

AMERICA'S ROLLING WAREHOUSES: OPPORTUNITIES AND CHALLENGES ON THE NATION'S FREIGHT DELIVERY SYSTEM



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TRIP

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Executive Summary

The nation's freight transportation system plays a vital role in the quality of life of Americans, enabling the timely movement of raw materials and finished products that are vital to the health of the U.S. agricultural, industrial, energy, retail and service sectors.

The ability of this system to efficiently and safely move local, regional, national and global products is a critical factor in the nation's economic health and quality of life. The importance of the nation's freight transportation system was demonstrated during the COVID-19 pandemic when the nation's supply chain, already straining under the growing consumer demand for timely deliveries, was at times overwhelmed by increased demand, production pauses and bottlenecks at some transportation facilities.

As the U.S. rebounds from the pandemic, the reliability, capacity, sustainability and safety of the nation's freight transportation system will be critical factors in the nation's ability to provide a supply chain that will meet the growing need for timely and safe movement of goods. The potential for the U.S. freight network to meet the nation's transport needs will depend on its ability to respond to key trends that will re-shape logistics in the U.S. These include ongoing improvements in analytics and artificial intelligence, which are increasing the efficiency of manufacturing and freight transportation; changing market demands; evolving global logistics patterns; a transition to lower-carbon transportation fuels, including electric, biofuels, natural gas and hydrogen; and advances in transport technology, including the increased autonomy of freight vehicles and the possible use of drones for last-mile deliveries.

Addressing the nation's need for a more efficient and safe freight transportation system will require increased investment in improvements to network capacity and safety, greater multijurisdictional cooperation to facilitate large transportation projects, and further technological advancements in the nation's supply chain, including vehicles, warehouses and logistics.

This report examines current and projected levels of freight movement in the U.S., large truck safety, and trends impacting freight movement. It concludes with a series of recommendations to improve the nation's freight transportation system.

U.S. FREIGHT TRANSPORTATION TRENDS

The delivery of freight – merchandise or commodities that are moved by a mode of transportation either for a fee or by a private fleet – is expected to increase rapidly as a result of economic growth, increasing demand, changing business and retail models, and a significantly increased reliance on e-commerce by businesses and households. U.S. logistics costs as a share of GDP reached the highest level on record in 2022.

- U.S. business logistics costs reached \$2.3 trillion in 2022, representing 9.1 percent of U.S. GDP – the highest share ever.
- Freight transportation impacts every business and household. It is critical to the nation's economy, which depends on efficient freight movement to connect businesses, manufacturers, customers and households within the U.S. and the world.
- In the U.S., 333 million residents, 129.9 million households, 7.9 million business establishments and 90,000 governmental units comprise an economy that requires the efficient movement of freight.

- The freight transportation system in the U.S. relies on an extensive system of highways, railroads, waterways, pipelines and waterways. This system includes 958,000 miles of Federal-aid highways, 141,000 miles of railroads, 11,000 miles of inland waterways, more than 19,000 airports, 1.6 million miles of pipelines, and more than 5,000 coastal, Great Lakes and inland waterway facilities.
- In 2022, the U.S. had 1,775 intermodal connectors between highways and maritime ports, airports, rail facilities and pipelines.
- In 2022 the U.S. freight system moved approximately 19.7 billion tons of freight, valued at approximately \$18.8 trillion, a daily average of approximately 54 million tons of freight valued at approximately \$52 billion.
- Trucking accounted for the largest modal share of freight movement in 2022, carrying 72 percent of freight by value and 64 percent by weight.
- The following chart details modal freight movement in 2022 by value and weight.

Mode	By Value	By Weight
Truck	72%	64%
Rail	3%	8%
Water	1%	4%
Air	3%	0%
Multiple Modes	14%	3%
Pipeline	6%	20%

- From 2022 to 2050, freight moved annually in the U.S. is expected to increase by 93 percent in value (inflation-adjusted dollars) and 47 percent by weight.
- The following chart indicates the anticipated percentage increase in freight by value and weight from 2022 to 2050, by mode.

Mode	Percent Increase 2022-2050 by Value	Percent Increase 2022-2050 by Weight
Truck	91%	53%
Rail	83%	22%
Water	74%	58%
Air	105%	67%
Multiple Modes	133%	91%
Pipeline	21%	31%

FACTORS IMPACTING FUTURE OF U.S. FREIGHT TRANSPORTATION

Multiple technological advances will transform how freight is delivered in the future. These include the growing use of artificial intelligence, which is driving manufacturing; increased automation in warehousing and supply chains; expanded growth and reliance on e-commerce; changing global logistics patterns; advances in vehicle autonomy, and the transition to environmentally friendlier fuels to reduce transportation greenhouse gas emissions.

- Improved analytics, including the use of artificial intelligence, are significantly improving the efficiency of the nation’s supply chain. Freight brokers, carriers, shippers and receivers can now exchange real-time data, which allows greater adaptive design, flexibility and agility by logistics companies, more efficiently utilizing shipping space and reducing the occurrence of empty payloads.
- In the last decade, U.S. retail e-commerce sales increased nearly four and a half times, from \$64 billion in the second quarter of 2013 to \$278 billion in the second quarter of 2023. The COVID-19 pandemic rapidly accelerated the growth in retail e-commerce, with U.S. e-commerce sales increasing from \$160 billion in the first quarter of 2020 to \$278 billion in the second quarter of 2023 – a 73 percent increase.
- Global supply chain concerns and advances in robotics and automation, which are increasing manufacturing efficiency, are driving an increase in onshoring and nearshoring of manufacturing.
- The development of autonomous trucks is expected to proceed in multiple stages. Existing driver assist tools such as cruise control and lane-assist will advance to a level that will allow large trucks to mostly drive themselves with a driver monitoring the vehicle. Advancements will eventually progress to full autonomy in certain environments, such as major highways, and finally to full autonomy in all environments.
- The use of drones for last-mile deliveries is a potential innovation for what can be the most difficult and expensive aspect of the supply chain. While the use of drones for last-mile delivery will still need to clear several hurdles, including Federal Aviation Administration regulations, public perception, and the technology itself, many companies have been testing [drone deliveries](#).
- With medium and heavy-duty trucks accounting for nearly a quarter (23 percent) of U.S. transportation greenhouse gas emissions in 2021, a transition by freight vehicles to lower carbon transportation fuels -including electric, biofuels, renewable natural gas and hydrogen will be critical in reducing the nation’s greenhouse gas emissions.

STATE FREIGHT TRANSPORTATION

The health of a state’s economy and quality of life are impacted greatly by the quality and reliability of a state’s transportation system and its ability to provide efficient, safe freight movement.

- The following chart ranks the 10 states with the greatest amount of freight shipped to or from sites in their state (including to or from foreign locations) by all modes and by truck, measured by value in millions of dollars. Data for all 50 states is available in the [Appendix](#).

RANK	STATE	2022 Freight by Value All Modes (millions of dollars)	STATE	2022 Freight By Value Shipped by Truck (millions of dollars)
1	Texas	3,132,697	Texas	2,053,701
2	California	2,845,127	California	1,896,400
3	Illinois	1,571,188	Illinois	1,123,656
4	New York	1,338,798	New York	1,001,711
5	Pennsylvania	1,137,664	Ohio	826,916
6	Michigan	1,090,656	Pennsylvania	818,624
7	Ohio	1,085,222	Michigan	798,274
8	Florida	1,064,559	Georgia	737,382
9	New Jersey	996,118	Florida	736,889
10	Georgia	985,880	New Jersey	726,281

- The following chart ranks the 10 states with the greatest amount of freight shipped to or from sites in their state by truck and by all modes, measured by weight in thousands of tons. Data for all 50 states is available in the [Appendix](#).

RANK	STATE	2022 Freight by Weight All Modes (thousands of tons)	STATE	2022 Freight By Weight Shipped by Truck (thousands of tons)
1	Texas	3,403,458	Texas	1,723,724
2	California	1,397,905	California	995,595
3	Louisiana	1,383,421	Illinois	755,633
4	Illinois	1,270,882	Florida	657,257
5	Ohio	980,297	Ohio	596,655
6	Pennsylvania	896,629	Pennsylvania	572,677
7	Florida	838,912	New York	535,876
8	Indiana	814,538	Indiana	468,573
9	Minnesota	760,175	Wisconsin	462,805
10	Michigan	755,676	Georgia	460,187

- The following chart ranks the 20 states that are expected to realize the greatest percentage increase in freight (by all modes and by truck only) shipped to and from sites within their state from 2022 to 2050, in inflation-adjusted dollars. Data for all 50 states is available in the [Appendix](#).

RANK	STATE	2022-2050 Increase in Freight by Value All Modes	STATE	2022-2050 Increase in Freight Shipped by Truck by Value
1	Hawaii	219%	Mississippi	118%
2	South Carolina	116%	Delaware	112%
3	Washington	114%	Louisiana	110%
4	Delaware	112%	South Carolina	110%
5	Tennessee	109%	Tennessee	105%
6	Nebraska	108%	Colorado	104%
7	California	107%	Nebraska	104%
8	Colorado	105%	California	100%
9	Massachusetts	102%	Missouri	100%
10	New Jersey	101%	Ohio	99%
11	Georgia	101%	Kentucky	99%
12	Florida	101%	New Jersey	98%
13	Mississippi	101%	Maryland	98%
14	Utah	101%	Pennsylvania	98%
15	Missouri	100%	North Carolina	97%
16	Maryland	100%	Iowa	97%
17	North Carolina	100%	Nevada	97%
18	Arkansas	100%	Georgia	96%
19	New York	99%	Arkansas	96%
20	Pennsylvania	99%	Massachusetts	96%

- The following chart ranks the 20 states that are expected to realize the greatest percentage increase in freight (by all modes and by truck only) shipped to and from sites within their state from 2022 to 2050, in weight. Data for all states is available in the [Appendix](#).

RANK	STATE	2022-2050 Increase in Freight by Weight All Modes	STATE	2022-2055 Increase in Freight Shipped by Truck by Weight
1	Nebraska	77%	Wyoming	77%
2	South Carolina	75%	Louisiana	75%
3	Delaware	69%	South Carolina	74%
4	Kansas	68%	Alaska	70%
5	Colorado	66%	Delaware	69%
6	Oregon	65%	Georgia	67%
7	Idaho	63%	New York	66%
8	California	63%	California	65%
9	Alaska	63%	Rhode Island	65%
10	Rhode Island	61%	North Carolina	64%
11	New York	61%	Arkansas	63%
12	Georgia	61%	Colorado	63%
13	North Carolina	59%	Oregon	63%
14	Iowa	58%	New Jersey	62%
15	Florida	58%	Mississippi	61%
16	New Jersey	58%	Missouri	61%
17	Michigan	57%	Tennessee	59%
18	Arkansas	57%	Alabama	59%
19	Massachusetts	55%	Florida	58%
20	Arizona	55%	Nebraska	58%

IMPACT OF TRAFFIC CONGESTION ON FREIGHT DELIVERY

Rising levels of traffic congestion are increasing the cost of moving freight and reducing the economic competitiveness and efficiency of businesses that require reliable, affordable freight transportation.

- The expansion of the transportation network has not kept pace with the rapid increase in travel, leading to increasingly congested and crowded roads. From 2000 to 2019, miles of U.S. roadway infrastructure increased by six percent, while traffic volume increased by 18 percent. During that time, miles of Class I railroads declined by nearly 24 percent.
- The [American Transportation Research Institute \(ATRI\)](#) estimates that traffic congestion on the nation’s major highways resulted in the addition of \$94.6 billion in operational costs to the trucking industry in 2022, including nearly 1.3 billion hours of lost productivity as a result of trucks being stuck in traffic.
- Fifty-seven percent of vehicle miles of travel by combination trucks in 2021 occurred on Interstate highways.

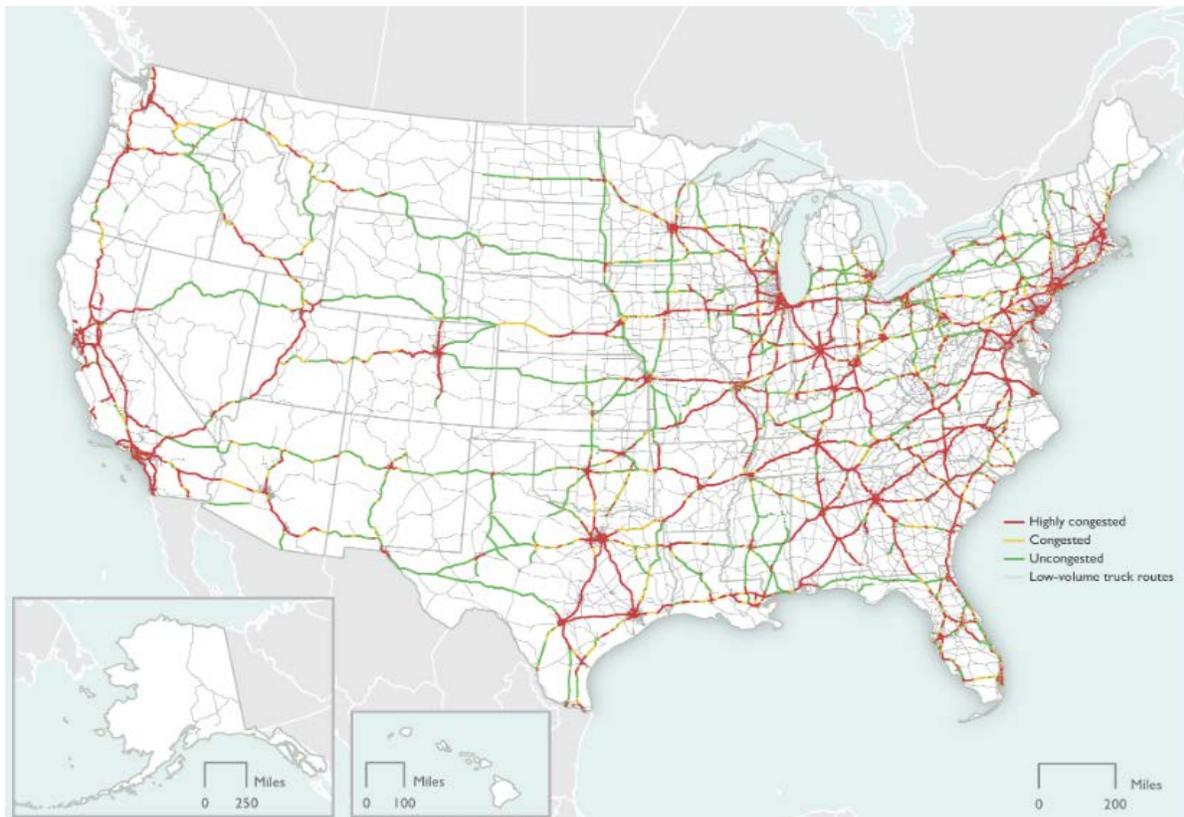
- Fourteen percent of travel on Interstate highways and 22 percent of travel on rural Interstate highways is by combination trucks.
- The following chart ranks the 20 states in 2021 where combination trucks make up the greatest share of vehicle miles of travel on all Interstate highways and on rural Interstate highways. Data for all states is available in the [Appendix](#).

RANK	STATE	Share of Interstate VMT by Combination Trucks	STATE	Share of Rural Interstate VMT by Combination Trucks
1	Arkansas	28%	Indiana	38%
2	Louisiana	27%	Nebraska	35%
3	Indiana	26%	Arkansas	34%
4	Nebraska	25%	Illinois	30%
5	Iowa	22%	Texas	29%
6	Nevada	22%	Tennessee	28%
7	New Mexico	21%	Missouri	27%
8	West Virginia	21%	Iowa	27%
9	North Dakota	21%	Louisiana	27%
10	Montana	18%	Nevada	26%
11	Missouri	18%	North Dakota	25%
12	Idaho	18%	Utah	24%
13	Mississippi	17%	Pennsylvania	24%
14	Illinois	17%	Ohio	24%
15	South Dakota	16%	Arizona	23%
16	Kentucky	16%	Mississippi	22%
17	Tennessee	16%	New Mexico	22%
18	Delaware	15%	Idaho	22%
19	Arizona	15%	Oklahoma	22%
20	Kansas	15%	Minnesota	22%

- Using a freight congestion index developed by the Federal Highway Administration, in 2023 the ATRI compiled the [following list](#) of the nation’s worst freight highway bottlenecks based on the number of trucks using a particular highway facility and the impact of congestion on the average speed of those vehicles.

Rank	Bottleneck Description	State	Avg. Speed	Peak Avg. Speed	Non-Peak Avg. Speed	% Change in Peak Avg. Speed 21-22
1	Fort Lee, NJ: I-95 at SR 4	NJ	26.8	20.2	29.5	-10%
2	Chicago, IL: I-294 at I-290/I-88	IL	45.2	37.8	48.3	-6%
3	Houston, TX: I-45 at I-69/US 59	TX	31.1	21.7	35.8	-11%
4	Atlanta, GA: I-285 at I-85 (North)	GA	38.1	28.5	42.4	-6%
5	Atlanta, GA: I-20 at I-285 (West)	GA	41.6	36.3	43.8	-3%
6	Chicago, IL: I-290 at I-90/I-94	IL	23.5	18.2	25.3	-10%
7	Los Angeles, CA: SR 60 at SR 57	CA	42.6	35.7	45.2	-3%
8	Los Angeles, CA: I-710 at I-105	CA	37.9	28.5	42.8	-33%
9	Nashville, TN: I-24/I-40 at I-440 (East)	TN	41.4	30.6	46.2	-13%
10	San Bernardino, CA: I-10 at I-15	CA	41.7	34.1	44.7	-5%
11	Houston, TX: I-10 at I-45	TX	39.2	27.7	45.2	-9%
12	Chicago, IL: I-80 at I-94	IL	47.1	44.8	48	-5%
13	McDonough, GA: I-75	GA	47	42.8	48.7	-3%
14	Atlanta, GA: I-285 at SR 400	GA	40.7	33.6	43.7	-9%
15	Cincinnati, OH: I-71 at I-75	OH	47.2	43	48.8	28%
16	Dallas, TX: I-45 at I-30	TX	37.8	27.5	42.4	1%
17	Atlanta, GA: I-20 at I-285 (East)	GA	43.8	37	46.7	-11%
18	Atlanta, GA: I-75 at I-285 (North)	GA	45	38.7	47.7	-8%
19	Houston, TX: I-45 at I-610 (North)	TX	40.1	28.8	45.9	-7%
20	Baton Rouge, LA: I-10 at I-110	LA	38.2	30.7	42	0%

- Based on projected increases for both passenger and commercial vehicle travel, the following [map from the Bureau of Transportation Statistics](#) shows peak-period congestion on high-volume truck portions of the National Highway System in 2045.



LARGE TRUCK SAFETY

Traffic fatalities as a result of crashes involving large trucks (10,000 lbs. or greater) increased significantly over the last five years. Approximately five-out-of-six people killed in crashes involving a large truck were occupants of the other vehicle involved in the crash or pedestrians or bicyclists. The most frequent event prior to fatal crashes between large trucks and another vehicle is the entering or encroaching into a large truck’s lane by the other vehicle.

- While large trucks account for five percent of all registered vehicles and ten percent of all vehicle miles of travel annually, 13 percent of traffic fatalities occur in traffic crashes in which a large truck was involved.
- Nearly three-quarters – 71 percent – of large trucks that were involved in fatal crashes in 2021 weighed more than 26,000 lbs.
- According to TRIP’s analysis of National Highway Traffic Safety Administration (NHTSA) data, 25,677 of the 191,528 U.S. traffic fatalities that occurred from 2017 to 2021, 13 percent, resulted from a collision that involved a large truck.
- Fatal traffic crashes involving large trucks from 2017 to 2021 resulted in the deaths of 4,491 drivers or passengers of large trucks. The remaining 21,186 people killed were either drivers or occupants of other vehicles (18,317 deaths) or were non-motorists, such as pedestrians or bicyclists (2,869 deaths).

	PERSONS KILLED IN CRASHES INVOLVING A LARGE TRUCK 2017-2021						
	Large Truck Occupants		Occupants of Other Vehicles or Nonoccupants		TOTAL	Total U.S. Fatalities	Share of U.S. Fatalities Involving a Large Truck
2017	18%	878	82%	4028	4906	37133	13%
2018	18%	890	82%	4116	5006	36560	14%
2019	18%	893	82%	4139	5032	36096	14%
2020	17%	822	83%	4123	4945	38824	13%
2021	17%	1008	83%	4780	5788	42795	14%
TOAL	17%	4491	83%	21186	25677	191408	13%

- From 2017 to 2021, the number of fatalities in large-truck involved crashes in the U.S. increased 18 percent, from 4,906 to 5,788.
- Eighty-one percent of fatal crashes involving large trucks in 2021 were multiple-vehicle crashes, compared to 63 percent for fatal crashes involving only passenger vehicles.
- In 64 percent of fatal large truck crashes from 2018 to 2020, the most critical pre-crash event was either another vehicle’s encroachment into a large truck’s lane (36.5 percent) or another vehicle entering a large truck’s lane (27.1 percent).
- A 2023 [report](#) by NHTSA that analyzed 2021 two-vehicle fatal crashes involving a large truck found the following: in 43 percent of the crashes both vehicles were proceeding straight, in 8.3 percent of these two-vehicle traffic crashes, the other vehicle was turning left regardless of the large-truck maneuver, in 8.9 percent of these traffic crashes the truck and the other vehicle were both negotiating a curve and in 8.3 percent of the two-vehicle fatal traffic crashes, either the truck or the other vehicle was stopped in the road (6.5% and 1.8%). The following chart presents percentages of two-vehicle fatal crashes involving large trucks by initial impact point of the large truck and the other vehicle.

Impact Point on	Impact Point on Other Vehicle				
	Front	Left Side	Right Side	Rear	Total
Front	32%	13%	10%	6%	60%
Left Side	8%	1%	1%	0%	10%
Right Side	5%	1%	0%	0%	6%
Rear	22%	1%	1%	0%	24%
Total	67%	16%	12%	6%	100%

- In large truck-involved fatal crashes in 2021, three percent of large truck drivers had blood alcohol concentrations above .08 f/dL, while the share for drivers of passenger vehicles, light trucks and motorcycles with blood alcohol concentrations above .08 f/dL was 24, 20 and 28 percent, respectively.
- The following chart ranks the top 20 states with the largest annual average number of fatalities in large truck involved crashes from 2017 to 2021. It also includes the average number of large truck non-occupant fatalities, which includes non-motorists, and large truck occupant fatalities. Data for all 50 states is available in the [Appendix](#).

Rank	STATE	Average Annual Large Truck Fatalities 2017-2021	Average Annual Large Truck Non-Occupant Fatalities 2017-2021	Average Annual Large Truck Occupant Fatalities 2017-2021
1	Texas	683	543	140
2	California	391	343	48
3	Florida	336	288	48
4	Georgia	217	178	38
5	Ohio	177	151	26
6	North Carolina	169	143	26
7	Illinois	163	138	25
8	Tennessee	155	127	28
9	Indiana	149	125	24
10	Pennsylvania	148	121	27
11	Alabama	130	107	23
12	Missouri	126	101	26
13	South Carolina	122	103	19
14	Oklahoma	115	92	22
15	New York	114	99	14
16	Kentucky	111	92	19
17	Virginia	108	84	25
18	Arizona	107	88	19
19	Louisiana	105	85	20
20	Mississippi	98	84	14

- The following chart ranks the top 20 states with the largest annual average number of fatalities in large truck involved crashes per one million population from 2017 to 2021. Data for all 50 states is available in the [Appendix](#).

Rank	STATE	Average Annual Large Truck Fatalities per 1M Population 2017-2021
1	Wyoming	45
2	New Mexico	34
3	Mississippi	33
4	Arkansas	30
5	Oklahoma	29
6	North Dakota	29
7	Kansas	28
8	Nebraska	27
9	Alabama	26
10	Montana	26
11	Idaho	25
12	West Virginia	25
13	South Dakota	25
14	Kentucky	25
15	South Carolina	24
16	Texas	23
17	Louisiana	23
18	Tennessee	22
19	Indiana	22
20	Iowa	21

LACK OF ADEQUATE PARKING, DRIVER SHORTAGE THREATENS U.S. FREIGHT SYSTEM

A lack of adequate parking for large trucks and a shortage of available truck drivers, particularly for long-haul trips, challenge the safety and efficiency of the nation’s freight system.

- A significant lack of adequate truck parking along major U.S. highways reduces the efficiency and safety of freight movement. Tired truck drivers may continue to drive because they have difficulty finding a place to park, or they may choose to park at unsafe locations such as a highway shoulder, exit ramps or vacant lots.
- The nationwide shortage of parking spots to accommodate large trucks causes challenges for freight movement and on-time freight delivery. Commercial truck drivers must remain within their allowed hours of service (HOS) and take regular breaks, and they must stay near and within industrial areas in order to arrive at their designated time. However, the lack of large truck parking spaces makes it difficult for drivers to schedule regular breaks and to arrive at their destination at their assigned time. Parking shortages can lead to mobility and safety concerns for truck drivers, shippers, the economy and the driving public.
- The American Trucking Associations estimates that in 2021, the shortage of truck drivers hit a historic high of just over 80,000 drivers. By 2030 the shortage could reach 160,000 drivers due to driver demographic trends, including age and gender, and projected growth in freight movement.

RECOMMENDATIONS FOR IMPROVING U.S. FREIGHT TRANSPORTATION

Achieving a 21st century freight transportation system capable of efficiently, safely and sustainably meeting the nation's freight transportation needs will require implementation of a freight transportation plan that addresses the following infrastructure, institutional and financial bottlenecks.

Infrastructure Bottlenecks

- ✓ Increase the capacity of the nation's freight transportation system, particularly at major bottlenecks, including portions of Interstate Highways and major trade gateways and corridors, rail facilities and ports, and including the addition of general purpose highway lanes and the construction of truck-only lanes when viable, such as the [planned addition of 41 miles of truck-only lanes on a portion of I-75 in Georgia](#).
- ✓ Construct additional intermodal connectors and improve the reliability and condition of intermodal connectors between major highways and rail, ports and waterways.
- ✓ Continue to develop vehicle autonomy and further automate warehousing.
- ✓ Ensure a transition by freight vehicles to lower carbon fuels that does not reduce the efficiency of freight movement and minimizes economic disruption.
- ✓ Improve roadway safety, particularly along highways and at major intersections, and provide additional truck parking spaces to insure adequate and timely rest for drivers.

Institutional Bottlenecks

- ✓ Further streamline the planning, review and permitting of transportation projects.
- ✓ Facilitate greater multijurisdictional collaboration on multimodal freight transportation solutions.

Funding bottlenecks:

- ✓ Provide funding for freight transportation improvements that is substantial, continuing, multimodal, reliable, and, where appropriate, specifically dedicated to freight transportation projects.
- ✓ Provide a permanent, adequate and reliable funding fix to the federal Highway Trust Fund as a critical step towards funding a 21st Century freight transportation system.

All data used in this report is the most current available. Sources of information for this report include: The American Transportation Research Institute (ATRI), The American Trucking Associations (ATA), The Bureau of Transportation Statistics (BTS), the Federal Highway Administration (FHWA) the Freight Analysis Framework (FAF), the National Highway Traffic Safety Administration (NHTSA), and the U.S. Census Bureau. Cover photo credit: Getty Images.

INTRODUCTION

The ability of the U.S. freight transportation system to efficiently and safely move local, regional, national and global products is a critical factor in the nation’s economic health and quality of life. The critical nature of the freight transportation system was demonstrated during the COVID-19 pandemic when the global supply chain, already straining under growing consumer demand for timely deliveries, was at times overwhelmed by increased demand, production pauses and bottlenecks at some transportation facilities.

As the U.S. rebounds from the pandemic, the reliability, capacity, sustainability and safety of the nation’s freight transportation system will be critical factors in its ability to provide a supply chain that will meet the growing need for timely and safe movement of goods. The potential for the U.S. freight network to meet the nation’s transport needs will depend on its ability to respond to key trends that will re-shape logistics in the U.S.: ongoing improvements in analytics and artificial intelligence that are increasing the efficiency of manufacturing and freight transportation; evolving market demands; changing global logistics patterns; a transition to lower carbon transportation fuels; and advances in transport technology, including the increased autonomy of freight vehicles and the use of drones for last-mile deliveries.

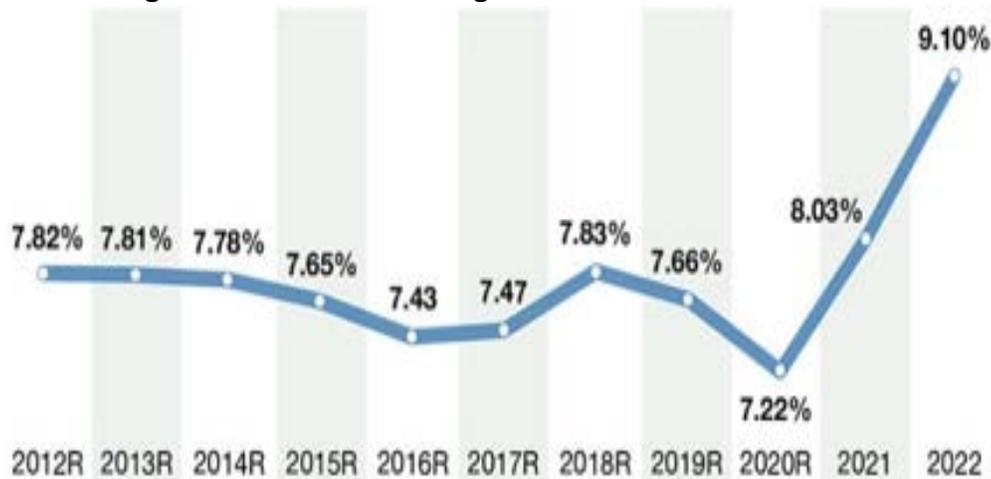
Addressing the nation’s need for a more efficient and safe freight transportation system will require increased investment in improvements to network capacity and safety, greater multijurisdictional cooperation to facilitate large transportation projects, and further technological advancements in the nation’s supply chain, including vehicles, warehouses and logistics.

TRENDS IN U.S. FREIGHT TRANSPORTATION

U.S. delivery of freight – merchandise or commodities that are moved by a mode of transportation for a fee or by private fleet– continues to increase as a result of economic growth and changing commercial, retail and household practices, including e-commerce. In the U.S., 333 million residents, 129.9 million households, 7.9 million business establishments and 90,000 governmental units comprise an economy that requires the efficient movement of freight.¹

U.S. business logistics costs reached \$2.3 trillion in 2022, representing 9.1 percent of U.S. GDP – the highest share of GDP on record.²

Chart 1. U.S. Business Logistics Cost as a Percentage of GDP



Source: Council of Supply Chain Management Professionals 34th Annual State of Logistics Report

America's freight transportation system relies on an extensive system of highways, railroads, waterways, pipelines and waterways. This includes 958,000 miles of Federal-aid highways, 141,000 miles of railroads, 11,000 miles of inland waterways, more than 19,000 airports, more than 5,000 coastal, Great Lakes and inland waterway facilities, and 1.6 million miles of pipelines.³

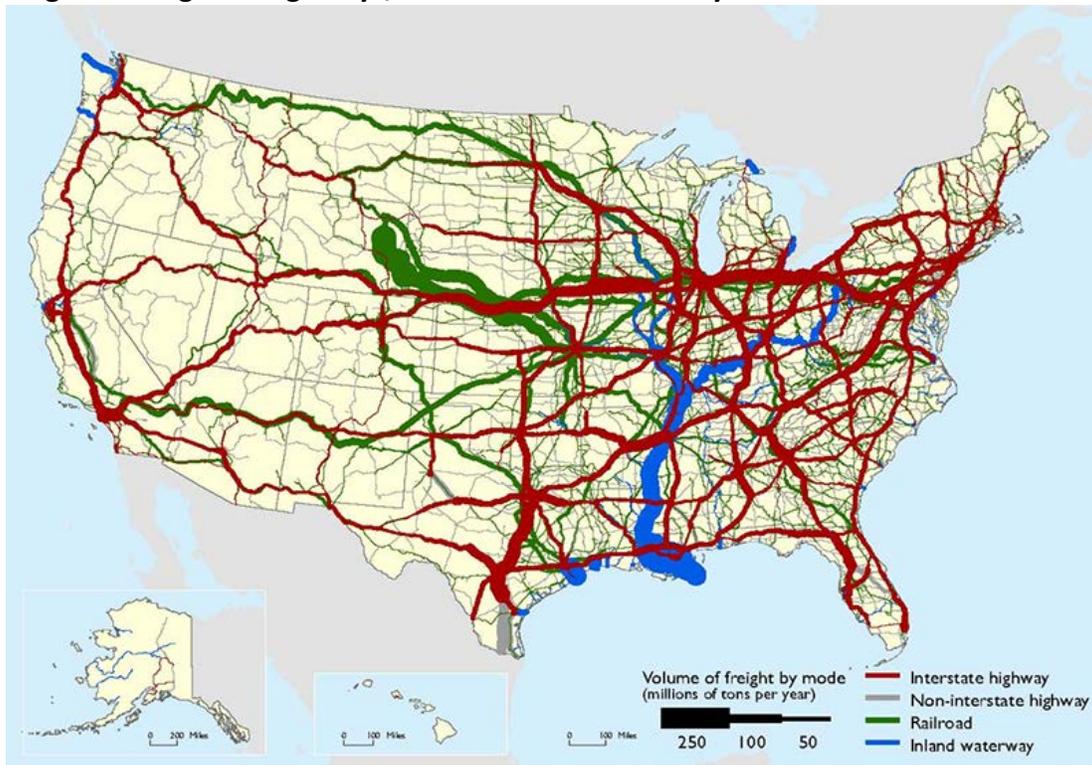
Every five years a U.S. Commodity Flow Survey (CFS) is conducted through a partnership between the Bureau of the Census of the U.S. Department of Commerce and the Bureau of Transportation Statistics. The CFS is the only comprehensive source of multimodal, system-wide data on the volume and pattern of goods movement in the United States.⁴

The [Freight Analysis Framework](#), which is produced through a partnership between the Bureau of Transportation Statistics and the Federal Highway Administration, integrates data from the CFS and other sources to create a comprehensive picture of freight movement at the national, state and regional level.

The 2022 and projected 2050 national and statewide data in this report is based on the Freight Analysis Framework, which provides annual freight estimates based largely on the 2017 CFS.

In 2022, the nation's freight system moved a daily average of approximately 54 million tons of freight, valued at approximately \$52 billion.⁵ In 2022 the nation's freight system moved approximately 19.7 billion tons of freight, valued at approximately \$18.8 trillion.⁶

Chart 2. Freight Tonnage on Highways, Railroads and Waterways



Source: Federal Highway Administration, Freight Analysis Framework

Freight is moved by numerous transportation modes, including truck, ship, aircraft, pipeline or train. In 2022 trucking accounted for the largest modal share of freight movement, carrying 72 percent of freight by value and 64 percent by weight.⁷ The following chart shows modal freight movement in 2022 by value and weight.

Chart 3. Modal Share of Freight Movement by Value and Weight (2022)

Mode	By Value	By Weight
Truck	72%	64%
Rail	3%	8%
Water	1%	4%
Air	3%	0%
Multiple Modes	14%	3%
Pipeline	6%	20%

Source: TRIP analysis of Federal Highway Administration, Freight Analysis Framework data

The amount and value of freight moved annually is anticipated to increase significantly through 2050, as a result of population and economic growth. From 2022 to 2050, the total amount of freight moved annually in the U.S. is expected to increase by 93 percent in value (in inflation adjusted dollars) and 47 percent by weight.⁸ The following chart indicates the percentage increase in freight by value and weight from 2022 to 2050, by mode.

Chart 4. Increase in Freight 2022-2050 by Mode

Mode	Percent Increase 2022-2050 by Value	Percent Increase 2022-2050 by Weight
Truck	91%	53%
Rail	83%	22%
Water	74%	58%
Air	105%	67%
Multiple Modes	133%	91%
Pipeline	21%	31%

Source: TRIP analysis of Federal Highway Administration, Freight Analysis Framework data

The top 10 commodities by weight delivered by freight are comprised entirely of bulk products while the top 10 commodities by value carried by freight are high value-per-weight goods frequently requiring rapid delivery.

Chart 5. Top 10 Commodities by Weight and Value: 2022

Rank	By Value	Millions of Dollars	By Weight	Thousands of Tons
1	Electronics	1,906,463	Natural gas and other fossil products	3,079,613
2	Motorized vehicles	1,535,728	Gravel	2,122,077
3	Mixed freight	1,511,774	Gasoline	1,413,907
4	Pharmaceuticals	1,412,866	Nonmetal min. prods.	1,261,901
5	Machinery	1,212,237	Cereal grains	1,202,542
6	Misc. mfg. prods.	851,417	Crude petroleum	1,094,889
7	Plastics/rubber	789,608	Fuel oils	973,066
8	Gasoline	757,659	Other ag prods.	727,759
9	Natural gas and other fossil products	734,099	Waste/scrap	696,821
10	Other foodstuffs	731,852	Other foodstuffs	684,677

Source: Bureau of Transportation Statistics, FHWA Freight Analysis Framework

FACTORS IMPACTING THE FUTURE OF FREIGHT

Multiple technological advances will transform how freight is delivered in the future. These include the growing use of artificial intelligence, which is driving manufacturing; increased automation in warehousing and supply chains; expanded growth and reliance on e-commerce; changing global logistics patterns; advances in vehicle autonomy; and the transition to environmentally friendlier fuels to reduce transportation greenhouse gas emissions.

Improved analytics, including the use of artificial intelligence, are significantly improving the efficiency of the nation’s supply chain. Freight brokers, carriers, shippers and receivers can now exchange real-time data, which allows greater adaptive design, flexibility and agility by logistics companies, more efficiently utilizing shipping space and reducing the occurrence of empty payloads.⁹

A significant increase in e-commerce and the development of logistics networks by large retailers are increasing the demand for the timely delivery of smaller payloads, largely to urban areas, and putting further competitive pressure on the nation’s freight logistic system. In the last decade, U.S. retail e-commerce sales increased nearly four and a half times, from \$64 billion in the second quarter of 2013 to \$278 billion in the second quarter of 2023.¹⁰ The COVID-19 pandemic rapidly accelerated the growth in retail e-commerce, with U.S. e-commerce sales increasing from \$160 billion in the first quarter of 2020 to \$278 billion in the second quarter of 2023 – a 73 percent increase.¹¹

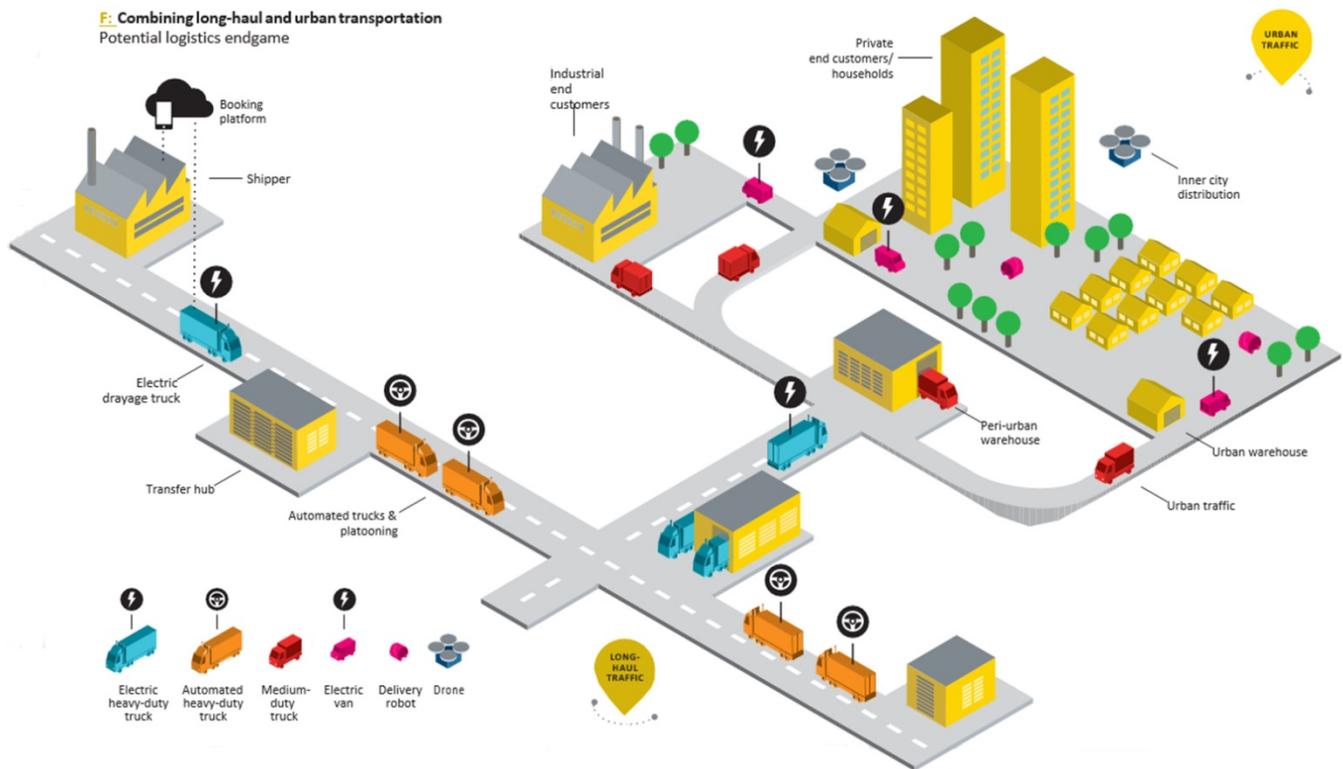
Global supply chain concerns and advances in robotics and automation, which are increasing manufacturing efficiency, are driving an increase in onshoring and nearshoring of manufacturing. In 2022 American companies are estimated to have reshored nearly 350,000 jobs, an increase from 260,000 jobs in 2021.¹² New multi-billion dollar facilities are being built in the U.S. by major automobile and electronics manufacturers to produce their highest-value products. In 2022, automotive companies announced \$13 billion in investments in U.S.-based battery production plants.¹³ A recent survey of U.S. manufacturing and transportation leaders found that the majority of the executives anticipated further reshoring or nearshoring of Asia-originating manufacturing to the U.S., Central America, South America and Canada.¹⁴

The development of autonomous trucks capable of transporting freight without a driver is expected to proceed in multiple stages. Existing driver assist tools such as cruise control and lane-assist will advance to a level of autonomy that will allow large trucks to largely drive themselves with a driver monitoring the vehicle. Advancements will eventually progress to full autonomy in certain

environments, such as major highways, and finally to full autonomy in all conditions. The gradual transition to vehicle autonomy will likely allow the growing use of large truck platooning on portions of major highways, which would reduce fuel costs and could possibly remove the need for a driver in trailing vehicles. Fully autonomous trucks would also likely be used along major highway corridors between urban areas, with payloads being transferred to human-driven trucks for deliveries within urban areas, where navigation by autonomous trucks would be too complex for the foreseeable future.

The international consulting firm Roland Berger recently released a [report](#) on the future of trucking that included the following graphic of a possible future freight transportation system that combines the use of autonomous and human driven commercial trucks of varying power sources and sizes, as well as transfer hubs close to urban areas to allow payloads to be shifted from autonomous trucks to human-driven vehicles for pick-ups and deliveries within urban areas.

Chart 6. Possible Future Freight Transportation System



Source: Roland Berger

A potential innovation for last-mile deliveries, which can be the most difficult and expensive aspect of the supply chain is the use of drones. While the use of drones for last-mile delivery will still need to clear several hurdles, including Federal Aviation Administration regulations, public perception, and the technology itself, many companies have been testing [drone deliveries](#).¹⁵

With medium and heavy-duty trucks accounting for nearly a quarter (23 percent) of U.S. transportation greenhouse gas emissions in 2021, a transition by freight vehicles to lower carbon transportation fuels -including electric, biofuels, renewable natural gas and hydrogen- will be critical in reducing the nation’s greenhouse gas emissions.¹⁶ Transitioning a significant share of heavy duty vehicles to electric power will require further technical innovations that increase the range of electric trucks, shorten charging times and improve reliability.¹⁷

STATE FREIGHT TRANSPORTATION

The five states with the greatest value of freight shipped to or from locations in their state (including to or from foreign locations) by all modes are Texas, California, Illinois, New York and Pennsylvania.¹⁸ And the top five states with the greatest value of freight shipped to or from locations in their state by truck are Texas, California, Illinois, New York and Ohio.¹⁹ Data for all 50 states can be found in the [Appendix](#). The following chart ranks the 20 states with the greatest amount of freight shipped to or from sites in their state by truck and by all modes in 2022, measured by value in millions of dollars.

Chart 7. Top 20 States Freight by Value Shipments in 2022 (in millions of dollars)

RANK	STATE	2022 Freight by Value All Modes (millions of dollars)	STATE	2022 Freight By Value Shipped by Truck (millions of dollars)
1	Texas	3,132,697	Texas	2,053,701
2	California	2,845,127	California	1,896,400
3	Illinois	1,571,188	Illinois	1,123,656
4	New York	1,338,798	New York	1,001,711
5	Pennsylvania	1,137,664	Ohio	826,916
6	Michigan	1,090,656	Pennsylvania	818,624
7	Ohio	1,085,222	Michigan	798,274
8	Florida	1,064,559	Georgia	737,382
9	New Jersey	996,118	Florida	736,889
10	Georgia	985,880	New Jersey	726,281
11	Tennessee	813,098	Indiana	607,318
12	Indiana	812,224	North Carolina	587,852
13	North Carolina	741,329	Tennessee	530,960
14	Washington	618,140	Wisconsin	457,456
15	Kentucky	604,849	Virginia	408,420
16	Louisiana	581,048	Washington	380,439
17	Wisconsin	566,595	Missouri	378,431
18	Virginia	537,771	Kentucky	355,448
19	Minnesota	513,798	Minnesota	353,014
20	Massachusetts	491,645	Massachusetts	346,300

Source: TRIP analysis of Federal Highway Administration, Freight Analysis Framework data

The five states with the greatest amount of freight, measured by weight, shipped to or from locations in their state (including to or from foreign locations) by all modes in 2022 were Texas, California, Louisiana, Illinois and Ohio. States with the greatest amount of freight, measured by weight, shipped to or from locations in their state (including to or from foreign locations) by trucks in 2022 include Texas, California, Illinois, Florida and Ohio. Data for all 50 states can be found in the [Appendix](#).

The following chart ranks the 20 states in 2022 with the greatest amount of freight (measured by weight) shipped to or from sites in their state regardless of mode, and shipped by truck only.

Chart 8. Top 20 Freight Shipments by Weight in 2022 (in thousands of tons), total and truck only

RANK	STATE	2022 Freight by Weight All Modes (thousands of tons)	STATE	2022 Freight By Weight Shipped by Truck (thousands of tons)
1	Texas	3,403,458	Texas	1,723,724
2	California	1,397,905	California	995,595
3	Louisiana	1,383,421	Illinois	755,633
4	Illinois	1,270,882	Florida	657,257
5	Ohio	980,297	Ohio	596,655
6	Pennsylvania	896,629	Pennsylvania	572,677
7	Florida	838,912	New York	535,876
8	Indiana	814,538	Indiana	468,573
9	Minnesota	760,175	Wisconsin	462,805
10	Michigan	755,676	Georgia	460,187
11	New York	742,787	Minnesota	459,626
12	Iowa	637,557	Iowa	454,022
13	Georgia	629,488	Michigan	430,110
14	Washington	607,123	North Carolina	388,914
15	Wisconsin	601,547	Virginia	361,975
16	Alabama	590,035	Tennessee	354,572
17	North Dakota	574,479	New Jersey	344,365
18	Tennessee	551,523	Washington	342,344
19	New Jersey	513,579	Missouri	320,516
20	Virginia	504,353	Louisiana	301,408

Source: TRIP analysis of Federal Highway Administration, Freight Analysis Framework data

Based on continued population and economic growth and the changing nature of e-commerce, the amount and value of freight moved annually is anticipated to increase significantly through 2050. The following chart ranks the 20 states that are expected to realize the greatest percentage increase in freight shipped to and from sites within their state from 2022 to 2050, in inflation-adjusted dollars. Data for all 50 states is available in the [Appendix](#).

Chart 9. Top 20 States in Percentage Increase in Freight Shipments From 2022 to 2050 in inflation-adjusted dollars

RANK	STATE	2022-2050 Increase in Freight by Value All Modes	STATE	2022-2050 Increase in Freight Shipped by Truck by Value
1	Hawaii	219%	Mississippi	118%
2	South Carolina	116%	Delaware	112%
3	Washington	114%	Louisiana	110%
4	Delaware	112%	South Carolina	110%
5	Tennessee	109%	Tennessee	105%
6	Nebraska	108%	Colorado	104%
7	California	107%	Nebraska	104%
8	Colorado	105%	California	100%
9	Massachusetts	102%	Missouri	100%
10	New Jersey	101%	Ohio	99%
11	Georgia	101%	Kentucky	99%
12	Florida	101%	New Jersey	98%
13	Mississippi	101%	Maryland	98%
14	Utah	101%	Pennsylvania	98%
15	Missouri	100%	North Carolina	97%
16	Maryland	100%	Iowa	97%
17	North Carolina	100%	Nevada	97%
18	Arkansas	100%	Georgia	96%
19	New York	99%	Arkansas	96%
20	Pennsylvania	99%	Massachusetts	96%

Source: TRIP analysis of Federal Highway Administration, Freight Analysis Framework data

The following chart ranks the 20 states that are expected to realize the greatest percentage increase in freight shipped to and from sites within their state from 2022 to 2050, by weight. Data for all 50 states is available in the [Appendix](#).

Chart 10. Top 20 States in Percentage Increase in Freight Shipments From 2022 to 2050 by weight

RANK	STATE	2022-2050 Increase in Freight by Weight All Modes	STATE	2022-2055 Increase in Freight Shipped by Truck by Weight
1	Nebraska	77%	Wyoming	77%
2	South Carolina	75%	Louisiana	75%
3	Delaware	69%	South Carolina	74%
4	Kansas	68%	Alaska	70%
5	Colorado	66%	Delaware	69%
6	Oregon	65%	Georgia	67%
7	Idaho	63%	New York	66%
8	California	63%	California	65%
9	Alaska	63%	Rhode Island	65%
10	Rhode Island	61%	North Carolina	64%
11	New York	61%	Arkansas	63%
12	Georgia	61%	Colorado	63%
13	North Carolina	59%	Oregon	63%
14	Iowa	58%	New Jersey	62%
15	Florida	58%	Mississippi	61%
16	New Jersey	58%	Missouri	61%
17	Michigan	57%	Tennessee	59%
18	Arkansas	57%	Alabama	59%
19	Massachusetts	55%	Florida	58%
20	Arizona	55%	Nebraska	58%

Source: TRIP analysis of Federal Highway Administration, Freight Analysis Framework data

LARGE TRUCK SAFETY

Traffic crashes involving large trucks (those with a gross vehicle weight greater than 10,000 pounds) result in a significant proportion of traffic fatalities annually. Due to the more serious consequences involved, crashes involving large trucks are more likely to result in fatalities. While large trucks account for five percent of all registered vehicles and ten percent of all vehicle miles of travel annually, 13 percent of traffic fatalities occur in traffic crashes in which a large truck was involved.²⁰ Seventy-one percent of large trucks that were involved in fatal crashes in 2021 weighed more than 26,000 pounds.²¹

According to TRIP's analysis of NHTSA data, 25,677 of the 191,528 U.S. traffic fatalities that occurred from 2017 to 2021, 13 percent - approximately one-out-of-seven - resulted from a collision that involved a large truck.²² Fatal traffic crashes involving large trucks from 2017 to 2021 resulted in the deaths of 4,491 drivers or passengers of large trucks. The remaining 21,186 people killed were either drivers or occupants of other vehicles (18,317 deaths) or were non-motorists, such as pedestrians or bicyclists (2,869 deaths).²³

From 2017 to 2021, the number of fatalities in large-truck involved crashes in the U.S. increased by 18 percent, from 4,906 to 5,788.

Chart 11. Fatalities in Large Truck Involved Crashes 2017 to 2021

PERSONS KILLED IN CRASHES INVOLVING A LARGE TRUCK 2017-2021							
	Large Truck Occupants		Occupants of Other Vehicles or Nonoccupants		TOTAL	Total U.S. Fatalities	Share of U.S. Fatalities Involving a Large Truck
2017	18%	878	82%	4028	4906	37133	13%
2018	18%	890	82%	4116	5006	36560	14%
2019	18%	893	82%	4139	5032	36096	14%
2020	17%	822	83%	4123	4945	38824	13%
2021	17%	1008	83%	4780	5788	42795	14%
TOAL	17%	4491	83%	21186	25677	191408	13%

Source: TRIP analysis of National Highway Traffic Safety Administration data

Fatal crashes involving large trucks are more likely to be multiple-vehicle crashes, as opposed to fatal crashes involving only passenger vehicles. Eighty-one percent of fatal crashes in 2021 involving large trucks are multiple-vehicle crashes, compared to 63 percent of fatal crashes involving only passenger vehicles.²⁴ From 2018 to 2020, in 64 percent of fatal large truck crashes, the most critical pre-crash event was either another vehicle’s encroachment into a large truck’s lane (36.5 percent) or another vehicle in a large truck’s lane (27.1 percent).²⁵

A 2023 [report](#) by NHTSA that analyzed 2021 two-vehicle fatal crashes involving a large truck found the following: in 43 percent of the crashes both vehicles were proceeding straight, in 8.3 percent of these two-vehicle traffic crashes, the other vehicle was turning left regardless of the large-truck maneuver, in 8.9 percent of these traffic crashes the truck and the other vehicle were both negotiating a curve and in 8.3 percent of the two-vehicle fatal traffic crashes, either the truck or the other vehicle was stopped in the road (6.5% and 1.8%).²⁶ The following chart presents percentages of two-vehicle fatal crashes involving large trucks by initial impact point of the large truck and the other vehicle.

Chart 12. Percentage of Two-Vehicle Fatal Crashes Involving Large Trucks, by Initial Impact Point of the Large Trucks and other Vehicles, 2021

Impact Point on	Impact Point on Other Vehicle				
	Front	Left Side	Right Side	Rear	Total
Front	32%	13%	10%	6%	60%
Left Side	8%	1%	1%	0%	10%
Right Side	5%	1%	0%	0%	6%
Rear	22%	1%	1%	0%	24%
Total	67%	16%	12%	6%	100%

Source: National Highway Traffic Safety Administration

In large truck involved fatal crashes, large-truck drivers are far less likely to be impaired than drivers of other types of vehicles. In large truck-involved fatal crashes in 2021, three percent of large truck drivers had blood alcohol concentrations (BAC) above .08 f/dL, while the share of drivers of passenger vehicles, light trucks and motorcycles with BACs above .08 f/dL was 24, 20 and 28 percent, respectively.²⁷

Fatal large truck crashes are more likely to occur on rural roads, with 55 percent of large-truck involved traffic fatalities on 2021 occurring on rural roads and highways.²⁸ Twenty-six percent of large-truck involved traffic fatalities in 2021 occurred on Interstate highways.²⁹

STATE LARGE TRUCK SAFETY DATA

The five states with the largest average number of fatalities in large truck involved crashes from 2017 to 2021 are Texas, California, Florida, Georgia and Ohio. The following chart ranks the top 20 states with the largest annual average number of fatalities in large truck-involved crashes from 2017 to 2021. The chart also includes data for the average number of fatalities among non-occupant of large trucks (which includes occupants of other vehicles, pedestrians and bicyclists) and the average number of large truck occupants who were killed in large truck involved traffic crashes from 2017 to 2021. Data for all states is available in the [Appendix](#).

Chart 13. States with Largest Average Number of Fatalities in Large Truck Involved Crashes 2017-2021; Average Number of Fatalities of Large Truck Non-Occupants and of Large Truck Occupants

Rank	STATE	Average Annual Large Truck Fatalities 2017-2021	Average Annual Large Truck Non-Occupant Fatalities 2017-2021	Average Annual Large Truck Occupant Fatalities 2017-2021
1	Texas	683	543	140
2	California	391	343	48
3	Florida	336	288	48
4	Georgia	217	178	38
5	Ohio	177	151	26
6	North Carolina	169	143	26
7	Illinois	163	138	25
8	Tennessee	155	127	28
9	Indiana	149	125	24
10	Pennsylvania	148	121	27
11	Alabama	130	107	23
12	Missouri	126	101	26
13	South Carolina	122	103	19
14	Oklahoma	115	92	22
15	New York	114	99	14
16	Kentucky	111	92	19
17	Virginia	108	84	25
18	Arizona	107	88	19
19	Louisiana	105	85	20
20	Mississippi	98	84	14

Source: TRIP Analysis of National Highway Traffic Safety Administration Data

The five states with the largest average number of fatalities in large truck-involved crashes per one million people from 2017 to 2021 are Wyoming, New Mexico, Mississippi, Arkansas and Oklahoma. The following chart ranks the top 20 states with the largest annual average number of fatalities in large

truck-involved crashes per one million people from 2017 to 2021. Data for all 50 states is available in the [appendix](#).

Chart 14. States with Largest Average Number of Fatalities in Large Truck Involved Crashes Per One Million People 2017-2021

Rank	STATE	Average Annual Large Truck Fatalities per 1M Population 2017-2021
1	Wyoming	45
2	New Mexico	34
3	Mississippi	33
4	Arkansas	30
5	Oklahoma	29
6	North Dakota	29
7	Kansas	28
8	Nebraska	27
9	Alabama	26
10	Montana	26
11	Idaho	25
12	West Virginia	25
13	South Dakota	25
14	Kentucky	25
15	South Carolina	24
16	Texas	23
17	Louisiana	23
18	Tennessee	22
19	Indiana	22
20	Iowa	21

Source: TRIP Analysis of National Highway Traffic Safety Administration data

IMPACT OF TRAFFIC CONGESTION ON FREIGHT DELIVERY

An interconnected freight transportation network contributes to state economic growth by supporting resource development and expanding interstate and global commerce.³⁰ But rising levels of traffic congestion increase the cost of moving freight and reduce the economic competitiveness and efficiency of businesses that rely on reliable, affordable freight transportation.

Long-haul freight truck traffic in the U.S. is concentrated on major routes connecting population centers, ports, border crossings, and other major hubs of activity. With the exception of Route 99 in California and a small number of toll roads and border connections, most of the heaviest traveled truck freight routes are on the Interstate Highway System.³¹ In fact, 57 percent of vehicle miles of travel by combination trucks in 2021 occurred on Interstate highways.³²

Fourteen percent of travel on Interstate highways and 22 percent of travel on rural Interstate highways is by combination trucks.³³ The following chart ranks the 20 states with the greatest share of

vehicle miles of travel in 2021 on all Interstate highways and on rural Interstate highways which is by combination trucks. Data for all 50 states is available in the [appendix](#).

Chart 15. Combination Truck Share of Vehicle Miles of Travel on All/Rural Interstate Highways (2021)

RANK	STATE	Share of Interstate VMT by Combination Trucks	STATE	Share of Rural Interstate VMT by Combination Trucks
1	Arkansas	28%	Indiana	38%
2	Louisiana	27%	Nebraska	35%
3	Indiana	26%	Arkansas	34%
4	Nebraska	25%	Illinois	30%
5	Iowa	22%	Texas	29%
6	Nevada	22%	Tennessee	28%
7	New Mexico	21%	Missouri	27%
8	West Virginia	21%	Iowa	27%
9	North Dakota	21%	Louisiana	27%
10	Montana	18%	Nevada	26%
11	Missouri	18%	North Dakota	25%
12	Idaho	18%	Utah	24%
13	Mississippi	17%	Pennsylvania	24%
14	Illinois	17%	Ohio	24%
15	South Dakota	16%	Arizona	23%
16	Kentucky	16%	Mississippi	22%
17	Tennessee	16%	New Mexico	22%
18	Delaware	15%	Idaho	22%
19	Arizona	15%	Oklahoma	22%
20	Kansas	15%	Minnesota	22%

Source: TRIP Analysis of Federal Highway Administration Data

The expansion of the transportation network has not kept pace with the rapid increase in travel, leading to increasingly congested and crowded roads. From 2000 to 2019, miles of U.S. roadway infrastructure increased by six percent, while traffic volume increased by 18 percent.³⁴ During that time, miles of Class I rail line decreased by nearly 24 percent.³⁵

The [American Transportation Research Institute \(ATRI\)](#) estimates that traffic congestion on the nation’s major highways resulted in the addition of \$94.6 billion in operational costs to the trucking industry in 2022, including nearly 1.3 billion hours of lost productivity as a result of trucks being stuck in traffic.³⁶

Using a freight congestion index developed by the Federal Highway Administration, ATRI compiled their [annual list](#) of the nation’s 100 worst freight highway bottlenecks. The index factors in

both the number of trucks using a particular highway facility and the impact of congestion on the average speed of those vehicles. The following chart details the nation’s top 20 freight bottlenecks.

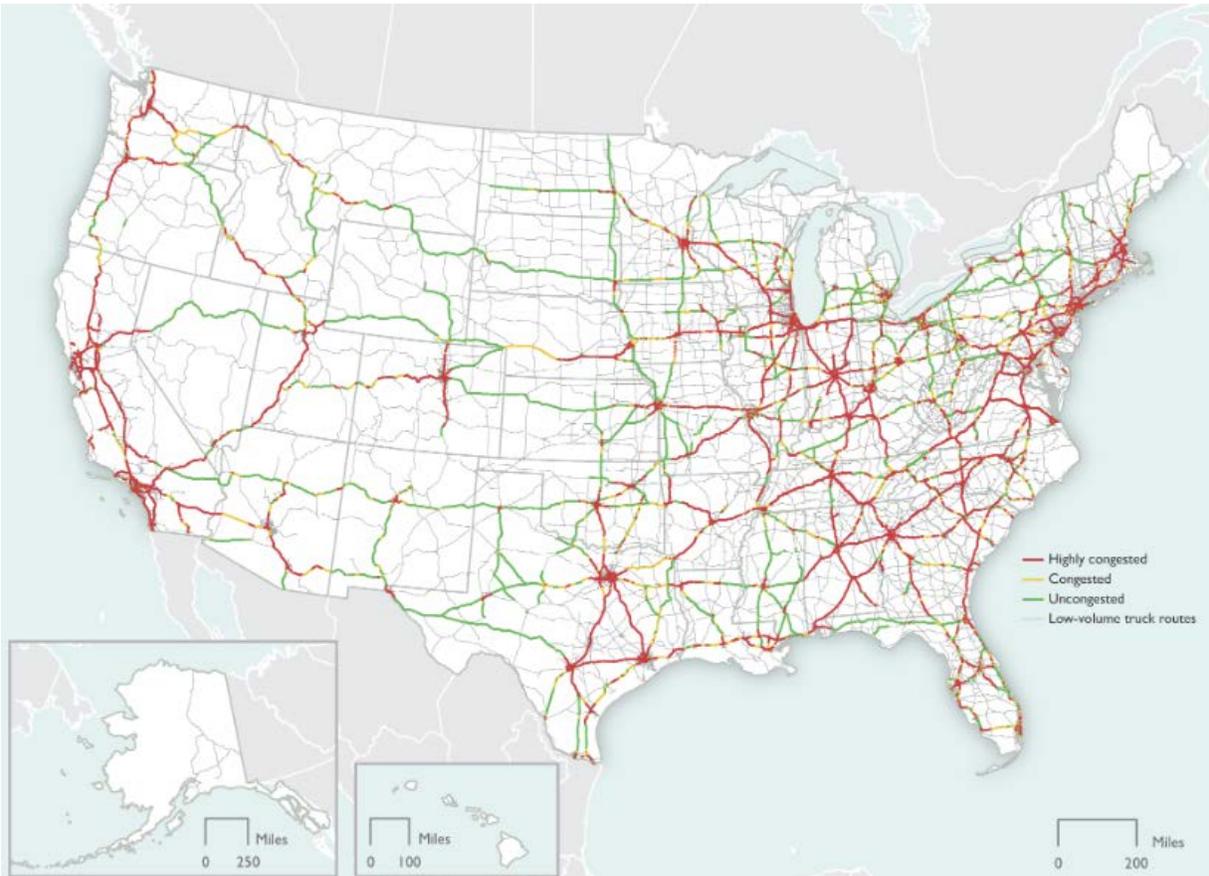
Chart 16. Top Commercial Truck Bottlenecks

Rank	Bottleneck Description	State	Avg. Speed	Peak Avg. Speed	Non-Peak Avg. Speed	% Change in Peak Avg. Speed 21-22
1	Fort Lee, NJ: I-95 at SR 4	NJ	26.8	20.2	29.5	-10%
2	Chicago, IL: I-294 at I-290/I-88	IL	45.2	37.8	48.3	-6%
3	Houston, TX: I-45 at I-69/US 59	TX	31.1	21.7	35.8	-11%
4	Atlanta, GA: I-285 at I-85 (North)	GA	38.1	28.5	42.4	-6%
5	Atlanta, GA: I-20 at I-285 (West)	GA	41.6	36.3	43.8	-3%
6	Chicago, IL: I-290 at I-90/I-94	IL	23.5	18.2	25.3	-10%
7	Los Angeles, CA: SR 60 at SR 57	CA	42.6	35.7	45.2	-3%
8	Los Angeles, CA: I-710 at I-105	CA	37.9	28.5	42.8	-33%
9	Nashville, TN: I-24/I-40 at I-440 (East)	TN	41.4	30.6	46.2	-13%
10	San Bernardino, CA: I-10 at I-15	CA	41.7	34.1	44.7	-5%
11	Houston, TX: I-10 at I-45	TX	39.2	27.7	45.2	-9%
12	Chicago, IL: I-80 at I-94	IL	47.1	44.8	48	-5%
13	McDonough, GA: I-75	GA	47	42.8	48.7	-3%
14	Atlanta, GA: I-285 at SR 400	GA	40.7	33.6	43.7	-9%
15	Cincinnati, OH: I-71 at I-75	OH	47.2	43	48.8	28%
16	Dallas, TX: I-45 at I-30	TX	37.8	27.5	42.4	1%
17	Atlanta, GA: I-20 at I-285 (East)	GA	43.8	37	46.7	-11%
18	Atlanta, GA: I-75 at I-285 (North)	GA	45	38.7	47.7	-8%
19	Houston, TX: I-45 at I-610 (North)	TX	40.1	28.8	45.9	-7%
20	Baton Rouge, LA: I-10 at I-110	LA	38.2	30.7	42	0%

Source: American Transportation Research Institute

Based on projected increases forecast for both passenger and commercial vehicle travel, the following [map from the Bureau of Transportation Statistics](#) projects peak-period congestion on high-volume truck portions of the National Highway System in 2045.

Chart 17. Projected Peak-Period Congestion on High-Volume Truck Portions of the National Highway System: 2045



Source: U.S. Bureau of Transportation Statistics

The following [map from the U.S. Bureau of Transportation Statistics](#) projects for 2045 which major U.S. highways will carry a high volume (more than 8,500 large trucks per day) and/or on which will carry a high percentage (25 percent or higher) of daily traffic comprised of large trucks.

Chart 18. Projected Major Truck Routes Carrying at Least 8,500 Large Trucks Today or On Which Large Trucks Represent At Least 25 Percent of all Vehicles: 2045



Source: U.S. Bureau of Transportation Statistics

LACK OF ADEQUATE PARKING, DRIVER SHORTAGE THREATENS U.S. FREIGHT SYSTEM

A lack of adequate parking for large trucks and a shortage of available truck drivers, particularly for long-haul trips, challenge the safety and efficiency of the nation's freight system.

The nationwide shortage of parking spots to accommodate large trucks causes challenges for freight movement and on-time freight delivery. Commercial truck drivers must remain within their allowed hours of service (HOS) and take regular breaks, and they must stay near and within industrial areas in order to arrive at their designated time. However, the lack of large truck parking spaces makes it difficult for drivers to schedule regular breaks and to arrive at their designated destination at their assigned time. Parking shortages can lead to mobility and safety concerns for truck drivers, shippers, the economy and the driving public.

According to the American Trucking Associations, 98 percent of drivers report problems finding safe and legal parking, with drivers wasting more than 56 minutes of drive time looking for parking.³⁷ Providing an adequate number of truck parking spaces along major highways is critical to provide long-haul truck operators with safe and reliable areas to rest. This significant lack of adequate truck parking along major U.S. highways reduces the efficiency and safety of freight movement. Tired truck drivers may choose to park at unsafe locations such as highway shoulders, exit ramps or vacant lots.

The growing shortage of commercial large truck drivers is a significant impediment to the nation's freight delivery system. The American Trucking Associations estimates that in 2021, the shortage of truck drivers hit a historic high of just over 80,000 drivers.³⁸ By 2030 the shortage could reach 160,000 drivers due to driver demographic trends, including age and gender, and projected growth in freight movement.³⁹

RECOMMENDATIONS FOR IMPROVING U.S. FREIGHT TRANSPORTATION

Achieving a 21st century freight transportation system capable of efficiently and safely meeting the nation's freight transportation needs will require implementation of a freight transportation plan that addresses the following infrastructure, institutional and financial bottlenecks.

Infrastructure bottlenecks:

Improving the safety, efficiency and sustainability of the nation's freight transportation will require numerous improvements including the addition of system capacity, particularly at major bottlenecks, including portions of Interstate Highways and major trade gateways and corridors, rail facilities, and ports. The expansion of highway capacity can include general purpose lanes as well as the construction of truck-only lanes when viable, such as the [planned addition of 41 miles of truck-only lanes on a portion of I-75 in Georgia](#).

The construction of additional intermodal connectors and the improvement of the reliability and condition of intermodal connectors, which connect major highways to rail, ports and waterways, is also critical to the improved efficiency of the nation's freight transportation system. In 2022, the U.S. had 1,775 intermodal connectors between highways and maritime ports, airports, rail facilities and pipelines.⁴⁰

Approximately two-thirds (68 percent) of the nation's intermodal connectors are congested and 56 percent of intermodal connectors have pavements in poor condition.⁴¹ The cost of adding adequate capacity to relieve traffic congestion on intermodal connectors is approximately \$3.2 billion and the cost to improve pavement conditions on intermodal connectors is approximately \$2.2 billion.⁴²

The capacity of the nation's transportation system will also be augmented by further automation and improvements to vehicles, warehousing and logistics networks.

The transition to greater large truck autonomy and lower-carbon transportation fuels should improve the safety and sustainability of freight movement, but must be implemented in a way that does not reduce freight efficiency and minimizes economic disruption.

Improving freight network safety will require additional improvements in roadway safety, particularly along highways and at major intersections. It will also require the provision of additional truck parking spaces to insure safe, adequate and timely rest for drivers.

Institutional Bottlenecks

Relieving institutional challenges to improved freight transportation will require the further streamlining of transportation project planning, review, permitting and the facilitation of greater multijurisdictional collaboration on multimodal freight transportation solutions.

Funding Bottlenecks

Making needed improvements to the nation's freight transportation system will require establishing funding for freight transportation improvements that is substantial, continuing, multimodal, reliable, and, in most cases, specifically dedicated to freight transportation projects.

At the federal level, the provision of a permanent, adequate and reliable funding fix to the Highway Trust Fund is critical to the nation's ability to achieve a 21st Century freight transportation system.

ENDNOTES

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- ¹ U.S. Department of Transportation, Bureau of Transportation Statistics, *Freight Facts and Figures* (Washington, DC: 2021).. <https://data.bts.gov/stories/s/The-Nation-Served-by-Freight/d3er-58uw>
- ² Council of Supply Chain Management Professionals (2023). 34th Annual State of Logistics Report. https://cscmp.org/CSCMP/Resources/Reports_and_Surveys/State_of_Logistics_Report/CSCMP/Educate/State_of_Logistics_Report.aspx?hkey=bdfd8da6-e34f-434c-b39c-d3219dd4a6a2
- ³ U.S. Department of Transportation (2018). Status of the Nation’s Highways, Bridges, and Transit Conditions and Performance; 23rd Edition: Part III: Highway Freight Transportation – Report to Congress. Chapter 11. https://ops.fhwa.dot.gov/freight/infrastructure/nfn/rptc/cp23hwyfreight/iii_ch11.htm#ch11-freight
- ⁴ Federal Register (2016). Proposed Information Collection; Comment Request; Commodity Flow Survey. <https://www.federalregister.gov/documents/2016/03/11/2016-05494/proposed-information-collection-comment-request-commodity-flow-survey>
- ⁵ Bureau of Transportation Statistics (2018). Freight Facts and Figures 2017. P. 1-3. https://www.bts.gov/sites/bts.dot.gov/files/docs/FFF_2017_Full_June2018revision.pdf TRIP used BTS projected growth rates to project 2015 freight estimates to 2018.
- ⁶ TRIP analysis of Federal Highway Administration’s Freight Analysis Framework data (2023). Data is for 2022. <https://faf.ornl.gov/fafweb/>
- ⁷ *Ibid.*
- ⁸ *Ibid.*
- ⁹ Logistics Management (2021). The Future of Motor Freight 2021. https://www.logisticsmgmt.com/article/the_future_of_motor_freight_2021
- ¹⁰ U.S. Census Bureau. Estimated Quarterly U.S. Retail Sales (Adjusted). <https://www.census.gov/retail/ecommerce.html#:~:text=E%2Dcommerce%20sales%20in%20the,the%20first%20quarter%20of%202023>
- ¹¹ *Ibid.*
- ¹² Reshoring Initiative IH 2022 Data Report. https://reshorenw.org/content/pdf/2022_1H_data_report-final5.5.pdf
- ¹³ *Ibid.*
- ¹⁴ Deloitte 2022 Future of Freight Survey. <https://www2.deloitte.com/uk/en/insights/focus/transportation/future-of-transport-industry.html>.
- ¹⁵ Logistics Viewpoints. The Race for Last Mile Drones. August 10, 2022. <https://logisticsviewpoints.com/2022/08/10/the-race-for-last-mile-drones/>
- ¹⁶ Environmental Protection Agency (2023). Fast Facts on Transportation Greenhouse Gas Emissions. <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>
- ¹⁷ Freight Connections (2021). DHL: Pioneer in the Use of Battery Electric Commercial Vehicles. <https://dhl-freight-connections.com/en/sustainability/dhl-pioneer-in-the-use-of-battery-electric-commercial-vehicles/>
- ¹⁸ TRIP analysis of Federal Highway Administration’s Freight Analysis Framework data (2022). <https://www.bts.gov/faf>
- ¹⁹ *Ibid.*
- ²⁰ National Highway Traffic Safety Administration (2023). Traffic Safety Facts: Large Trucks. <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813452>
- ²¹ *Ibid.*
- ²² TRIP analysis of National Highway Traffic Safety Administration data 2017 to 2021.
- ²³ National Highway Traffic Safety Administration (2023). Traffic Safety Facts: Large Trucks. <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813452>
- ²⁴ *Ibid.*
- ²⁵ U.S. Department of Transportation (2022). Large Truck and Bus Crash Facts 2020. P. 82. <https://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts-2020#A4>

- ²⁶ National Highway Traffic Safety Administration (2023). Traffic Safety Facts: Large Trucks. <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813452>
- ²⁷ *Ibid.*
- ²⁸ *Ibid.*
- ²⁹ *Ibid.*
- ³⁰ Bureau of Transportation Statistics (2018). Freight Facts and Figures 2017. P. 1-3. https://www.bts.gov/sites/bts.dot.gov/files/docs/FFF_2017_Full_June2018revision.pdf
P. 2-10.
- ³¹ *Ibid.* P. 3-18.
- ³² Federal Highway Administration (2021). Highway Statistics 2021. TRIP analysis of VM-1 chart. <https://www.fhwa.dot.gov/policyinformation/statistics/2021/pdf/vm1.pdf>
- ³³ TRIP analysis of Federal Highway Administration data (2021). 2021 Highway Statistics. <https://www.fhwa.dot.gov/policyinformation/statistics/2021/>
- ³⁴ U.S. Department of Transportation, Bureau of Transportation Statistics, *Freight Facts and Figures* (Washington, DC: 2020). <https://data.bts.gov/stories/s/Freight-Transportation-System-Extent-Use/r3vy-npgd>
- ³⁵ *Ibid.*
- ³⁶ American Transportation Research Institute. Cost of Congestion to the Trucking Industry: 2023 Update. <https://truckingresearch.org/2023/10/cost-of-congestion-to-the-trucking-industry-2023-update/>
- ³⁷ Biden-Harris Administration Brings Together Trucking Community to Help Expand Truck Parking. U.S. Department of Transportation news release. September 30, 2022. <https://www.transportation.gov/briefing-room/biden-harris-administration-brings-together-trucking-community-help-expand-truck>
- ³⁸ American Trucking Association. Driver Shortage Update 2021. https://www.trucking.org/sites/default/files/2021-10/ATA%20Driver%20Shortage%20Report%202021%20Executive%20Summary.FINAL_.pdf
- ³⁹ *Ibid.*
- ⁴⁰ Bureau of Transportation Statistics (2023). Freight Intermodal Connectors on the National Highway System by State. <https://www.bts.gov/browse-statistical-products-and-data/freight-facts-and-figures/freight-intermodal-connectors>
- ⁴¹ U.S. Department of Transportation, Federal Highway Administration (2017). Freight Intermodal Connectors Study. P. 15, 27 and 50. <https://ops.fhwa.dot.gov/publications/fhwahop16057/fhwahop16057.pdf>
- ⁴² *Ibid.*