

III. THE FREIGHT TRANSPORTATION SYSTEM



Freight is carried via an extensive network of roads, railroad, waterways, and pipelines. Road infrastructure has increased slowly over the past two decades despite a large increase in the volume of traffic. Between 1980 and 2002, route miles of public roads increased by 3 percent compared with a 101 percent increase in vehicle-miles traveled. Miles of railroad dropped by more than 20 percent over this same period, while rail shipments (measured in ton-miles) increased by 64 percent.

Table 3-1. Miles of Infrastructure by Mode

	1980	1990	2000	2002	Percent change, 1980-2002
Public roads, route miles	3,859,837	3,866,926	3,951,099	3,981,671	3.2
National Highway System (NHS)	N	N	161,189	161,537	N
Interstates	41,120	45,074	46,675	46,747	13.7
Other NHS	N	N	114,514	114,790	N
Freight intermodal connectors ¹	N	N	N	1,791	N
Other	N	N	9,910	3,820,134	N
Strategic Highway Corridor Network (STRAHNET)	N	N	62,066	62,792	N
Interstate	N	N	46,675	46,747	N
Non-Interstate	N	N	15,389	16,045	N
Railroad	183,077 ²	175,909	170,512	141,391	-22.8
Class I	NA	133,189	120,597	99,943	NA
Regional	NA	18,375	20,978	15,048	NA
Local	NA	24,337	28,937	26,400	NA
Inland waterways					
Navigable channels	11,000	11,000	11,000	11,000	0.0
Great Lakes-St. Lawrence Seaway	2,342	2,342	2,342	2,342	0.0
Pipelines					
Oil	218,393	208,752	176,996	NA	NA
Gas	1,051,774	1,206,894	1,379,500	1,432,700	36.2

Key: N = not applicable; NA = not available.

¹Excludes intermodal connectors serving intercity bus, Amtrak, and public transit facilities.

²Excludes Class III railroads.

TABLE 3-1. MILES OF INFRASTRUCTURE BY MODE

Sources: Public roads: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, (Washington, DC: Annual issues).

Intermodal connectors: U.S. Department of Transportation, Federal Highway Administration, Office of Planning, National Highway System Intermodal Connectors, available at <http://www.fhwa.dot.gov/hep10/nhs/intermodalconnectors/index.html> as of August 24, 2004.

Rail: Association of American Railroads, *Railroad Facts* (Washington, DC: various issues).

Navigable channels: U.S. Army Corps of Engineers.

Great Lakes-St. Lawrence Seaway: Great Lakes-St. Lawrence Seaway System, "Seaway Facts," available at <http://www.greatlakes-seaway.com/en/aboutus/seawayfacts.html> as of May 11, 2004.

Oil pipelines: Eno Transportation Foundation, Inc., *Transportation in America, 2002* (Washington, DC: 2002).

Gas pipelines: American Gas Association, *Gas Facts* (Arlington, VA: Annual issues).

Table 3-2. Number of U.S. Vehicles, Vessels, and Other Conveyances

	1980	1990	2000	2001	2002
Highway	161,490,159	193,057,376	225,821,241	235,331,381	234,624,135
Truck, single-unit 2-axle 6-tire or more	4,373,784	4,486,981	5,926,030	5,703,500	5,650,619
Truck, combination	1,416,869	1,708,895	2,096,619	2,154,174	2,276,661
Truck, total	5,790,653	6,195,876	8,022,649	7,857,674	7,927,280
Trucks as percent of all highway vehicles	3.6	3.2	3.6	3.3	3.4
Rail					
Class I, locomotive	28,094	18,835	20,028	19,745	20,506
Class I, freight cars ¹	1,168,114	658,902	560,154	499,860	477,751
Nonclass I freight cars ¹	102,161	103,527	132,448	125,470	130,590
Car companies and shippers freight cars ¹	440,552	449,832	688,194	688,806	691,329
Water	38,788	39,445	41,354	41,588	41,002
Nonself-propelled vessels ²	31,662	31,209	33,152	33,042	32,381
Self-propelled vessels ³	7,126	8,236	8,202	8,546	8,621
Oceangoing steam and motor ships ⁴	864	636	454	443	426
US Flag fleet as percent of world fleet ⁴	3.5	2.7	1.6	1.6	1.5

¹Beginning with 2001 data, Canadian-owned U.S. railroads are excluded. This accounts for about 47,000 cars in 2000.

²Nonself-propelled vessels include dry-cargo barges, tank barges, and railroad-car floats.

³Self-propelled vessels include dry cargo, passenger, off-shore support, tankers, and towboats.

⁴1,000 gross tons and over.

A vast number of vehicles and vessels are used to move goods over the transportation network. The number of commercial trucks has climbed steadily over the past twenty years, but their share of the total highway vehicle fleet remained constant. The total number of commercial trucks grew by nearly 40 percent between 1980 and 2002. The character of the fleet has changed, however, as the number of combination trucks grew twice as fast as the number of single-unit trucks over this period, 60 percent versus 30 percent. The number of rail freight cars has declined since 1980 as newer cars typically have greater capacity than older ones.

TABLE 3-2. NUMBER OF U.S. VEHICLES, VESSELS, AND OTHER CONVEYANCES

Sources: Highway: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* (Washington, DC: Annual issues).

Rail: Association of American Railroads, *Railroad Facts 2003* (Washington, DC: 2003).

Water: Nonself-propelled vessels and self-propelled vessels: U.S. Army, Corps of Engineers, *Waterborne Transportation Lines of the United States, Volume 1, National Summaries* (New Orleans, LA : Annual issues).

Oceangoing steam motor ships: U.S. Department of Transportation, Maritime Administration, *Merchant Fleets of the World* (Washington, DC: Annual issues).

Most heavy truck mileage is made in the carriage of commodities. Only about 10 percent of truck miles are made for other reasons such as carrying household goods, garbage, and craftsmen's equipment.

The average weight of heavy trucks (those over 10,000 pounds) using the road system diverged between 1987 and 1997. The number of light-heavy trucks (10,000 to 19,500 pounds) and heavy-heavy trucks (over 26,000 pounds) both grew by 40 percent over this period. At the same time, the number of medium-heavy trucks (19,501 to 26,000 pounds) declined by 5 percent. VMT grew in all weight classes, but showed the same general pattern with faster growth in the light-heavy and the heavy-heavy categories and slower growth in the medium-heavy category. The 60,000 to 80,000 pounds average weight category is the largest both in number of trucks and VMT because in most cases 80,000 pounds is the maximum allowed on the highway system.

Table 3-3. Truck Miles by Primary Load Carried¹
(millions of miles)

Primary Load carried	1992	1997
Total	116,580	157,364
Farm products	8,638	10,020
Live animals	2,543	2,767
Animal feed	2,022	2,172
Mining products	1,383	1,553
Logs and other forest products	3,097	3,705
Lumber and fabricated wood products	3,801	5,087
Processed foods	17,547	23,742
Textile mill products	2,523	4,944
Building materials	12,041	15,571
Furniture or hardware	2,894	3,278
Paper products	5,255	6,404
Chemicals	3,935	4,999
Petroleum	4,581	4,942
Plastics and/or rubber	1,887	2,710
Primary metal products	3,778	4,747
Fabricated metal products	2,894	3,359
Machinery	3,678	7,400
Transportation equipment	5,197	6,298
Glass products	587	626
Miscellaneous products of manufacturing	2,920	5,196
Industrial "waste" water	201	210
Mixed cargoes	10,787	18,412
Recyclable products	878	1,286
Hazardous waste (EPA manifest)	424	466
Hazardous waste (non-EPA manifest)	115	83
Household goods	2,072	4,015
Scrap, refuse, or garbage	2,528	3,326
Craftsman's equipment	3,924	5,047
Personal transportation	996	953
Passengers	117	277
No load carried	1,905	1,794
Other and not reported ²	1,431	1,976

¹Excludes pickups, panels, minivans, sport utilities, and station wagons

²Includes vehicles which, though licensed, were not operated or were wrecked or inoperative for more than 6 months during 1997.

TABLE 3-3. TRUCK MILES FOR TRUCKS, EXCLUDING PICKUPS, PANELS, MINIVANS, SPORT UTILITIES, AND STATION WAGONS
(MILLIONS OF MILES)

Source: U.S. Department of Commerce, U.S. Census Bureau, *Vehicle Inventory and Use Survey 1997: United States* (Washington, DC: 1999), available at <http://www.census.gov/svsd/www/97vehinv.html> as of August 17, 2004.

Because of its effect on roads and bridges, governments at all levels are very concerned with truck weight. Truck weight enforcement activity, measured by the number of weighs, has increased over the past few years. Less than 1 percent of weighs discover violations.

Table 3-4. Number and Vehicle Miles Traveled (VMT) of Trucks by Average Weight (Including Vehicle and Load)¹

Average weight (pounds)	1987		1992		1997		Percent change, 1987-1997	
	Number (thousands)	VMT (millions)	Number (thousands)	VMT (millions)	Number (thousands)	VMT (millions)	Number	VMT
Total	3,624	89,972	4,008	104,987	4,701	147,873	30	64
Light-heavy	1,030	10,768	1,259	14,012	1,436	19,815	39	84
10,001 to 14,000	525	5,440	694	8,000	819	11,502	56	111
14,001 to 16,000	242	2,738	282	2,977	316	3,951	31	44
16,001 to 19,500	263	2,590	282	3,035	301	4,362	15	68
Medium-heavy	766	7,581	732	8,143	729	10,129	-5	34
19,501 to 26,000	766	7,581	732	8,143	729	10,129	-5	34
Heavy-heavy	1,829	71,623	2,017	82,832	2,536	117,930	39	65
26,001 to 33,000	377	5,411	387	5,694	428	7,092	13	31
33,001 to 40,000	209	4,113	233	5,285	257	6,594	23	60
40,001 to 50,000	292	7,625	339	9,622	400	13,078	37	72
50,001 to 60,000	188	7,157	227	8,699	311	12,653	66	77
60,001 to 80,000	723	45,439	781	51,044	1,070	74,724	48	64
80,001 to 100,000	28	1,254	33	1,529	46	2,427	64	94
100,001 to 130,000	8	440	12	734	18	1,051	129	139
130,001 or more	4	185	5	227	6	312	34	69

¹Excludes trucks with an average weight of 10,000 pounds or less.

Note: Weight includes the empty weight of the vehicle plus the average weight of the load carried.

In addition to weight, state and federal governments are also interested in the length and other characteristics of commercial trucks using the road system. Twenty nine

Table 3-5. Commercial Vehicle Weight Enforcement Activities

	2000	2001	2002	2003
All weighs	192,991,221	198,459,894	208,429,680	177,369,377
Weigh-in-motion	92,908,114	98,177,442	106,662,180	95,078,759
Static weighs ¹	100,103,107	100,282,452	101,861,470	82,290,618
Semiportable scales	NA	902,380	592,604	522,758
Fixed scales	NA	98,751,448	99,710,078	81,276,662
Portable scales	NA	628,624	1,558,788	491,198
Violations ²	653,720	663,706	657,308	515,587
Axle weight violations	NA	281,681	271,308	254,910
Gross weight violations	NA	141,707	144,518	132,258
Bridge weight violations	NA	240,318	241,482	128,419
Permits ³	3,483,746	3,402,522	3,566,236	3,544,449
Non-divisible trip permits	NA	2,685,971	2,603,257	2,629,392
Non-divisible annual permits	NA	197,328	251,245	234,607
Divisible trip permits	NA	226,100	240,782	258,206
Divisible annual permits	NA	289,400	422,522	377,482
Divisible overwidth permits	NA	3,723	48,430	44,762

Key: NA = not available.

¹Static weighs include the total vehicles weighed from semiportable, portable, and fixed scales.

²Violations include those from axle, gross, and bridge formula weight limits.

³Permits issued are for divisible and non-divisible loads on a trip or annual basis, as well as the overwidth movement of a divisible load.

states have semitrailer length limitations on the National Truck Network other than the 48 foot limit set by federal law for a semitrailer operating in a truck tractor-semi-trailer combination.

Table 3-6. Semitrailer Length Limitations On National Truck Network by State (48 Feet Unless Otherwise Specified)

State	Length limitation (feet and inches)
Alabama	53-6
Arizona	57-6
Arkansas	53-6
California ¹	48-0
Colorado	57-4
Delaware	53-0
Illinois	53-0
Indiana ²	48-6
Iowa	53-0
Kansas	57-6
Kentucky	53-0
Louisiana	59-6
Mississippi	53-0
Missouri	53-0
Montana	53-0
Nebraska	53-0
Nevada	53-0
New Mexico	57-6
North Dakota	53-0
Ohio	53-0
Oklahoma	59-6
Oregon	53-0
Pennsylvania	53-0
Rhode Island	48-6
South Dakota	53-0
Tennessee	50-0
Texas	59-0
Wisconsin ³	48-0
Wyoming	57-4

¹Semitrailers up to 53 feet may also operate without a permit by conforming to a kingpin-to-rear-most axle distance of 38 feet.

²Semitrailers up to 53 feet in length may operate without a permit by conforming to a kingpin-to-rear-most axle distance of 40 feet and 6 inches. Semitrailers that are consistent with 23 CFR 23 658.13(h) may operate without a permit provided the distance from the kingpin to the center of the rear axle is 46 feet or less.

³Semitrailers up to 53 feet in length may operate without a permit by conforming to a kingpin-to-rear-most axle distance of 41 feet, measured to the center of the rear tandem assembly. Semitrailers that are consistent with 23 CFR 658.13(h) may operate without a permit provided the distance from the kingpin to the center of the rear axle is 46 feet or less.

Note: The National Truck Network is the composite of the individual network of highways from each state on which vehicles authorized by the Surface Transportation Assistance Act of 1982 are allowed to operate.

TABLE 3-4. NUMBER AND VEHICLE MILES TRAVELED (VMT) OF TRUCKS BY AVERAGE WEIGHT (INCLUDING VEHICLE AND LOAD)¹

Sources: U.S. Department of Commerce, U.S. Census Bureau, *1997 Vehicle Inventory and Use Survey: United States* (Washington, DC: 1999), available at <http://www.census.gov/econ/www/viusmain.html> as of July 1, 2004; U.S. Department of Commerce, U.S. Census Bureau, *1992 Truck Inventory and Use Survey: United States* (Washington, DC: 1995), available at <http://www.census.gov/econ/www/viusmain.html> as of July 1, 2004.

TABLE 3-5. COMMERCIAL VEHICLE WEIGHT ENFORCEMENT ACTIVITIES

Source: U.S. Department of Transportation, Federal Highway Administration, Annual State Certifications of Size and Weight Enforcement on Federal-aid Highways, as prescribed under CFR Part 657.

TABLE 3-6. SEMITRAILER LENGTH LIMITATIONS ON NATIONAL TRUCK NETWORK BY STATE (48 FEET UNLESS OTHERWISE SPECIFIED)

Source: U.S. Department of Transportation, Federal Highway Administration, Truck Size and Weight, Route Designations - Length, Width and Weight Limitations, *Code of Federal Regulations*, Title 23, Part 658.

Table 3-7. Maximum Posted Speed Limits on Rural Interstates: September 2004 (miles per hour)

State	Truck	Car
Alabama	70	70
Alaska	65	65
Arizona	75	75
Arkansas	65	70
California	55	70
Colorado	75	75
Connecticut	65	65
Delaware	65	65
District of Columbia ¹	55	55
Florida	70	70
Georgia	70	70
Hawaii	60	60
Idaho	65	75
Illinois	55	65
Indiana	60	65
Iowa	65	65
Kansas	70	70
Kentucky	65	65
Louisiana	70	70
Maine	65	65
Maryland	65	65
Massachusetts	65	65
Michigan	55	70
Minnesota	70	70
Mississippi	70	70
Missouri	70	70
Montana	65	75
Nebraska	75	75
Nevada	75	75
New Hampshire	65	65
New Jersey	65	65
New Mexico	75	75
New York	65	65
North Carolina	70	70
North Dakota	75	75
Ohio	55	65
Oklahoma	75	75
Oregon	55	65
Pennsylvania	65	65
Rhode Island	65	65
South Carolina	70	70
South Dakota	75	75
Tennessee	70	70
Texas	65	75
Utah	75	75
Vermont	65	65
Virginia	65	65
Washington	60	70
West Virginia	70	70
Wisconsin	65	65
Wyoming	75	75

¹Urban Interstate.

Note: 55 miles per hour (mph) = 89 kilometers per hour (kph); 60 mph = 97 kph; 65 mph = 105 kph; 70 mph = 113 kph.

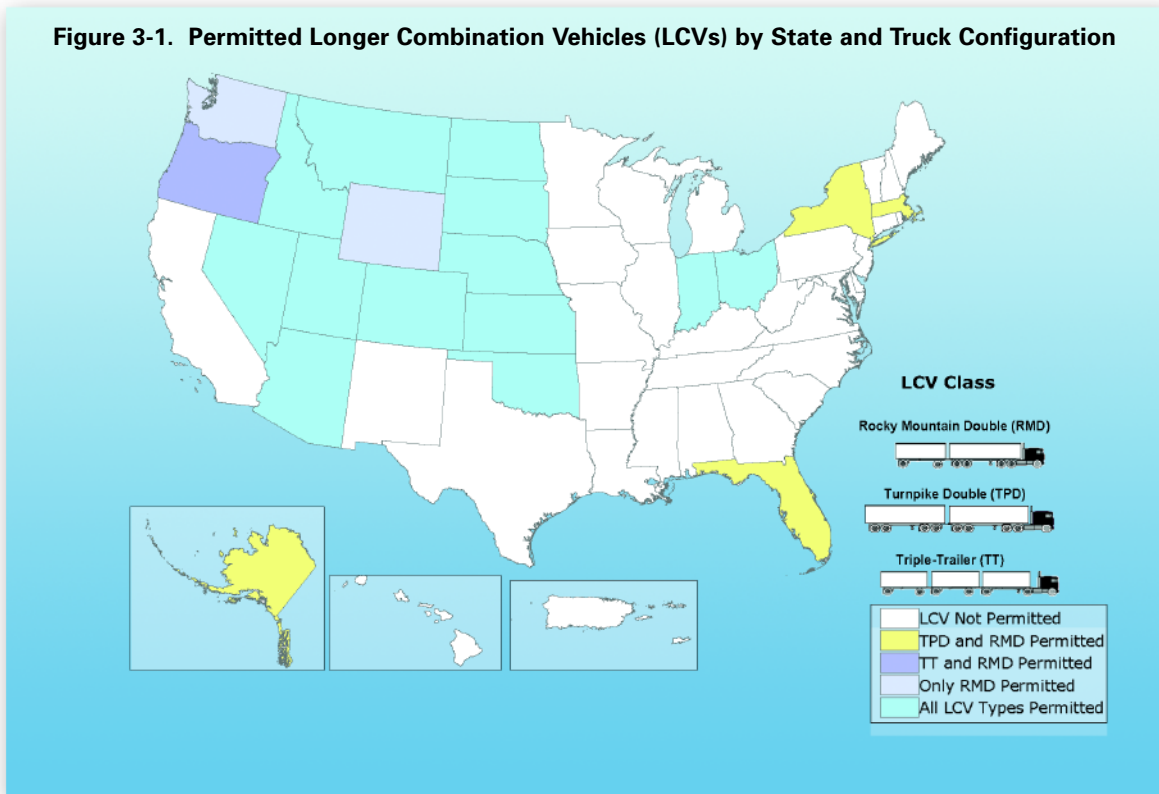
Another important variable for road users is the speed limit. Speed limits for trucks vary from state to state and often differ with limits set for passenger vehicles.



TABLE 3-7. MAXIMUM POSTED SPEED LIMITS ON RURAL INTERSTATES: SEPTEMBER 2004 (MILES PER HOUR)

Source: Insurance Institute for Highway Safety, Maximum Posted Speed Limits for Passenger Vehicles as of September 2004, available at http://www.hwysafety.org/safety_facts/state_laws/speed_limit_laws.htm as of September 8, 2004.

Figure 3-1. Permitted Longer Combination Vehicles (LCVs) by State and Truck Configuration



Fourteen states and six state turnpike authorities allow at least one type of Longer Combination Vehicle (LCV) on at least some parts of the road network.

As highway traffic increases over the next twenty years, the conditions that truckers will encounter on the roads are expected to worsen considerably (figures 3-2 and 3-3).

FIGURE 3-1. PERMITTED LONGER COMBINATION VEHICLES (LCVs) BY STATE AND TRUCK CONFIGURATIONSource: U.S. Department of Transportation, Federal Highway Administration, *Comprehensive Truck Size and Weight Study, Volume II* (Washington, DC: 2000).

Figure 3-2. National Highway System Estimated Peak Period Congestion: 1998



Figure 3-3. National Highway System Estimated Peak Period Congestion: 2020



FIGURE 3-2. NATIONAL HIGHWAY SYSTEM ESTIMATED PEAK PERIOD CONGESTION: 1998

Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework.

FIGURE 3-3. NATIONAL HIGHWAY SYSTEM ESTIMATED PEAK PERIOD CONGESTION: 2020

Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework.