixteen percent of Michigan's bridges are rated as structurally deficient, showing significant deterioration to decks and other major components.
- Twelve percent of Michigan's bridges are functionally obsolete. These bridges no longer meet modern design standards for safety features such as lane widths or alignment with connecting roads or are no longer adequate for the volume of traffic being carried.
- Nationwide, 13 percent of bridges are rated as structurally deficient, and an additional 13 percent are functionally obsolete.
- Bridge deficiencies have an impact on mobility and safety. Restrictions on vehicle weight may cause many vehicles – especially emergency vehicles, commercial trucks, school buses and farm equipment – to use alternate routes to avoid these bridges. Narrow bridge lanes, inadequate clearances and poorly aligned bridge approaches reduce traffic safety. Redirected trips lengthen travel time, waste fuel and reduce the efficiency of the local economy.

CONGESTION

Traffic congestion levels in Michigan are rising as vehicle travel on the state's roadways is increasing faster than additional roadway capacity is being added. Increases in population and vehicle travel have placed additional stress on the state's highway transportation system.

- Michigan's population reached 10.1 million in 2004, an increase of approximately nine percent since 1990. Michigan's population is projected to increase approximately seven percent by 2020.
- Vehicle travel on Michigan's major highways increased by 27 percent from 1990 to 2004 – jumping from 81.1 billion vehicle miles traveled in 1990 to 103.3 billion vehicle miles traveled in 2004. At the same time, total lane miles in the state increased by only four percent.
- Nearly a third (31 percent) of Michigan's urban Interstates and other highways or freeways are considered congested, because they carry a level of traffic that is likely to result in delays during peak travel hours. This is a significant increase since 2000, when 23 percent of urban Interstates or other highways or freeways were considered congested.
- TRIP estimates that vehicle travel in Michigan will increase by 25 percent by the year 2020 to 129.1 billion miles annually.

SAFETY

Nearly 1,300 people were killed annually on Michigan's roads in the last five years. Improving safety features on Michigan's roads and highways would result in a decrease in traffic fatalities in the state. Roadway design is an important factor in approximately one-third of fatal and serious traffic accidents.

- An average of 1,286 people were killed annually in Michigan in traffic accidents between 2000 and 2004 (the latest year for which data is available).
- Michigan's traffic fatality rate was 1.18 fatalities per 100 million vehicle miles of travel in 2004. The state had a traffic fatality rate of 12.8 fatalities per 100,000 population in 2004.
- The traffic fatality rate on Michigan's rural, non-Interstate roads is more than three times higher than the fatality rate on all other roads in the state. The fatality rate on Michigan's rural, non-Interstate roads was 2.02 fatalities per 100 million vehicle miles of travel, while the fatality rate on all other roads in the state was 0.66 fatalities per 100 million vehicle miles of travel.
- While only 25 percent of travel takes place on Michigan's rural, non-Interstate roads, 46 percent of fatalities occur on these roads.

- Highway improvements such as removing or shielding obstacles, adding or improving medians, adding rumble strips, wider lanes, wider and paved shoulders, upgrading roads from two lanes to four lanes and better road markings and traffic signals, where appropriate, can reduce traffic fatalities and accidents while improving traffic flow to help relieve congestion.
- 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.

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

Introduction

Michigan's system of roads and bridges provides the state's 10.1 million residents and visitors with a high level of mobility. As the backbone of Michigan's surface transportation system, roads and bridges play a central role in the state's economy and enable residents and visitors to go to work, visit family and friends, move goods to market, and frequent tourist attractions.

The continued modernization of Michigan's roads, bridges and public transit systems is crucial to providing a safer, more efficient transportation system, while improving the economic livelihood of the state and accommodating future growth. These projects are designed to improve traffic flow and make driving safer, ultimately improving the state's level of mobility. As travel on Michigan's surface transportation system becomes more efficient, personal and commercial productivity will increase, boosting economic development statewide.

Michigan's extensive highway transportation system is maintained by state, local and municipal agencies. Of the 122,381 miles of roads in Michigan, the state has jurisdiction over approximately 8 percent of the roads, with the other 92 percent of the roads under the jurisdiction of counties, cities and villages. The deficiencies cited in this report are not a reflection of the effectiveness of state and local transportation agencies, but of a lack of adequate funding.

This report looks at the condition, use, safety and funding of Michigan'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, 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), the Bureau of Transportation Statistics (BTS) and the Michigan Department of Transportation (MDOT).

Population and Travel Trends in Michigan

Michigan residents enjoy modern lifestyles that rely on a high level of personal and commercial mobility. Significant increases in both the state's population and the rate of travel of its residents have created an increased demand on Michigan's transportation system, particularly its key highways and roads. It is critical that Michigan develop and maintain a modern transportation system that can accommodate future growth in population, vehicle travel and economic development.

Michigan's population reached 10.1 million in 2004, an increase of approximately nine percent since 1990. Michigan's population is expected to increase by another 700,000 residents by 2020.¹

Steady population and economic growth in Michigan have resulted in increased vehicle travel in the state. From 1990 to 2004, annual vehicle miles of travel (VMT) increased by 27 percent, from 81.1 billion annual VMT to 103.3 billion VMT.² At the same time, total lane miles in the state increased by only four percent.

Vehicle travel in Michigan is expected to increase by another 25 percent by 2020 to 129.1 billion VMT.³

Condition of Michigan's Roads

The lifecycle of Michigan's roads is greatly affected by the state's ability to perform timely maintenance and upgrades to ensure that structures last as long as possible. The pavement condition of the state's major roads are evaluated and classified as being in poor, mediocre, fair or good condition.

In 2004 (the latest year for which data is available), 14 percent of Michigan's major roads were rated in poor condition, and an additional 24 percent were rated in mediocre condition.⁴ Nationwide, 13 percent of major roads are rated in poor condition. Roads rated poor are badly cracked or broken. 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.

In Michigan, 47 percent of roads were rated in good condition in 2004, significantly lower than the recommended 75 percent for which state and local organizations strive.⁵

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.⁶

Bridge Conditions in Michigan

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

In 2005, the latest year for which data is available, 16 percent of Michigan's bridges (20 feet or longer) were rated structurally deficient.⁷ 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.

Approximately 12 percent of Michigan's bridges (20 feet or longer) were functionally obsolete in 2004.⁸ Bridges that are functionally obsolete no longer meet current highway design standards, often because of narrow lanes, inadequate clearances or poor alignment.

Chart 1. Bridge Conditions in Michigan

BRIDGE CONDITION	NUMBER OF BRIDGES	PERCENTAGE OF BRIDGES
Structurally Deficient	1,772	16%
Functionally Obsolete	1,258	12%
Total Deficient Bridges	3,030	28%
Total Number of Bridges	10,872	

Source: National Bridge Inventory

Traffic Congestion in Michigan

Traffic congestion in Michigan is a growing burden in key urban areas and threatens to impede the state's economic development. Congestion on Michigan's urban highways is growing as a result of increases in vehicle travel and population.

In 2004, the latest year for which data is available, nearly a third – 31 percent – of Michigan's urban highways were congested, carrying traffic volumes that result in significant rush hour delays.⁹ This is a significant increase since 2000, when 23 percent of Michigan's urban highways were congested.

These routes are considered congested because the levels of traffic they carry are likely to cause delays during peak travel hours, as a result of traffic levels in excess of what the highway can carry without experiencing 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.

Traffic Safety in Michigan

An average of 1,286 people were killed annually in motor vehicle accidents in Michigan from 2000 through 2004, according to the National Highway Transportation Safety Administration.¹⁰ Michigan had a traffic fatality rate of 1.18 fatalities per 100 million vehicle miles of travel in 2004 (the latest year for which data is available). In 2004, Michigan had a traffic fatality rate of 12.8 fatalities per 100,000 population.

Chart 2. Traffic fatalities and fatality rate per 100 million vehicle miles of travel (VMT) in Michigan from 2000 – 2004.

Year	Fatalities	Fatalities/100M VMT
2000	1,382	1.31
2001	1,328	1.28
2002	1,277	1.25
2003	1,283	1.28
2004	1,159	1.18

Source: Michigan Department of Transportation.

While 46 percent of Michigan's traffic fatalities in 2004 occurred on rural, non-Interstate routes, only 25 percent of the state's total vehicle travel occurred on these routes. The high number of fatalities on rural, non-Interstate roads relative to the amount of traffic carried by these routes can be explained by the high rate of fatalities on these routes. The fatality rate on Michigan's rural non-Interstate routes in 2004 was 2.02 deaths for every 100,000,000 vehicle miles of travel, more than three times higher than the fatality rate on all other routes, which is 0.66 fatalities per 100,000,000 vehicle miles of travel.¹¹

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 fatal and serious traffic accidents. Improving safety on Michigan's roads and 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, where appropriate, 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.¹²

Roads with poor geometry, with insufficient clear distances, without turn lanes, inadequate shoulders for the posted speed limits, or poorly laid out intersections or interchanges, pose greater risks to motorists, pedestrians and bicyclists.

The following chart shows the correlation between specific needed road improvements and the reduction of fatal accident rates nationally:

Chart 3. Reduction in fatal accident rates after roadway improvements¹³

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

Conclusion

It is critical that Michigan develop and maintain a modern transportation system that can accommodate the state's tremendous growth in population, vehicle travel and economic development. Further modernization of Michigan's system of roads, bridges and public transit is crucial to providing a safer, more efficient transportation system, while improving the economic livelihood of the state's residents. These projects are designed to improve traffic flow and make driving safer, and help the state accommodate increasing levels of vehicle travel. As travel on Michigan's surface transportation system becomes more efficient, personal and commercial productivity will increase, boosting economic development statewide.

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Endnotes

¹ U.S. Census Bureau. www.census.gov

² U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 2004.

³ TRIP estimate based on analysis of FHWA data.

⁴ TRIP analysis of U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 2004.

⁵ Why We Must Preserve our Pavements, D. Jackson, J. Mahoney, G. Hicks, 1996 International Symposium on Asphalt Emulsion Technology.

⁶ Selecting a Preventative Maintenance Treatment for Flexible Pavements. R. Hicks, J. Moulthrop. Transportation Research Board. 1999. Figure 1.

⁷ Federal Highway Administration – National Bridge Inventory.

⁸ Ibid.

⁹ U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 2004

¹⁰ U.S. Department of Transportation - Federal Highway Administration: Highway Statistics 1999-2004
www.fhwa.dot.gov and www-fars.nhtsa.dot.gov.

¹¹ TRIP analysis of NHTSA and Federal Highway Administration data.

¹² Highway Safety Evaluation System, 1996 Annual Report on Highway Safety Improvement Programs, U.S. Department of Transportation.

¹³ Highway Safety Evaluation System; 1996 Annual Report on Highway Safety Improvement Programs; U.S. Department of Transportation.