III. THE FREIGHT TRANSPORTATION SYSTEM

Freight is carried via an extensive network of roads, railroad, waterways, and pipelines. Road infrastructure increased slowly over the past two decades despite a large increase in the volume of traffic. Between 1980 and 2003, route miles of public roads increased by 3 percent compared with an 89 percent increase in vehicle miles traveled (vmt). Over the same period, miles of railroad dropped by more than 20 percent, while rail shipments (measured in ton-miles) increased by 69 percent.

Table 3-1. Miles of Infrastructure by Transportation Mode

	1980	1990	2000	2003	Percent change, 1980-2003
Public roads, route miles	3,859,837	3,866,926	3,951,101	3,989,847	3.4
National Highway System (NHS)	N	N	161,189	161,801	N
Interstates	41,120	45,074	46,673	46,769	13.7
Other NHS	N	N	114,516	115,032	N
Freight intermodal connectors[1]	N	N	N	1,853	N
Other	N	N	3,789,912	3,828,047	N
Strategic Highway Corridor Network (STRAHNET)	N	N	62,066	62,576	N
Interstate	N	N	46,675	46,773	N
Non-Interstate	N	N	15,389	15,803	N
Railroad	[2]183,077	175,909	170,512	140,939	-23.0
Class I	NA	133,189	120,597	98,944	NA
Regional	NA	18,375	20,978	15,648	NA
Local	NA	24,337	28,937	26,347	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	160,868	-26.3
Gas	1,051,774	(R) 1,189,200	(R) 1,369,300	1,424,200	35.4

Key: N = not applicable; NA = not available; R = revised.
[1]Excludes intermodal connectors serving intercity bus, Amtrak, and public transit facilities.
[2]Excludes 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), table HM-16.
Freight 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 July 5, 2005.
Rail: Association of American Railroads, *Railroad Facts* (Washington, DC: Annual 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 July 6, 2005.
Oil pipelines: 1980-2000: ENO Transportation Foundation, *Transportation in America, 2002* (Washington, DC: 2002). 2003: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Pipeline Statistics, Internet site http://ops.dot.gov/stats/lpo.htm as of July 5, 2005.
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	2003
Highway	**161,490,159**	**193,057,376**	**225,821,241**	**236,760,033**
Truck, single-unit 2-axle 6-tire or more	4,373,784	4,486,981	5,926,030	5,666,933
Truck, combination	1,416,869	1,708,895	2,096,619	2,245,085
Truck, total	5,790,653	6,195,876	8,022,649	7,912,018
Trucks as percent of all highway vehicles	3.6	3.2	3.6	3.3
Rail				
Class I, locomotive	28,094	18,835	20,028	20,774
Class I, freight cars[1]	1,168,114	658,902	560,154	467,063
Nonclass I freight cars[1]	102,161	103,527	132,448	124,580
Car companies and shippers freight cars[1]	440,552	44 2	9,83 688,194	687,337
Water	**38,788**	**39,445**	**41,354**	**39,983**
Nonself-propelled vessels[2]	31,662	31,209	33,152	31,335
Self-propelled vessels[3]	7,126	8,236	8,202	8,648
Oceangoing steam and motor ships[4]	864	636	454	412
US Flag fleet as percent of world fleet[4]	3.5	2.7	1.6	1.4

[1]Beginning with 2003 data, Canadian-owned U.S. railroads are excluded. This accounts for about 47,000 cars in 2000.
[2]Nonself-propelled vessels include dry-cargo barges, tank barges, and railroad-car floats.
[3]Self-propelled vessels include dry cargo, passenger, off-shore support, tankers, and towboats.
[4]1,000 gross tons and over.

A vast number of vehicles and vessels move goods over the transportation network. The number of commercial trucks climbed 37 percent between 1980 and 2003, but their share of the total highway vehicle fleet remained constant. The character of the commercial truck fleet has changed, however, as the number of combination trucks grew twice as fast as the number of single-unit trucks over this period, 59 percent versus 30 percent. In comparison, the number of rail freight cars 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 2004* (Washington, DC: 2004).
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 miles are made in the carriage of commodities. Nevertheless, about 20 percent of truck miles are made with no product on board.

The weight profile of heavy trucks on the road (those over 10,000 pounds) changed between 1987 and 2002 with greater use of trucks at both the lighter and heavier ends of the spectrum. Between 1987 and 2002, the number of light-heavy trucks (between 10,000 and 19,500 pounds) and heavy-heavy trucks (over 26,000 pounds) increased 86 percent and 42 percent respectively. Over the same period, the number of medium-heavy trucks (between 19,501 and 26,000 pounds) grew by only 19 percent. Trucks between 60,000 and 80,000 pounds average weight form the largest category in both 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 Products Carried: 2002[1]

Products carried	Millions of miles
Total[2]	**145,172**
Animals and fish, live	735
Animal feed and products of animal origin	2,088
Grains, cereal	1,368
All other agricultural products	2,661
Basic chemicals	876
Fertilizers and fertilizer materials	1,666
Pharmaceutical products	305
All other chemical products and preparations	1,351
Alcoholic beverages	1,124
Bakery and milled grain products	3,553
Meat, seafood, and their preparations	3,056
Tobacco products	445
All other products foodstuff	7,428
Logs and other wood in the rough	1,149
Paper or paperboard articles	3,140
Printed products	765
Pulp, newsprint, paper, paperboard	1,936
Wood products	3,561
Articles of base metal	3,294
Base metal in primary or semifinished forms	2,881
Nometallic mineral products	3,049
Tools, nonpowered	7,759
Tools, powered	6,478
Electronic and other electrical equipment	3,024
Furniture, mattresses, lamps, etc.	2,043
Machinery	3,225
Miscellaneous manufactured products	4,008
Precision instruments and apparatus	734
Textile, leather, and related articles	1,538
Vehicles, including parts	3,844
All other transportation equipment	636
Coal	301
Crude petroleum	132
Gravel or rushed stone	2,790
Metallic ores and concentrates	45
Monumental or building stone	462
Natural sands	1,089
All other nonmetallic minerals	499
Fuel oils	1,232
Gasoline and aviation turbine fuel	849
Plastic and rubber	2,393
All other coal and refined petroleum products	1,172
Hazardous waste (EPA manifest)	190
All other waste and scrape (non-EPA manifest)	2,647
Recyclable products	922
Mail and courier parcels	4,760
Empty shipping containers	794
Passengers	274
Mixed freight	14,659
Products, equipment,or materials not elsewhere classified	265
Products not specified	6,358
Not applicable[3]	150
No product carried	28,977

[1]Excludes pickups, panels, minivans, sport utilities, and station wagons.
[2]Detail lines may not add to total because multiple products/hazardous materials may be carried at the same time.
[3]Vehicles not in use. When the respondent had partial-year ownership of the vehicle, annual miles were adjusted to reflect miles traveled when not owned by the respondent.

Table 3-3. Truck Miles by Products Carried: 2002
Source: U.S. Department of Commerce, Census Bureau, *Vehicle Inventory and Use Survey 2002: United States* (Washington, DC: 2004), available at http://www.census.gov/svsd/www/02vehinv.html as of July 6, 2005.

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

Average weight (pounds)	1987 Number (thousands)	1987 VMT (millions)	1992 Number (thousands)	1992 VMT (millions)	1997 Number (thousands)	1997 VMT (millions)	2002 Number (thousands)	2002 VMT (millions)	Percent change, 1987-2002 Number	Percent change, 1987-2002 VMT
Total	**3,624**	**89,972**	**4,008**	**104,987**	**4,701**	**147,876**	**5,415**	**145,624**	**49**	**62**
Light-heavy	**1,030**	**10,768**	**1,259**	**14,012**	**1,436**	**19,815**	**1,914**	**26,256**	**86**	**144**
10,001 to 14,000	525	5,440	694	8,000	819	11,502	1,142	15,186	118	179
14,001 to 16,000	242	2,738	282	2,977	316	3,951	396	5,908	64	116
16,001 to 19,500	263	2,590	282	3,035	301	4,362	376	5,161	43	99
Medium-heavy	**766**	**7,581**	**732**	**8,143**	**729**	**10,129**	**910**	**11,766**	**19**	**55**
19,501 to 26,000	766	7,581	732	8,143	729	10,129	910	11,766	19	55
Heavy-heavy	**1,829**	**71,623**	**2,017**	**82,832**	**2,536**	**117,931**	**2,591**	**107,602**	**42**	**50**
26,001 to 33,000	377	5,411	387	5,694	428	7,093	437	5,845	16	8
33,001 to 40,000	209	4,113	233	5,285	257	6,594	229	3,770	10	-8
40,001 to 50,000	292	7,625	339	9,622	400	13,078	318	6,698	9	-12
50,001 to 60,000	188	7,157	227	8,699	311	12,653	327	8,950	74	25
60,001 to 80,000	723	45,439	781	51,044	1,070	74,724	1,179	77,489	63	71
80,001 to 100,000	28	1,254	33	1,529	46	2,427	69	2,950	144	135
100,001 to 130,000	8	440	12	734	18	1,051	26	1,571	238	257
130,001 or more	4	185	5	227	6	312	6	329	43	78

[1]Excludes 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.

Federal and state governments are very concerned about truck weight because of the damage that heavy trucks can do to roads and bridges. To monitor truck weight, approximately 200 million weighs are made each year, about half are weigh-in-motion and half static. Less than 1 percent of weighs discover violations.

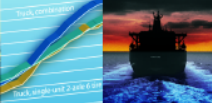
Table 3-5. Commercial Vehicle Weight Enforcement Activities

	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	3,554,449
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.
[1]Static weighs include the total vehicles weighed from semiportable, portable, and fixed scales.
[2]Violations include those from axle, gross, and bridge formula weight limits.
[3]Permits issued are for divisible and non-divisible loads on a trip or annual basis, as well as the overwidth movement of a divisible load.

TABLE 3-4. NUMBER AND VEHICLE-MILES TRAVELED (VMT) OF TRUCKS BY AVERAGE WEIGHT
Sources: U.S. Department of Commerce, Census Bureau, *2002 Vehicle Inventory and Use Survey: United States* (Washington, DC: 2004), available at http://www.census.gov/svsd/www/02vehinv.html as of July 1, 2005; U.S. Department of Commerce, Census Bureau, *1992 Truck Inventory and Use Survey: United States* (Washington, DC: 1995), available at http://www.census.gov/svsd/www/97vehinv.html as of July 1, 2005.

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.



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 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-semitrailer combination.

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

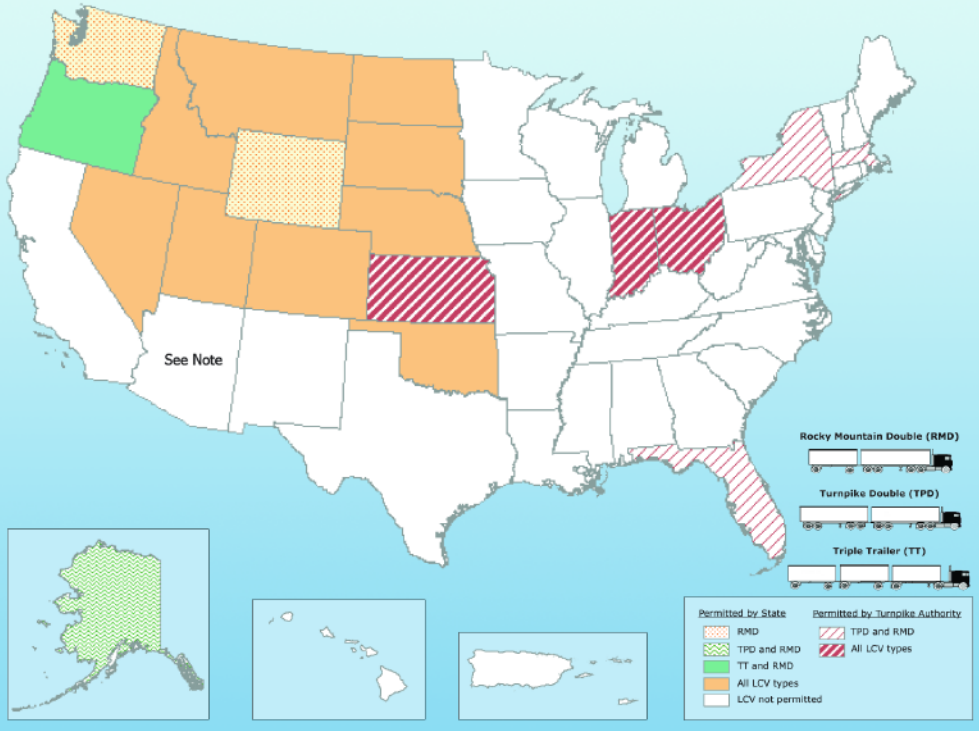
State	Length limitation (feet and inches)
Alabama	53-6
Arizona	57-6
Arkansas	53-6
California[1]	48-0
Colorado	57-4
Delaware	53-0
Illinois	53-0
Indiana[2]	48-6
Iowa	53-0
Kansas	57-6
Kentucky	53-0
Louisiana	59-6
Mississippi	53-0
Missouri	53-0
Montana	53-0
Nebraska	53-0
Nevada	53-0
New Mexico	57-6
North 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

[1]Semitrailers up to 53 feet may also operate without a permit by conforming to a kingpin-to-rearmost axle distance of 38 feet.
[2]Semitrailers up to 53 feet in length may operate without a permit by conforming to a kingpin-to-rearmost 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.
[3]Semitrailers up to 53 feet in length may operate without a permit by conforming to a kingpin-to-rearmost 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 3-6. 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.

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.

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

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

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 on page 30).

Table 3-7. Maximum Posted Speed Limits on Rural Interstates: 2005 (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	[2]65	[2]70
Iowa	[2]70	[2]70
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

[1]Urban Interstate.
[2]Indiana and Iowa increased speed limits for both cars and trucks by 5 miles per hour beginning July 1, 2005.
Note: 55 miles per hour (mph) = 89 kilometers per hour (kph); 60 mph = 97 kph; 65 mph = 105 kph; 70 mph = 113 kph.

TABLE 3-7. MAXIMUM POSTED SPEED LIMITS ON RURAL INTERSTATES: 2005
Source: Insurance Institute for Highway Safety, Maximum Posted Speed Limits for Passenger Vehicles as of May 2005, available at http://www.hwysafety.org/safety_facts/state_laws/speed_limit_laws.htm as of June 27, 2005.

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

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

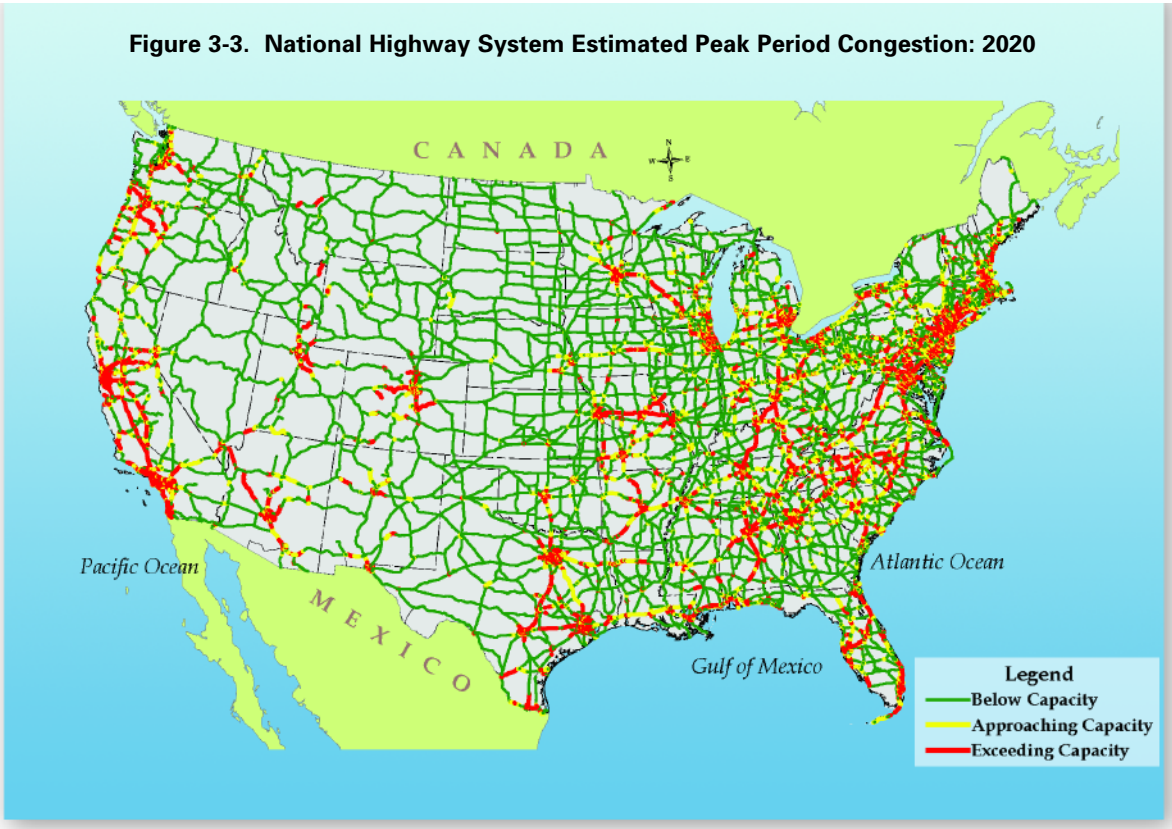


FIGURE 3-2. National Highway System Estimated Peak Period Congestion: 1998
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework.

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.