



Roads





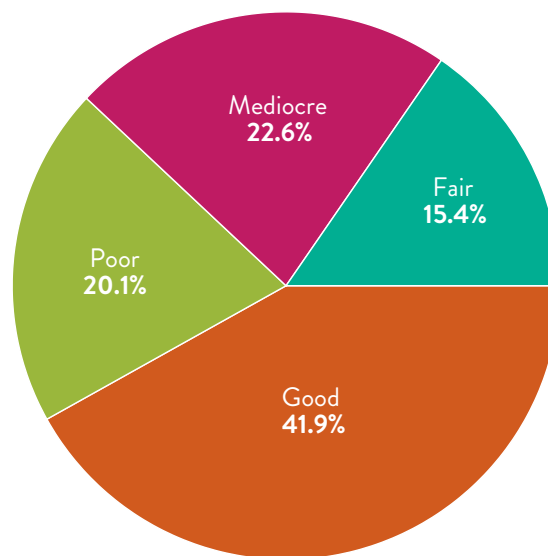
EXECUTIVE SUMMARY

America's roads are critical for moving an ever-increasing number of people and goods. However, these vital lifelines are frequently underfunded, and over 40% of the system is now in poor or mediocre condition. As the backlog of rehabilitation needs grows, motorists are forced to pay over \$1,000 every year in wasted time and fuel. Additionally, while traffic fatalities have been on the decline, over 36,000 people are still dying on the nation's roads every year, and the number of pedestrian fatalities is on the rise. Federal, state, and local governments will need to prioritize strategic investments dedicated to improving and preserving roadway conditions that increase public safety on the system we have in place, as well as plan for the roadways of the future, which will need to account for connected and autonomous vehicles.

CONDITION, CAPACITY & PUBLIC SAFETY

There are over 4 million miles of public roadways in the United States carrying people and goods to their destinations every day. However, these roadways are expected to withstand an ever-increasing volume of traffic each year, with vehicle miles traveled reaching more than 3.2 trillion in 2019, an 18% increase from 2000.¹ Unfortunately, the growing wear and tear to our nation's roads has left 43%² of our public roadways in poor or mediocre condition, a number that has remained stagnant over the past several years. Of note, the vast majority of roads in poor and mediocre condition tend to be on urban and rural collectors and the non-interstate system, while the interstate system tends to be in good condition. Overall, our deteriorating roads are forcing the nation's motorists to spend nearly \$130 billion³ each year in extra vehicle repairs and operating costs. Even more troubling is that the number of vehicle miles traveled on roads in "poor" condition has risen from 15% to more than 17% over the last decade.⁴

Roadway Condition



Source: Data from TRIP, a National Transportation Research Nonprofit

Congestion and Reliability

In the years following the 2008 economic recession, congestion increased by 1% to 3% annually and continues to outpace population growth. In fact, 47%⁵ of the nation's urban interstates are experiencing congestion during peak hours, and 30%⁶ of trips taken on the nation's roads are impacted by severe or extreme congestion. Compounding the problem has been the growth of transportation network companies (TNCs) or ride-sharing services, which initial studies have shown can increase congestion in urban areas. For example, studies have shown that TNCs have accounted for 52% of vehicle delays in San Francisco alone.⁷ With estimates that ridesharing trips can reach 97 million daily⁸ by 2030, congestion concerns will continue to grow.
























In 2017, congestion caused urban Americans to travel an extra 8.8 billion hours and purchase and extra 3.3 billion gallons of fuel.⁹ This congestion costs the nation \$166 billion each year, or approximately \$1,080 annually in wasted time and fuel for the average auto commuter. This is additional spending to the money already spent on vehicle repair costs due to the condition of the roadways. However, as every lane-mile of road costs approximately \$24,000 annually in operation and maintenance, roadway expansion can be more costly and less efficient

than operational changes. In fact, in many cases, roadway expansion can lead to induced demand and further sprawl.

Our nation's highways and roads move 72%, or nearly \$17 trillion,¹⁰ of the nation's goods; therefore, consumers, industry, and the traveling public require reliable and consistent travel times.

While everyday congestion remains common in and around many U.S. cities, unexpected congestion is highly troubling for commuters and freight movement. Without consistent, reliable travel times due to irregular and unpredictable backups, it is more difficult for the public and shippers to plan their trips. Even after accounting for unexpected crashes, bad weather, special events, or other irregular congestion, the average American is spending 54 hours each year in traffic congestion, up from 42 hours in 2014.¹¹ If these trends continue, on average across the U.S., a 60-minute trip is expected to take 106 minutes in 2039.¹² While the Federal Highway Administration is now encouraging agencies to adopt travel time reliability measures to better manage and operate transportation systems, work still needs to be done to create a national database.

10 Most Congested Urban Areas in the U.S.

2019 Congestion Rank	Urban Area	Hours Lost In Congestion	2018-2019 Change	2017-2018 Change	Incident Impact	Cost Per Driver	Total Cost Per City	Bike	Transit	Last Mile Speed (Mph)
1 (1)	Boston, MA	149	-5%	3%		\$2,250	\$4.1B			12
2 (3)	Chicago, IL	145	4%	0%		\$2,146	\$7.6B			11
3 (5)	Philadelphia, PA	142	4%	5%		\$2,102	\$4.5B			10
4 (2)	New York City, NY	140	-4%	-3%		\$2,072	\$11B			11
5 (3)	Washington, DC	124	-11%	4%		\$1,835	\$4.1B			10
6 (7)	Los Angeles, CA	103	4%	-8%		\$1,524	\$8.2B			16
7 (6)	San Francisco, CA	97	-8%	-4%		\$1,436	\$3B			10
8 (9)	Portland, OR	89	10%	-7%		\$1,317	\$1.2B			14
9 (11)	Baltimore, MD	84	5%	9%		\$1,243	\$1.3B			10
10 (12)	Atlanta, GA	82	9%	-3%		\$1,214	\$3.0B			12

Source: Inrix 2019 Global Traffic Scorecard



TRAFFIC IN LOS ANGELES, CALIFORNIA

While traffic fatalities increased annually in the early part of the last decade, they have been declining since 2017. Unfortunately, 36,096 people died on the nation's roadways in 2019, with an increasing proportion of those fatalities suffered by non-motorists, such as pedestrians. In fact, in 2019 over 6,000 pedestrians¹³ were killed, marking a 60% increase of pedestrian fatalities from 10 years prior and the highest number since 1988. Additionally, the overall fatality rate in rural areas continues to be disproportionately higher than the fatality rate on all other roadways, and it is estimated that roadway design features are likely a contributing factor in approximately one-third of traffic fatalities. Investments to widen lane, shoulder, and clearance widths, as well as introducing more center lane rumble strips, lane markings, and sidewalks are infrastructure improvements that could reduce traffic fatalities.

The National Safety Council attributes the recent decline in traffic fatalities to the implementation of several risk mitigation actions over the last several years. For example, since 2016, 10 cities have embraced Vision Zero models,

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and more than 30 other cities have joined the Vision Zero Network, which is an alliance of communities committed to making streets safer by taking actions such as redesigning areas that have a history of high crashes and lowering speed limits where possible. Further action from policymakers and communities focused on reducing

traffic fatalities through infrastructure, combined with vehicles that are becoming safer through advances in technologies, could reduce the severity of future crashes or prevent them altogether. In fact, some estimates have found that new technologies such as connected vehicles can cut fatal crashes by as much as 86%.¹⁴

FUNDING & FUTURE NEED

The U.S. has been underfunding its roadway maintenance for years, resulting in a \$786 billion backlog of road and bridge capital needs. The bulk of the backlog (\$435 billion) is in repairing existing roads, while \$125 billion is needed for bridge repair, \$120 billion for targeted system expansion, and \$105 billion for targeted system enhancement (which includes safety enhancements, operational improvements, and environmental projects).¹⁵ However, in 2017, federal, state, and local governments spent just \$177 billion on roads and bridges, with an increasing focus on operations and maintenance needs.¹⁶ As roads age and deteriorate, the most recent data estimates that over 62% of roadway spending was directed toward system preservation, a

3% increase from the Federal Highway Administration's previous reporting period.¹⁷ Therefore over the next 20 years, the projected spending is estimated at \$41 billion. However, the funding required to rehabilitate pavement and other operational conditions will average \$53 billion annually. We need to increase current spending levels by a 29% to address the current and anticipated backlogs.¹⁸

Federal investment in roads has historically been paid for from a dedicated, user fee-funded source, the Highway Trust Fund. Unfortunately, the Highway Trust Fund has been teetering on the precipice of insolvency for nearly 15 years due to the limitations of its primary funding source,

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Encouragingly, some state lawmakers are helping reverse losses in the federal gas tax purchasing power by making the decision to raise or reform state gas taxes. Since 2010, 37 states have raised or reformed their gas taxes either through legislative action or automatic formulas that regularly adjust the gas tax rate. Furthermore, in 2019 alone, voters in 19 states approved \$9.6 billion in one-time and recurring revenue through ballot initiatives. In fact, in 2018 alone,

States are also exploring other revenue sources for funding road investment, including mileage-based user fees. With continued improvements in vehicle fuel efficiency and the popularity of hybrid and electric vehicles, mileage-based user fees could present an opportunity for a long-term funding alternative to the motor fuels tax. However, while legislative and voter action has allowed some states to maintain or increase local sources of roadway funding, federal funding remains a significant portion of overall road funding. Put another way, federal partnership for roadway infrastructure is still required to maintain and modernize the system. Additionally, the COVID-19 pandemic has led to a sharp decline in vehicle miles travelled and therefore gas tax receipts in 2020, and the full impact of this revenue loss for state transportation budgets, could be as much as \$37 billion over 2020 and 2021.²⁰

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2021 INFRASTRUCTURE REPORT CARD
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INNOVATION

Timely, preventive maintenance of our roads with better materials extends the life of pavement and costs less than reconstructing pavements after they reach failure. The increased use of innovative materials to preserve and rebuild pavements that are better suited to today's vehicle loading and more resilient to environmental impacts has led to longer lasting pavements and lower life cycle costs. However, material innovations in pavements have not kept pace with other areas of infrastructure, such as bridge construction.

Advancements in technology have created opportunities for the nation's road networks. Technologies like advanced pavement monitoring, where the use of moisture and temperature sensors are embedded in the pavement, have made it possible to collect information about the condition of road pavements more quickly and

with less impact on roadway users. The advent of smart pavement is opening up the possibility for features like radio-connected sensors being embedded in a road to constantly monitor and report the pavement's changing condition or to charge electric cars as they drive along, thus reducing the need for off-road recharging stops. Additionally, the use of next generation materials and decentralized traffic lights to promote traffic flow are innovative solutions for issues like congestion data collection. Meanwhile, the increased focus on how to efficiently integrate bicycle and pedestrian traffic is creating longer term congestion solutions in urban areas.

Furthermore, one of the largest technological shifts is the introduction of connected and autonomous vehicles onto the nation's roadways. While these new technologies can provide an opportunity to increase safety and



mobility, reduce congestion, improve land use, and reduce our carbon footprint, if implemented incorrectly this technology could have the opposite effect and lead to extra stress on the system. With 40 states having

enacted either legislation or an Executive Order related to autonomous vehicles, policies are already accounting for the deployment of these technologies on our nation's roads.

RESILIENCE AND OPERATIONS & MAINTENANCE

The increase in severe weather events is damaging key roadways that serve as community lifelines, while simultaneously increasing maintenance needs, interrupting the normal operation of the nation's roads, creating delays, and negatively impacting the economy. For example, rising temperatures are estimated to add approximately \$19 billion to pavement costs each year by 2040.²¹ Therefore, engineers are increasingly incorporating the resilience of the road network during the materials selection and design process and using data-driven analysis to make investments. Furthermore, the Federal Highway Administration now requires state transportation departments and planning organizations (DOTs and MPOs) to consider resilience in the planning process and include resilience considerations in asset management plans.

States are also developing asset management plans to define strategic processes for operating, maintaining,

and improving their road networks. Effective plans focus on engineering and economic analysis to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement while promoting actions that will help optimize their networks within the available funding constraints. Every state DOT is now required to have an asset management plan in order to receive federal funding, although many of these plans still do not cover the majority of roadways, as the plans are only required to cover the National Highway System. While asset management plans still have room for improvement, when paired with life-cycle cost analysis, they are helping states set priorities and determine where investments should be made to improve the overall system. Repaving and surface treatments might improve a roadway in the short term, but because underlying roadways continue to age, replacing the road might be a more effective solution for the long-term. Life-cycle cost analysis can help facilitate these decisions.



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RECOMMENDATIONS TO RAISE THE GRADE

- Focus resources on preserving a state of good repair, as the nation will never be able to fully build its way out of congestion. Policies and efforts focused on improving travel time reliability will need to be implemented to maximize the capacity of the existing road network. This should be done in coordination with the acceleration of the development and deployment of new technologies that promote an integrated, multimodal transportation system.
- Increase funding from all levels of government and the private sector to address the condition and operations of the roadway system to maintain a state of good repair and ensure safety for all users.
- Fix the federal Highway Trust Fund by raising the federal motor fuels tax by five cents each year over five years. To ensure long-term, sustainable funding for the federal surface transportation program, the current user fee of 18.4 cents per gallon on gasoline and 24.4 cents per gallon on diesel should be tied to inflation to restore its purchasing power, fill the funding deficit, and ensure reliable funding for the future.
- Develop state and local level comprehensive transportation asset management plans that link asset management efforts to long-term transportation planning and incorporate the use of life-cycle cost analysis.
- Create dedicated federal investments to build resilience into the nation's road and bridge infrastructure and integrate resilience planning into State Transportation Asset Management Plans.

DEFINITIONS

CONDITION — The “ride quality” of highways and roadways is typically evaluated using the International Roughness Index (IRI), and the Federal Highway Administration (FHWA) data are the only national source of pavement condition ratings based on a consistent criterion. Using this information, TRIP categorizes the condition of a region's roads and highways into poor, mediocre, fair, or good condition. The FHWA has found that a road surface with an IRI rating below 95 provides a good ride quality, a road with an IRI from 95 to 170 provides an acceptable ride quality, and a road with an IRI above 170 provides an unacceptable ride quality.



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