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

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Executive Summary

The nation's freight transportation system plays a vital role in the quality of life of Americans, providing 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 amount of freight transported in the U.S. is expected to increase significantly as a result of further economic growth, changing business and retail models, increasing international trade, and rapidly changing consumer expectations that place an emphasis on faster deliveries, often of smaller packages or payloads.

The ability of the nation's freight transportation system to efficiently and safely accommodate the growing demand for freight movement could be hampered by inadequate transportation capacity, a lack of adequate safety features on some transportation facilities, institutional barriers to enhancing the nation's freight facilities, a lack of adequate funding for needed improvements to the freight network and a shortage of drivers.

The need to improve the U.S. freight network is occurring at a time when the nation's freight delivery system is being transformed by advances in vehicle autonomy, manufacturing, warehousing and supply chain automation, increasing e-commerce, and the growing logistic networks being developed by Amazon and other retail organizations in response to the demand for a faster and more responsive delivery and logistics cycle.

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, growing international trade, changing business and retail models, and a significantly increased reliance on e-commerce by businesses and households.

- 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 with the U.S. and the world.

- The nation's 327 million residents, 126 million households, 7.7 million business establishments and 90,000 governmental units are all part of 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, more than 5,000 coastal, Great Lakes and inland waterway facilities, and 1.6 million miles of pipelines.

- The nation's freight system moves a daily average of approximately 51 million tons freight valued at approximately $55 billion. The U.S. freight system annually moves approximately 17.7 billion tons of freight, valued at approximately $16.8 trillion.

- Trucking accounted for the largest modal share of freight movement in 2016, carrying 72 percent of freight by value and 66 percent by weight.

- The following chart details modal freight movement in 2016 by value and weight.

Mode	By Value	By Weight
Truck	72%	66%
Rail	4%	10%
Water	2%	4%
Air	3%	0.03%
Multiple Modes	14%	3%
Pipeline	4%	16%

- Modern society is likely to become even more reliant on trucking and other types of shipments as international trade continues to increase, domestic demand for freight movement increases, and commercial and retail models increasingly rely on timely and efficient freight deliveries.

- From 2016 to 2045, freight moved annually in the U.S. is expected to increase by 104 percent in value (inflation-adjusted dollars) and 44 percent by weight.

- From 2016 to 2045, freight moved annually in the U.S. by trucks is expected to increase by 91 percent in value (inflation-adjusted dollars) and 41 percent by weight. The following chart indicates the anticipated percentage increase in freight by value and weight from 2016 to 2045, by mode.

Mode	Percent Increase 2016-2045 by Value	Percent Increase 2016-2045 by Weight
Truck	91%	41%
Rail	95%	24%
Water	83%	28%
Air	495%	391%
Multiple Modes	123%	64%
Pipeline	42%	64%

- In 2016, the share of overall U.S. freight shipments to or from another country was 11 percent measured by weight and 21 percent measured by value. By 2045, the share of U.S. freight shipments to or from another country is projected to be 18 percent by weight and 39 percent by value.

IMPACT OF EMERGING TECHNOLOGY ON FREIGHT

Freight delivery is being transformed by a convergence of advances in vehicle autonomy, manufacturing, warehousing and supply chain automation, and by increases in e-commerce and the growing logistic networks being developed by Amazon and other large retailers.

- The development of autonomous trucks is expected to proceed in stages from currently deployed driver assist tools such as cruise control and lane-assist to a level that will allow large trucks to mostly drive themselves with a driver monitoring the vehicle, to full autonomy in certain environments, such as major highways, and finally to full autonomy.

- Improved automation of manufacturing and warehousing facilities is increasing the competitiveness of domestic manufacturing and increasing the need for timely freight movement to and from sites that are able to operate 24 hours per day.

- Digitization is significantly improving the efficiency of the nation's supply chain by allowing freight brokers, carriers, shippers and receivers to exchange real-time data to more efficiently use freight capacity.

- From 2014 to 2018, U.S. e-commerce increased by 69 percent, from $298 billion to $505 billion, and is expected to increase another 39 percent by 2022, to $706 billion. Since 2016, Amazon has built 20 new distribution centers in the U.S. and continues to expand its logistics system domestically and globally, including the development of truck, aircraft and shipping fleets.

- Advancements in vehicle autonomy and improvements in vehicle and supply chain automation are anticipated to result in reduced shipping costs.

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 truck and by all modes, measured by value in millions of dollars. Data for all 50 states is available in the Appendix.

RANK	STATE	2016 Freight by Value All Modes (millions of dollars)	STATE	2016 Freight By Value Shipped by Truck (millions of dollars)
1	Texas	2,685,364	Texas	1,724,289
2	California	2,596,985	California	1,633,099
3	Illinois	1,410,240	Illinois	926,678
4	New York	1,280,384	New York	917,640
5	Pennsylvania	1,073,402	Pennsylvania	785,540
6	Ohio	1,042,209	Ohio	780,197
7	Michigan	999,766	Michigan	701,696
8	New Jersey	905,382	New Jersey	643,002
9	Florida	865,243	Georgia	637,225
10	Georgia	843,173	Florida	603,417

- 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	2016 Freight by Weight All Modes (thousands of tons)	STATE	2016 Freight By Weight Shipped by Truck
1	Texas	2,933,850	Texas	1,365,952
2	California	1,409,758	California	1,031,722
3	Illinois	1,317,567	Illinois	744,431
4	Louisiana	1,035,053	Florida	663,708
5	Pennsylvania	934,359	Pennsylvania	560,622
6	Ohio	856,618	Ohio	555,087
7	Florida	799,953	New York	544,348
8	New York	698,423	Georgia	430,435
9	Indiana	669,477	Indiana	418,883
10	Minnesota	656,732	Iowa	418,669

- 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 2016 to 2045, in inflation-adjusted dollars. Data for all 50 states is available in the Appendix.

RANK	STATE	2016-2045 Increase in Freight by Value All Modes	STATE	2016-2045 Increase in Freight Shipped by Truck by Value
1	Vermont	258%	California	134%
2	New York	154%	North Dakota	128%
3	Alaska	148%	New Mexico	126%
4	California	147%	Montana	126%
5	District of Columbia	146%	Texas	115%
6	Connecticut	144%	Louisiana	112%
7	Florida	143%	New York	108%
8	Virginia	128%	Florida	106%
9	Tennessee	128%	South Carolina	106%
10	Michigan	128%	Michigan	102%
11	Arizona	124%	Arizona	100%
12	Washington	124%	Washington	98%
13	Hawaii	120%	New Jersey	93%
14	New Jersey	120%	Vermont	92%
15	Georgia	115%	Virginia	92%
16	Kentucky	114%	Utah	92%
17	South Carolina	111%	Georgia	89%
18	Maryland	110%	Maryland	88%
19	Delaware	110%	North Carolina	82%
20	New Mexico	110%	West Virginia	82%

- 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 2016 to 2045, in weight. Data for all states is available in the Appendix.

RANK	STATE	2016-2045 Increase in Freight by Weight All Modes	STATE	2016-2045 Increase in Freight Shipped by Truck by Weight
1	Mississippi	92%	Hawaii	135%
2	Hawaii	92%	Louisiana	91%
3	Arkansas	87%	Alaska	85%
4	District of Columbia	85%	Mississippi	82%
5	Virginia	85%	District of Columbia	79%
6	Nevada	76%	Michigan	70%
7	Michigan	76%	Delaware	69%
8	Alaska	73%	Virginia	65%
9	Utah	69%	Maryland	64%
10	Tennessee	68%	Arkansas	63%
11	Maine	67%	Washington	61%
12	Vermont	65%	Maine	60%
13	New York	65%	Vermont	57%
14	Louisiana	64%	New York	57%
15	Maryland	63%	Pennsylvania	57%
16	California	63%	West Virginia	56%
17	South Carolina	63%	Alabama	55%
18	Delaware	63%	New Jersey	54%
19	Idaho	60%	California	53%
20	Indiana	59%	North Dakota	52%

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 American Transportation Research Institute (ATRI) estimates that traffic congestion on the nation's major highways resulted in the addition of $74.5 billion in operational costs to the trucking industry in 2016, including 1.2 billion hours of lost productivity as a result of trucks being stuck in traffic.

- Fifty-three percent of vehicle miles of travel by large trucks (10,000 lbs. or greater) in 2016 occurred on Interstate highways. Forty-six percent of urban Interstates are congested.

- Twelve percent of travel on Interstate highways and 21 percent of travel on rural Interstate highways is by combination trucks.

- The following chart ranks the 20 states in 2017 with the greatest share of vehicle miles of travel on all Interstate highways and on rural Interstate highways which is by combination trucks. Data for all states is available in the Appendix.

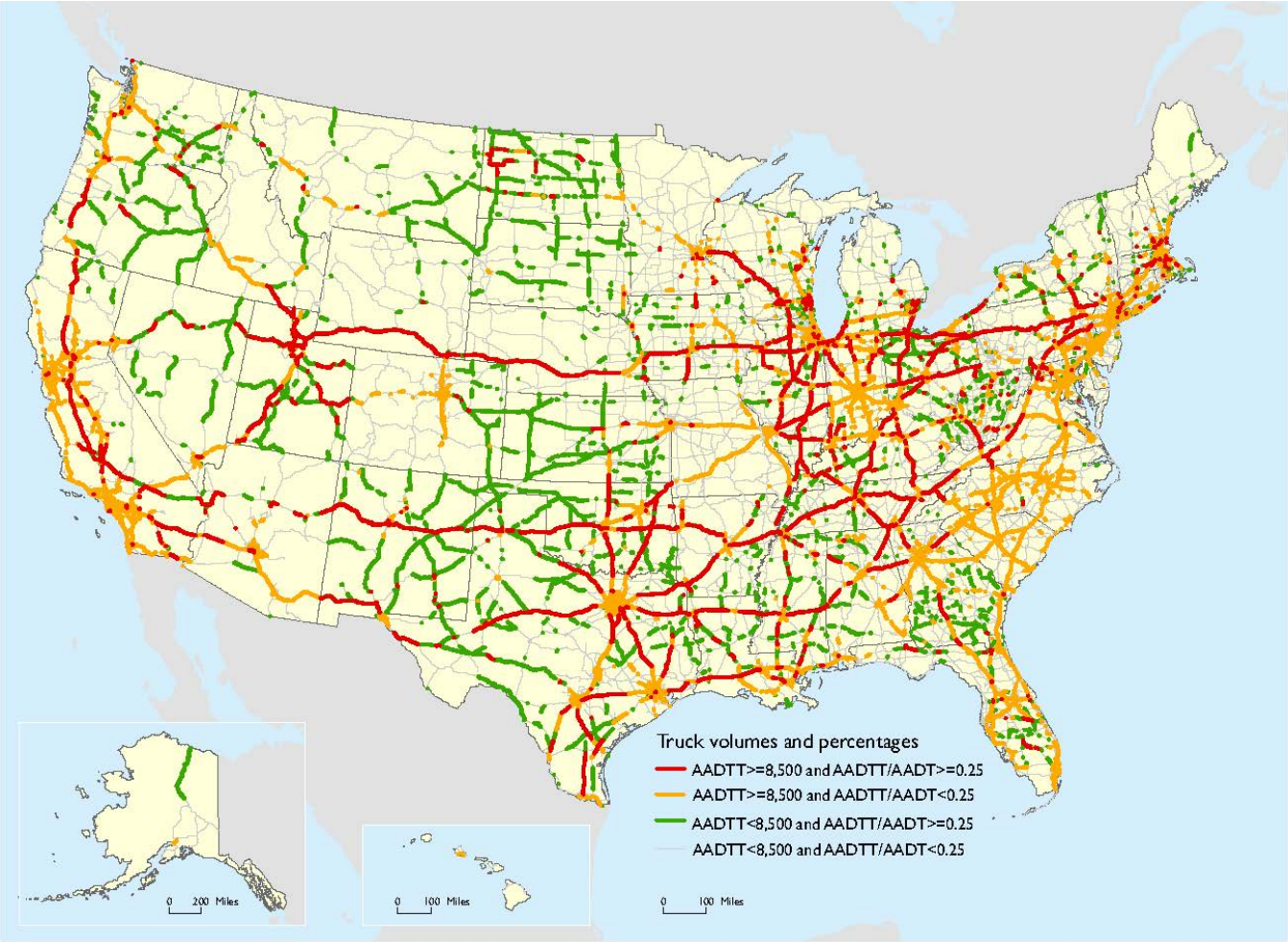
STATE	Share of Interstate VMT by Combination Trucks	STATE	Share of Rural Interstate VMT by Combination Trucks
Wyoming	29%	Arkansas	32%
Arkansas	27%	New Mexico	30%
New Mexico	23%	Wyoming	29%
North Dakota	20%	Illinois	28%
Iowa	20%	Texas	28%
Montana	18%	Tennessee	28%
Kansas	18%	Missouri	27%
Mississippi	17%	Utah	25%
Missouri	17%	Pennsylvania	25%
South Dakota	17%	Iowa	25%
Louisiana	16%	Oregon	24%
Kentucky	16%	North Dakota	24%
Maine	16%	Oklahoma	23%
Oregon	16%	Nebraska	23%
Nebraska	16%	Minnesota	23%
Illinois	15%	Ohio	23%
Idaho	15%	Louisiana	23%
Pennsylvania	15%	Mississippi	23%
Oklahoma	15%	Indiana	22%
Indiana	15%	Kentucky	21%

- Using a freight congestion index developed by the Federal Highway Administration, in 2019 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	STATE	Location Description	Average Speed	Average Speed During Peak Hours	Average Speed During Non-Peak Hours
1	New Jersey	Fort Lee: I-95 at SR 4	32	23	35
2	Georgia	Atlanta: I-285 at I-85 (North)	35	23	41
3	Georgia	Atlanta: I-75 at I-285 (North)	38	27	43
4	California	Los Angeles: SR 60 at SR 57	42	35	44
5	Texas	Houston: I-45 at I-69/US 59	34	24	38
6	Ohio	Cincinnati: I-71 at I-75	44	36	47
7	Illinois	Chicago: I-290 at I-90/I-94	24	18	27
8	Tennessee	Nashville: I-24/I-40 at I-440 (East)	41	28	48
9	Georgia	Atlanta: I-20 at I-285 (West)	45	38	47
10	California	Los Angeles: I-710 at I-105	38	27	43
11	Indiana	Gary: I-65 at I-80	47	45	48
12	Colorado	Denver: I-70 at I-25	38	30	42
13	Texas	Houston: I-10 at I-45	40	28	46
14	Connecticut	Hartford: I-84 at I-91	45	35	49
15	California	San Bernardino: I-10 at I-15	45	36	49
16	Texas	Dallas: I-45 at I-30	40	29	45
17	Illinois	Chicago: I-90 at I-94 (North)	31	17	37
18	Michigan	Detroit: I-94 at I-75	39	31	44
19	Louisiana	Baton Rouge: I-10 at I-110	37	29	41
20	New York	Brooklyn: I-278 at Belt Parkway	34	26	37

- The U.S. Department of Transportation forecasts that between 2012 and 2045, the miles of major U.S. highways that are congested during peak periods will quadruple from 19,200 miles to 78,500.

- The following map indicates major highways that carry more than 8,500 large trucks per day and/or on which more than 25 percent of daily traffic is comprised of large trucks.



- The miles of major highway segments with more than 8,500 large trucks per day and where at least 25 percent of vehicles are large trucks is expected to increase by 140 percent between 2012 and 2045, from 5,560 miles to 13,480 miles.

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.

- Large trucks account for four percent of all registered vehicles and nine percent of all vehicle miles of travel annually. Twelve percent of traffic fatalities occur in crashes in which a large truck was involved.

- Approximately three-quarters – 76 percent – of large trucks that were involved in fatal crashes in 2016 weighed more than 33,000 lbs.

- From 2013 to 2017, fatal traffic crashes involving large trucks resulted in the deaths of 21,114 people. This included 3,582 drivers or passengers of large trucks and 17,532 drivers or occupants of other vehicles, or non-motorists, such as pedestrians or bicyclists.

Year	Large Truck Fatalities	Large Truck Non-Occupant Fatalities	Large Truck Occupant Fatalities
2013	3,981	3,286	695
2014	3,908	3,252	656
2015	4,095	3,430	665
2016	4,369	3,644	725
2017	4,761	3,920	841
Total	**21,114**	**17,532**	**3,582**

- From 2013 to 2017, the number of fatalities in large-truck involved crashes in the U.S. increased 20 percent, from 3,981 to 4,761.

- Eighty percent of fatal crashes involving large trucks from 2013 to 2017 were multiple-vehicle crashes, compared to 61 percent for fatal crashes involving only passenger vehicles.

- In 62 percent of fatal large truck crashes from 2013 to 2017, the most critical pre-crash event was either another vehicle's encroachment into a large truck's lane (38 percent) or another vehicle entering a large truck's lane (26 percent).

- A 2018 report by the National Highway Traffic Safety Administration (NHTSA) that analyzed 2016 two-vehicle fatal crashes involving a large truck found the following: in 43 percent of the crashes both vehicles were proceeding straight, in nine percent of the crashes the other vehicle was turning left or right regardless of the large trucks maneuver, in 10 percent of the crashes the truck and the other vehicle were negotiating curves, and in seven percent of the crashes either the truck or the other vehicle was stopped in a traffic lane (five percent and two percent, respectively).

- In large truck-involved fatal crashes in 2016, two 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 21, 20 and 25 percent, respectively.

- Fatal large truck crashes are more likely to occur on rural roads, two-lane roads and roads with speed limits 55 miles per hour or higher.

- The following chart ranks the top 10 states with the largest annual average number of fatalities in large truck involved crashes from 2013 to 2017. 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 2013-2017	Average Annual Large Truck Non-Occupant Fatalities 2013-2017	Average Annual Large Truck Occupant Fatalities 2013-2017
1	Texas	572	460	113
2	California	316	275	41
3	Florida	239	209	31
4	Georgia	179	147	32
5	Pennsylvania	162	133	29
6	Ohio	143	123	20
7	North Carolina	141	120	21
8	Illinois	131	113	17
9	Oklahoma	122	92	30
10	Indiana	122	106	16
11	Tennessee	122	100	22
12	New York	114	100	14
13	Alabama	107	85	22
14	Missouri	103	84	19
15	Michigan	91	81	10
16	Virginia	88	66	22
17	South Carolina	87	71	16
18	Louisiana	87	71	16
19	Kentucky	83	72	11
20	Arizona	80	65	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 2013 to 2017. Data for all 50 states is available in the Appendix.

Rank	STATE	Average Annual Large Truck Fatalities 2013-2017 Per 1 Million Population
1	North Dakota	52
2	Wyoming	43
3	Oklahoma	31
4	New Mexico	27
5	Mississippi	27
6	Arkansas	26
7	Kansas	23
8	Nebraska	22
9	Alabama	22
10	Texas	20
11	Iowa	20
12	West Virginia	19
13	Idaho	19
14	Kentucky	19
15	Louisiana	19
16	Montana	18
17	Indiana	18
18	Tennessee	18
19	South Dakota	18
20	South Carolina	17

CHALLENGES IMPACTING THE FUTURE OF U.S. FREIGHT TRANSPORTATION

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.

- A 2014 survey evaluating the adequacy of truck parking capacity in the U.S. found that 38 states reported having truck parking problems, particularly along major freight corridors and in large metropolitan areas. Truck drivers surveyed said truck parking problems exist in all states and 75 percent of truck drivers surveyed reported having difficulty finding safe and legal parking during mandated rest periods.

- The American Trucking Associations estimates there is a current shortage of 63,000 truck drivers in the U.S. and the shortage is expected to increase to 174,000 by 2026.

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

- ✓ 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 as well as the construction of truck-only lanes when viable, such as the planned addition of 40 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. The number of intermodal connectors in the U.S. increased 30 percent from 2000 to 2014 from 616 to 798.

- ✓ Approximately two-thirds (68 percent) of intermodal connectors are congested and 56 percent of intermodal connectors have pavements in poor condition.

- ✓ Continue to develop vehicle autonomy and further automate warehousing.

- ✓ 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, in most cases, 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.

INTRODUCTION

The ability of the nation'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. But, an efficient and safe freight network that meets the nation's growing need for timely and safe movement of goods is threatened by increasing congestion on the nation's highways, rails, ports and waterways, increasing truck-related fatalities, institutional barriers to improving freight facilities, and a lack of adequate and reliable funding for needed improvements to the transportation system.

The need to enhance America's freight transportation network is further heightened by the transformation of freight delivery as a result of advances, including: vehicle autonomy; the automation of manufacturing, warehousing and supply chains; further growth of e-commerce; and, the development of improved logistic networks by Amazon and other large retailers in response to a need for faster and more responsive goods movement.

Addressing the nation's need for a more efficient and safer 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. The nation's 327 million residents, 126 million households, 7.7 million business establishments and 90,000 governmental units are all part of an economy that requires the efficient movement of freight.[1]

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.[2]

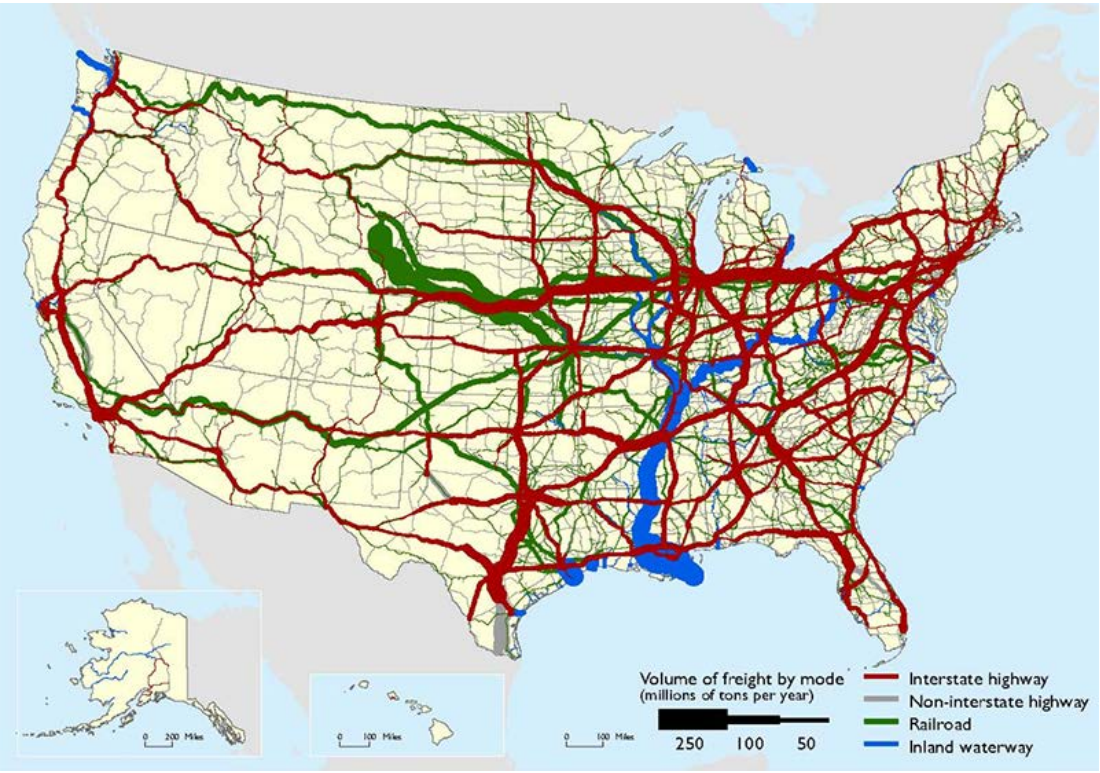
Every five years a U.S. Commodity Flow Survey (CFS) is conducted through a partnership between the Bureau of the Census of the U.S. Department of Commerce and the Bureau of Transportation Statistics. The CFS is the only comprehensive source of multimodal, system-wide data on the volume and pattern of goods movement in the United States.[3]

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 2016 national and statewide data in this report is based on the Freight Analysis Framework, which provides annual freight estimates based largely on the 2012 CFS. A CFS was again conducted in 2017, and national, statewide and regional freight data based on the 2017 CFS is expected to be available in 2020.

The nation's freight system moves a daily average of approximately 51 million tons of freight, valued at approximately $55 billion.[4] Annually the nation's freight system moves approximately 17.7 billion tons of freight, valued at approximately $16.8 trillion.[5]

Chart 1. 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. Trucking accounts for the largest modal share of freight movement, carrying 72 percent of freight by value and 66 percent by weight in 2016.[6] The following chart shows modal freight movement in 2016 by value and weight.

Chart 2. Modal Share of Freight Movement by Value and Weight (2016)

Mode	By Value	By Weight
Truck	72%	66%
Rail	4%	10%
Water	2%	4%
Air	3%	0.03%
Multiple Modes	14%	3%
Pipeline	4%	16%

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 2045, as a result of population and economic growth. From 2016 to 2045, the total amount of freight moved annually in the U.S. is expected to increase by 104 percent in value (in inflation adjusted dollars) and 44 percent by weight.[7] From 2016 to 2045, the total amount of freight moved annually in the U.S. by truck is expected to increase by 91 percent in value (in inflation adjusted dollars) and 41 percent by weight.[8] The following chart indicates the percentage increase in freight by value and weight from 2016 to 2045, by mode.

Chart 3. Increase in Freight 2016-2045 by Mode

Mode	Percent Increase 2016-2045 by Value	Percent Increase 2016-2045 by Weight
Truck	91%	41%
Rail	95%	24%
Water	83%	28%
Air	495%	391%
Multiple Modes	123%	64%
Pipeline	42%	64%

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 4. Top 10 Commodities by Weight and Value: 2016

Rank	By Value	Millions of Dollars	By Weight	Thousands of Tons
1	Motorized vehicles	1,650,308	Natural gas, coke, asphalt	2,141,371
2	Mixed freight	1,469,679	Gravel	2,030,910
3	Electronics	1,429,375	Cereal grains	1,316,887
4	Pharmaceuticals	1,296,123	Nonmetal min. prods.	1,114,741
5	Machinery	1,019,570	Crude petroleum	985,949
6	Misc. manufacturing products	712,575	Gasoline	976,338
7	Other foodstuffs	679,843	Fuel oils	952,106
8	Plastics/rubber	671,011	Coal	770,860
9	Natural gas, coke, asphalt	605,747	Natural sands	744,772
10	Textiles/leather	605,558	Other foodstuffs	662,604

Source: Bureau of Transportation Statistics, FHWA Freight Analysis Framework

IMPACT OF EMERGING TECHNOLOGY ON FREIGHT

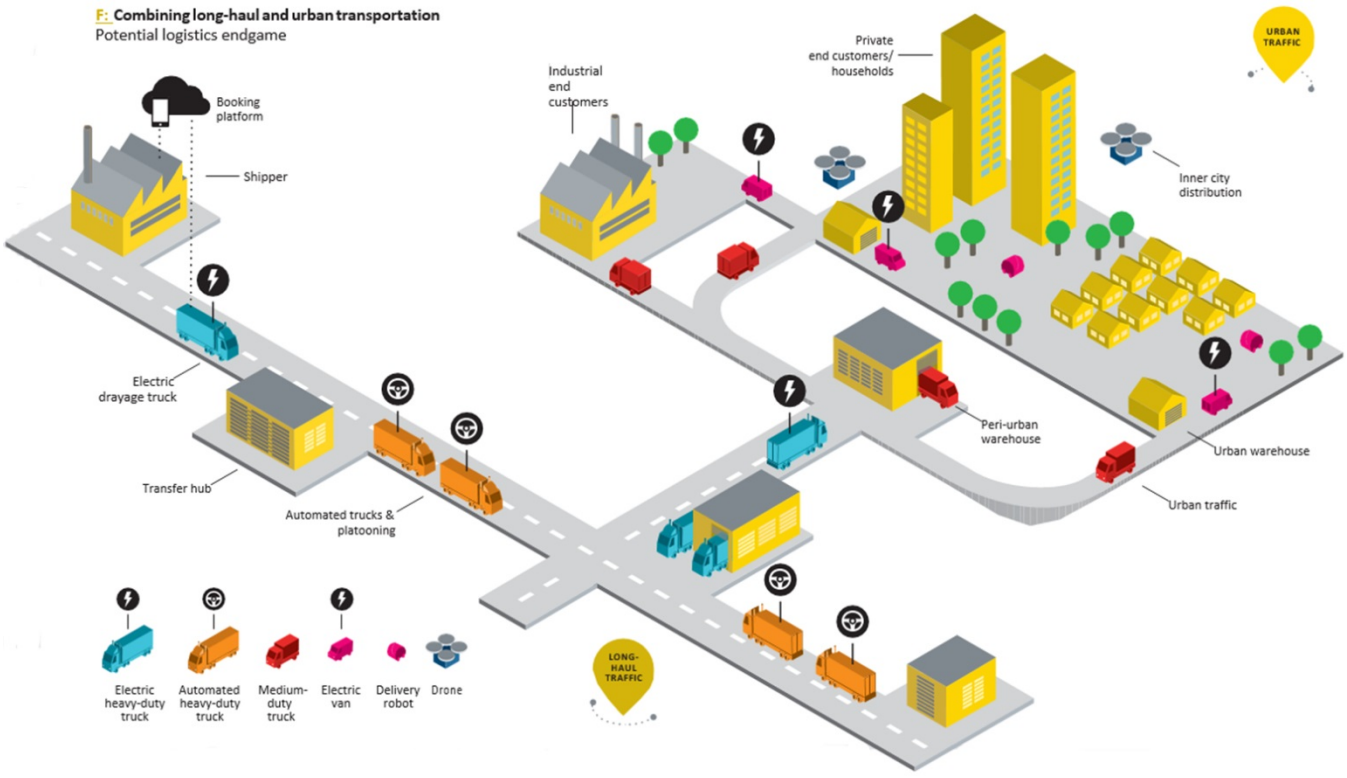
The delivery of freight is being transformed by a convergence of advances in vehicle autonomy, manufacturing, warehousing and supply chain automation, further growth of e-commerce, and the growing logistic networks being developed by large retailers such as Amazon. These trends are likely to reduce shipping costs and eventually may also help address a shortage of long-haul truck drivers.

The development of autonomous trucks capable of transporting freight without a driver is expected to proceed in stages, from currently available driver assist tools such as cruise control and lane-assist to a level of autonomy that will allow large trucks to largely drive themselves with a driver monitoring the vehicle, 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 timeline of these developments is uncertain, but most experts in the field anticipate partial autonomy in approximately 10 years and full autonomy somewhat later.

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 5. Possible Future Freight Transportation System



Source: Roland Berger

The gradual introduction of vehicle autonomy is occurring concurrently with improved automation of manufacturing and warehousing facilities, increasing the competitiveness of domestic manufacturing as a result of reduced labor costs and increasing the importance of timely freight movement from sites that are able to operate 24 hours per-day.

Digitization is significantly improving the efficiency of the nation's supply chain, where large trucks currently do not carry a payload on approximately 20 percent of all miles traveled. Freight brokers, carriers, shippers and receivers can now exchange real-time data, which allows the adoption of variable pricing strategies to more efficiently utilize shipping space and reduce the occurrence of empty payloads.[9] Combined together, advancements in vehicle autonomy and improvements in vehicle and supply chain automation are anticipated to result in reduced shipping costs.

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. From 2014 to 2018, U.S. e-commerce increased by 69 percent, from $298 billion to $505 billion, and is expected to increase another 39 percent by 2022, to $706 billion.[10] Since 2016, Amazon has built 20 new distribution centers in the U.S. and continues to expand its logistics system domestically and globally, including the development of truck, aircraft and shipping fleets.[11]

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 as well as by trucks are Texas, California, Illinois, New York and Pennsylvania.[12] 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 2016, measured by value in millions of dollars.

Chart 6. Top 20 States Freight by Value Shipments in 2016 (in millions of dollars).

RANK	STATE	2016 Freight by Value All Modes (millions of dollars)	STATE	2016 Freight By Value Shipped by Truck (millions of dollars)
1	Texas	2,685,364	Texas	1,724,289
2	California	2,596,985	California	1,633,099
3	Illinois	1,410,240	Illinois	926,678
4	New York	1,280,384	New York	917,640
5	Pennsylvania	1,073,402	Pennsylvania	785,540
6	Ohio	1,042,209	Ohio	780,197
7	Michigan	999,766	Michigan	701,696
8	New Jersey	905,382	New Jersey	643,002
9	Florida	865,243	Georgia	637,225
10	Georgia	843,173	Florida	603,417
11	Indiana	726,082	Indiana	548,447
12	Tennessee	700,598	North Carolina	543,214
13	North Carolina	672,439	Tennessee	467,455
14	Kentucky	578,482	Wisconsin	394,601
15	Washington	575,482	Virginia	386,105
16	Wisconsin	510,050	Kentucky	375,901
17	Louisiana	502,544	Washington	368,798
18	Virginia	496,790	Missouri	331,777
19	Minnesota	474,487	Minnesota	315,821
20	Missouri	468,855	Alabama	311,266

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 were Texas, California, Illinois, Louisiana and Pennsylvania. 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 include Texas, California, Illinois, Florida and Pennsylvania. Data for all 50 states can be found in the Appendix. The following chart ranks the 20 states in 2016 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 7. Top 20 Freight Shipments by Weight in 2016 (in thousands of tons), total and truck only.

	STATE	2016 Freight by Weight All Modes (thousands of tons)	STATE	2016 Freight By Weight Shipped by Truck
1	Texas	2,933,850	Texas	1,365,952
2	California	1,409,758	California	1,031,722
3	Illinois	1,317,567	Illinois	744,431
4	Louisiana	1,035,053	Florida	663,708
5	Pennsylvania	934,359	Pennsylvania	560,622
6	Ohio	856,618	Ohio	555,087
7	Florida	799,953	New York	544,348
8	New York	698,423	Georgia	430,435
9	Indiana	669,477	Indiana	418,883
10	Minnesota	656,732	Iowa	418,669
11	Michigan	613,220	Minnesota	380,986
12	Iowa	603,530	North Carolina	367,872
13	Georgia	579,318	New Jersey	360,392
14	New Jersey	512,648	Wisconsin	345,236
15	Alabama	500,750	Michigan	345,156
16	Kansas	477,866	Missouri	295,693
17	Oklahoma	470,301	Kansas	295,513
18	Missouri	469,195	Virginia	292,166
19	Kentucky	465,609	Washington	287,705
20	North Dakota	461,850	Louisiana	286,552

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 2045. 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 2016 to 2045, in inflation-adjusted dollars. Data for all 50 states is available in the Appendix.

Chart 8. Top 20 States in Percentage Increase in Freight Shipments From 2016 to 2045 in inflation-adjusted dollars.

RANK	STATE	2016-2045 Increase in Freight by Value All Modes	STATE	2016-2045 Increase in Freight Shipped by Truck by Value
1	Vermont	258%	California	134%
2	New York	154%	North Dakota	128%
3	Alaska	148%	New Mexico	126%
4	California	147%	Montana	126%
5	District of Columbia	146%	Texas	115%
6	Connecticut	144%	Louisiana	112%
7	Florida	143%	New York	108%
8	Virginia	128%	Florida	106%
9	Tennessee	128%	South Carolina	106%
10	Michigan	128%	Michigan	102%
11	Arizona	124%	Arizona	100%
12	Washington	124%	Washington	98%
13	Hawaii	120%	New Jersey	93%
14	New Jersey	120%	Vermont	92%
15	Georgia	115%	Virginia	92%
16	Kentucky	114%	Utah	92%
17	South Carolina	111%	Georgia	89%
18	Maryland	110%	Maryland	88%
19	Delaware	110%	North Carolina	82%
20	New Mexico	110%	West Virginia	82%

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 2016 to 2045, by weight. Data for all 50 states is available in the Appendix.

Chart 9. Top 20 States in Percentage Increase in Freight Shipments From 2016 to 2045 by weight.

RANK	STATE	2016-2045 Increase in Freight by Weight All Modes	STATE	2016-2045 Increase in Freight Shipped by Truck by Weight
1	Mississippi	92%	Hawaii	135%
2	Hawaii	92%	Louisiana	91%
3	Arkansas	87%	Alaska	85%
4	District of Columbia	85%	Mississippi	82%
5	Virginia	85%	District of Columbia	79%
6	Nevada	76%	Michigan	70%
7	Michigan	76%	Delaware	69%
8	Alaska	73%	Virginia	65%
9	Utah	69%	Maryland	64%
10	Tennessee	68%	Arkansas	63%
11	Maine	67%	Washington	61%
12	Vermont	65%	Maine	60%
13	New York	65%	Vermont	57%
14	Louisiana	64%	New York	57%
15	Maryland	63%	Pennsylvania	57%
16	California	63%	West Virginia	56%
17	South Carolina	63%	Alabama	55%
18	Delaware	63%	New Jersey	54%
19	Idaho	60%	California	53%
20	Indiana	59%	North Dakota	52%

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

The amount and share of U.S. freight movement as a result of international trade is expected to increase significantly by 2045. In 2016, the share of U.S. freight shipments to or from another country was 11 percent measured by weight and 21 percent measured by value.[13] By 2045, the share of U.S. freight shipments to or from another country will be 18 percent by weight and 39 percent by value.[14]

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 four percent of all registered vehicles and nine percent of all vehicle miles of travel

annually, 12 percent of traffic fatalities occur in traffic crashes in which a large truck was involved.[15] Approximately three-quarters – 76 percent – of large trucks that were involved in fatal crashes in 2016 weighed more than 33,000 pounds.[16]

According to TRIP's analysis of NHTSA data, 21,114 of the 176,061 U.S. traffic fatalities that occurred from 2013 to 2017, twelve percent - approximately one-out-of-eight - resulted from a collision that involved a large truck.[17] Fatal traffic crashes involving large trucks from 2013 to 2017 resulted in the deaths of 3,582 drivers or passengers of large trucks. The remaining 17,532 people killed were either drivers or occupants of other vehicles or were non-motorists, such as pedestrians or bicyclists.[18]

From 2013 to 2017, the number of fatalities in large-truck involved crashes in the U.S. increased by 20 percent, from 3,981 to 4,761.

Chart 10. Fatalities in Large Truck Involved Crashes 2013 to 2017.

Year	Large Truck Fatalities	Large Truck Non-Occupant Fatalities	Large Truck Occupant Fatalities
2013	3,981	3,286	695
2014	3,908	3,252	656
2015	4,095	3,430	665
2016	4,369	3,644	725
2017	4,761	3,920	841
Total	**21,114**	**17,532**	**3,582**

Source: National Highway Traffic Safety Administration

Fatal crashes involving large trucks are more likely to be multiple-vehicle crashes, as opposed to fatal crashes involving only passenger vehicles. Eighty percent of fatal crashes from 2013 to 2017 involving large trucks are multiple-vehicle crashes, compared to 61 percent of fatal crashes involving only passenger vehicles.[19] In 2013 to 2017, 62 percent of fatal large truck crashes, the most critical pre-crash event was either another vehicle's encroachment into a large truck's lane (38 percent) or another vehicle in a large truck's lane (26 percent).[20]

A 2018 report by NHTSA that analyzed 2016 two-vehicle fatal crashes involving a large truck found the following: in 43 percent of the crashes both vehicles were proceeding straight, in nine percent of the crashes the other vehicle was turning left or right regardless of the large trucks maneuver, in 10 percent of the crashes the truck and the other vehicle were negotiating curves, and in

seven percent of the crashes either the truck or the other vehicle was stopped in a traffic lane (five percent and two percent, respectively).[21] 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 11. Percentage of Two-Vehicle Fatal Crashes Involving Large Trucks, by Initial Impact Point of the Large Trucks and other Vehicles, 2016.

Impact Point on Large Truck	Impact Point on Other Vehicle				
	Front	Left Side	Right Side	Rear	Total
Front	31%	13%	10%	7%	60%
Left Side	9%	1%	1%	0%	12%
Right Side	6%	1%	0%	0%	6%
Rear	21%	0%	0%	0%	22%
Total	**66%**	**15%**	**11%**	**7%**	**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 2016, two 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 21, 20 and 25 percent, respectively.[22]

Fatal large truck crashes are more likely to occur on rural roads, two-lane roads and roads with speed limits 55 miles per hour or higher. More than two-thirds – 69 percent – of large trucks involved in fatal traffic crashes from 2013 to 2017 were involved in crashes that occurred on two-lane roads.[23] Another 17 percent of large trucks were involved in fatal traffic crashes that occurred on highways with four or more lanes.[24] Nearly three quarters – 73 percent – of large trucks involved in fatal crashes from 2013 to 2017 were involved in crashes that occurred on roadways with a speed limit of 55 miles-per-hour or higher (17 percent were on roadways with speed limits from 40 to 50 MPH and 10 percent were on roadways with speed limits of 35 mph or less).[25] And 62 percent of large-truck involved traffic fatalities from 2013 to 2017 occurred on rural roads and highways.[26]

STATE LARGE TRUCK SAFETY DATA

The five states with the largest average number of fatalities in large truck involved crashes from 2013 to 2017 are Texas, California, Florida, Georgia and Pennsylvania. The following chart ranks the top 20 states with the largest annual average number of fatalities in large truck-

involved crashes from 2013 to 2017. 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 2013 to 2017. Data for all states is available in the Appendix.

Chart 12. States with Largest Average Number of Fatalities in Large Truck Involved Crashes 2013-2017; Average Number of Fatalities of Large Truck Non-Occupants and of Large Truck Occupants.

Rank	STATE	Average Annual Large Truck Fatalities 2013-2017	Average Annual Large Truck Non-Occupant Fatalities 2013-2017	Average Annual Large Truck Occupant Fatalities 2013-2017
1	Texas	572	460	113
2	California	316	275	41
3	Florida	239	209	31
4	Georgia	179	147	32
5	Pennsylvania	162	133	29
6	Ohio	143	123	20
7	North Carolina	141	120	21
8	Illinois	131	113	17
9	Oklahoma	122	92	30
10	Indiana	122	106	16
11	Tennessee	122	100	22
12	New York	114	100	14
13	Alabama	107	85	22
14	Missouri	103	84	19
15	Michigan	91	81	10
16	Virginia	88	66	22
17	South Carolina	87	71	16
18	Louisiana	87	71	16
19	Kentucky	83	72	11
20	Arizona	80	65	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 2013 to 2017 are North Dakota, Wyoming, Oklahoma, New Mexico and Mississippi. 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 2013 to 2017. Data for all 50 states is available in the appendix.

Chart 13. States with Largest Average Number of Fatalities in Large Truck Involved Crashes Per One Million People 2013-2017

Rank	STATE	Average Annual Large Truck Fatalities 2013-2017 Per 1 Million Population
1	North Dakota	52
2	Wyoming	43
3	Oklahoma	31
4	New Mexico	27
5	Mississippi	27
6	Arkansas	26
7	Kansas	23
8	Nebraska	22
9	Alabama	22
10	Texas	20
11	Iowa	20
12	West Virginia	19
13	Idaho	19
14	Kentucky	19
15	Louisiana	19
16	Montana	18
17	Indiana	18
18	Tennessee	18
19	South Dakota	18
20	South Carolina	17

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.[27] 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.[28] In fact, 53 percent of vehicle miles of travel by

large trucks (10,000 lbs. or greater) in 2016 occurred on Interstate highways.[29] Forty-six percent of urban Interstate highways were congested in 2017.[30]

Twelve percent of travel on Interstate highways and 21 percent of travel on rural Interstate highways is by combination trucks.[31] The following chart ranks the 20 states with the greatest share of vehicle miles of travel in 2017 on all Interstate highways and on rural Interstate highways which is by combination trucks. Data for all 50 states is available in the appendix.

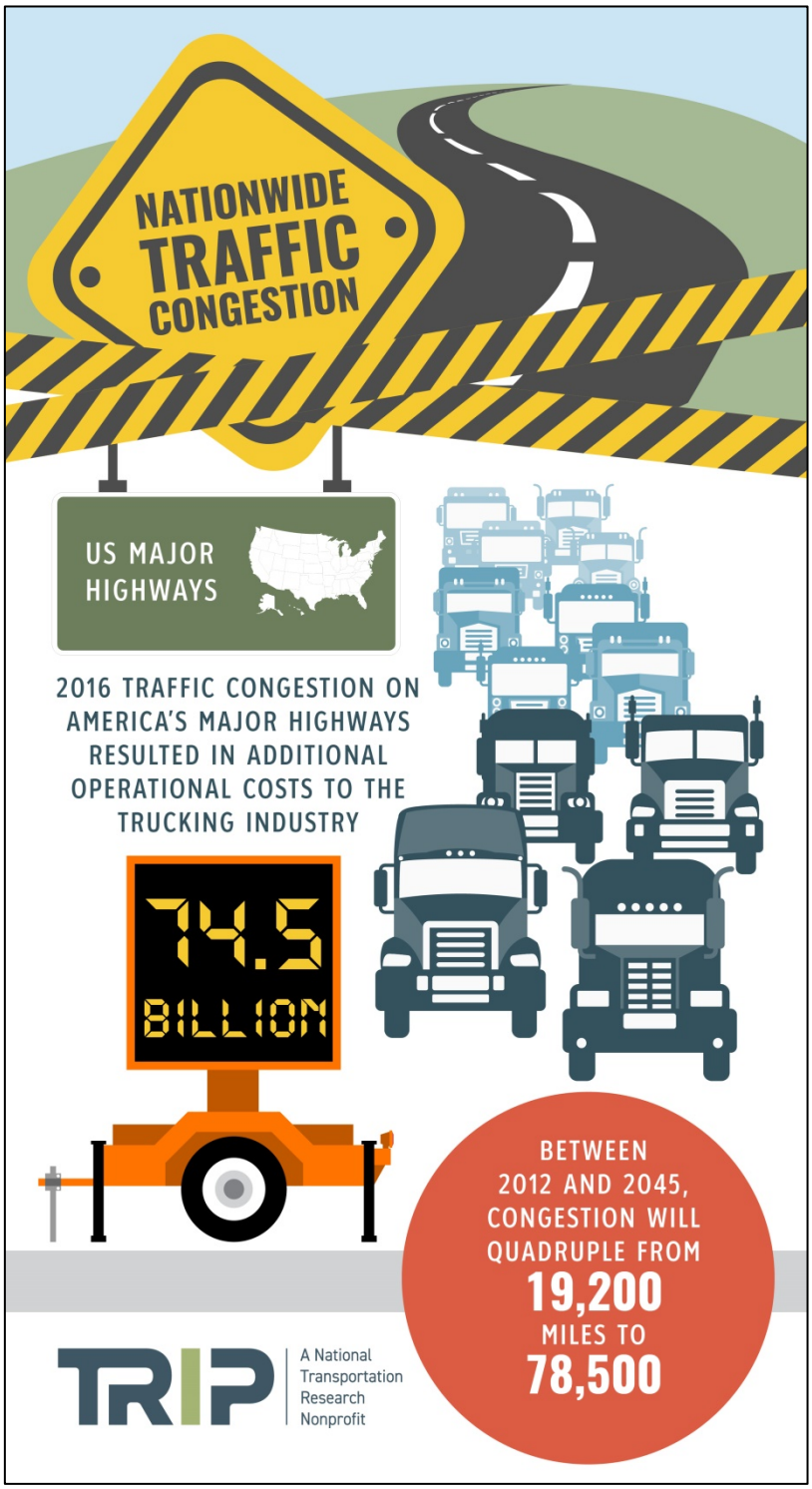


Chart 14. Combination Truck Share of Vehicle Miles of Travel on All/Rural Interstate Highways (2017).

STATE	Share of Interstate VMT by Combination Trucks	STATE	Share of Rural Interstate VMT by Combination Trucks
Wyoming	29%	Arkansas	32%
Arkansas	27%	New Mexico	30%
New Mexico	23%	Wyoming	29%
North Dakota	20%	Illinois	28%
Iowa	20%	Texas	28%
Montana	18%	Tennessee	28%
Kansas	18%	Missouri	27%
Mississippi	17%	Utah	25%
Missouri	17%	Pennsylvania	25%
South Dakota	17%	Iowa	25%
Louisiana	16%	Oregon	24%
Kentucky	16%	North Dakota	24%
Maine	16%	Oklahoma	23%
Oregon	16%	Nebraska	23%
Nebraska	16%	Minnesota	23%
Illinois	15%	Ohio	23%
Idaho	15%	Louisiana	23%
Pennsylvania	15%	Mississippi	23%
Oklahoma	15%	Indiana	22%
Indiana	15%	Kentucky	21%

Source: TRIP Analysis of Federal Highway Administration Data

Growing traffic congestion on the nation's major highways results in a significant economic loss for the nation. The American Transportation Research Institute (ATRI) estimates that traffic congestion on the nation's major highways resulted in the addition of $74.5 billion in operational costs to the trucking industry in 2016 as a result of commercial trucks being stuck in traffic for 1.2 billion hours.[32]

Using a freight congestion index developed by the Federal Highway Administration, in 2019 the ATRI compiles an annual list the nation's 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.

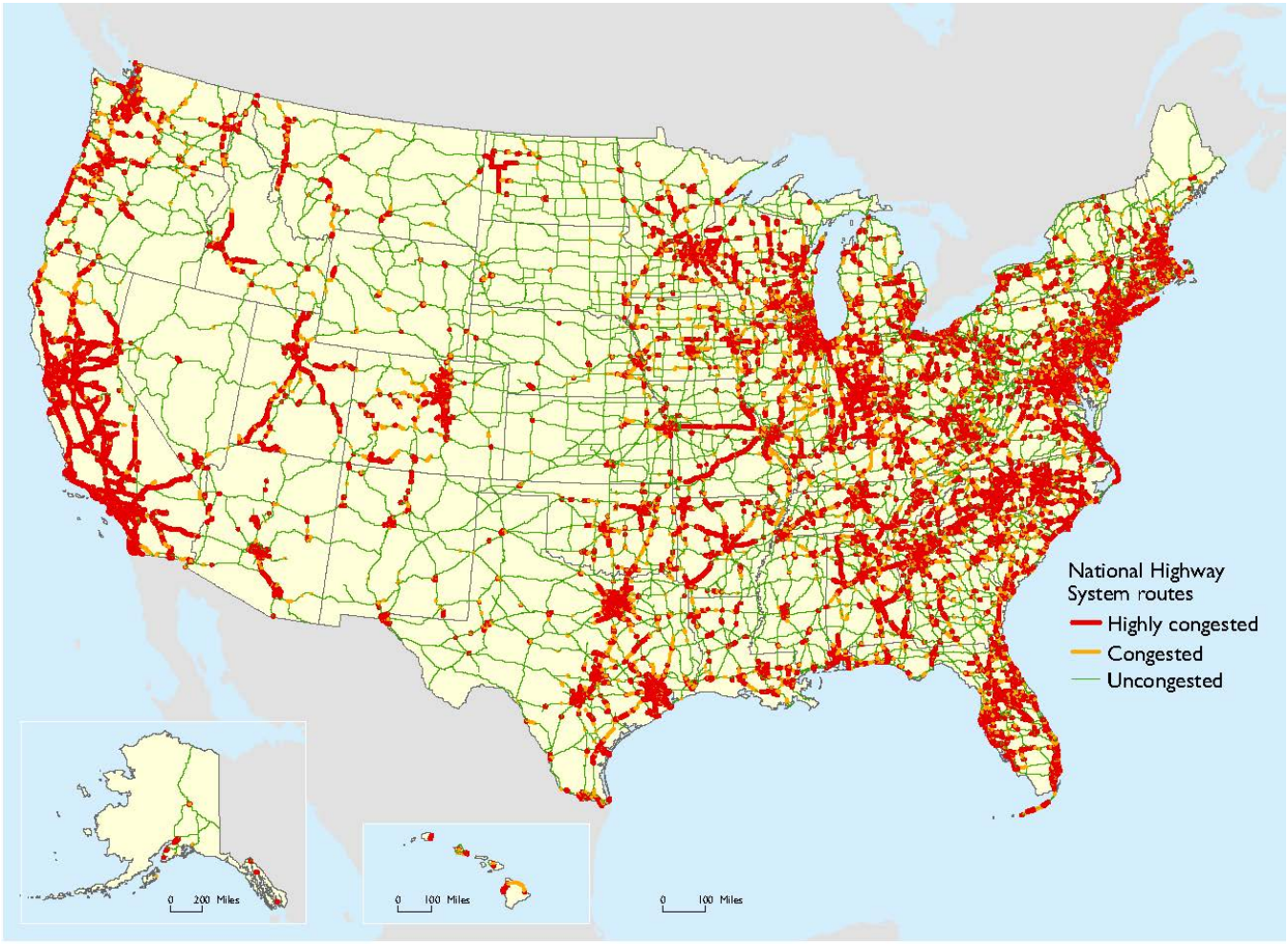
Chart 15. Top Commercial Truck Bottlenecks.

RANK	STATE	Location Description	Average Speed	Average Speed During Peak Hours	Average Speed During Non-Peak Hours
1	New Jersey	Fort Lee: I-95 at SR 4	32	23	35
2	Georgia	Atlanta: I-285 at I-85 (North)	35	23	41
3	Georgia	Atlanta: I-75 at I-285 (North)	38	27	43
4	California	Los Angeles: SR 60 at SR 57	42	35	44
5	Texas	Houston: I-45 at I-69/US 59	34	24	38
6	Ohio	Cincinnati: I-71 at I-75	44	36	47
7	Illinois	Chicago: I-290 at I-90/I-94	24	18	27
8	Tennessee	Nashville: I-24/I-40 at I-440 (East)	41	28	48
9	Georgia	Atlanta: I-20 at I-285 (West)	45	38	47
10	California	Los Angeles: I-710 at I-105	38	27	43
11	Indiana	Gary: I-65 at I-80	47	45	48
12	Colorado	Denver: I-70 at I-25	38	30	42
13	Texas	Houston: I-10 at I-45	40	28	46
14	Connecticut	Hartford: I-84 at I-91	45	35	49
15	California	San Bernardino: I-10 at I-15	45	36	49
16	Texas	Dallas: I-45 at I-30	40	29	45
17	Illinois	Chicago: I-90 at I-94 (North)	31	17	37
18	Michigan	Detroit: I-94 at I-75	39	31	44
19	Louisiana	Baton Rouge: I-10 at I-110	37	29	41
20	New York	Brooklyn: I-278 at Belt Parkway	34	26	37

Source: American Transportation Research Institute

Based on projected increases forecast for both passenger and commercial vehicle travel, the U.S. Department of Transportation estimates that, assuming no increases in highway capacity, between 2012 and 2045 the miles of major U.S. highways that are congested during peak periods will quadruple from 19,200 miles to 78,500.[33]

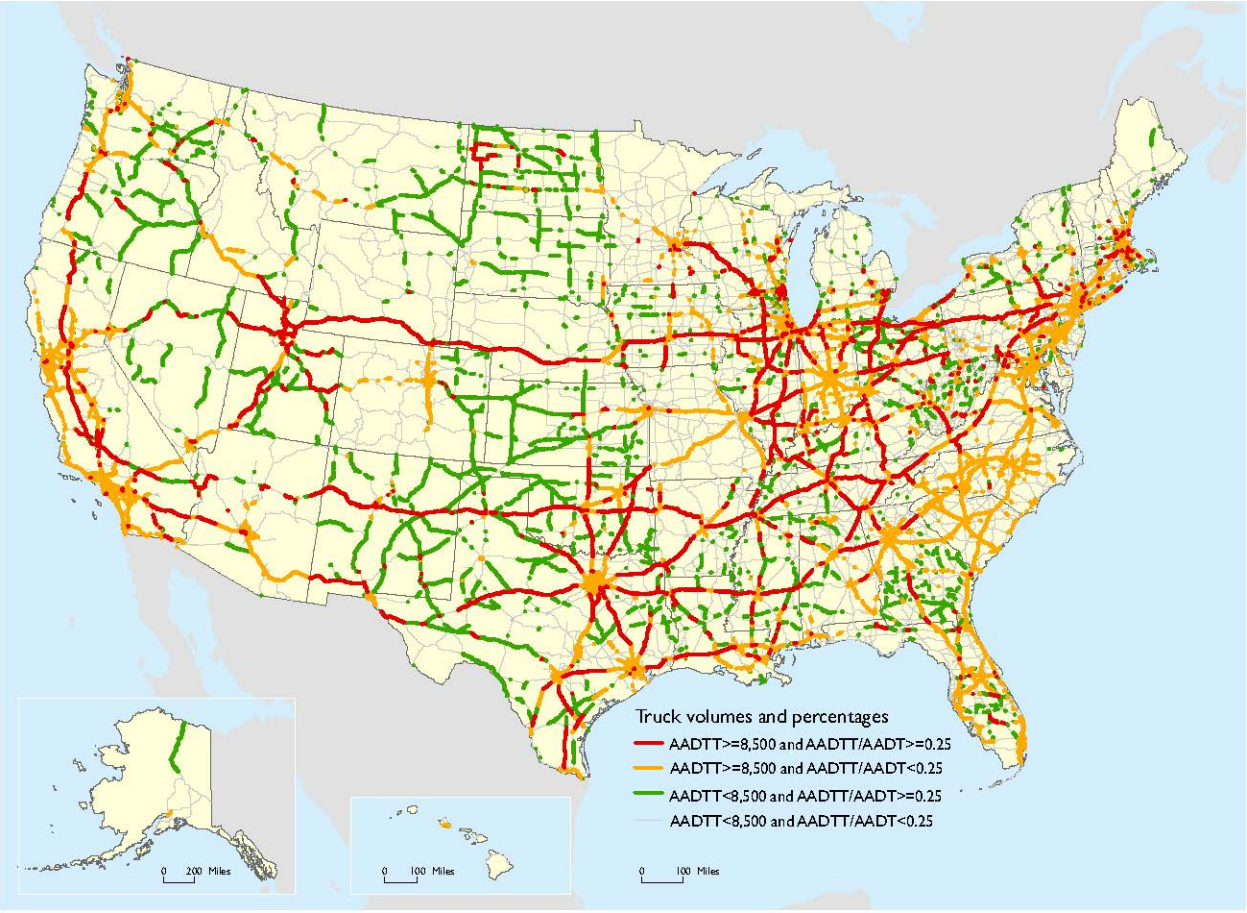
Chart 16. Projected Peak-Period Congestion on the National Highway System: 2045



Source: U.S. Department of Transportation

The following map indicates major highways that carry more than 8,500 large trucks per day, or on which more than 25 percent of daily traffic is comprised of large trucks.

Chart 17. Major Truck Routes Carrying at Least 8,500 Large Trucks Today or On Which Large Trucks Represent At Least 25 Percent of all Vehicles



Source: U.S. Department of Transportation

The share of major highway segments with more than 8,500 large trucks per day and/or where at least 25 percent of vehicles are large trucks is expected to increase by 140 percent between 2012 and 2045, from 5,560 miles to 13,480 miles.[34]

U.S. FREIGHT TRANSPORTATION CHALLENGES

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.

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. But a 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.

A 2014 survey evaluating the adequacy of truck parking capacity in the U.S. found that 38 states reported having truck parking problems, particularly along major freight corridors and in large metropolitan areas.[35] Truck drivers surveyed said that truck parking problems exist in all states and 75 percent of surveyed truck drivers reported having difficulty finding safe and legal parking during mandated rest periods.[36]

The growing shortage of commercial large truck drivers is a significant impediment to the nation's freight delivery system. Approximately 1.7 million people are employed as drivers of large commercial trucks and another 859,000 as drivers of light-duty, delivery trucks.[37] The American Trucking Associations estimates that there is currently a shortage of 63,000 truck drivers in the U.S. and the shortage is expected to increase to 174,000 by 2026.[38]

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 freight transportation flow will require that the capacity of the nation's freight transportation system is expanded, 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 40 miles of truck-only lanes on a portion of I-75 in Georgia, scheduled to be complete by 2029.

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. The number of intermodal connectors in the U.S. increased 30 percent from 2000 to 2014, from 616 to 798.[39]

Approximately two-thirds (68 percent) of the nation's intermodal connectors are congested and 56 percent of intermodal connectors have pavements in poor condition.[40] 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.[41]

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

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.

###

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