CHAPTER 2.3

FREIGHT FORECAST

Forecasting domestic and international freight flows is a serious challenge. Changes in manufacturing locations, global economic forces, competition, new technologies, political dynamics, regulations, trade agreements, opening of new routes, and labor disputes can each affect freight transportation. Significant growth is predicted in both the weight and value of goods moving through California's transportation system. Total California domestic mode shipments are forecast to increase over 160 percent by weight and 250 percent by value by the year 2040 as detailed in the tables included in this chapter.

Based on the US DOT Interim Guidance, the FHWA Freight Analysis Framework (FAF) tool was used to develop freight forecasts. The FAF is a commodity flow database that contains freight flow information by mode, commodity, and origin-destination zones. The data in this chapter was generated using Version 3 (FAF 3) and will be updated when version 4 is released.

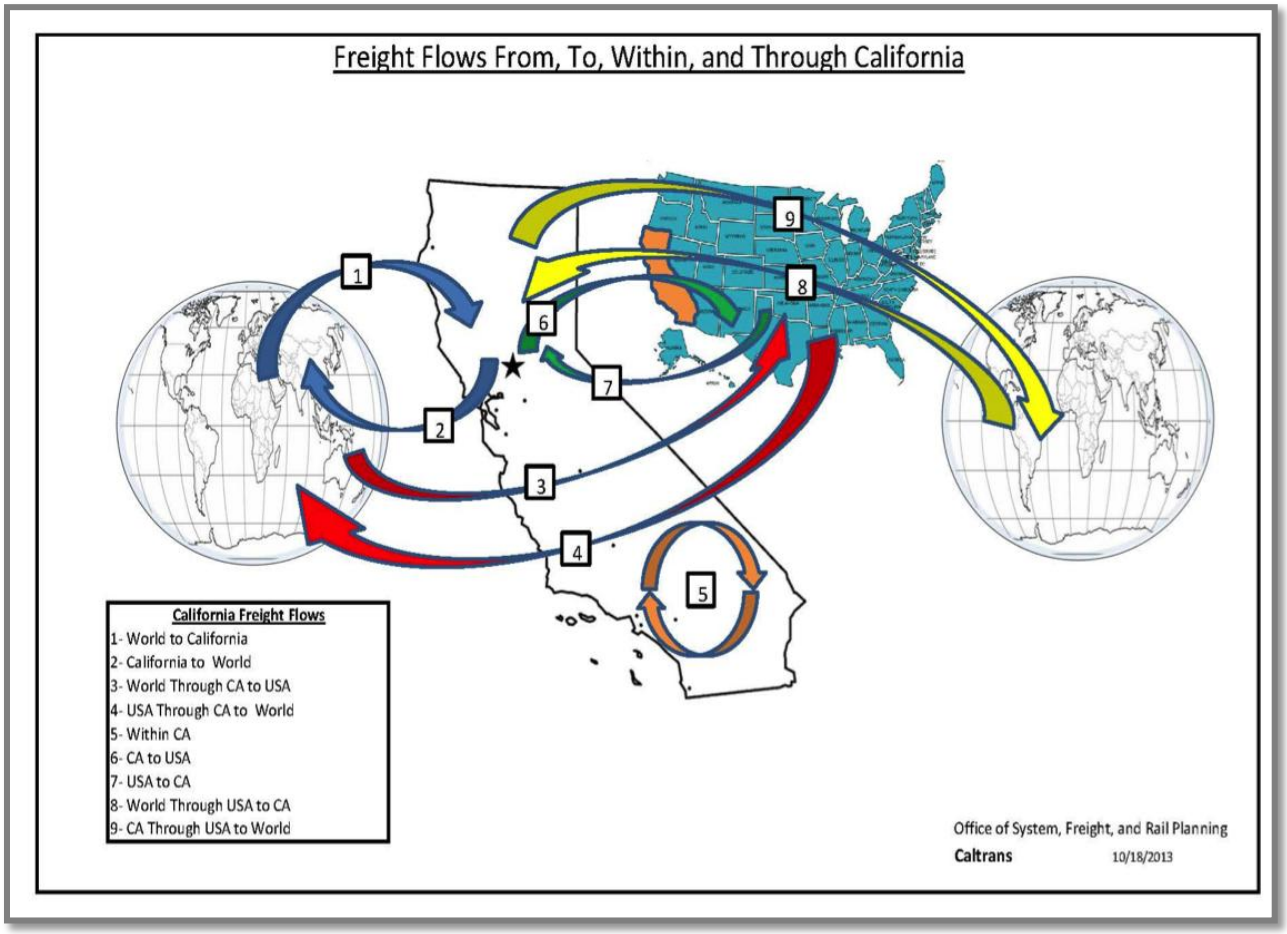
Released in July 2010, and updated in 2014 with 2012 data, the original FAF 3 was based on the 2007 Commodity Flows Survey (CFS) and incorporates other data sources, such as the public-use version of the waybill (a carrier-issued document with details and instructions relating to shipments), Federal Aviation Administration (FAA) air cargo data, and United States Army Corps of Engineers waterborne commerce data. Freight flows by Metropolitan Statistical Areas (MSA) (geographic entities with populations of 50,000 and over defined for use by Federal agencies) and Consolidated Statistical Areas (CSA) (geographic statistical areas that qualify as a MSA and have a population of over 1,000,000) were reported in annual tons moved and monetary value of the goods (in 2007 dollars). Based on MSA and CSA, the FAF 3 is broken up into 123 regions within the US that include 74 major metropolitan areas. There are also eight international "world" regions: Canada, Mexico, Rest of Americas, Europe, Africa, Southwest and Central Asia, Eastern Asia, and South East Asia and Oceania.

FAF mode and value calculations are based on the following nine possible freight flows depicted in Figure 54 on the next page:

1. Major World Regions Flows Destined to CA
2. A Origin Flows Destined to Major World Regions
3. Flows from Major World Regions, through CA, Destined to US States (outside of CA)
4. Flows from States through CA, Destined to Major World Regions

5. CA Intrastate Freight Flows
6. Domestic Flows from CA to States
7. Domestic Flows from States to CA
8. World Regions through States to CA
9. California to World Regions through States

FIGURE 54. FREIGHT FLOWS FROM, TO, WITHIN, AND THROUGH CALIFORNIA



Source: FHWA Freight Analysis Framework, adapted by Caltrans Office of System and Freight Planning (2013)

The complete FAF 3 origin-destination commodity flow matrix is made up of 131 origin, 131 destination, 43 commodity class, and 7 modal category data cells in annual tons and dollars. For purposes of this document, base year freight flows are for 2012 and are forecast for 2025 and 2040. Annual data for 2012 is presented in ktons (thousands of US short tons) for weight and millions in 2012 dollars. The units of measure for 2025 and 2040 data are in ktons for weight and millions of 2007 dollars for value. For inflow shipments, the origin of the flow is the state or major world region of exit, and for export shipments the destination of the flow is the state or region of entry. Foreign shipments include flows between the state of entry and the destination state for imported shipments and flows between the origin state and the state of exit for exported shipments. Mode of transportation consists of three types: the domestic mode (between and within states), the foreign mode (domestic origin to foreign zone of entry), and the inbound mode (between a foreign origin zone of exit and the domestic destination zone of entry).

The realistic expectation is that forecasted tonnage and value figures will likely decline from the 2007-based forecasts when FAF 4 becomes available (anticipated by 2016) and data is adjusted accordingly. FAF forecast data does not take into account events such as natural disasters, armed conflict, recessions, new or restricted highway capacity, transfer of trucked freight to automated conveyances, widespread deployment of new manufacturing technologies, such as 3-D printing, the expansion of the Panama Canal, or other events that could significantly change the forecast. While the freight flow data presented in this report may vary from actual freight flows in the future, the information does highlight relationships and orders of magnitude in the movement of goods.

The FAF international Import Flows component examines flows moved from foreign regions to domestic destinations. Regions for this type of flow include foreign origin region, zone of entry (country or region), and domestic destination. Import shipments that do not move beyond the zone of entry are classified in the “Major World Regions Freight Flows Destined for California” category. The FAF Export Flows component examines flows moved from domestic origins to foreign destinations through California’s ports of exit.

COMMODITIES

Prior to delving into specific flow data for California, it is important to gain some appreciation for the diverse commodities being transported throughout the State. In order to wisely invest scarce transportation funds to meet transport requirements of the various industry sectors, there is a need to understand the type and weight of commodities moved through the transportation system. In addition, it is important to know which commodities have significantly high values, because these commodities will likely be more time sensitive and be impacted by issues such as congestion.

Current and Forecast Top Ten Commodities

The following discussion refers solely to intrastate shipments and international commodities originating or having a final destination in California. In 2012, waste/scrap and gasoline were the leading commodities for the state's freight transportation system. That year, 214,845 ktons, or 15.9 percent of the total freight tonnage, consisted of waste/scrap, followed by gasoline with 147,106 ktons, or 10.9 percent. By 2040, waste/scrap is forecast to continue to be the top commodity for transport and is projected to reach 275,456 ktons. The forecast scenario reveals that nonmetal mineral products are expected to reach 207,374 ktons by 2040 and gravel/stone will reach 168,448 ktons, which would surpass gasoline (at 138,305 ktons) in the amount of weight being transported. Greenhouse gas (GHG) reduction strategies, such as expanded use of low- and zero-emissions vehicles, could contribute to the future decline in demand for gasoline.

The top four commodities by weight in 2012 (waste/scrap, gasoline, nonmetal mineral products, and gravel/stone) comprised over 45 percent of the intrastate and international tonnage with California origins or destinations. The top ten commodities combined represented more than 70 percent of the total weight transported. By 2040, natural sands and fuel oils will drop from this list, making way for mixed freight and cereal grains. In addition, the total share of the top ten commodities by weight will fall to around 66 percent.

TABLE 22. TOP TEN INTRASTATE AND INTERNATIONAL COMMODITIES ORIGINATING FROM OR DESTINED FOR CALIFORNIA BY WEIGHT (YEARS 2012 AND 2040)

Top 2012 Commodities	Weight (in ktons)	Share	Top 2040 Commodities	Weight (in ktons)	Share
Waste and scrap	214,845	15.9%	Waste and scrap	275,456	13.9%
Gasoline	147,106	10.9%	Nonmetallic mineral products	207,374	10.5%
Nonmetallic mineral products	140,453	10.4%	Gravel and crushed stone	168,448	8.5%
Gravel and crushed stone	124,133	9.2%	Gasoline	138,305	7.0%
Crude petroleum	86,022	6.4%	Other agriculture products	126,523	6.4%
Other agriculture products	63,217	4.7%	Crude petroleum	100,427	5.1%
Natural sands	54,886	4.1%	Other foodstuffs	82,896	4.2%
Coal-n.e.c. (not elsewhere classified)	62,643	4.6%	Mixed freight	77,526	3.9%
Other foodstuffs	51,295	3.8%	Cereal grains	71,230	3.6%
Fuel oils	41,239	3.1%	Coal-n.e.c.	60,505	3.1%
2012 Top Ten Total	985,839	72.9%	2040 Top Ten Total	1,308,690	66.1%
2012 All Commodity Total	1,351,574		2040 All Commodity Total	1,980,491	

Source: FHWA Freight Analysis Framework Summary Statistics

In terms of value, the top ten commodity categories are listed in Table 22. It is anticipated that machinery and electronics will continue to lead the list for the 2012 to 2040 time period. The value of these two commodities combined is projected to increase from $336.7 trillion, or 23.6 percent of total, in 2012 to $963.9 trillion, or 30.7 percent of the total, in 2040. Of the top four categories, gasoline is anticipated to lose rank (perhaps due to decline in demand) and pharmaceuticals will gain 439 percent in value, shifting from seventh in rank to fourth. By 2040, textiles/leather and other foodstuffs are expected to drop from the list, and precision instruments and plastics/rubber will rank among the top ten. In 2012, the top ten categories represented over 60 percent of the total commodity value of shipments; in 2040, the percentage will rise to nearly 70, making them important to consider as freight transportation decisions are made.

These top ten lists show that a commodity ranking high in weight does not necessarily rank high in value. In the competitive world, consideration of volume, weight, and value are crucial to maximize effectiveness of the freight transportation system. The statewide stance should be proactive and cannot ignore preparation for potential damage and congestion along corridors due to volume and weight of transported commodities.

TABLE 23. TOP TEN INTRASTATE AND INTERNATIONAL COMMODITIES ORIGINATING FROM OR DESTINED FOR CALIFORNIA BY VALUE (YEARS 2012 AND 2040)

2012 Commodities	Value (in Millions)	Share	2040 Commodities	Value (in Millions)	Share
Machinery	$169,896	11.9%	Machinery	$545,479	17.4%
Electronics	$166,805	11.7%	Electronics	$418,455	13.3%
Gasoline	$111,435	7.8%	Mixed Freight	$246,064	7.8%
Mixed freight	$104,720	7.3%	Pharmaceuticals	$226,368	7.2%
Motorized and other vehicles	$97,802	6.9%	Precision instruments	$190,399	6.1%
Textiles and leather	$61,022	4.3%	Motorized and other vehicles	$135,683	4.3%
Pharmaceuticals	$51,559	3.6%	Miscellaneous manufactured products	$124,567	4.0%
Other foodstuffs	$50,799	3.6%	Gasoline	$105,843	3.4%
Other agriculture products	$47,938	3.4%	Other agricultural products	$95,304	3.0%
Miscellaneous manufactured products	$44,272	3.1%	Plastics and rubber	$93,833	3.0%
2012 Top Ten Total	$906,248	63.5%	2040 Top Ten Total	$2,181,995	69.6%
2012 All Commodities Total	$1,426,365		2040 All Commodities Total	$3,134,935	

Source: FHWA Freight Analysis Framework Summary Statistics

Domestic Mode Shipments

When transporting commodities within or through California, the mode of transportation is considered domestic. There are various ways to group these shipments using the flow numbers corresponding to the nine domestic and international flows represented in Figure 54. For example, domestic-only shipments include California-only (Flow 5) as well as US-only interstate movements involving the State (Flows 6 and 7). Imports and exports originating from or destined only for California are represented by Flows 1 and 2. However, import shipments destined for California can also arrive indirectly through other states (Flow 8), and exports originating in California can leave the country from other states (Flow 9). In addition, there are shipments that are not destined for California but pass through the state, entering our ports as imports and exports (Flows 3 and 4).

Table 24 (below) shows total weight of shipments by flow in ktons, by domestic mode and total value coming into, traveling through, and leaving California for 2012 and forecast for 2040. The total tonnage of California domestic mode shipments is expected to increase by over 160 percent, from nearly 1.8 million ktons (thousands of US short tons) in 2012 to over 2.9 million ktons in 2040. The dollar value associated with these exchanged goods is anticipated to increase by nearly 250 percent, to over $6.9 trillion.

As can be seen in Table 24, representing all nine domestic flows, the trucking industry is currently the predominant mode of transportation for the state's freight shipments. By weight, trucks transport the largest amount of goods into, within, and out of the state, and this is forecast to remain the case through 2040. In 2012, pipelines transported the next highest volume of commodities; however, by 2040, multiple modes and mail is expected to surpass pipelines in rank. Percentage-wise, by weight, both the air and multiple modes and mail categories are expected in increase by over 280 percent between 2012 and 2040, perhaps due to growth in demand for e-commerce. The only mode anticipated to lose share of shipped tonnage is the domestic water mode. More detailed tables regarding domestic flows are discussed later in this chapter.

TABLE 24. DOMESTIC MODE SHIPMENTS BY WEIGHT (IN KTONS*) AND VALUES WITHIN, TO, THROUGH, AND FROM CALIFORNIA (YEARS 2012 AND 2040)

Year	2012	2040	2012	2040	2012	2040
Mode	World to CA (1)		CA to World (2)		World, through CA to Other States (3)	
Truck	42,318	106,890	42,075	133,737	27,413	88,074
Rail	420	1,134	3,561	9,709	1,745	4,253
Water	1,581	5,359	153	341	138	2,163
Air (include truck-air)	31	135	15	62	8	40
Multiple modes and mail	2,506	6,423	9,013	29,757	18,569	63,873
Pipeline	11,513	20,806	3,024	7,082	158	2,363

Other and unknown	1,276	3,552	525	2,322	1,138	3,007
No domestic mode	36,334	41,351	--	--	--	--
Weight Totals in Ktons	95,979	185,649	58,366	183,009	49,169	163,773
Value Totals in Millions	$259,220	$734,713	$124,155	$516,385	$197,082	$783,062
Mode	Other States, through CA to World (4)		Within CA (5)		CA to Other States (6)	
Truck	11,384	43,925	1,023,115	1,416,020	76,928	122,136
Rail	5,221	20,645	9,947	11,122	9,384	17,883
Water	84	229	15,609	17,270	1,314	4,254
Air (include truck-air)	15	89	48	108	691	1,413
Multiple modes and mail	17,574	83,401	14,671	22,796	9,240	16,103
Pipeline	12	11	110,958	106,529	6,787	3,983
Other and unknown	410	1,465	22,882	37,989	1,635	2,344
Weight Totals in Ktons	34,699	149,766	1,197,230	1,611,833	105,979	168,116
Value Totals in Millions	$58,643	$398,772	$1,068,151	$1,883,837	$487,413	$989,704
Mode	Other States to CA (7)		World, through Other States to CA (8)		CA, through Other States to World (9)	
Truck	69,542	177,977	11,289	30,740	10,877	31,775
Rail	38,452	55,536	5,904	16,555	4,626	10,907
Water	17,605	3,796	515	1,945	141	337
Air (include truck-air)	296	811	425	1,660	189	571
Multiple modes and mail	18,105	37,042	3,775	7,472	3,237	7,095
Pipeline	56,734	58,844	37	1,580	--	--
Other and unknown	2,046	5,082	494	1,037	1,583	3,640
Weight Totals in Ktons	202,781	339,086	22,438	60,989	20,652	54,325
Value Totals in Millions	$419,520	$1,131,026	$110,409	$338,368	$47,738	$154,178

**Ktons represent thousands of short tons*
Note: Numbers in parentheses represent corresponding freight flows.
Source: FHWA Freight Analysis Framework Data (FAF 3.5)

CALIFORNIA INTRASTATE AND INTERSTATE FREIGHT FLOWS

Table 25 shows that the vast majority of movements by both weight and value begin and end within California (Flow 5). Total ktons transported within California were 1,197,230 in 2012 and are forecast to reach 1,611,833 ktons by 2040. The data shows the Los Angeles (LA) CSA as the strongest generator of shipments (477,048 ktons) and also the largest recipient (422,116 ktons). By 2040, only a modest increase in total shipments, to 484,088 ktons, is expected from LA CSA; however, an increase in value of over 160 percent is anticipated. Another large California shipment generator is the San Francisco CSA, with 297,391 ktons in 2012, a majority of which is expected to remain in the area of origin. By 2040, shipment volume from this CSA is projected to increase by 139 percent to 413,371 ktons, with a corresponding increase in value of nearly 182 percent, to $417.5 billion.

Tables 26 and 27 (Flows 6 and 7) represent domestic flows between other states and California, and vice versa. Most of the commodities by weight flow from California to Nevada, Arizona, and Texas, are expected to continue to 2040. Texas and Arizona lead in value of commodities coming from California. With regard to freight coming to California from other states, in 2012, Texas, Alaska, and Washington transported the most commodities by weight; which is forecast to change to Arizona, Texas, and Washington by 2040. By value, the top states were Texas, Tennessee, and Ohio in 2012, with Texas, Tennessee, and Arizona forecast to lead by 2040.

TABLE 25. CALIFORNIA (CA) INTRASTATE FREIGHT – FLOW 5 (YEARS 2012, 2025, AND 2040)

REGION		2012		2025		2040	
From	TO	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Los Angeles CA CSA*	Los Angeles CA CSA*	422,115.6	$438,887.9	398,294.5	$525,538.7	414,605.3	$632,358.4
	Remainder of CA	24,052.4	$32,408.2	23,171.6	$48,032.5	29,210.5	$80,913.8
	Sacramento CA-Nevada (NV) CSA (CA Part)	4,688.2	$7,129.1	4,890.0	$12,247.3	6,140.6	$29,664.0
	San Diego CA MSA**	14,006.8	$27,954.3	14,047.2	$35,582.1	14,960.4	$57,322.5
	San Francisco CA CSA	12,184.8	$24,904.7	14,900.0	$36,264.2	19,171.2	$53,271.8
Subtotal		477,047.9	$531,284.2	455,303.2	$657,664.8	484,088.0	$853,530.5
Remainder of California	Los Angeles CA CSA	31,002.4	$26,132.3	40,201.2	$36,212.5	49,187.3	$46,926.8
	Remainder of CA	177,864.7	$105,033.6	234,197.1	$171,413.8	311,067.1	$241,890.9
	Sacramento CA-NV CSA (CA Part)	12,669.0	$12,138.3	19,606.0	$21,081.8	27,482.8	$33,594.8
	San Diego CA MSA	1,795.2	$1,713.6	2,441.1	$2,615.3	3,102.7	$3,503.8
	San Francisco CA CSA	43,031.0	$29,725.4	52,518.5	$46,752.9	72,012.9	$65,969.0
Subtotal		266,362.4	$174,743.1	348,963.8	$278,076.3	462,852.8	$391,885.4
Sacra	Los Angeles CA CSA	3,199.2	$2,466.1	3,225.8	$2,770.0	4,913.3	$3,915.8

	Remainder of CA	19,844.0	$12,691.0	39,662.1	$14,421.4	50,201.4	$25,649.6
	Sacramento CA-NV CSA (CA Part)	58,758.4	$36,915.2	69,250.6	$47,256.7	97,928.0	$74,060.5
	San Diego CA MSA	398.4	$333.7	268.3	$443.1	464.9	$595.2
	San Francisco CA CSA	12,611.3	$11,946.7	25,249.5	$12,424.7	31,723.1	$20,879.6
	Subtotal	94,811.3	$64,352.6	137,656.3	$77,315.9	185,230.8	$125,100.7
San Diego CA MSA**	Los Angeles CA CSA	8,397.8	$17,510.7	8,975.1	$20,055.0	10,035.4	$26,310.6
	Remainder of CA	2,078.1	$2,326.8	1,605.8	$2,686.2	1,939.6	$4,203.2
	Sacramento CA-NV CSA (CA Part)	300.2	$543.6	405.8	$1,023.5	335.4	$1,897.5
	San Diego CA MSA	49,741.6	$45,817.2	46,383.2	$52,404.1	52,360.2	$59,004.7
	San Francisco CA CSA	1,099.8	$1,627.5	1,464.4	$2,765.7	1,619.7	$4,420.7
	Subtotal	61,617.4	$67,825.9	58,834.4	$78,934.5	66,290.4	$95,836.7
San Francisco CA CSA	Los Angeles CA CSA	13,538.3	$20,142.1	13,639.1	$25,599.3	15,642.4	$33,233.0
	Remainder of CA	26,080.9	$18,519.0	31,959.3	$24,763.7	38,673.0	$32,291.1
	Sacramento CA-NV CSA (CA Part)	8,059.1	$7,292.3	10,314.5	$13,732.5	14,814.3	$33,989.5
	San Diego CA MSA	1,056.7	$2,266.8	510.7	$3,030.3	592.9	$3,889.0
	San Francisco CA CSA	248,655.8	$181,725.1	282,610.1	$240,067.5	343,648.8	$314,081.6
	Subtotal	297,390.7	$229,945.3	339,033.7	$307,193.3	413,371.3	$417,484.2
	Grand Totals	1,197,229.6	$1,068,151.1	1,339,791.5	$1,399,184.8	1,611,833.4	$1,883,837.4

** CSA - Consolidated Statistical Area*

***MSA - Metropolitan Statistical Area*

Source: FHWA Freight analysis Framework Data (FAF 3)

TABLE 26. DOMESTIC FREIGHT FLOWS FROM CALIFORNIA TO OTHER UNITED STATES – FLOW 6

	2012		2025		2040	
State	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Alabama	731.0	$4,634.3	856.1	$7,745.9	1,014.9	$11,048.4
Alaska	145.5	$833.5	142.7	$781.6	195.6	$1,014.0
Arizona	13,092.8	$35,097.8	13,577.0	$48,540.0	19,016.8	$71,988.8
Arkansas	535.1	$2,591.0	691.9	$3,237.1	944.8	$4,643.1
Colorado	2,650.8	$11,393.5	3,577.3	$17,738.7	4,707.8	$25,721.0
Connecticut	411.3	$3,286.1	460.3	$4,888.7	483.9	$5,706.1
Delaware	114.9	$1,339.3	138.8	$1,700.5	206.0	$2,476.6
Florida	3,241.9	$28,379.0	3,562.8	$34,539.7	4,271.4	$45,951.4
Georgia	1,961.0	$13,665.7	2,351.3	$17,346.4	2,950.8	$22,867.7
Hawaii	1,281.5	$5,315.3	1,892.2	$8,721.4	2,702.6	$14,808.6
Idaho	841.6	$3,676.2	991.8	$5,974.1	1,213.4	$8,814.2
Illinois	4,329.5	$22,764.3	4,826.5	$27,380.6	5,958.4	$38,033.6
Indiana	1,574.7	$11,141.4	1,864.3	$17,952.6	2,240.9	$24,409.0

	2012		2025		2040	
Iowa	1,398.3	$3,989.9	2,738.2	$5,668.5	5,350.1	$9,047.0
Kansas	852.3	$4,994.2	946.8	$7,588.7	1,210.3	$11,085.0
Kentucky	1,159.4	$15,075.9	1,462.4	$22,254.9	2,092.4	$45,595.3
Louisiana	865.8	$3,174.6	866.2	$4,092.3	876.6	$5,464.8
Maine	112.6	$992.9	126.3	$1,534.6	167.3	$2,265.8
Maryland	1,018.8	$10,518.2	1,248.5	$12,942.2	1,695.5	$19,592.6
Massachusetts	1,004.2	$9,956.0	1,097.0	$10,813.7	1,402.6	$15,727.5
Michigan	1,409.2	$7,453.9	1,623.3	$10,810.4	2,117.0	$15,740.1
Minnesota	1,256.2	$7,696.3	1,476.0	$10,960.9	1,969.4	$16,653.2
Mississippi	367.1	$3,435.3	474.1	$4,325.6	557.4	$5,476.6
Missouri	1,550.0	$7,232.9	1,932.1	$9,873.5	2,513.4	$12,804.8
Montana	452.4	$1,737.5	537.3	$2,339.0	727.7	$3,827.4
Nebraska	481.0	$2,152.5	690.8	$3,341.4	971.2	$5,050.1
Nevada	16,614.1	$26,160.2	18,182.8	$32,888.8	23,914.4	$48,976.5
New Hampshire	154.5	$2,264.1	170.3	$2,820.0	196.8	$3,152.9
New Jersey	2,674.4	$21,292.1	2,806.6	$23,022.1	3,421.2	$32,400.4
New Mexico	1,350.9	$4,619.9	1,297.1	$5,309.2	1,777.7	$8,460.8
New York	2,590.7	$17,641.0	2,975.7	$25,333.6	3,967.8	$42,021.5
North Carolina	1,092.1	$10,629.0	1,252.1	$12,894.6	1,549.6	$18,522.9
North Dakota	119.8	$514.2	208.3	$799.9	293.5	$1,301.3
Ohio	2,115.5	$13,490.0	2,803.2	$20,609.3	3,742.1	$32,204.2
Oklahoma	686.7	$4,405.3	749.5	$5,840.6	892.5	$8,257.5
Oregon	7,564.4	$14,912.2	8,737.8	$21,626.2	11,932.0	$32,927.7
Pennsylvania	2,267.5	$20,907.7	2,844.2	$28,163.4	3,727.6	$39,851.4
Rhode Island	68.2	$622.9	57.9	$742.1	60.0	$841.6
South Carolina	412.4	$3,851.4	490.7	$5,007.9	663.0	$7,485.6
South Dakota	85.5	$535.5	102.1	$732.5	137.4	$1,224.0
Tennessee	1,227.7	$12,387.3	1,410.4	$15,846.6	2,054.7	$31,841.2
Texas	9,392.7	$53,772.2	13,108.0	$75,719.6	16,711.4	$106,360.5
Utah	4,148.7	$13,047.6	5,197.3	$21,384.1	7,032.7	$34,914.4
Vermont	60.8	$550.6	67.0	$703.8	88.8	$1,058.2
Virginia	1,009.3	$9,628.0	1,186.0	$12,303.8	1,524.7	$17,572.9
Washington	7,471.3	$23,125.3	12,408.6	$42,545.2	14,007.5	$46,822.9
Washington DC	35.9	$726.4	27.7	$379.5	33.4	$564.7
West Virginia	179.0	$911.7	181.4	$1,265.3	211.9	$2,092.8
Wisconsin	1,608.3	$8,154.8	1,944.5	$14,066.5	2,384.5	$23,255.1

	2012		2025		2040	
Wyoming	210.1	$736.3	189.9	$990.2	233.2	$1,780.6
Totals	105,979.2	$487,412.9	128,551.1	$674,087.6	168,116.5	$989,704.2

Source: FHWA Freight Analysis Framework Data (FAF 3)

TABLE 27. DOMESTIC FLOWS FROM OTHER UNITED STATES TO CALIFORNIA – FLOW 7

State of Origin	2012 Weight (in Ktons)	2012 Value (in Millions)	2025 Weight (in Ktons)	2025 Value (in Millions)	2040 Weight (in Ktons)	2040 Value (in Millions)
Alabama	3,544.6	$5,616.0	4,462.5	$7,493.0	4,539.1	$10,865.1
Alaska	14,400.3	$6,514.1	5,402.8	$2,552.5	2,495.6	$1,289.9
Arizona	7,367.3	$17,424.7	45,072.5	$41,161.3	57,041.4	$69,875.6
Arkansas	3,560.3	$5,272.9	4,761.9	$7,142.9	4,699.5	$8,252.7
Colorado	4,630.5	$8,023.4	6,272.1	$16,000.0	7,768.7	$25,905.9
Connecticut	623.6	$4,087.7	1,045.6	$9,673.3	2,212.7	$24,302.0
Delaware	179.7	$1,294.8	161.9	$1,110.8	248.3	$1,435.1
Florida	1,814.2	$8,434.1	5,530.9	$21,744.8	6,533.4	$44,478.9
Georgia	2,751.7	$7,936.8	4,014.1	$15,128.0	4,707.8	$21,767.2
Hawaii	144.1	$413.8	101.0	$328.6	179.8	$625.2
Idaho	3,601.0	$2,849.1	4,762.9	$3,856.3	6,474.0	$5,358.9
Illinois	6,540.4	$20,940.5	6,746.1	$34,451.6	8,036.7	$55,368.6
Indiana	2,574.2	$10,853.7	3,779.6	$19,739.0	4,391.8	$29,087.6
Iowa	3,443.6	$5,525.7	4,269.5	$7,667.9	5,039.7	$10,585.1
Kansas	2,806.8	$5,101.0	3,333.7	$8,273.3	4,220.0	$16,479.2
Kentucky	2,218.9	$10,497.3	3,472.9	$22,058.4	4,467.1	$29,279.7
Louisiana	9,660.2	$6,628.8	11,279.8	$10,370.7	11,914.1	$14,189.2
Maine	489.4	$1,044.7	1,041.5	$1,339.1	1,238.2	$1,861.5
Maryland	1,560.7	$3,158.3	1,651.2	$4,732.5	1,610.9	$5,683.6
Massachusetts	1,207.1	$8,524.3	1,931.3	$16,192.2	1,745.1	$25,014.6
Michigan	2,205.3	$12,508.2	3,805.4	$18,888.6	5,738.5	$27,339.5
Minnesota	4,296.8	$11,316.1	6,397.3	$25,844.1	8,180.7	$45,407.2
Mississippi	1,147.0	$2,914.9	1,542.2	$5,229.9	1,534.4	$5,057.7
Missouri	1,953.4	$9,476.2	2,662.4	$13,332.0	3,660.6	$21,043.2
Montana	2,681.2	$1,449.7	2,863.0	$2,219.4	2,802.7	$2,975.2
Nebraska	8,747.1	$4,852.3	7,681.9	$5,531.5	7,444.0	$6,668.8
Nevada	7,430.2	$12,657.7	9,522.4	$26,596.6	12,918.6	$41,092.0
New Hampshire	351.7	$1,851.1	613.9	$8,952.2	716.3	$13,119.3

State of Origin	2012 Weight (in Ktons)	2012 Value (in Millions)	2025 Weight (in Ktons)	2025 Value (in Millions)	2040 Weight (in Ktons)	2040 Value (in Millions)
New Jersey	1,101.5	$13,970.9	1,537.2	$23,486.6	2,136.5	$36,601.5
New Mexico	2,582.7	$2,106.0	2,102.7	$2,521.3	2,094.5	$3,380.5
New York	6,021.7	$20,386.7	6,802.0	$29,626.6	6,364.2	$41,189.0
North Carolina	1,436.5	$8,848.7	1,808.0	$13,113.2	2,105.9	$15,553.4
North Dakota	2,610.8	$1,351.5	8,981.1	$3,963.5	12,211.9	$5,456.9
Ohio	2,866.0	$21,111.0	4,509.9	$35,749.0	5,816.1	$58,387.0
Oklahoma	6,970.7	$4,230.5	10,996.5	$8,296.4	11,887.6	$13,031.9
Oregon	9,897.9	$15,854.4	11,548.5	$32,127.6	12,914.5	$48,254.3
Pennsylvania	3,331.4	$17,320.3	3,935.9	$26,242.4	4,155.8	$38,570.2
Rhode Island	91.0	$848.8	81.7	$861.0	85.4	$994.9
South Carolina	796.4	$3,721.7	1,362.5	$7,719.7	1,947.4	$13,376.6
South Dakota	1,268.4	$1,032.4	2,601.4	$1,794.1	3,559.1	$2,274.3
Tennessee	1,672.7	$26,375.8	2,687.0	$41,534.4	3,850.2	$79,013.6
Texas	31,238.5	$39,362.9	45,522.8	$58,300.7	46,052.0	$93,231.0
Utah	6,466.6	$8,089.6	10,840.3	$16,815.0	12,576.6	$25,081.6
Vermont	95.4	$356.6	256.3	$715.5	483.8	$1,170.1
Virginia	1,421.9	$5,297.6	1,496.7	$8,828.5	1,652.0	$11,371.0
Washington	12,635.2	$17,741.7	14,645.3	$29,013.5	16,666.3	$48,925.0
Washington DC	1.1	$26.5	2.5	$50.5	2.2	$44.7
West Virginia	1,336.8	$1,939.5	1,600.0	$2,745.9	1,319.3	$3,228.6
Wisconsin	2,165.0	$10,601.3	2,783.9	$16,535.8	3,513.7	$23,733.7
Wyoming	4,840.9	$1,777.8	5,686.6	$3,047.7	5,131.7	$3,747.6
Totals	202,780.7	$419,520.1	295,971.4	$720,699.4	339,086.1	$1,131,025.8

Source: FHWA Freight Analysis Framework Data (FAF 3)

INTERNATIONAL SHIPMENTS

This section discusses foreign shipments directly and indirectly destined for California (Flows 1 and 8) and export shipments originating in California (Flows 2 and 9). International shipments arrive in California by various modes; however, the vast majority of the weight brought into California is by ships, mainly through the ports of Los Angeles, Long Beach, and Oakland. Over 94 percent (over 90,000 ktons) of the total international (import mode) shipments to California in 2012 arrived by water (Table 30), only a slight drop in percentage to 92 percent is expected by 2040. Most of the goods arriving in ships are in either break bulk or containerized goods that are transshipped to other modes of transportation in order to be distributed throughout and beyond the State to their final destinations. As can be seen in the domestic mode portion of Table 30, a large shift occurs at the ports where shipments are transferred to trucks (mainly transloaded containerized), other and unknown modes, and pipelines.

Time-sensitive shipments of high value are flown into various California international airports, but primarily to Los Angeles International Airport (LAX). Table 30 illustrates that between 2012 and 2040; both by weight and value of goods inbound from world regions to California (by import mode) via air are forecast to increase by over 410 percent (from 687 ktons to nearly 2,826 ktons and $68.2 billion to $283.2 billion, respectively). In terms of value, air shipments are expected to be the fastest-growing mode of imported cargo into California. In 2012, air cargo accounted for 26 percent of the value of international cargo into the region and in 2040, that share is expected to jump to over 38 percent.

International flows directly into the State by weight are projected to grow by over 193 percent; from 95,979 ktons in 2012 to 185,649 ktons in 2040 (Table 28). The value of international shipments arriving directly into California between 2012 and 2040 is projected to increase by 283 percent. As represented in Table 31 (Flow 8), in 2012 and into the future, Washington and Texas lead the way in transported weight of foreign commodities destined for California, and Alaska and Texas lead by value.

By far, California's largest international trading (both import and export) region, both by weight and value is Eastern Asia – and this trend is forecast to continue into 2040 (see Tables 28 and 29). It is estimated that by 2040, commodities by weight from the Rest of Americas (import) region to California will surpass the volume from the Southwest and Central Asia region. However, by commodity value, Mexico will exceed all regions (except Eastern Asia), followed by Europe, and South East Asia and Oceania.

On the export side from California to world regions (Table 29), after Eastern Asia, both Mexico and Canada will continue to lead in weight transported; and by value, Eastern Asia, Europe and Mexico will lead. With regard to exports originating in California, and exiting to foreign lands through other states (Table 30 – Flow 9), most of the weight will continue to be transported

through Washington and Texas. By value of California commodities exiting from other state ports destined for world regions, Alaska and Texas lead the way in 2012 and will also in 2040.

International freight arriving into California through ground transportation import modes must come from either Mexico or Canada. In 2012, around five percent combined weight from these border countries (about 4,742 ktons) was imported into this country by rail and trucks, and in 2040 the share will reach about seven percent (to over 12,745 ktons). The total value of 2012 outbound shipments from California by all modes to Canada and Mexico was $47 billion (Table 32) and inbound shipments from those countries to California were worth $35.4 billion (from Table 30). By 2040, outbound shipments are projected to grow over 350 percent to $164.7 billion and inbound shipments by over 270 percent to $97.1 billion.

Although forecasted international flows by weight into California (Flows 1 and 8) in the domestic mode, will exhibit close to a 1:1 ratio with goods leaving the state for foreign destinations (Flows 2 and 9) in 2040, the weight of California exports is expected to increase much faster than imports destined for California over the forecast period (300 percent versus around 200 percent). However, the value of these imports will increase to $1.07 trillion, while exports will only reach $670 billion. Therefore, a large trade imbalance is forecast to remain into the future.

Table 28. Major World Regions Flows Destined for California
Flow 1 (Years 2012, 2025, and 2040)

By Import Region						
Import Region	**2012**		**2025**		**2040**	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Africa	4,364.5	$1,936.8	3,525.8	$1,537.2	4,364.6	$1,952.7
Canada	2,851.4	$2,617.4	6,838.9	$6,072.0	9,719.9	$10,138.2
Eastern Asia	28,047.1	$148,077.4	42,581.0	$269,259.7	67,073.5	$446,291.9
Europe	4,852.3	$29,754.5	6,424.8	$47,390.8	8,660.8	$78,001.0
Mexico	8,444.5	$32,851.5	11,786.2	$51,249.0	19,684.0	$86,978.4
Rest of Americas	16,663.1	$9,655.5	31,110.3	$20,156.0	39,715.0	$28,428.4
Southeast Asia and Oceania	4,717.7	$18,579.4	7,183.1	$36,465.7	10,978.6	$60,519.9
Southwest and	26,038.6	$15,747.1	23,742.3	$17,304.6	25,452.5	$22,402.5

Central Asia						
Totals	95,979.2	$259,219.7	133,192.2	$449,434.9	185,649.0	$734,713.0
By Import Mode						
Import Mode	**2012**		**2025**		**2040**	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Air (include truck-air)	686.5	$68,157.2	1,744.8	$159,651.3	2,825.8	$283,219.3
Multiple modes and mail	62.2	$1,389.1	104.9	$2,520.8	180.0	$4,350.6
Other and unknown	11.4	$181.1	15.6	$265.4	27.2	$461.7
Rail	58.1	$58.6	105.8	$79.4	148.3	$108.5
Truck	4,683.7	$30,888.7	7,502.2	$50,133.6	12,596.7	$85,951.9
Water	90,477.2	$158,545.0	123,719.0	$236,784.3	169,871.1	$360,621.0
Totals	95,979.2	$259,219.7	133,192.2	$449,434.9	185,649.0	$734,713.0
By Domestic Mode						
CA Intrastate Distribution Mode	**2012**		**2025**		**2040**	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Air (include truck-air)	30.9	$2,983.2	87.5	$6,145.7	134.7	$10,253.7
Multiple modes and mail	2,506.4	$9,014.2	4,260.6	$14,776.0	6,422.5	$23,258.7
Other and unknown	37,610.3	$23,420.71	38,530.2	$27,804.94	44,903.3	$36,831.21
Pipeline	11,512.6	$10,121.3	18,664.5	$13,314.1	20,806.3	$15,684.7
Rail	420.0	$581.1	802.1	$1,305.0	1,133.6	$2,251.0
Truck	42,318.4	$212,587.3	66,802.9	$384,595.1	106,889.9	$644,716.4
Water	1,580.6	$511.9	4,044.4	$1,494.2	5,358.7	$1,717.3
Totals	95,979.2	$259,219.7	133,192.2	$449,434.9	185,649.0	$734,713.0

Source: FHWA Freight Analysis Framework Data (FAF 3)

TABLE 29. TOTAL CALIFORNIA ORIGIN FLOWS TO MAJOR WORLD REGIONS – FLOWS 2 AND 9 (YEARS 2012, 2025, AND 2040)

CA Origin Flows Destined for Major World Regions						
World Major Region	2012		2025		2040	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Africa	1,024.4	$1,175.8	1,335.7	$1,613.0	1,872.2	$2,606.6
Canada	9,579.5	$20,000.8	16,542.3	$37,264.2	26,911.0	$63,956.5
Eastern Asia	36,838.4	$75,249.7	76,834.6	$173,988.7	113,309.8	$294,076.9
Europe	4,123.9	$25,530.2	6,622.9	$62,864.0	10,590.6	$111,836.6
Mexico	11,546.7	$27,010.3	20,286.5	$57,211.2	33,772.2	$100,751.5
Rest of Americas	3,917.0	$4,998.8	9,383.6	$14,401.5	14,050.7	$23,984.4
Southeast Asia and Oceania	7,669.9	$14,016.1	14,976.4	$34,085.3	22,921.5	$58,460.9
Southwest and Central Asia	4,318.1	$3,911.2	9,146.7	$8,404.8	13,905.7	$14,889.4
Totals	79,017.9	$171,892.9	155,128.7	$389,832.5	237,333.7	$670,562.7
CA Origin Flows (by Export Mode) Destined for Major World Regions						
Export Mode	2012		2025		2040	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Air (include truck-air)	750.8	$76,385.4	1,566.7	$185,527.4	2,641.5	$327,549.4
Multiple modes and mail	40.0	$497.7	70.7	$753.0	121.1	$1,092.7
Other and unknown	1,159.7	$5,993.3	1,828.2	$14,463.3	2,858.9	$23,508.3
Rail	3,671.7	$2,506.2	6,092.1	$3,778.9	9,733.9	$5,896.6
Truck	12,876.1	$32,105.4	24,392.1	$63,307.5	41,790.6	$112,629.5
Water	60,519.6	$54,404.9	121,179.0	$122,002.4	180,187.7	$199,886.2
Totals	79,017.9	$171,892.9	155,128.7	$389,832.5	237,333.7	$670,562.7

Source: FHWA Freight Analysis Framework Data (FAF 3)

TABLE 30. DOMESTIC FLOWS FROM CALIFORNIA, THROUGH STATES, TO WORLD – FLOW 9

	2012		2025		2040	
≈	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Alabama	22.1	$13.1	27.9	$20.6	44.3	$31.9
Alaska	127.0	$13,381.1	219.0	$29,701.7	350.9	$46,546.7
Arizona	209.0	$500.7	375.3	$873.9	663.5	$1,430.0
Colorado	0.0	$4.1	0.1	$6.2	0.2	$13.4
Delaware	0.8	$3.1	1.5	$5.7	2.3	$8.7
Florida	352.0	$518.7	690.8	$1,026.9	1,165.2	$1,759.8
Georgia	169.1	$603.0	255.2	$1,263.1	374.0	$2,251.0

Hawaii	153.4	$604.9	381.3	$1,575.5	680.3	$2,792.8
Idaho	187.6	$182.6	332.6	$343.0	587.4	$602.0
Illinois	4.5	$376.5	9.1	$647.3	17.3	$1,227.5
Indiana	0.2	$5.3	0.5	$11.9	1.0	$24.6
Kentucky	1.1	$11.8	1.6	$14.4	3.0	$26.8
Louisiana	1,688.6	$2,474.8	2,167.4	$4,474.1	3,994.6	$8,153.7
Maine	18.8	$85.4	27.5	$148.2	43.9	$248.6
Maryland	75.4	$190.9	187.9	$330.8	357.9	$595.4
Massachusetts	39.4	$23.3	87.7	$57.6	130.9	$93.6
Michigan	2,983.9	$6,778.2	4,878.9	$10,191.7	8,521.3	$17,944.1
Minnesota	56.5	$91.5	106.7	$178.5	174.9	$321.7
Mississippi	2.4	$1.2	3.3	$2.0	4.1	$3.1
Missouri	0.0	$0.1	0.0	$0.4	0.0	$0.6
Montana	878.1	$1,328.2	1,652.5	$2,413.2	2,914.7	$4,320.0
New Hampshire	0.2	$1.0	0.5	$2.1	0.8	$3.8
New Jersey	690.6	$1,214.0	1,645.8	$2,816.7	2,635.4	$4,918.5
New Mexico	5.6	$21.2	7.4	$29.2	12.3	$48.1
New York	881.5	$2,370.5	1,520.2	$3,958.0	2,573.1	$7,126.2
North Carolina	49.5	$73.9	96.4	$148.2	166.2	$268.5
North Dakota	262.0	$520.5	322.0	$725.3	502.5	$1,196.1
Ohio	30.4	$1,495.0	46.3	$2,748.9	101.9	$5,033.1
Oregon	1,399.2	$810.9	3,204.7	$1,846.9	3,837.2	$3,155.0
Pennsylvania	17.9	$21.5	37.3	$45.9	72.0	$93.1
Rhode Island	0.4	$0.7	0.3	$0.6	0.4	$0.9
South Carolina	78.0	$254.5	111.1	$456.7	168.4	$773.2
Tennessee	0.0	$1.7	0.1	$2.7	0.1	$4.0
Texas	3,966.3	$7,362.0	7,270.6	$12,071.4	11,940.1	$21,663.9
Vermont	3.7	$18.6	6.4	$45.3	11.6	$89.7
Virginia	182.9	$545.4	322.2	$904.9	533.2	$1,539.4
Washington	6,114.1	$5,847.4	8,012.1	$12,311.7	11,737.6	$19,866.4
Wisconsin	0.0	$0.6	0.0	$1.2	0.1	$2.3
Totals	20,652.4	$47,737.5	34,009.8	$91,402.7	54,324.9	$154,178.2

Source: FHWA Freight Analysis Framework Data (FAF 3)

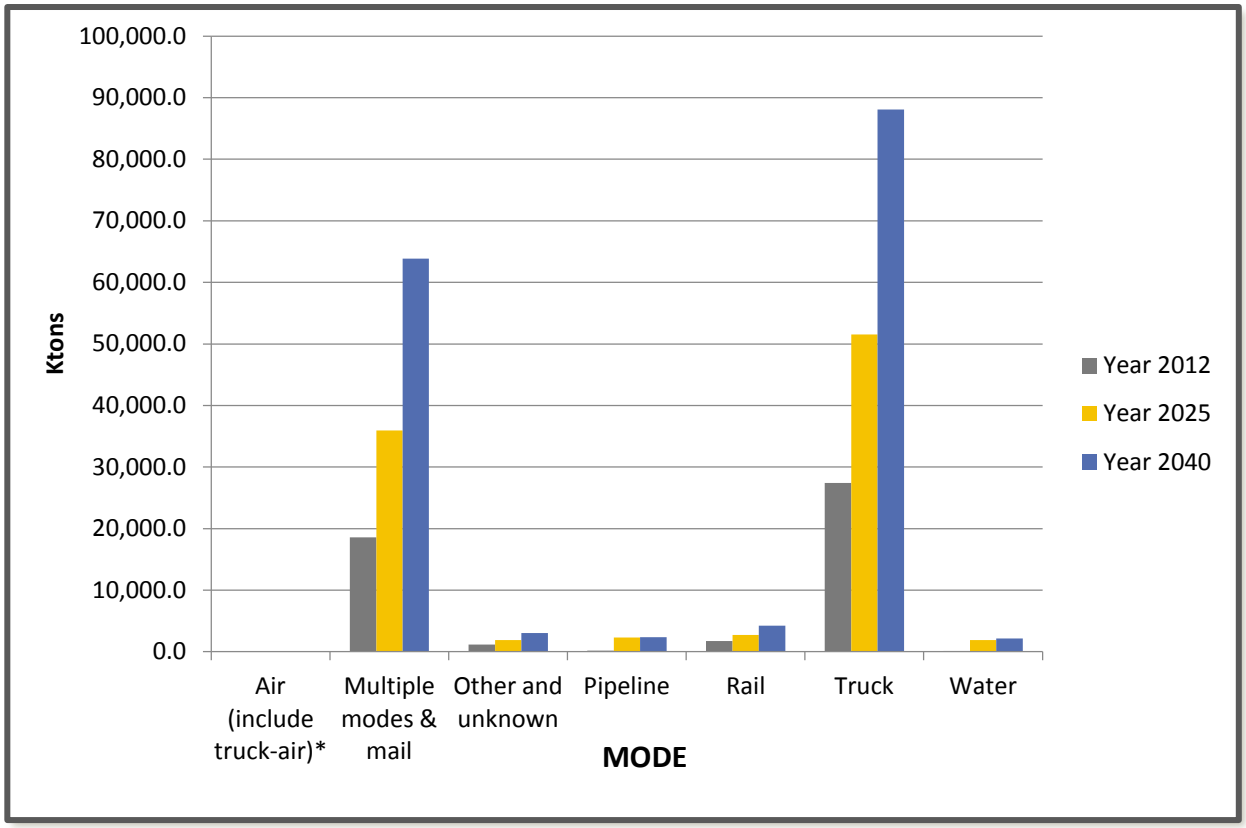
EXPORTS AND IMPORTS THROUGH, NOT DESTINED FOR, CALIFORNIA

This section discusses international shipments that are either destined for, or originating in, the rest of the US and heading to or departing from the eight major world regions using California's ports of entry/exit (i.e., through shipments). To a large extent, this can be considered discretionary trade that could go to/from other states without traversing California. This trade is an important component of the State freight sector as it supports many thousands of jobs at seaport, railroad, trucking, transloading, and warehousing facilities. Although these shipments are not destined for California, some processing or repacking of freight containers may occur here. Many of these goods enter and leave the State using the California SHS in trucks thus

exerting wear and tear on the SHS without generating much revenue to benefit State highway maintenance and operations.

Of the nine possible freight flows, the largest forecasted increases in transported weight will pass through the State between foreign origins and other states. Shipments from major world regions, through California, to other states are expected to increase in weight by 333 percent from 49,168 ktons to 163,773 ktons (Table 31 – Flow 3), while exports from other states through the State to other countries are estimated to increase by over 430 percent from 34,699 ktons to 149,766 ktons (Table 32 – Flow 4). Value figures between 2012 and 2040 in the export direction are forecast to skyrocket by approximately 680 percent from around $59 billion to nearly $399 billion, while in the reverse direction, an increase in import value of 397 percent from $197 billion to $783 billion has been forecast. In terms of value, international movements coming into California ports of entry, in transit for other states, will be almost double that of export flows by 2040 – which is an improvement from the 2012 imbalance, but more exports than imports is healthier for our economy.

FIGURE 55. UNITED STATES IMPORTS THROUGH CALIFORNIA (DOMESTIC MODE)



** Under 100 ktons (thousand short tons)*
Source: FHWA Freight Analysis Framework Data Tabulation Tool

Goods from major world regions destined for other states through California ports arriving in waterborne vessels was 47,521 ktons in 2012, it is expected to climb to 158,721 ktons by year 2040. The vast majority of imported goods are transferred and repacked at the ports of entry or nearby transloading facilities into larger or smaller containers and then onto trucks for subsequent transport to other states through the highway system. To a lesser extent, these imported goods are transported via the national freight rail system.

TABLE 31. IMPORT FLOWS FROM MAJOR WORLD REGIONS, DESTINED FOR US STATES, THROUGH CA FLOW 3 (2012, 2025, AND 2040)

By Region						
Major Region World	2012		2025		2040	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Africa	76.1	$76.7	1,897.3	$976.9	2,187.5	$1,185.9
Canada	88.4	$160.5	577.0	$507.0	634.2	$716.1
Eastern Asia	34,597.0	$151,488.9	67,817.1	$349,581.3	119,623.0	$625,224.5
Europe	3,712.9	$8,199.8	5,022.3	$14,758.1	7,883.5	$24,215.4
Mexico	1,646.4	$7,744.0	2,923.3	$13,069.2	5,024.2	$22,166.8
Rest of Americas	1,322.5	$1,217.4	2,934.7	$2,940.5	4,389.0	$4,436.3
Southeast Asia and Oceania	5,423.0	$19,447.1	9,294.8	$38,451.6	15,386.0	$67,995.3
Southwest and Central Asia	2,302.2	$8,747.4	5,868.3	$20,905.6	8,645.5	$37,121.8
Totals	49,168.5	$197,081.7	96,334.9	$441,190.1	163,772.8	$783,062.0
Flows from Major World Regions, Destined to US States, Through CA (by International Mode)						
International Mode Into CA	2012		2025		2040	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Air (include truck-air)	8.0	$808.0	26.7	$2,449.9	40.6	$3,851.1
Multiple modes and mail	22.1	$313.7	34.5	$572.4	56.1	$946.9
Other and unknown	0.0	$15.8	0.0	$27.1	0.0	$34.1
Rail	208.1	$128.1	330.3	$164.3	441.2	$220.9
Truck	1,409.1	$7,531.5	2,551.3	$12,810.4	4,513.4	$21,809.1
Water	47,521.2	$188,284.5	93,392.0	$425,166.0	158,721.4	$756,200.0
Totals	49,168.5	$197,081.7	96,334.9	$441,190.1	163,772.8	$783,062.0
Flows from Major World Regions, Destined to US States, Through CA (by Domestic Mode)						
Domestic Mode Out Of CA To US	**2012**		2025		2040	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Air (include truck-air)	7.9	$793.7	26.4	$2,429.8	40.1	$3,817.8
Multiple modes and mail	18,569.3	$79,613.2	35,935.5	$183,848.3	63,872.8	$333,508.6
Other and unknown	1,137.7	$4,038.6	1,878.5	$8,367.2	3,007.2	$14,561.4
Pipeline	158.3	$68.4	2,295.8	$1,001.4	2,363.5	$1,030.4

Rail	1,745.1	$3,032.5	2,738.3	$5,231.2	4,252.8	$8,499.3
Truck	27,412.5	$109,474.9	51,551.6	$239,452.4	88,073.8	$420,667.3
Water	137.7	$60.3	1,908.9	$859.9	2,162.7	$977.2
Totals	49,168.5	$197,081.7	96,334.9	$441,190.1	163,772.8	$783,062.0

Source: FHWA Freight Analysis Framework (FAF 3)

TABLE 32. EXPORTS FROM US STATES, THROUGH CALIFORNIA, TO MAJOR WORLD REGIONS – FLOW 4 (YEARS 2012, 2025, AND 2040)

Flows from States, Through CA, Destined for Major World Regions (by Domestic Mode)						
Domestic Mode Into CA	2012		2025		2040	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Air (include truck-air)	15.0	$1,519.2	43.0	$4,365.6	88.7	$9,396.2
Multiple modes and mail	17,574.1	$26,780.9	44,010.1	$103,343.4	83,400.9	$219,040.8
Other and unknown	409.8	$1,214.6	869.1	$5,409.4	1,465.4	$12,148.0
Pipeline	11.9	$4.1	8.3	$3.2	11.0	$4.2
Rail	5,220.5	$4,905.0	11,522.8	$14,668.6	20,645.3	$28,665.4
Truck	11,383.9	$24,113.9	24,530.2	$67,184.8	43,925.2	$129,190.2
Water	83.5	$105.0	148.4	$198.7	229.3	$327.3
Totals	34,698.6	$58,642.7	81,131.9	$195,173.7	149,765.8	$398,772.2
Flows from States, Through CA, Destined for Major World Regions (by Foreign Mode)						
International Export Mode	2012		2025		2040	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Air (include truck-air)	15.1	$1,525.5	43.2	$4,394.5	89.1	$9,458.9
Multiple modes and mail	0.1	$0.4	0.4	$1.5	0.6	$3.2
Other and unknown	2.0	$302.5	6.5	$1,434.4	11.7	$3,830.7
Pipeline	11.9	$4.1	8.3	$3.2	11.0	$4.2
Rail	691.0	$211.1	1,092.3	$383.9	1,588.8	$568.2
Truck	1,056.4	$2,642.1	2,345.6	$6,983.9	4,325.0	$13,751.6
Water	32,922.1	$53,956.9	77,635.8	$181,972.3	143,739.7	$371,155.3
Totals	34,698.6	$58,642.7	81,131.9	$195,173.7	149,765.8	$398,772.2
Flows from States, Through CA, Destined for Major World Regions (by Region)						
World Region Destination	2012		2025		2040	
	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)	Weight (in Ktons)	Value (in Millions)
Africa	24.1	$55.7	65.2	$214.2	133.0	$440.6
Canada	5.0	$102.2	12.4	$361.5	21.0	$767.1
Eastern Asia	24,855.2	$40,169.7	60,764.6	$146,268.3	113,894.5	$304,848.3
Europe	940.7	$703.1	1,939.3	$2,089.4	3,289.6	$3,917.6
Mexico	1,800.0	$3,370.4	3,495.1	$9,469.5	5,996.1	$19,556.9

Rest of Americas	628.3	$299.0	1,840.2	$1,203.3	3,063.2	$2,247.2
Southeast Asia and Oceania	4,892.0	$12,409.6	10,578.5	$31,631.0	19,238.8	$59,809.5
Southwest and Central Asia	1,553.4	$1,533.0	2,436.7	$3,936.4	4,129.6	$7,184.9
Totals	34,698.6	$58,642.7	81,131.9	$195,173.7	149,765.8	$398,772.2

Source: FHWA Freight Analysis Framework (FAF 3)

CONCLUSION

The State's economy is freight transportation-dependent. Despite California's excellent rail, marine, highway, and air connections to national and international destinations, projected growth in freight, even with currently planned improvements, will strain the capacity of the transportation system and potentially increase community and environmental impacts. Investment in our transportation infrastructure is needed to remain competitive with other states and countries that are investing in their transportation networks and to reduce impacts to California's environment and communities. Along with the system investments, mitigation and implementation of best practices will be necessary.

The FAF freight data and forecasts strongly indicate that freight moved on trucks is expected to increase for the foreseeable future. The value of shipments is expected to grow over two times as fast as their weight, thus the cost of trucks delayed by congestion will rise accordingly. Trucks unable to meet shipment schedules will directly affect regional and State economic development and competitiveness. On the other hand, it takes several thousand passenger vehicles passing over a given segment of roadway to do the same damage as one fully loaded, heavy-duty 5-axle truck. Understanding that there will be more truck trips on California highways will inform decision makers of needed infrastructure improvements, such as strengthening pavement design standards, constructing dedicated truck facilities, shortening pavement maintenance schedules, and effecting modal shifts to avoid highway impacts.

FIGURE 56. TEU CONTAINERS

Source: Caltrans