

# RESTORING COLORADO'S INTERSTATE HIGHWAY SYSTEM:

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



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Founded in 1971, [TRIP](#)® of Washington, DC, is a nonprofit organization that researches, evaluates and distributes economic and technical data on surface transportation issues. TRIP is sponsored by insurance companies, equipment manufacturers, distributors and suppliers; businesses involved in highway and transit engineering and construction; labor unions; and organizations concerned with efficient and safe surface transportation.

# Executive Summary

Colorado's 952-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.

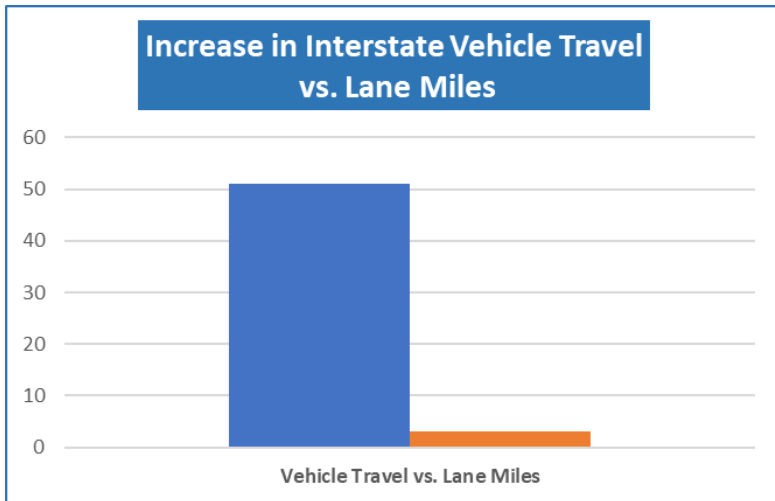
In 2015, as part of the Fixing America's Surface Transportation (FAST) Act, the U.S. Congress asked the [Transportation Research Board](#) (TRB), a division of the National Academy of Sciences, Engineering and Medicine, to conduct a study to determine actions needed to upgrade and restore the Interstate 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 Colorado'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.

## **COLORADO INTERSTATE USE AND CONGESTION**

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

- While Colorado's Interstate Highway System accounts for just two percent of all roadway lane miles in the state, it carries 27 percent of the state's vehicle travel.
- Since 1956 when funding of the Interstate system was approved, the number of vehicles in Colorado increased nearly seven-fold, from 775,418 vehicles to 5.4 million vehicles. Colorado's population increased nearly three and a half times, from 1.6 million to 5.8 million during this time.
- Travel on Colorado's Interstate highways is increasing at a rate 17 times faster than the rate at which new lane capacity is being added. From 2000 to 2018, vehicle travel on Colorado's Interstate highways increased 51 percent – the fifth fastest rate of growth in the nation. From 2000 to 2018, lane miles of Interstates in Colorado increased just three percent, from 4,043 to 4,165 miles.



RANK	STATE	2000-18 Interstate VMT Increase
1	Nevada	72%
2	Louisiana	60%
3	North Carolina	54%
4	Utah	54%
5	Colorado	51%
6	Texas	45%
7	North Dakota	45%
8	Idaho	43%
9	Wisconsin	42%
10	Mississippi	39%

- Fifty-seven percent of Colorado’s urban Interstate highways are considered congested because they carry traffic levels that result in significant delays during peak travel hours. This is the eleventh 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%
11	Colorado	57%
12	Texas	56%
13	New Hampshire	56%
14	Minnesota	56%
15	Georgia	53%

- Colorado’s urban Interstates are the third 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

**COLORADO’S INTERSTATE ROAD AND BRIDGE CONDITIONS**

The levels of both pavement deterioration and bridge deterioration on Colorado’s Interstate system are the eighth highest in the nation. As the aging Interstate system’s foundations continue to deteriorate, most Interstate highways, bridges and interchanges will need to be rebuilt or replaced.

- 48 of Colorado’s Interstate pavements are rated in mediocre condition, 18 percent are in fair condition and the remaining 64 percent are in good condition.
- The chart below shows the top ten states with the greatest share of their Interstate highways with pavements in poor condition.

RANK	STATE	INTERSTATE PAVEMENT POOR
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%

- An analysis of U.S. Department of Transportation’s [National Bridge Inventory](#) data indicates that nine percent of Colorado’s Interstate bridges are in need of repair or replacement.
- Five percent of Colorado’s Interstate bridges are rated in poor/structurally deficient condition, the eighth highest share in the U.S. A bridge is rated in poor/structurally deficient condition if

there is significant deterioration of the bridge deck, supports or other major components. Fifty-four percent of the state's Interstate bridges are rated in fair condition and the remaining 41 percent are in good condition.

- The chart below shows states with the greatest share of Interstate bridges rated poor/structurally deficient.

RANK	STATE	INTERSTATE BRIDGES POOR/STRUCTURALLY DEFICIENT
1	Rhode Island	17%
2	West Virginia	14%
3	Illinois	8%
4	Massachusetts	6%
5	New York	6%
6	Missouri	5%
7	Michigan	5%
8	Colorado	5%
9	Connecticut	4%
10	California	4%

- 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 Colorado's Interstate bridges is 43 years. Forty-eight percent of the state's Interstate bridges are at least 50 years old.

### INTERSTATE FATALITY RATES AND SAFETY

**Colorado's Interstate Highway System provides a network of highways with a variety of safety designs that greatly reduce the likelihood of serious crashes. While the fatality rate on Colorado's Interstate system is the 14<sup>th</sup> highest in the nation, travel on the state's Interstate highways is nearly twice as safe as travel on all other roadways in the state.**

- Colorado's Interstate Highway System, which carried 27 percent of the state's travel in 2018, accounted for only 16 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 Colorado’s Interstate highways is nearly twice as safe as travel on all other roadways in the state. The fatality rate per 100 million vehicle miles of travel on Colorado’s Interstate system in 2018 was 0.71, compared to 1.34 on Colorado’s non-Interstate routes.
- Colorado’s traffic fatality rate of 0.71 fatalities per 100 million vehicle miles of travel on the Interstate system was the 14<sup>th</sup> highest in the US. The chart below shows states with the highest traffic fatality rates in 2018 on their Interstate highways and the fatality rate on all other roads in those states.

RANK	STATE	INTERSTATE FATALITY RATE	ALL OTHER ROADS FATALITY RATE
1	Arizona	1.09	1.65
2	Mississippi	1.00	1.80
3	Texas	0.97	1.40
4	Idaho	0.96	1.42
5	New Mexico	0.90	1.63
6	South Carolina	0.87	2.20
7	Montana	0.86	1.63
8	Wyoming	0.85	1.16
9	Kansas	0.79	1.41
10	Arkansas	0.79	1.63
11	Oklahoma	0.77	1.66
12	West Virginia	0.74	1.86
13	Alabama	0.73	1.51
14	Colorado	0.71	1.34
15	Louisiana	0.69	1.95

- TRIP estimates that Colorado’s Interstate Highway System saved 99 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

**Colorado’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 eight percent of all vehicle miles of travel on Colorado’s Interstate Highway System in 2018.
- Every year, \$305 billion in goods are shipped to and from sites in Colorado, primarily by truck. Sixty-seven percent of the goods shipped annually from sites in Colorado are carried by trucks and another 20 percent are carried by courier services, which use trucks for part of the deliveries.

- Two of the 25 top truck bottlenecks in the U.S. identified by the American Transportation Research Institute (ATRI) in its 2020 [annual list](#) of the nation's top 100 truck bottlenecks are on I-70 in Denver. They include I-70 Central Project (#15) and I-70 at I-25 (#21).
- 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), the National Highway Traffic Safety Administration (NHTSA), the Transportation Research Board (TRB), and the U.S. Census Bureau. Cover photo credit: Getty Images.*

## 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, Colorado's Interstate Highway System - which includes I-25 bisecting the state north and south, and I-70 and I-76 crossing east and west - 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 21<sup>st</sup> 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.<sup>1</sup> "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."<sup>2</sup>

This report looks at Colorado'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.

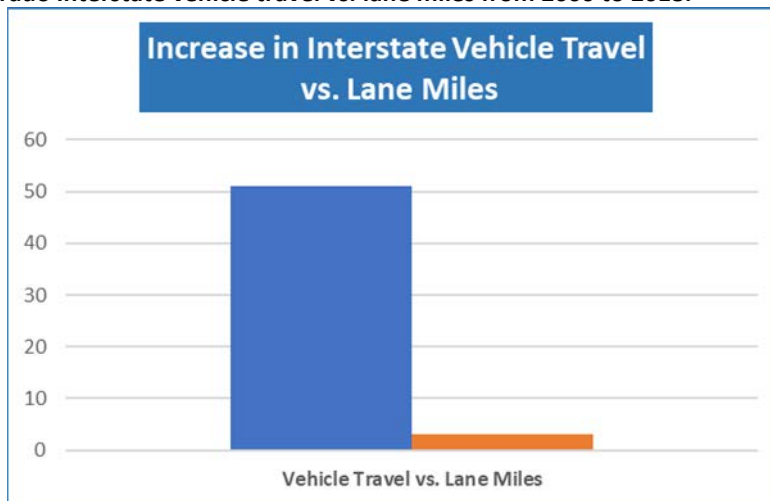
## Trends in Colorado Interstate Travel and Capacity

Since the beginning of the Interstate era 64 years ago, Colorado 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 percent<sup>3</sup>, the number of motor vehicles increased by 357 percent<sup>4</sup>, and vehicle travel increased by 418 percent.<sup>5</sup> Since funding of the Interstate system was approved in 1956 to 2018, the number of vehicles in Colorado increased nearly seven-fold, from 775,418 vehicles to 5.4 million vehicles.<sup>6</sup> Colorado's population increased nearly three and a half times, from 1.6 million to 5.8 million during this time.<sup>7</sup>

Colorado's 952-mile Interstate Highway System remains the most critical component of the state's surface transportation network. While Colorado's Interstate highways account for only two percent of all lane miles of roads in the state, they carry 27 percent of the state's vehicle travel.<sup>8</sup>

Travel on Colorado's Interstate highways is growing at a rate 17 times faster than new capacity is being added to the system. From 2000 to 2018, vehicle travel on Colorado's Interstate highways increased 51 percent, from 9.7 billion miles traveled annually to 14.7 billion miles.<sup>9</sup> Yet, during the same period, total lanes miles on the state's Interstate system increased by just three percent, from 4,043 miles to 4,165.<sup>10</sup>

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



**Source:** TRIP analysis of FHWA data.

Colorado's 51 percent increase in Interstate vehicle travel from 2000 to 2018 was the fifth greatest increase in the nation during that time.<sup>11</sup> The chart below shows the states with the greatest increase in vehicle miles of travel (VMT) on their Interstate highways from 2000 to 2018.

**Chart 2. States with Largest Increase in Interstate Vehicle Travel from 2000 to 2018.**

RANK	STATE	2000-18 Interstate VMT Increase
1	Nevada	72%
2	Louisiana	60%
3	North Carolina	54%
4	Utah	54%
5	Colorado	51%
6	Texas	45%
7	North Dakota	45%
8	Idaho	43%
9	Wisconsin	42%
10	Mississippi	39%

Source: TRIP analysis of FHWA data

### Traffic Congestion on Colorado’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 Colorado’s Interstates has grown 17 time faster than the addition new lane miles, 57 percent of Colorado’s urban Interstates are considered congested because they carry traffic levels that result in delays during peak travel hours – the eleventh highest rate of congestion in the nation.<sup>12</sup> The chart below shows states with the greatest share of congested urban Interstates.

**Chart 3. 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%
11	Colorado	57%
12	Texas	56%
13	New Hampshire	56%
14	Minnesota	56%
15	Georgia	53%

Source: TRIP analysis of FHWA data.

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

**Chart 4. 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.

## Pavement Conditions on Colorado’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 18 percent of Colorado’s Interstate highways were rated in poor or mediocre condition, with six percent rated poor and 12 percent rated mediocre.<sup>14</sup> 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. An additional 18 percent of Colorado’s Interstate pavements are rated in fair condition and the remaining 64 percent are rated in good condition.<sup>15</sup>

Colorado’s share of Interstate pavement in poor condition is the eighth highest share in the nation. The chart below shows the states with the greatest share of their Interstate highways with pavements in poor condition.

**Chart 5. States with greatest share of Interstate highways with pavements in poor condition (2018).**

RANK	STATE	INTERSTATE PAVEMENT POOR
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%

Source: TRIP analysis of FHWA data.

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.<sup>16</sup>

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.<sup>17</sup> 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.<sup>18</sup>

### **Colorado Interstate Bridge Conditions**

Of the 1,118 bridges on Colorado's Interstate system, five percent are rated in poor/structurally deficient condition and 54 percent are rated in fair condition and the remaining 41 percent are in good condition.<sup>19</sup>

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.

The share of Colorado's Interstate bridges in poor/structurally deficient condition is the eighth highest in the nation. The chart below shows states with the greatest share of Interstate bridges in poor/structurally deficient condition.



**Chart 6. States with greatest share of Interstate bridges rated poor/structurally deficient (2019).**

RANK	STATE	INTERSTATE BRIDGES POOR/STRUCTURALLY DEFICIENT
1	Rhode Island	17%
2	West Virginia	14%
3	Illinois	8%
4	Massachusetts	6%
5	New York	6%
6	Missouri	5%
7	Michigan	5%
8	Colorado	5%
9	Connecticut	4%
10	California	4%

**Source:** TRIP analysis of National Bridge Inventory data.

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 nine percent of Colorado’s Interstate bridges are in need of repair or replacement.<sup>20</sup>

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 Colorado’s Interstate bridges is 43 years.<sup>21</sup> Forty-eight percent of the state’s Interstate bridges are at least 50 years old.<sup>22</sup>

### **Traffic Safety on Colorado’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.

Colorado’s Interstate Highway System, which carried 27 percent of the state’s travel in 2018, accounted for only 16 percent of the state’s traffic fatalities as a result of superior safety features.<sup>23</sup>

The traffic fatality rate per 100 million vehicle miles of travel on Colorado’s Interstate highways was 0.71 in 2018.<sup>24</sup> While this was the 14<sup>th</sup> highest Interstate fatality rate in the nation, it was still approximately half the 1.34 fatality rate on non-Interstate routes in the state.<sup>25</sup>

The chart below shows states with the highest traffic fatality rates on their Interstate highways in 2018, and the fatality rate on all other roads in those states.<sup>26</sup>

**Chart 7. States with Highest Traffic Fatality Rate per 100 Million Vehicle Miles of Travel on its Interstate system and Traffic Fatality Rate on non-Interstate roadways (2018).**

RANK	STATE	INTERSTATE FATALITY RATE	ALL OTHER ROADS FATALITY RATE
1	Arizona	1.09	1.65
2	Mississippi	1.00	1.80
3	Texas	0.97	1.40
4	Idaho	0.96	1.42
5	New Mexico	0.90	1.63
6	South Carolina	0.87	2.20
7	Montana	0.86	1.63
8	Wyoming	0.85	1.16
9	Kansas	0.79	1.41
10	Arkansas	0.79	1.63
11	Oklahoma	0.77	1.66
12	West Virginia	0.74	1.86
13	Alabama	0.73	1.51
14	Colorado	0.71	1.34
15	Louisiana	0.69	1.95

Source: TRIP analysis of FHWA and NHTSA 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 Colorado’s Interstate Highway System saved 99 lives in 2018.<sup>27</sup> 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, \$305 billion in goods are shipped to and from sites in Colorado.<sup>28</sup> Sixty-seven percent of the goods shipped annually to and from sites in Colorado are carried by trucks and another 20 percent are carried by courier services, which use trucks for part of their deliveries.<sup>29</sup>

Travel by combination trucks, which are the large trucks that carry the majority of freight shipped in the U.S., accounted for eight percent of all vehicle miles of travel on Colorado's Interstate Highway System in 2018.<sup>30</sup>

The American Transportation Research Institute (ATRI) prepares an [annual list](#) of the nation's top 100 truck bottlenecks, based on the analysis of a massive database of truck GPS data, to quantify the impact of traffic congestion on truck-borne freight. Two of the 25 top truck bottlenecks in the U.S. identified by ATRI are on I-70 in Denver. They are I-70 Central Project (#15) and I-70 at I-25 (#21).

Interstate highway interchanges are a significant source of traffic delays and are the location of almost all of the nation's worst bottlenecks. Reconstructing and reconfiguring these interchanges would result in improved physical conditions, reduced travel delays and improved traffic safety.<sup>31</sup>

### **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.<sup>32</sup>

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.<sup>33</sup>

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).<sup>34</sup>

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.<sup>35</sup>

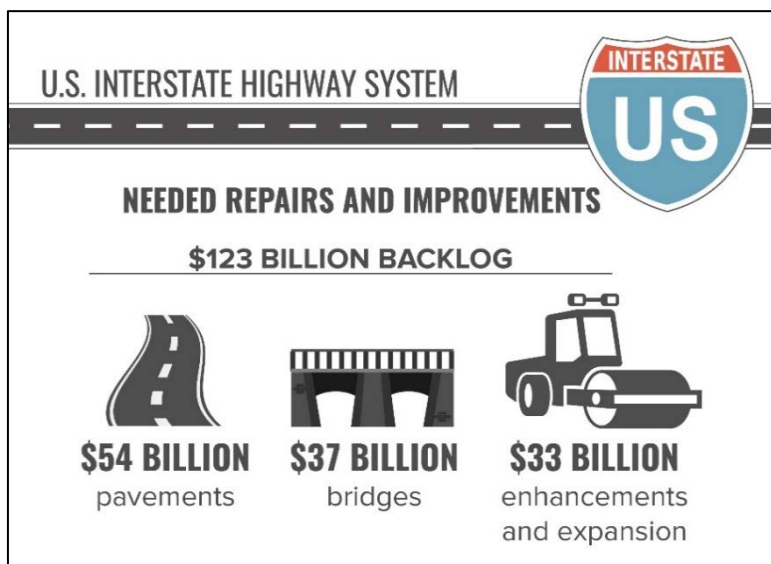
### Meeting Future Interstate Travel Needs

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, 23<sup>rd</sup> 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.<sup>36</sup> 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.<sup>37</sup>



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

**U.S. INTERSTATE HIGHWAY SYSTEM**

**INCREASED INVESTMENT NEEDED**

**\$57 BILLION ANNUALLY**

Investment in the Interstate Highway System should be increased from \$23 billion in 2018 to \$57 billion annually over the next 20 years

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.<sup>38</sup>

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.<sup>39</sup>

### Recommendations for Restoring and Renewing the Interstate Highway System

Restoring and upgrading the Interstate Highway System to meet the nation’s 21<sup>st</sup> 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.”<sup>40</sup> 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.<sup>41</sup>

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

Colorado'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 21<sup>st</sup> Century will require a significant boost in investment in an Interstate restoration program based on strong federal leadership of a robust federal-state partnership.

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## ENDNOTES

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- <sup>1</sup> 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>
- <sup>2</sup> *Ibid.* P. 200
- <sup>3</sup> TRIP analysis of U.S. Census Bureau data.
- <sup>4</sup> U.S. Census Bureau data, Federal Highway Administration data. See chart MV-1. Additional historical data from Highway Statistics Summary to 1995.
- <sup>5</sup> U.S. Census Bureau data, Federal Highway Administration data. See chart VM-2. Additional historical data from Highway Statistics Summary to 1995.
- <sup>6</sup> U.S. Census Bureau data, Federal Highway Administration data. See chart VM-2. Additional historical data from Highway Statistics Summary to 1995.
- <sup>7</sup> *Ibid.*
- <sup>8</sup> TRIP analysis of Highway Statistics, 2018, Federal Highway Administration. Data is from charts VM-2 and HM-60.
- <sup>9</sup> TRIP analysis of 2000 and 2018 Federal Highway Administration data. See chart VM-2 in Highway Statistics 2000 and Highway Statistics 2018.
- <sup>10</sup> TRIP analysis of 2000 and 2018 Highway Statistics, Federal Highway Administration. See charts HM-60 and VM-2.
- <sup>11</sup> *Ibid.*
- <sup>12</sup> Highway Statistic 2014. Federal Highway Administration.
- <sup>13</sup> Federal Highway Administration. TRIP analysis of Highway Statistics 2018, charts VM-2, HM-60.
- <sup>14</sup> TRIP analysis of 2018 Federal Highway Administration data. See chart HM-64 in Highway Statistics.
- <sup>15</sup> *Ibid.*
- <sup>16</sup> Selecting a Preventative Maintenance Treatment for Flexible Pavements. R. Hicks, J. Moulthrop. Transportation Research Board. 1999. Figure 1.
- <sup>17</sup> 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>
- <sup>18</sup> *Ibid.* P. 54
- <sup>19</sup> Federal Highway Administration, 2019. National Bridge Inventory data.
- <sup>20</sup> TRIP Analysis of 2019 U.S. Department of Transportation National Bridge Inventory data. <https://www.fhwa.dot.gov/bridge/nbi.cfm>
- <sup>21</sup> *Ibid.*
- <sup>22</sup> *Ibid.*
- <sup>23</sup> TRIP analysis of 2018 FHWA data. See charts FI-20, VM-2 in 2018 Highway Statistics.
- <sup>24</sup> *Ibid.*
- <sup>25</sup> *Ibid.*
- <sup>26</sup> Highway Statistics 2018, Federal Highway Administration. Charts FI-20, VM-2.
- <sup>27</sup> TRIP analysis of 2018 FHWA data. See charts FI-20, VM-2 in 2014 Highway Statistics.
- <sup>27</sup> *Ibid.*
- <sup>28</sup> TRIP analysis of Federal Highway Administration's Freight Analysis Framework data (2018). Data is for 2016. <https://faf.ornl.gov/fafweb/>
- <sup>29</sup> *Ibid.*
- <sup>30</sup> TRIP analysis of 2018 FHWA data. See chart VM-4 in 2014 Highway Statistics.
- <sup>31</sup> Transportation Research Board (2019). Renewing the National Commitment to the Interstate Highway System: A Foundation for the Future. P. 166. <http://www.trb.org/Main/Blurbs/178485.aspx>
- <sup>32</sup> Select USA. (2019). Logistics and Transportation Spotlight. <https://www.selectusa.gov/logistics-and-transportation-industry-united-states>
- <sup>33</sup> 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>
- <sup>34</sup> 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.

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<sup>35</sup> 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>

<sup>36</sup> 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>

<sup>37</sup> Ibid.

<sup>38</sup> 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.

<sup>39</sup> Ibid. P. 5

<sup>40</sup> Ibid. P. 266.

<sup>41</sup> Ibid. P. 5.