

RESTORING MARYLAND'S INTERSTATE HIGHWAY SYSTEM:

Meeting Maryland's Transportation Needs with a Reliable,
Safe & Well-Maintained National Highway Network



TRIP | A National
Transportation
Research
Nonprofit
AUGUST 2020

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

Maryland's 480-mile Interstate Highway System remains the workhorse of the state's surface transportation network: heavily traveled and providing the most important link in the supply chain, and the primary connection between and within urban communities. The importance of the Interstate Highway System and the reliable movement of goods it provides has been heightened during the response to the COVID-19 pandemic. But, many Interstate highways are wearing out and showing signs of their advanced age, often heavily congested, and in need of significant reconstruction, modernization and expansion.

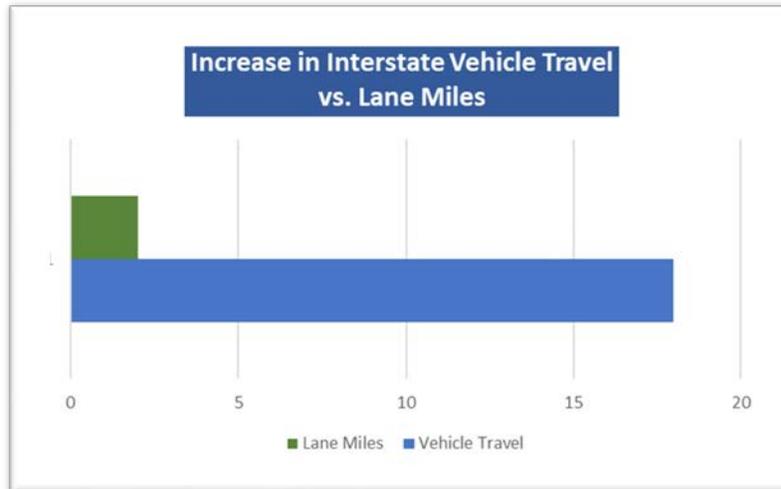
In 2015, as part of the Fixing America's Surface Transportation (FAST) Act, the U.S. Congress asked the [Transportation Research Board](#) (TRB), a division of the National Academy of Sciences, Engineering and Medicine, to conduct a study to determine actions needed to upgrade and restore the Interstate Highway System to fulfill its role of safely and efficiently meeting the nation's future critical personal, commercial and military travel needs. In 2019, the TRB provided Congress with a [report](#) that found that the nation's Interstates are heavily congested and aging, with large portions of the system in need of major reconstruction and modernization. The report found that addressing the needs of the Interstate Highway System will require more than a doubling of current investment to adequately improve the system's condition, reliability and safety, and that the restoration of the nation's Interstate Highway System should be based on strong federal leadership of a collaborative effort with the states.

TRIP's *Restoring Maryland's Interstate Highway System* report provides the latest information on the Interstate system, including pavement conditions, bridge conditions, travel trends, traffic congestion levels, truck use, and traffic safety. It reviews the findings of the TRB Interstate report and concludes with recommended actions - based on the findings of the TRB report - to ensure that the system is able to meet the nation's transportation needs.

MARYLAND INTERSTATE USE AND CONGESTION

Maryland's Interstate Highway System is among the most critical links in the state's transportation system and a vital part of Maryland's transportation network. Traffic congestion is increasing on Maryland's Interstate Highway System as the amount of vehicle travel far outstrips the capacity added to the system. More than 80 percent of the length of Maryland's urban Interstates is congested.

- Maryland's Interstate Highway System accounts for four percent of all roadway lane miles in the state and carries 30 percent of the state's vehicle travel.
- Since 1956 when funding of the Interstate system was approved, the number of vehicles in Maryland increased more than four-fold, from approximately 993,000 vehicles to 4.2 million vehicles. Maryland's population has more than doubled, from 2.8 million to 6.0 million during this time.
- Travel on Maryland's Interstate highways is increasing at a rate nine times faster than the rate at which new lane capacity is being added. From 2000 to 2018, vehicle travel on Maryland's Interstate highways increased 18 percent. From 2000 to 2018, lane miles of Interstates in Maryland increased just two percent, from 2,761 to 2,823 miles.



- Eighty-two percent of Maryland’s urban Interstate highways are considered congested because they carry traffic levels that result in significant delays during peak travel hours. This is the second highest share in the nation. The chart below shows the states with the greatest share of their urban Interstate highways considered congested.

RANK	STATE	Congested Urban Interstates
1	California	86%
2	Maryland	82%
3	New Jersey	78%
4	Delaware	73%
5	Florida	70%
6	Massachusetts	70%
7	Rhode Island	67%
8	Connecticut	64%
9	Hawaii	62%
10	Washington	58%

- The vast majority of the most congested sections of freeways and expressways in Maryland are on the state’s Interstate network. The chart below shows the most congested Maryland freeways and expressways during morning and evening peak travel hours.

RANK	MARYLAND MOST CONGESTED FREEWAY/EXPRESSWAY SECTIONS	
	AM PEAK	PM PEAK
1	I-495 Outer Loop from I-95 to MD 97	I-495 Inner Loop from VA State Line to I-270 West Spur
2	I-695 Outer Loop from US 1 to Cromwell Bridge Rd	I-695 Inner Loop from MD 139 to Cromwell Bridge Rd
3	US 50 WB from MD 410 to DC Line	I-95/I-495 Inner Loop from I-95 to MD 201
4	I-695 Outer Loop from MD 129 to US 40	I-495 Inner Loop from I-270 East Spur to MD 97
5	I-695 Inner Loop from MD 140 to I-83	I-695 Inner Loop from I-95 to I-70
6	MD 295 SB from MD 198 to MD 197	I-95/I-495 Outer Loop from MD 450 to MD 201
7	I-95/I-495 Inner Loop from MD 414 to I-295	MD 295 NB from MD 410 to Powder Mill Road
8	I-270 SB from I-370 to Montrose Road	I-270 West Spur from NB I-270 split to I-495
9	I-270 Local from SB I-370 to Montrose Road	I-270 NB from I-370 to MD 124
10	I-270 SB from Father Hurley Blvd. to MD 124	I-495 Outer Loop from I-270 West Spur to VA State Line
11	I-270 Spur SB from I-270 Split to I-495 (West)	I-270 Local NB from Shady Grove Road to MD 124
12	I-97 SB from Benfield Boulevard to MD 178	I-95 NB from MD 32 to MD 100
13	I-95 SB from South of MD 200 to I-495	I-95/I-495 Inner Loop from US 50 to MD 214
14	I-495 Outer Loop from MD 187 to Cabin John Pkwy	MD 32 EB from MD 295 to MD 175
15	US 29 SB from I-70 to MD 100	I-95/I-495 Outer Loop from MD 202 to MD 450

- Maryland's urban Interstates are the second busiest in the nation, as measured by average daily traffic per lane mile.

RANK	STATE	Daily Interstate Travel Per Lane Mile
1	California	20,861
2	Maryland	20,055
3	Colorado	17,497
4	Rhode Island	17,082
5	Florida	16,815
6	Texas	16,787
7	Hawaii	16,689
8	Massachusetts	16,322
9	Washington	16,244
10	Delaware	15,889

- The chart below shows Maryland's busiest urban Interstate portions, as measured by average daily traffic per lane mile.

Freeway Section	Daily Travel per Lane Mile
I-270 N of I-270 Split	266,000
I-270 N of Montrose Rd.	254,000
I-495 E of MD 650	252,000
I-495 N of VA State Line	251,000
I-95/I-495 W of US 1	251,000

MARYLAND'S INTERSTATE ROAD AND BRIDGE CONDITIONS

Pavements and bridges on Maryland's Interstate system are showing deterioration and signs of their advancing age. As the aging Interstate system's foundations continue to deteriorate, most Interstate highways, bridges and interchanges will need to be rebuilt or replaced.

- Five percent of Maryland's Interstates have pavement in poor condition, the eleventh highest rate in the nation in 2018. Six percent of Maryland's Interstate pavements are rated in mediocre condition, eight percent are in fair condition and the remaining 80 percent are in good condition.
- The chart below shows the top 15 states with the greatest share of their Interstate highways with pavements in poor condition.

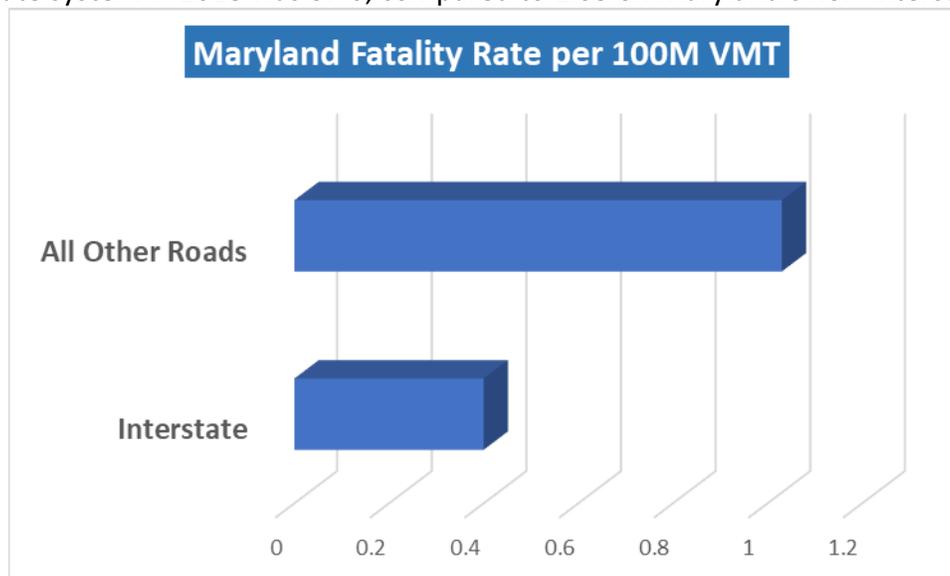
RANK	STATE	INTERSTATE PAVEMENT IN POOR CONDITION
1	Hawaii	19%
2	Delaware	11%
3	Wyoming	9%
4	New Jersey	8%
5	Louisiana	7%
6	Michigan	7%
7	Washington	6%
8	Colorado	6%
9	California	6%
10	Indiana	6%
11	Maryland	5%
12	New York	5%
13	Wisconsin	4%
14	Pennsylvania	4%
15	Oklahoma	3%

- An analysis of U.S. Department of Transportation's [National Bridge Inventory](#) data indicates that 22 percent of Maryland's Interstate bridges are in need of repair or replacement.
- Two percent of Maryland's Interstate bridges are rated in poor/structurally deficient condition. A bridge is rated in poor/structurally deficient condition if there is significant deterioration of the bridge deck, supports or other major components. Seventy-two percent of the state's Interstate bridges are rated in fair condition and the remaining 26 percent are in good condition.
- The intended lifespan of many of the nation's Interstate bridges at the time of their construction is 50 years, though newer bridges are often built with longer-lasting materials and techniques that allow for a longer intended lifespan. Older bridges often need significant repairs or rehabilitation or may need to be replaced to continue to provide adequate service.
- The average age of Maryland's Interstate bridges is 46 years. Fifty-two percent of the state's Interstate bridges are at least 50 years old.

INTERSTATE FATALITY RATES AND SAFETY

Maryland's Interstate Highway System provides a network of highways with a variety of safety designs that greatly reduce the likelihood of serious crashes. Travel on the state's Interstate highways is more than twice as safe as travel on all other roadways in the state.

- Maryland's Interstate Highway System, which carried 30 percent of the state's travel in 2018, accounted for only 14 percent of the state's traffic fatalities as a result of superior safety features.
- The features that make Interstates safer than other roads include a separation from other roads and rail lines, a minimum of four-lanes, gentler curves, paved shoulders, median barriers, and rumble strips to warn drivers when they are leaving the roadway.
- Travel on Maryland's Interstate highways is more than twice as safe as travel on all other roadways in the state. The fatality rate per 100 million vehicle miles of travel on Maryland's Interstate system in 2018 was 0.40, compared to 1.03 on Maryland's non-Interstate routes.



- TRIP estimates that Maryland's Interstate Highway System saved 108 lives in 2018, based on an estimate of the number of additional fatalities that would have occurred had Interstate traffic been carried by other major roadways, which often have higher traffic fatality rates and may lack the safety features common to Interstate routes.

INTERSTATE TRAVEL AND ECONOMIC GROWTH

Maryland's Interstate Highway System is the backbone of the state's economy and has played a critical role in improving business productivity.

- Travel by combination trucks, which are the large trucks that carry the majority of freight shipped in the U.S., accounted for six percent of all vehicle miles of travel on Maryland's Interstate Highway System in 2018.
- The chart below details the Maryland Interstate locations with the highest truck volumes.

Rank	Location	Average Daily Truck Volume
1	I-95 North of I-695	31,300
2	I-95 North of MD 32	25,100
3	I-95/I-495 North of US 50	24,600
4	I-95 North of MD 100	24,500
5	I-95 North of MD 24	24,300

- Every year, \$369 billion in goods are shipped to and from sites in Maryland, primarily by truck. Seventy-seven percent of the goods shipped annually from sites in Maryland are carried by trucks and another 16 percent are carried by courier services, which use trucks for part of the deliveries.
- The completion of the vast majority of the Interstate system by the 1980s, and the deregulation of the U.S. trucking industry, resulted in a significant improvement in the competitiveness of U.S. business. The cost of moving freight, as measured by U.S. business logistics costs, dropped from 16 percent of U.S. Gross Domestic Product (GDP) in 1980 to eight percent in 2018.
- U.S. counties either on an Interstate highway or within 20 miles of an Interstate are anticipated to grow in population through 2060 at a rate approximately seven times greater than counties that are at least 20 miles from an Interstate highway (36 percent versus five percent).
- The Interstate Highway System has reduced travel times between destinations throughout the U.S. The improved mobility provided by the Interstate Highway System has given Americans greater choices about where they live, work, shop and spend their leisure time.

INTERSTATE FUNDING CHALLENGES

The U.S. Department of Transportation (USDOT) has determined that the nation faces a significant backlog in needed Interstate highway repairs and improvements.

- The current backlog of needed improvements on the nation’s Interstate Highway System is estimated by the USDOT to be \$123 billion.
- The backlog on the nation’s Interstate Highway System includes \$54 billion needed to improve pavement conditions, \$37 billion to improve bridges and \$33 billion for needed system expansion and enhancement.
- The ability of states to invest in Interstate highway repairs and improvements may be hampered by the tremendous decrease in vehicle travel that has occurred due to the COVID-19 pandemic, which the [American Association of State Highway and Transportation Officials](#) estimates will reduce state transportation revenues by approximately \$16 billion in 2020 and by \$37 billion over a five year period.

The primary source of revenue for the Interstate Highway System is the federal surface transportation program, which expires on September 30, 2020. The program does not have a long-term and sustainable revenue source.

- Signed into law in December 2015, the [Fixing America's Surface Transportation \(FAST Act\)](#), provides modest increases in federal highway and transit spending, allows states greater long-term funding certainty and streamlines the federal project approval process.
- Revenue collected from the 18.4 cents-per-gallon federal motor fuel tax and the 24.4 cents-per-gallon federal diesel fuel tax are the primary sources of funding for the federal Highway Trust Fund, which distributes funds to state and local governments for highway and bridge repairs and other surface transportation improvements, including public transit, pedestrian and bicycling facilities.

TRB INTERSTATE HIGHWAY SYSTEM REPORT REQUESTED BY CONGRESS

In 2015, as part of the Fixing America's Surface Transportation (FAST) Act, the U.S. Congress requested a report evaluating the condition of the Interstate Highway System and providing recommendations on actions required to restore and upgrade the System to meet the growing and shifting transportation demands of the 21st Century. The report was conducted by the [Transportation Research Board \(TRB\)](#), a division of the National Academies of Sciences, Engineering and Medicine. The findings of the TRB report, released in 2019, include:

- The Interstate Highway System has a persistent and growing backlog of physical and operational deficiencies as a result of age, heavy use and deferred reinvestment, and is in need of major reconstruction and modernization.
- Most roadway segments of the Interstate Highway System retain their original underlying foundations and need to be completely rebuilt from the subbase up.
- The repeated resurfacing of Interstate highways is not addressing the deterioration of roadway subbases. Repeated resurfacing – rather than addressing underlying foundational issues - provides diminishing returns as additional resurfacing results in increasingly shorter periods of pavement smoothness and is likely to result in higher lifecycle costs than periodic reconstruction.
- The modernization of the Interstate Highway System needs to include the following: reconstruction of the majority of Interstate highways and bridges, including their foundations; the upgrade of most interchanges to improve their function and safety; the addition of capacity along existing corridors, the construction of new routes and the conversion of some existing routes to Interstate standards; the modification of some urban segments to maintain connectivity while remediating economic and social disruption; and, further improvement of highway safety features.
- To address the physical and operational deficiencies identified in the TRB report, annual investment in the Interstate Highway System should be increased by approximately two-and-a-half times, from its level of \$23 billion in 2018 to \$57 billion annually over the next 20 years.

- The restoration of the nation’s Interstate Highway System will require strong federal leadership and a robust federal-state partnership.

RECOMMENDATIONS FOR RESTORING THE INTERSTATE HIGHWAY SYSTEM

The restoration and upgrading of the Interstate Highway System to meet 21st Century transportation needs will require strong federal leadership and a robust federal-state partnership to reestablish the Interstate Highway System as the nation’s premier transportation network. The TRB Interstate report notes that “the scale and scope of the Interstate reinvestment imperative is daunting.”

- The following recommendations, based on the findings and recommendations of the TRB Interstate report, provide a roadmap for the restoration of the Interstate Highway System:
 - Reconstruct the nation’s Interstate Highway System, including pavements, bridges and interchanges
 - Improve safety features on Interstate highways
 - Right-size the Interstate Highway System by:
 - ✓ upgrading some existing roadways to Interstate standard
 - ✓ adding needed additional highway capacity on existing routes to maintain and improve mobility
 - ✓ adding additional corridors to accommodate demographic and economic growth
 - ✓ modifying some urban segments to maintain connectivity while remediating economic and social disruption

All data used in this report is the most current available. Sources of information for this report include: The Federal Highway Administration (FHWA), Maryland Department of Transportation State Highway Administration, the National Highway Traffic Safety Administration (NHTSA), the Transportation Research Board (TRB), and the U.S. Census Bureau. Cover photo credit: FA Martin.

Introduction

The Dwight D. Eisenhower National System of Interstate and Defense Highways, built at a cost of \$114 billion (\$209 billion in current dollars), has been called the most ambitious public works project built since the age of the Roman Empire, and is the backbone of America's economy and the most critical element of the nation's transportation system. Today, Maryland's Interstate Highway System - which includes 16 Interstate highways - continues to provide economic growth, improved traffic safety and convenient access.

Concerned that the condition, reliability and safety of the nation's preeminent transportation system is declining, Congress in 2015, as part of the legislation authorizing the five-year Fixing America's Surface Transportation Act ([FAST-Act](#)), required that a comprehensive report be prepared on the Interstate Highway System. The U.S. Congress asked the [Transportation Research Board](#) (TRB), a division of the National Academy of Sciences, Engineering and Medicine, to develop the report, which was to include an examination of the condition of the Interstate Highway System and provide recommendations on actions necessary to restore and upgrade the system to meet the transportation needs of the 21st Century. The findings of TRB's report, "[Renewing the National Commitment to the Interstate Highway System: A Foundation for the Future](#)," confirmed Congress' fears for the nation's Interstate highways.

"The Interstate Highway System's physical condition and operating performance continue to exhibit deficiencies, and much of the Interstate System is already past due for major reconstruction and modernization as a result of heavy use and the effects of age, exacerbated by escalating use and deferred reinvestment," notes the report.¹ "These aging and intensely used segments, whose numbers are expected to grow over the next 20 years, are poorly positioned to accommodate even modest projections of future traffic growth, much less the levels of growth actually experienced over the past 50 years."²

This report looks at Maryland's, and the nation's, Interstate Highway System, its current use and condition, and the future needs of the state's most critical transportation system. It concludes with a set of recommendations based on the findings of the TRB report requested by Congress to restore, renew and upgrade the nation's Interstate Highway System.

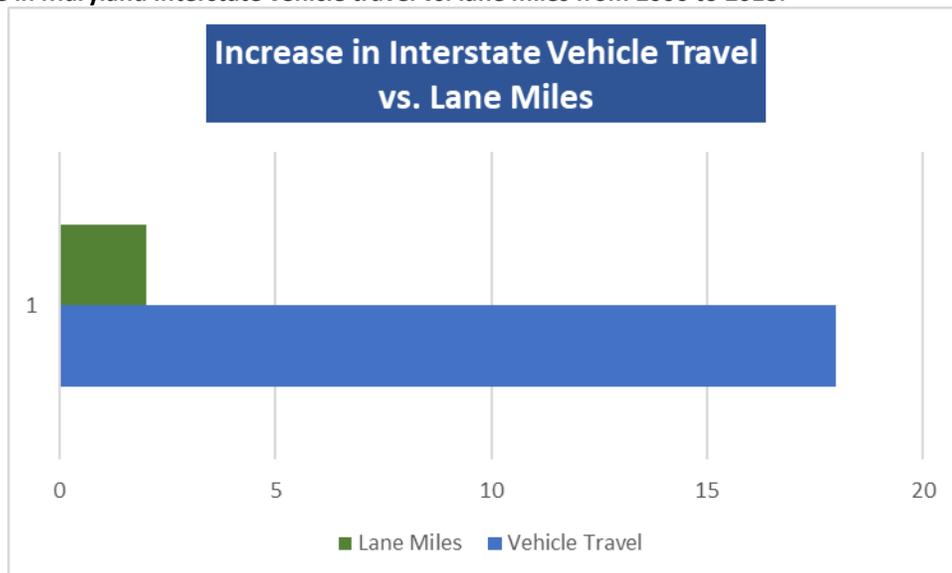
Trends in Maryland Interstate Travel and Capacity

Since the beginning of the Interstate era 64 years ago, Maryland and the nation have seen enormous increases in population, motor vehicles and vehicle travel. From 1956 to 2018, the nation's population increased by 95 percent³, the number of motor vehicles increased by 357 percent⁴, and vehicle travel increased by 418 percent.⁵ Since funding of the Interstate system was approved in 1956 to 2018, the number of vehicles in Maryland increased more than four times, from approximately 993,000 vehicles to 4.2 million vehicles.⁶ Maryland's population more than doubled, from 2.8 million to 6.0 million during this time.⁷

Maryland's 480-mile Interstate Highway System remains the most critical component of the state's surface transportation network. Maryland's Interstate highways account for four percent of all lane miles of roads in the state and carry 30 percent of the state's vehicle travel.⁸

Travel on Maryland's Interstate highways is growing at a rate nine times faster than new capacity is being added to the system. From 2000 to 2018, vehicle travel on Maryland's Interstate highways increased 18 percent, from 50.2 billion miles traveled annually to 59.8 billion miles.⁹ Yet, during the same period, total lanes miles on the state's Interstate system increased by just two percent, from 2,761 miles to 2,823.¹⁰

Chart 1. Increase in Maryland Interstate vehicle travel vs. lane miles from 2000 to 2018.



Source: TRIP analysis of FHWA data.

Traffic Congestion and Travel Volume on Maryland's Interstates

The nation's Interstate Highway System was initially designed to provide transportation between urban areas and to support national defense. But, as Interstate highways were ultimately built around and through many cities, they became the nation's most critical transportation corridors between and often within urban areas.

Across the nation, the continued increase in Interstate highway travel, without a corresponding increase in capacity, has resulted in a surge in traffic congestion levels. As the vehicle travel on Maryland's Interstates has grown nine times faster than the addition new lane miles, 82 percent of Maryland's urban Interstates are considered congested because they carry traffic levels that result in delays during peak travel hours – the second highest rate of congestion in the nation.¹¹ The chart below shows states with the greatest share of congested urban Interstates.

Chart 2. States with Greatest Share of Urban Interstates that Experience Congestion during Peak Hours, 2018.

RANK	STATE	Congested Urban Interstates
1	California	86%
2	Maryland	82%
3	New Jersey	78%
4	Delaware	73%
5	Florida	70%
6	Massachusetts	70%
7	Rhode Island	67%
8	Connecticut	64%
9	Hawaii	62%
10	Washington	58%

Source: TRIP analysis of FHWA data.

The vast majority of the most congested sections of freeways and expressways in Maryland are on the state's Interstate network.¹² The chart below details the most congested segments of Maryland freeways and expressways during morning and evening peak travel hours.

Chart 3. Maryland’s most congested freeway and expressway sections, 2018.

RANK	MARYLAND MOST CONGESTED FREEWAY/EXPRESSWAY SECTIONS	
	AM PEAK	PM PEAK
1	I-495 Outer Loop from I-95 to MD 97	I-495 Inner Loop from VA State Line to I-270 West Spur
2	I-695 Outer Loop from US 1 to Cromwell Bridge Rd	I-695 Inner Loop from MD 139 to Cromwell Bridge Rd
3	US 50 WB from MD 410 to DC Line	I-95/I-495 Inner Loop from I-95 to MD 201
4	I-695 Outer Loop from MD 129 to US 40	I-495 Inner Loop from I-270 East Spur to MD 97
5	I-695 Inner Loop from MD 140 to I-83	I-695 Inner Loop from I-95 to I-70
6	MD 295 SB from MD 198 to MD 197	I-95/I-495 Outer Loop from MD 450 to MD 201
7	I-95/I-495 Inner Loop from MD 414 to I-295	MD 295 NB from MD 410 to Powder Mill Road
8	I-270 SB from I-370 to Montrose Road	I-270 West Spur from NB I-270 split to I-495
9	I-270 Local from SB I-370 to Montrose Road	I-270 NB from I-370 to MD 124
10	I-270 SB from Father Hurley Blvd. to MD 124	I-495 Outer Loop from I-270 West Spur to VA State Line
11	I-270 Spur SB from I-270 Split to I-495 (West)	I-270 Local NB from Shady Grove Road to MD 124
12	I-97 SB from Benfield Boulevard to MD 178	I-95 NB from MD 32 to MD 100
13	I-95 SB from South of MD 200 to I-495	I-95/I-495 Inner Loop from US 50 to MD 214
14	I-495 Outer Loop from MD 187 to Cabin John Pkwy	MD 32 EB from MD 295 to MD 175
15	US 29 SB from I-70 to MD 100	I-95/I-495 Outer Loop from MD 202 to MD 450

Source: MDOT Maryland State Highway Mobility Report, 2019.

Maryland’s urban Interstates are the second busiest in the nation, as measured by the number of vehicles carried daily per Interstate lane mile.¹³ The chart below shows the states with the greatest daily travel per lane mile on urban Interstates.

Chart 3. States with Greatest Daily Travel Per-Lane-Mile on Urban Interstates, 2018.

RANK	STATE	Daily Interstate Travel Per Lane Mile
1	California	20,861
2	Maryland	20,055
3	Colorado	17,497
4	Rhode Island	17,082
5	Florida	16,815
6	Texas	16,787
7	Hawaii	16,689
8	Massachusetts	16,322
9	Washington	16,244
10	Delaware	15,889

Source: TRIP analysis of FHWA data.

Maryland’s Interstate routes – including I-270, I-495 and I-95- are the busiest roads in the state.¹⁴ The chart below shows Maryland’s busiest roadways, as measured by average daily traffic per lane mile.

Chart 4. Maryland busiest roadways, 2018.

Freeway Section	Daily Travel per Lane Mile
I-270 N of I-270 Split	266,000
I-270 N of Montrose Rd.	254,000
I-495 E of MD 650	252,000
I-495 N of VA State Line	251,000
I-95/I-495 W of US 1	251,000

Source: MDOT Maryland State Highway Mobility Report, 2019.

Pavement Conditions on Maryland’s Interstate System

The lifecycle of highway pavements is greatly affected by a transportation agency’s ability to perform timely maintenance and upgrades to ensure that surfaces remain smooth as long as possible. The pavement condition of major roads is evaluated and classified as being in poor, mediocre, fair or good condition. In 2018, pavement on five percent of Maryland’s Interstate highways were rated in poor condition, the eleventh highest share in the nation.¹⁵

Chart 5. States with Greatest Share of Interstate Pavement in Poor Condition, 2018.

RANK	STATE	INTERSTATE PAVEMENT IN POOR CONDITION
1	Hawaii	19%
2	Delaware	11%
3	Wyoming	9%
4	New Jersey	8%
5	Louisiana	7%
6	Michigan	7%
7	Washington	6%
8	Colorado	6%
9	California	6%
10	Indiana	6%
11	Maryland	5%
12	New York	5%
13	Wisconsin	4%
14	Pennsylvania	4%
15	Oklahoma	3%

Source: TRIP analysis of FHWA data.

Six percent of Maryland’s Interstate pavement was rated mediocre, eight percent fair, and the remaining 80 percent was rated in good condition in 2018.¹⁶ Roads rated poor often have pavements that are 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 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.

Pavement deterioration 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.¹⁷

The 2019 TRB Interstate report found that more than half a century of intensive use has taken a toll on the nation's Interstate system, and that most segments of the system need to be rebuilt from the subbase up. The report found that most of the nation's Interstate miles have been subject to age and wear with only periodic resurfacing, resulting in a significant backlog of needed reconstruction of the roadway's original underlying structure.¹⁸ The TRB report found that the repeated resurfacing of Interstate highways is not addressing the deterioration of subbases of the roadways and results in diminishing returns. This leads to shorter periods of serviceability between successive overlays and can produce higher life-cycle costs relative to full-depth periodic pavement reconstruction.¹⁹

Maryland Interstate Bridge Conditions

Of the 882 bridges on Maryland's Interstate system, two percent are rated in poor/structurally deficient condition, 72 percent are rated in fair condition and the remaining 26 percent are in good condition.²⁰

Bridges that are rated poor/structurally deficient show significant signs of deterioration as a result of use and exposure. The FHWA defines a poor/structurally deficient bridge as one that requires immediate rehabilitation to remain open, is restricted to carrying lighter-weight vehicles, or is closed.

While most Interstate bridges are generally in acceptable condition, a large number of these bridges are reaching an age when they will require significant repairs, and in some cases replacement. An analysis of U.S. Department of Transportation [National Bridge Inventory](#) data indicates that 22 percent of Maryland's Interstate bridges are in need of repair or replacement.²¹

The intended lifespan of many of the nation's Interstate bridges at the time of their construction is 50 years, though newer bridges are often built with longer-lasting materials and techniques that allow for a longer intended lifespan. Older bridges often need significant repairs or rehabilitation or may need to be replaced to continue to provide adequate service. The average age of Maryland's Interstate bridges is 46 years.²² Fifty-two percent of the state's Interstate bridges are at least 50 years old.²³

Traffic Safety on Maryland's Interstate Highways

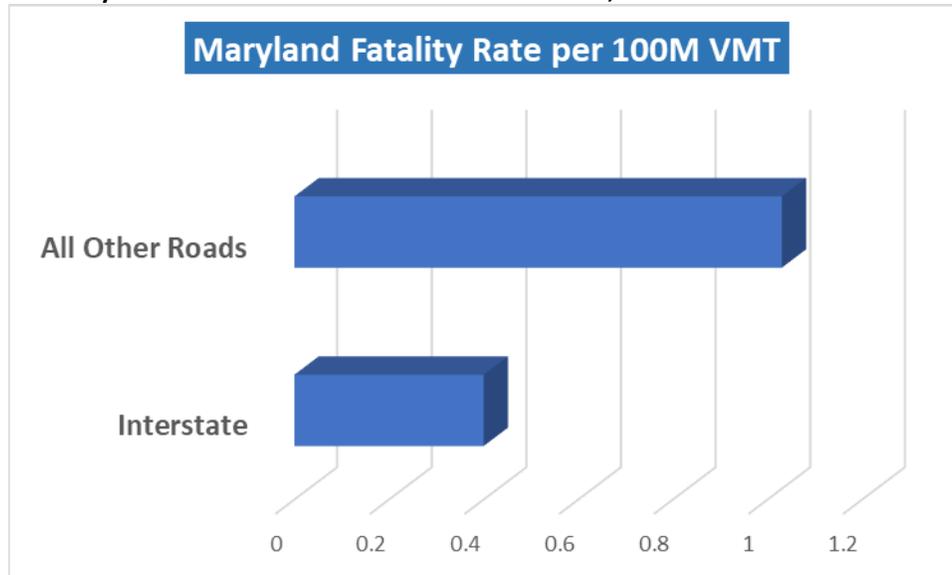
Perhaps the most significant benefit of the Interstate system is that it has greatly improved traffic safety throughout the nation by providing travelers with a network of highways with a variety of safety designs that significantly reduce the likelihood of serious accidents.

The safety features that are required on Interstates include a separation from other roads, streets and rail lines; access limited to on and off ramps; a minimum of four-lanes to prevent the need to enter oncoming lanes for passing; and, gentler curves. Most Interstate highways also have paved shoulders, and many have median barriers to avoid cross-over crashes and rumble strips to warn drivers if they are leaving the roadway. The result of the high level of safety design standards on the Interstate is that travel on the nation's Interstate highways is more than twice as safe as travel on all other roads and highways.

Maryland's Interstate Highway System, which carried 30 percent of the state's travel in 2018, accounted for only 14 percent of the state's traffic fatalities as a result of superior safety features.²⁴

The traffic fatality rate per 100 million vehicle miles of travel on Maryland's Interstate highways was 0.40 in 2018,²⁵ less than half the 1.03 fatality rate on non-Interstate routes in the state.²⁶

Chart 6. Maryland Fatality Rate on Interstate and Non-Interstate Roads, 2018.



Source: TRIP analysis of FHWA data.

Lives Saved by Interstate Highway System

Because it carries significant volumes of traffic on roadways with higher safety standards and lower traffic fatality rates, the Interstate Highway System saves thousands of lives annually. TRIP estimates that Maryland’s Interstate Highway System saved 108 lives in 2018.²⁷ This estimate is based on a comparison of the annual fatality rate on the nation’s Interstate highways compared to the fatality rate each year on other major roads in the state. Interstate safety benefits were estimated by calculating the additional fatalities that would have occurred each year if the travel that occurred on Interstate highways had instead been carried by other major roads, many of which often lack some of the safety features found on Interstate highways and have a significantly higher traffic fatality rate.

Freight Shipment by Large Trucks on the Interstates

Every year, \$369 billion in goods are shipped to and from sites in Maryland.²⁸ Seventy-seven percent of the goods shipped annually to and from sites in Maryland are carried by trucks and another 16 percent are carried by courier services, which use trucks for part of their deliveries.²⁹

Travel by combination trucks, which are the large trucks that carry the majority of freight shipped in the U.S., accounted for six percent of all vehicle miles of travel on Maryland’s Interstate

Highway System in 2018.³⁰ The chart below details the Maryland Interstate locations with the highest truck volumes.³¹

Chart 7. Maryland Interstate locations with highest truck volumes.

Rank	Location	Average Daily Truck Volume
1	I-95 North of I-695	31,300
2	I-95 North of MD 32	25,100
3	I-95/I-495 North of US 50	24,600
4	I-95 North of MD 100	24,500
5	I-95 North of MD 24	24,300

Source: MDOT Maryland State Highway Mobility Report, 2019.

Economic Benefits of the Interstate System

The construction of the Interstate Highway System has had a profound impact on the nation’s development, affecting the quality of life of Americans in numerous ways including increased safety, expanded lifestyle choices and an enhanced standard of living. By greatly increasing the number of areas that are within a reasonable driving distance, the Interstate system has significantly increased access to jobs, housing, recreation, healthcare, shopping and other amenities.

Similarly, the construction of the Interstate Highway System has benefited the nation’s economy by reducing the costs of and increasing the speed of goods movement. The ability to cheaply and quickly ship products to or from domestic and international sites has resulted in lower costs and greater selection to consumers, while opening up new markets to U.S. businesses. The completion of the vast majority of the Interstate system by the 1980s, and the deregulation of the U.S. trucking industry, resulted in a significant improvement in the competitiveness of U.S. business. The cost of moving freight, as measured by U.S. business logistics costs, dropped from 16 percent of U.S. Gross Domestic Product (GDP) in 1980 to eight percent in 2018.³²

Interstate access has a significant impact on the competitiveness of a region’s economy. Highway accessibility was ranked the number one site selection factor in a 2020 [survey](#) of corporate executives by Area Development Magazine.³³

The TRB report found that U.S. counties either on an Interstate highway or within 20 miles of an Interstate are anticipated to grow in population through 2060 at a rate approximately seven times greater than counties that are at least 20 miles from an Interstate highway (36 percent versus five percent).³⁴

The tremendous increase in freight deliveries over recent years has been partly fueled by improved communications and the need for greater economic competitiveness. Improved communications provided by the Internet are integrating producers, wholesalers, retailers and consumers. Businesses have responded to improved communications and the necessity 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 businesses 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.

Funding of the Interstate System

The primary source of revenue for the nation's Interstate Highway System is the [Fixing America's Surface Transportation \(FAST Act\)](#), the nation's current federal surface transportation program, which was authorized in 2015 and expires on September 30, 2020.

Revenue collected from the 18.4 cents-per-gallon federal motor fuel tax and the 24.4 cents-per-gallon federal diesel fuel tax are the primary sources of funding for the federal Highway Trust Fund, which distributes funds to state and local governments for highway and bridge repairs and other surface transportation improvements, including public transit, pedestrian and bicycling facilities.

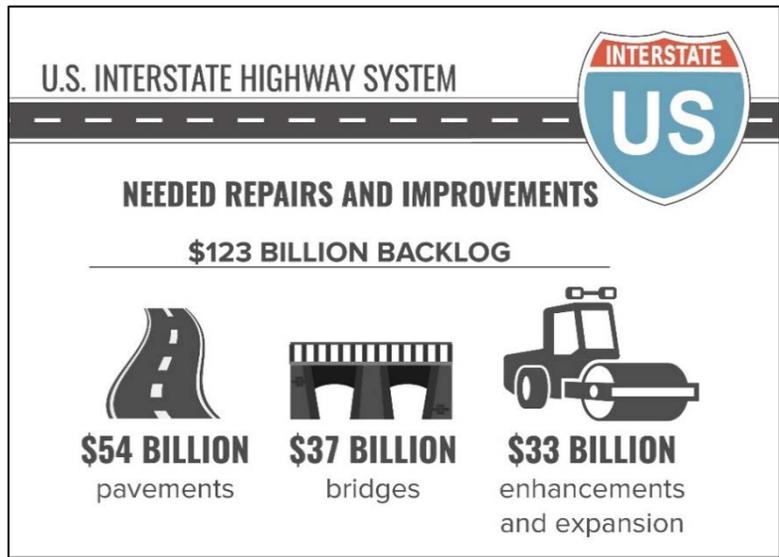
The ability of states to invest in Interstate highway repairs and improvements may be hampered by the tremendous decrease in vehicle travel that has occurred due to the COVID-19 pandemic. The [American Association of State Highway and Transportation Officials](#) estimates that state transportation revenues will be decreased by approximately \$16 billion this year and approximately \$37 billion over a five-year period due to the reduced level of vehicle travel as a result of the COVID-19 pandemic.³⁵

Meeting Future Interstate Travel Needs

The U.S. faces a significant challenge in maintaining and rebuilding its aging Interstate Highway System and providing additional lane capacity to meet growing travel demand.

The most recent U.S. Department of Transportation (USDOT) analysis of the condition of the nation’s surface transportation system found that the nation faces a significant backlog in needed improvements to the Interstate Highway System.

The U.S. Department of Transportation, in its report, [Status of the Nation’s Highways, Bridges, and Transit, 23rd Edition](#), submitted to Congress in 2019, determined that the current backlog in needed improvements on the nation’s Interstate Highway System is estimated to be \$123 billion.³⁶ The backlog on the nation’s Interstate Highway System includes \$54 billion needed to improve pavement conditions, \$37 billion to improve bridges and \$33 billion for needed system expansion and enhancement.³⁷



The TRB report evaluated future Interstate Highway System investment that will be necessary to: address the need to rebuild the majority of the system’s pavements and bridges; address current and future deterioration; improve traffic safety features and expand the capacity of the system to handle future traffic levels,

particularly in urban areas; and, to connect growing urban areas that are not well connected to the Interstate system. The TRB report estimated that approximately \$57 billion should be spent on

Interstate Highway System renewal and modernization annually over the next 20 years, a 146 percent increase from the approximately \$23 billion spent on Interstate highways in 2018.³⁸

Because of the lack of analytical tools and adequate databases, the TRB needed funding estimate does not include the funding needed to reconfigure and reconstruct many of the Interstate system's approximately 15,000 interchanges.³⁹

Recommendations for Restoring and Renewing the Interstate Highway System

Restoring and upgrading the Interstate Highway System to meet the nation's 21st Century transportation needs will take significant resolve to reestablish the Interstate Highway System as the nation's premier transportation network. The TRB Interstate report notes that "the scale and scope of the Interstate reinvestment imperative is daunting."⁴⁰ The TRB report also noted that the renewal and restoration of the Interstate Highway System will require strong federal leadership and a robust partnership between the states and the federal government.⁴¹

The following recommendations, based on the findings and recommendations of the TRB Interstate report, provide a roadmap for the restoration of the Interstate Highway System:

- Reconstruct the nation's Interstate Highway System, including pavements, bridges and interchanges
- Improve safety features on Interstate highways
- Right-size Interstate system by:
 - ✓ upgrading some existing roadways to Interstate standard
 - ✓ adding needed additional highway capacity on existing routes to maintain and improve mobility
 - ✓ adding additional corridors to accommodate demographic and economic growth
 - ✓ modifying some urban segments to maintain connectivity while remediating economic and social disruption

Conclusion

Maryland's Interstate Highway System is beset with growing traffic congestion, increasing car and truck travel, and aging pavements, bridges and interchanges that need to be reconstructed and modernized.

Today, the Interstate Highway System continues to save time, lives and money while playing a critical role in supporting economic growth and enhancing the lifestyle choices of the nation's residents and visitors.

Ensuring that the Interstate Highway System plays the same role in supporting the nation's development in the 21st Century will require a significant boost in investment in an Interstate restoration program based on strong federal leadership of a robust federal-state partnership.

###

ENDNOTES

-
- ¹ Transportation Research Board (2019). Renewing the National Commitment to the Interstate Highway System: A Foundation for the Future. P. 199. <http://www.trb.org/Main/Blurbs/178485.aspx>
- ² *Ibid.* P. 200
- ³ TRIP analysis of U.S. Census Bureau data.
- ⁴ U.S. Census Bureau data, Federal Highway Administration data. See chart MV-1. Additional historical data from Highway Statistics Summary to 1995.
- ⁵ U.S. Census Bureau data, Federal Highway Administration data. See chart VM-2. Additional historical data from Highway Statistics Summary to 1995.
- ⁶ U.S. Census Bureau data, Federal Highway Administration data. See chart VM-2. Additional historical data from Highway Statistics Summary to 1995.
- ⁷ *Ibid.*
- ⁸ TRIP analysis of Highway Statistics, 2018, Federal Highway Administration. Data is from charts VM-2 and HM-60.
- ⁹ TRIP analysis of 2000 and 2018 Federal Highway Administration data. See chart VM-2 in Highway Statistics 2000 and Highway Statistics 2018.
- ¹⁰ TRIP analysis of 2000 and 2018 Highway Statistics, Federal Highway Administration. See charts HM-60 and VM-2.
- ¹¹ Highway Statistic 2014. Federal Highway Administration.
- ¹² Maryland Department of Transportation State Highway Administration. [Maryland State Highway Mobility Report 2019](#).
- ¹³ Federal Highway Administration. TRIP analysis of Highway Statistics 2018, charts VM-2, HM-60.
- ¹⁴ Maryland Department of Transportation State Highway Administration. [Maryland State Highway Mobility Report 2019](#).
- ¹⁵ TRIP analysis of 2018 Federal Highway Administration data. See chart HM-64 in Highway Statistics.
- ¹⁶ *Ibid.*
- ¹⁷ Selecting a Preventative Maintenance Treatment for Flexible Pavements. R. Hicks, J. Moulthrop. Transportation Research Board. 1999. Figure 1.
- ¹⁸ Transportation Research Board (2019). Renewing the National Commitment to the Interstate Highway System: A Foundation for the Future. P. 51. <http://www.trb.org/Main/Blurbs/178485.aspx>
- ¹⁹ *Ibid.* P. 54
- ²⁰ Federal Highway Administration, 2019. National Bridge Inventory data.
- ²¹ TRIP Analysis of 2019 U.S. Department of Transportation National Bridge Inventory data. <https://www.fhwa.dot.gov/bridge/nbi.cfm>
- ²² *Ibid.*
- ²³ *Ibid.*
- ²⁴ TRIP analysis of 2018 FHWA data. See charts FI-20, VM-2 in 2018 Highway Statistics.
- ²⁵ *Ibid.*
- ²⁶ *Ibid.*
- ²⁷ TRIP analysis of 2018 FHWA data. See charts FI-20, VM-2 in 2014 Highway Statistics.
- ²⁷ *Ibid.*
- ²⁸ TRIP analysis of Federal Highway Administration's Freight Analysis Framework data (2018). Data is for 2016. <https://faf.ornl.gov/fafweb/>
- ²⁹ *Ibid.*
- ³⁰ TRIP analysis of 2018 FHWA data. See chart VM-4 in 2014 Highway Statistics.
- ³¹ Maryland Department of Transportation State Highway Administration. [Maryland State Highway Mobility Report 2019](#).
- ³² Select USA. (2019). Logistics and Transportation Spotlight. <https://www.selectusa.gov/logistics-and-transportation-industry-united-states>
- ³³ Area Development Magazine (2020). 34th Annual Survey of Corporate Executives: Availability of Skilled Labor New Top Priority. <https://www.areadevelopment.com/Corporate-Consultants-Survey-Results/Q1-2020/34th-annual-corporate-survey-16th-annual-consultants-survey.shtml>
- ³⁴ Transportation Research Board (2019). Renewing the National Commitment to the Interstate Highway System: A Foundation for the Future. P. 89. <http://www.trb.org/Main/Blurbs/178485.aspx>
Additional analysis provided by TRIP.

³⁵ The Transportation Construction Coalition, (July, 2020). Correspondence to Congressional Leadership. <https://policy.transportation.org/wp-content/uploads/sites/59/2020/04/2020-04-06-AASHTO-Letter-to-Congress-on-COVID-19-Phase-4-FINAL.pdf>

³⁶ United States Department of Transportation (2015). 2015 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance. Chapter 7. Exhibit 7-9. <https://www.fhwa.dot.gov/policy/2015cpr/es.cfm#8h>

³⁷ Ibid.

³⁸ Transportation Research Board (2019). Renewing the National Commitment to the Interstate Highway System: A Foundation for the Future. P. 4. <http://www.trb.org/Main/Blurbs/178485.aspx> The recommended funding is based on the funding needs estimated by TRB assuming an annual 1.5 percent annual average increase in travel. From 2013 to 2019, the average annual increase in vehicle miles of travel was 2.1 percent.

³⁹ Ibid. P. 5

⁴⁰ Ibid. P. 266.

⁴¹ Ibid. P. 5.