THE U.S. FREIGHT NETWORK'S CRITICAL ROLE IN THE SUPPLY CHAIN

A National Transportation Research Nonprofit

DECEMBER 2021

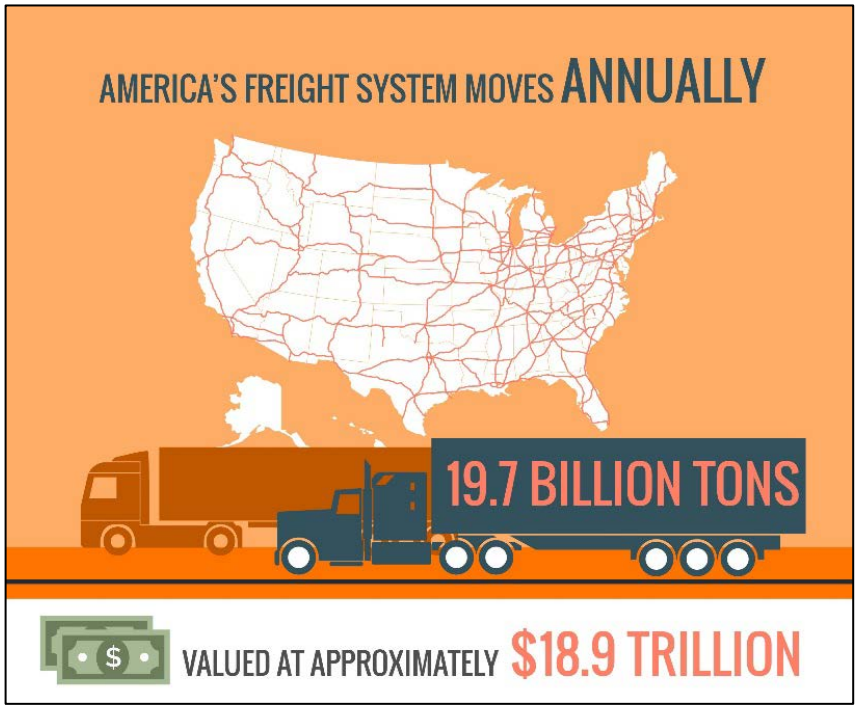
Founded in 1971, TRIP ® of Washington, DC, is a nonprofit organization that researches, evaluates and distributes economic and technical data on surface transportation issues. TRIP is sponsored by insurance companies, equipment manufacturers, distributors and suppliers; businesses involved in highway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

An efficient and reliable supply chain has always been critically important for the delivery of goods and the continued momentum of America's economy. That importance became even more evident during the COVID-19 pandemic. As supply chain disruptions continue to hamper the nation's economy and the timely delivery of goods, this TRIP report examines the latest information on the condition and reliability of the nation's supply chain and the critical role of the U.S. freight transportation network in keeping the economy moving - literally and figuratively - and ensuring that commerce and deliveries are uninterrupted.

NATION'S SUPPLY CHAIN

The U.S. freight transportation network provides for the movement of raw materials, intermediate goods, and finished products from one location to another.[1] This critical supply chain, which is vital to the nation's standard of living, involves a complex, intermodal system that includes over four million miles of roads, 140,000 miles of freight railways[2], more than 25,000 miles of navigable waterways[3], more than 5,000 public airports[4], and a vast network of pipelines.

Annually, 19.7 billion tons of freight, valued at $18.9 trillion dollars, are shipped to and from sites in the U.S. The majority of freight shipped in the U.S. are transported by trucks, which carry 72 percent of freight by value and 64 percent by weight annually.[5] An additional seven percent by value and three percent by weight are shipped annually by multiple modes, which includes trucks.[6]



The amount of freight shipped to and from each state, measured in billions of dollars of value and in total tons moved, and the share of value and weight moved by trucks to and from each state can be found in the report's Appendix.

In 2015 Congress established the National Highway Freight Network (NHFN) to strategically direct federal resources to the most critical freight highways in the U.S. The nation's 47,279 miles of Interstate highways represent the largest portion of the 57,994-mile NHFN.[7]

Chart 1. National Highway Freight Network

Source: Federal Highway Administration; Office of Freight Management and Operations

COVID-19 IMPACT ON TRAVEL AND FREIGHT TRENDS

Starting with initial lockdowns in March 2020, the COVID-19 pandemic has had a profound impact on the U.S. transportation system, including changes in personal and commercial mobility. These changes in transportation patterns – both during the initial response to COVID-19 and during the subsequent, ongoing efforts to minimize the spread of COVID-19 while restoring some aspects of daily life - will likely have significant implications for the nature of the country's future mobility needs and the best ways to meet those needs.

Overall vehicle miles of travel (VMT) bottomed out in April 2020 at a level 40 percent below April 2019 as a result of the various restrictions implemented due to COVID-19 and the resulting reduction in commercial and personal travel. [8]

VMT has rebounded significantly since the onset of the pandemic in the U.S., with national VMT now nearing pre-pandemic levels and vehicle travel in more than a dozen states now exceeding pre-pandemic levels. By September of 2021, U.S. VMT was just under two percent below September 2019 levels (the most recent pre-COVID September), with 13 states exceeding VMT levels of September 2019.[9]

The chart below lists the states where VMT levels in September 2021 exceeded pre-pandemic levels. VMT data for all 50 states can be found in the Appendix.

Chart 2. States with Largest Increase in Vehicle Miles of Travel September 2019 to September 2021.

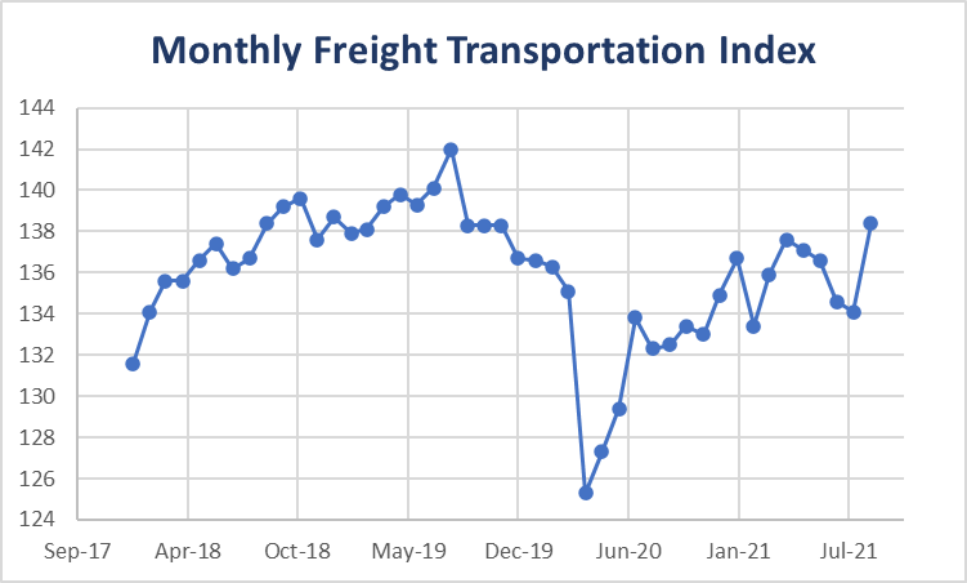
States Exceeding Pre-Pandemic Vehicle Travel - September 2019 to September 2021					
1	Arizona	13.2%	8	Iowa	4.6%
2	Idaho	8.8%	9	Indiana	2.3%
3	Montana	7.9%	10	Utah	2.1%
4	Florida	7.5%	11	New Mexico	1.6%
5	Alaska	6.6%	12	Arkansas	1.2%
6	South Dakota	5.9%	13	Rhode Island	0.6%
7	Missouri	4.9%	U.S. Average: - 1.8 %		

Source: Federal Highway Administration.

While national vehicle miles of travel dropped by as much as 40 percent during the pandemic, freight movement fell by just 10 percent by April 2020, demonstrating the resilience of the supply chain and the nation's reliance on freight movement.[10]

The following chart indicates a monthly measure of freight services, including for-hire trucking, freight railroad services, inland waterway traffic, pipeline movements and air freight from January 2018 to September 2021. Freight movement peaked in August 2019, reached its lowest level in April 2020, and by September 2021 had rebounded to within two percent from September 2019, the most recent pre-pandemic September.[11]

Chart 3. Freight Transportation Monthly Index January 2018 to September 2021



Source: U.S. Department of Transportation Bureau of Transportation Statistics.

RELIABILITY OF THE NATION'S FREIGHT TRANSPORTATION SYSTEM

Traffic congestion, which occurs when traffic demand approaches or exceeds the available capacity of the system, can significantly degrade the efficiency of the nation's supply chain. Congestion and decreased or unpredictable reliability on the nation's freight transportation network can impact delivery times and hinder the delivery of goods, supplies and raw materials, disrupting manufacturing supply chains and prolonging the time it takes for customers to receive their orders.

The chart below shows recurring peak-period congestion on the National Highway Freight Network.

Chart 4. Congestion on the National Highway Freight Network.

Source: Federal Highway Administration; Office of Freight Management and Operations

Traffic congestion can increase the cost of goods and services as a result of increased delays. The Texas Transportation Institute in its 2021 Urban Mobility Report estimated that increasing traffic congestion resulted in a 77 percent increase in traffic delays for commercial trucks from 2000 to 2019, increasing from 219 million hours to 387 million hours.[12]

Chart 5. Millions of hours of freight delays, 2000-2019.

Source: Texas Transportation Institute 2021 Urban Mobility Report.

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. The chart below includes the top 20 truck bottlenecks. A list of the top 50 bottlenecks is included in the Appendix.

Chart 6. ATRI Top 20 Truck Bottlenecks (2021).

Top 20 U.S. Truck Bottlenecks					
1	NJ	Fort Lee, NJ I-95 at SR 4	11	CA	Los Angeles, CA SR 60 at SR 57
2	OH	Cincinnati, OH I-71 at I-75	12	TX	Dallas, TX I-45 at I-30
3	GA	Atlanta, GA I-285 at I-85 (North)	13	TN	Nashville, TN I-24/I-40 at I-440 (East)
4	GA	Atlanta, GA I-20 at I-285 (West)	14	NY	Brooklyn, NY I-278 at Belt Parkway
5	TX	Houston, TX I-45 at I-69/US 59	15	TX	Austin, TX I-35
6	IL	Chicago, IL I-290 at I-90/I-94	16	GA	Atlanta, GA I-75 at I-285 (North)
7	TN	Chattanooga, TN I-75 at I-24	17	TX	Houston, TX I-45 at I-610 (North)
8	MO	St. Louis, MO I-64/I-55 at I-44	18	LA	Baton Rouge, LA I-10 at I-110
9	NY	Rye, NY I-95 at I-287	19	IL	Chicago, IL I-90 at I-94 (South)
10	CA	San Bernardino, CA I-10 at I-15	20	CO	Denver, CO I-70 at I-25

Source: American Transportation Research Institute (ATRI).

Reliability in the ability to predict freight travel times is of critical importance, particularly to industries that rely on "just in time" manufacturing to have the right material, at the right time, at the right place, and in the exact amount needed. Late deliveries can have costly ripple effects and can cause costly disruptions in the production process. Decreased reliability also requires drivers to budget extra time, track routes in real time and make route adjustments to account for inconsistent travel times and delays. The inability to predict travel times may lead to delayed deliveries or schedule changes, which can increase the cost of freight operations or deliveries and result in lost pay to truck drivers.[13]

The chart below lists travel reliability on the nation's top 25 domestic freight corridors.[14] The corridors are ranked by the Travel Time Reliability Index, which indicates how much longer travel times are on heavy travel days, compared to normal days. A higher score reflects a lower level of reliability. The numbers after the decimal point can be treated as a percentage; a corridor with a travel time reliability index of 1.50 had travel times that were 50 percent longer on heavy travel days, compared with normal days.

Chart 7. Top 25 Domestic Freight Corridors, Ranked by Travel Time Reliability Index.

Top 25 Domestic Freight Corridors Ranked by Travel Time Reliability Index		
1	I-95: Richmond to New Haven	1.75
2	I-5: Medford, OR to Seattle	1.51
3	I-35: Laredo to Oklahoma City	1.42
4	I-10: Los Angeles to Tucson	1.38
5	I-5/CA 99: Sacramento to Los Angeles	1.36
6	I-75: Lexington to Detroit	1.34
7	I-65/I-24: Chattanooga to Nashville to Chicag	1.33
8	I-10: San Antonio to New Orleans	1.32
9	I-95: Miami to I-26 (SC)	1.31
10	I-75: Tampa to Knoxville	1.25
11	I-80: Cleveland to Chicago	1.24
12	I-78/I-76: New York to Pittsburgh	1.23
13	I-30: Little Rock to Dallas	1.21
14	I-80: New York to Cleveland	1.21
15	I-70: Kansas City to Columbus	1.19
16	I-40: Knoxville to Little Rock	1.15
17	I-40: Raleigh to Asheville	1.15
18	I-94: Chicago to Detroit	1.15
19	I-57/I-74: I-24 (IL) to I-55 (IL)	1.14
20	I-80: Chicago to I-76 (CO/NE border)	1.14
21	I-55/I-39/I-94: St. Louis to Minneapolis	1.13
22	I-40: Oklahoma City to Flagstaff	1.11
23	I-81: Harrisburg to I-40 (Knoxville)	1.11
24	I-84: Boise to I-86	1.1
25	I-10: Pensacola to I-75	1.07

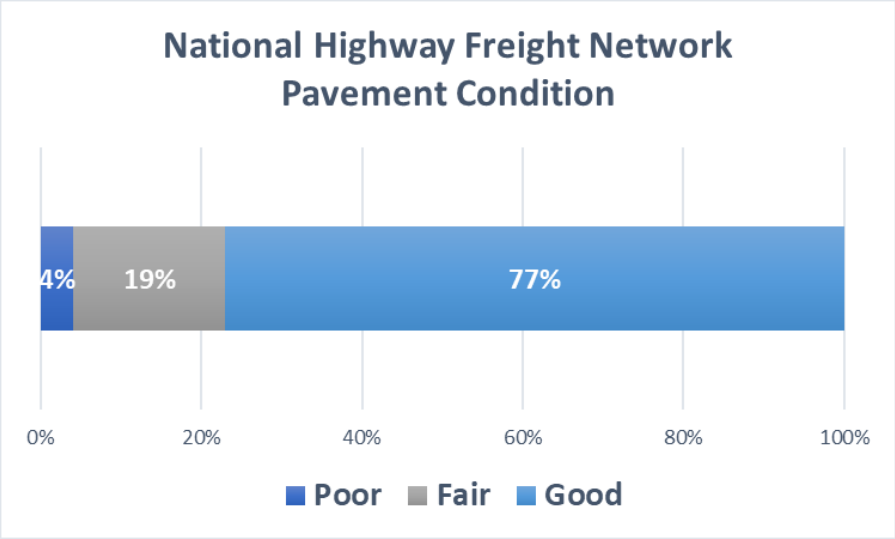
Source: U.S. Department of Transportation (2021). Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress.

PAVEMENT AND BRIDGE CONDITIONS ON THE NATION'S FREIGHT TRANSPORTATION SYSTEM

The condition of the nation's freight network can greatly impact the delivery of goods. The pavement life cycle on the National Highway Freight Network is greatly affected by state and local governments' ability to perform timely maintenance and upgrades to ensure that road and highway surfaces last as long as possible.

Four percent of pavement on the National Highway Freight Network are rated in poor condition, while 19 percent are rated in fair condition and the remaining 77 percent are rated in good condition.[15]

Chart 8. Pavement Conditions on the National Highway Freight Network.

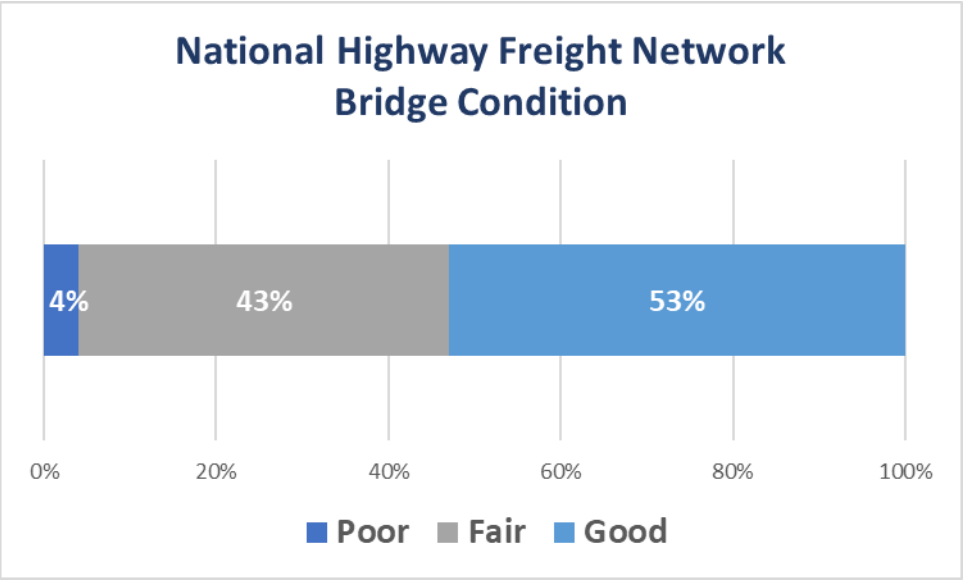


Source: U.S. Department of Transportation (2021). Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress.

Four percent of National Highway Freight Network bridges are rated in poor condition, 43 percent are rated in fair condition, and the remaining 53 percent are rated in good condition.[16]

The ratings for bridges on the NHFN consider the condition of the bridge deck, superstructure, substructure and culvert. The classification of a bridge in "poor" condition does not imply that the bridge is unsafe; it indicates the extent to which a bridge has deteriorated from its original condition when first built. Bridges rated poor might experience reduced performance in the form of lane closures or road limits and would be closed if an inspection determines the bridge to be unsafe.[17]

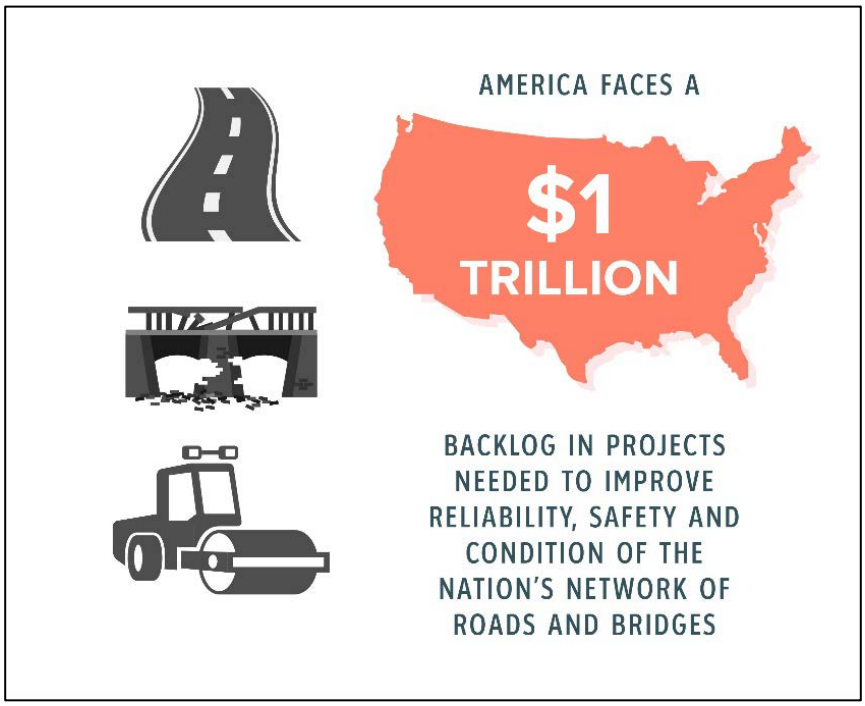
Chart 9. Bridge Conditions on the National Highway Freight Network.



Source: U.S. Department of Transportation (2021). Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress.

ADDRESSING NATION'S SUPPLY CHAIN CHALLENGE

In the short term, improving the performance of the nation's supply chain will require addressing the many supply chain challenges that are restricting the timely movement of freight. But ensuring that the nation's long-term goals for economic growth and quality of life are met will require investing adequately in an efficient transportation system that will provide the U.S. with a reliable supply chain.



Improving the condition and performance of the nation's network of roads and bridges will require a significant increase in investment. According to the Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress released by the United States Department of Transportation in 2021, the U.S. would need to increase annual road, highway and bridge investment by 55 percent increase over the current level of highway investment, to make significant improvements in road and bridge conditions, reduce traffic congestion and improve traffic safety.[18] The nation currently faces a $1 trillion backlog in projects needed to improve reliability, safety and conditions.[19]

Signed into law in November 2021, the Infrastructure Investment and Jobs Act (IIJA) will increase investment in highway, road and bridge projects needed to improve the efficiency of the nation's supply chain. The IIJA will provide $304 billion for highways, roads and bridges over the next five years through September 30, 2026 -- a 34 percent increase over current funding levels.[20]

###

ENDNOTES

[1] U.S. Department of Transportation (2021). Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress. P. III-2.
[2] U.S. Department of Transportation Federal Railroad Administration. Freight Rail Overview.
[3] *Untapped Potential: Far too little freight on US waterways, experts say*. Freightwaves.com. October 12, 2021.
[4] U.S. Department of Transportation Bureau of Transportation Statistics. Number of U.S. Airports.
[5] Federal Highway Administration, Freight Analysis Framework (2021). Data is for 2017. https://ops.fhwa.dot.gov/freight/freight_analysis/faf/
[6] Ibid.
[7] Federal Highway Administration, Freight Management and Operations (2021). National Highway Freight Network. https://ops.fhwa.dot.gov/freight/infrastructure/nfn/index.htm
[8] U.S. Department of Transportation (2021). Travel Monitoring. (Additional analysis is provided by TRIP). https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm
[9] Ibid.
[10] U.S. Department of Transportation Bureau of Transportation Statistics. Transportation Services Index – Freight. https://data.bts.gov/Research-and-Statistics/Transportation-Services-Index-Freight/gutz-h9fp
[11] Ibid.
[12] Texas A & M Transportation Institute (2021). 2021 Urban Mobility Report. https://mobility.tamu.edu/umr/
[13] Federal Highway Administration, Freight Management and Operations (2021). National Highway Freight Network. https://ops.fhwa.dot.gov/freight/infrastructure/nfn/index.htm
[14] U.S. Department of Transportation (2021). Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress. P. III-22. Data is for 2016.
[15] U.S. Department of Transportation (2021). Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress.
[16] Ibid.
[17] Ibid.
[18] U.S. Department of Transportation (2021). Status of the Nation's Highways, Bridges and Transit: Conditions and Performance Report to Congress. P. 7-4.
[19] Ibid.
[20] Associated General Contractors of America (2021). Infrastructure Investment and Jobs Act. https://www.agc.org/sites/default/files/IIJA%20Summary-%20Highway%20and%20Transportation%20Market%20jvc%20edits.pdf?utm_source=informz&utm_medium=email&utm_campaign=informz_email&_zs=H6fnc1&_zl=Gw3o7