

U.S. 101 CENTRAL COAST CALIFORNIA FREIGHT STRATEGY

Final Report

prepared for

Association of Monterey Bay Area Governments (AMBAG)
Santa Cruz County Regional Transportation Commission (SCCRTC)
Transportation Agency for Monterey County (TAMC)
San Benito Council of County Governments (SBtCOG)
San Luis Obispo Council of Governments (SLOCOG)
Santa Barbara County Association of Governments (SBCAG)
California Department of Transportation (Caltrans)

prepared by

Cambridge Systematics, Inc.

A project funded by

The California Department of Transportation (Caltrans)

April 13, 2016

final report

U.S. 101 Central Coast Freight Strategy

Final Report

prepared for

**The Association of Monterey Bay Area Governments
The San Luis Obispo Council of Governments
The Santa Barbara County Association of Governments
The California Department of Transportation**

prepared by

Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

date

April 13, 2016

Table of Contents

Executive Summary	1
1 Introduction.....	1-1
2 A Vision for the Future	2-1
3 Goods Movement and the Economy.....	3-1
3.1 Socio-Economic Conditions	3-1
3.1.1 Employment.....	3-2
3.1.2 Gross Regional Product.....	3-6
3.1.3 Key Industries, Locations, and Land Use	3-7
3.2 Goods Movement Flows.....	3-9
4 Freight System Infrastructure	4-1
5 Freight Needs and Issues.....	5-1
5.1 Economic Development Needs.....	5-4
5.2 Mobility Needs	5-5
5.2.1 Travel Time Delay and Reliability	5-5
5.2.2 Safety	5-10
5.2.3 Pavement and Bridge Conditions	5-13
5.2.4 Truck Parking and Truck Routes	5-16
5.2.5 Hours of Service Rules	5-17
5.2.6 Intelligent Transportation System	5-17
5.3 Environmental/Quality of Life Needs	5-18
5.4 Additional Needs	5-19
6 Strategies, Projects, and Programs.....	6-1
6.1 Priority Projects.....	6-2
6.2 Programs and Other Recommendations	6-9
6.2.1 Intelligent Transportation System Program	6-9
6.2.2 Grade Crossing Improvement Program	6-12
6.2.3 Freight Parking Program	6-12
6.2.4 Truck Route Signage Improvement Program	6-13
6.2.5 Environmental Programs.....	6-14
7 Implementation	7-1
7.1 Funding Gaps and Funding Options.....	7-1
7.2 Funding Sources.....	7-1
7.2.1 Federal Funding.....	7-2
7.2.2 State.....	7-6
7.2.3 Regional/Local.....	7-7

7.3 Partnerships	7-11
7.4 Continuing Collaboration among the Central Coast Transportation Agencies	7-12
7.5 Advocacy	7-13
A. Full Project List	A-1
B. Vision and Goals Working Paper.....	B-1
C. Literature Review Working Paper	C-1
D. Performance Measures Working Paper	D-1
E. Existing Conditions, Data Collection, and Freight Analysis Working paper	E-1
F. Strategy Working Paper	F-1

List of Tables

Table 3.1	Central Coast California Summary Economic Profile by County	3-2
Table 3.2	Central Coast California Employment in Goods Movement Dependent Industries by County 2013.....	3-5
Table 3.3	GRP in Goods Movement Dependent Industries by County, Central Coast California <i>Millions of Chained 2005 Dollars (2009)</i>	3-6
Table 4.1	Key Intersecting Highways with U.S. 101, by County	4-2
Table 5.1	Central Coast California Summary of Needs Evaluation.....	5-2
Table 6.1	U.S. 101 Priority Projects by County	6-3
Table 6.2	Non-U.S. 101 Priority Projects by County.....	6-5
Table 6.3	ITS Technology Costs (2016 estimated cost).....	6-11
Table 7.1	Cost of Projects by Category <i>Thousands \$</i>	7-1
Table 7.2	California Funding from FAST Act (in \$ millions)	7-5
Table 7.3	Priority Projects, Programs, and Potential Funding Sources	7-8
Table A.1	U.S. 101 Central Coast California Full Project List	A-1

List of Figures

Figure ES.1	Freight-Related Statistics, U.S. 101 Central Coast California	2
Figure 1.1	Stages of Plan Development.....	1-2
Figure 3.1	Top Goods Movement-Dependent Industries by Employment (2013) Central Coast California	3-3
Figure 3.2	Agricultural, Manufacturing, and Transportation/Warehousing Employment in the Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-7
Figure 3.3	Agricultural, Manufacturing, and Transportation/Warehousing Employment in the Study Area <i>Santa Luis Obispo and Santa Barbara Counties</i>	3-8
Figure 3.4	Central Coast California Regional Freight Flows by Direction of Movement (2012 and 2040) <i>Millions of Tons</i>	3-10
Figure 3.5	Central Coast California Regional Freight Flows by Direction of Movement (2012 and 2040) <i>Billions of Dollars</i>	3-10
Figure 3.6	Central Coast California Regional Freight Flows by Mode (2012) <i>Millions of Tons</i>	3-12
Figure 3.7	Central Coast California Regional Freight Flows by Mode (2012) <i>Billions of Dollars</i>	3-12
Figure 3.8	Central Coast California Regional Freight Flows by Top Commodities by Tonnage (2012 and 2040) <i>Millions of Tons</i>	3-13
Figure 3.9	Central Coast California Regional Freight Flows by Top Commodities by Value (2012 and 2040) <i>Billions of Dollars</i>	3-14
Figure 4.1	Multimodal Freight Systems Infrastructure in the Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	4-3
Figure 4.2	Multimodal Freight Systems Infrastructure in the Study Area <i>San Luis Obispo and Santa Barbara Counties</i>	4-4
Figure 4.3	Truck Volumes and Percent Traffic that is Trucks on U.S. 101 and Adjacent Highways <i>Santa Cruz, San Benito, and Monterey Counties</i>	4-5
Figure 4.4	Truck Volumes and Percent Traffic that is Trucks on U.S. 101 and Adjacent Highways <i>San Luis Obispo and Santa Barbara Counties</i>	4-6
Figure 5.1	Weekday Planning Time Index along U.S. 101, AM Peak <i>Santa Cruz, San Benito, and Monterey Counties</i>	5-7
Figure 5.2	Weekday Planning Time Index along U.S. 101, AM Peak <i>San Luis Obispo and Santa Barbara Counties</i>	5-8
Figure 5.3	Weekday Planning Time Index along U.S. 101, PM Peak <i>Santa Cruz, San Benito, and Monterey Counties</i>	5-9
Figure 5.4	Weekday Planning Time Index along U.S. 101, PM Peak <i>San Luis Obispo and Santa Barbara Counties</i>	5-10
Figure 5.5	Truck-Involved Injury and Fatality Crashes on U.S. 101 and Intersecting Routes. 2010-2012 <i>Santa Cruz, San Benito, and Monterey Counties</i>	5-11
Figure 5.6	Truck-Involved Injury and Fatality Crashes on U.S. 101 and Intersecting Routes. 2010-2012 <i>San Luis Obispo and Santa Barbara Counties</i>	5-12
Figure 5.7	Pavement Maintenance Needs in Central Coast Region	5-14
Figure 5.8	2011 Pavement Conditions and Bridges with Sufficiency Ratings Less Than 50 <i>Santa Cruz, San Benito, and Monterey Counties</i>	5-15

Figure 5.9	2011 Pavement Conditions and Bridges with Sufficiency Ratings Less Than 50 <i>San Luis Obispo and Santa Barbara Counties</i>	5-16
------------	---	------



EXECUTIVE SUMMARY

The Central Coast region, which includes San Benito, Monterey, Santa Cruz, San Luis Obispo, and Santa Barbara counties, is one of the most important agricultural production areas in the country and is known for its fresh produce and wine grape production. The region's industries include agriculture, manufacturing, food processing, and other freight-related business clusters which are critical to the region's economy. Growth in Central Coast population centers related to the region's proximity to the Silicon Valley in the north and the Los Angeles Metro area in the south has resulted in increased demand for products shipped via freight modes concurrently with an increase in demand for Central Coast products from outside of the region. The Central Coast relies on U.S. 101 as the primary transportation artery for the region and the area's major truck route.

Figure ES.1 summarizes the freight transportation system in the region and the impact that freight has on the region's economy.

This report developed a **vision** which lays out the strategic direction for this U.S. 101 Corridor Goods Movement System in the Central Coast Region:

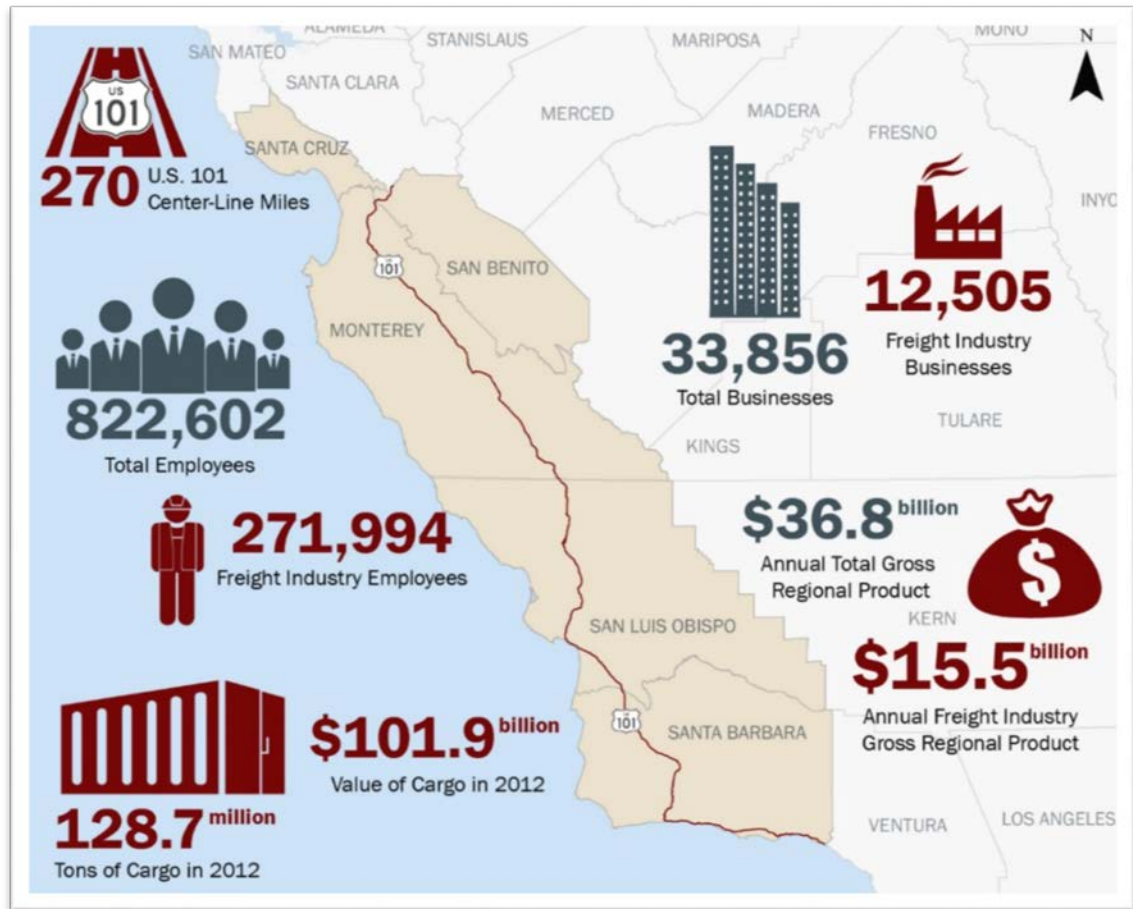
"The goods movement system in the U.S. 101 Corridor in the Central Coast Region will drive and support the regional economy by creating a technologically advanced, integrated, safe, and efficient multimodal corridor that provides critical connections to international and domestic markets and improves the quality of life of residents."

The vision is supported by three **goals** that involve collaboration of public and private sectors, community input, and investment to:

- Support **economic development** in the region
- Provide an **efficient, reliable, well-maintained, and safe** goods movement facility along the U.S. 101 corridor, and

- Reduce and mitigate **environmental, social, health, and economic impacts** from goods movement operations

Figure ES.1 Freight-Related Statistics, U.S. 101 Central Coast California



Source: Employees (2013). Cargo tons/value (2012). Businesses (2011). Gross Regional Product (2009).

An analysis of current conditions based on suggested performance measures tied to the three goals found that the corridor (including key connecting routes) experiences a number of issues including congestion, safety issues, lack of modal alternatives, truck parking shortages, limited east-west connectivity and others that impact mobility of shippers and receivers that support the region's economy. Based on available data from this and previous studies and stakeholder input, twelve performance metrics were developed and given preliminary ratings based on a qualitative analysis.

- Two metrics, freight access/east-west connectivity and parking availability, were determined to be serious issues with poor current conditions
- Two metrics, tons of PM_{2.5}, PM₁₀, CO₂/NO₂ and rail vehicle crashes at at-grade rail crossings, were determined to not be major issues in the study area
- Eight additional metrics were rated as moderate needs

In order to address the issues identified through the conditions analysis, a priority list of 25 projects was developed containing:

- Eight Interchange/Intersection Improvement Projects
- Seven Capacity Expansion/New Road Projects
- Five Rail Projects including new sidings, track realignment, and track upgrades
- Four Operational Improvement Projects including truck climbing lanes and Intelligent Transportation Systems improvements
- One Transload Project

It is important to note that the above list identifies only projects by their primary aim. Many of the projects address concerns across multiple categories. For example, an interchange project may also include operational improvements such as an Intelligent Transportation System (ITS) component like a ramp meter. In addition to the 25 projects, five programs were developed to meet needs and issues that are difficult to address with a single project.

Thirteen of the projects are located directly on U.S. 101 or an intersection/interchange with U.S. 101 while the remaining 12 projects are located on intersecting routes to U.S. 101 or rail lines in the study region. The east-west routes in the region provide critical links between Central Coast businesses and the Interstate highway system. Based on the conditions analysis and stakeholder comments, these routes are most in need of improvement. Rail transportation is also a key component, as projects that improve the mobility and reliability of rail potentially reduce congestion and wear and tear on U.S. 101 and surrounding highways.

Implementing these projects will require a coordinated effort that builds on the collaboration and advocacy begun during the development of the earlier Central Coast Commercial Flows Study and continued through the U.S. 101 Goods Movement Corridor Plan process. Funding for small-scale freight projects which constitute the majority of the priority projects in this study has historically been a challenge due to competing passenger transportation needs and limited funding dedicated to freight needs. However, the passage of the Fixing America's Surface Transportation (FAST) Act in December 2015 provides new federal funding dedicated to freight needs that may be leveraged to advance the projects and programs needed to maintain and improve goods movement on U.S. 101 and the surrounding network. There are also ongoing discussions at the state level that could result in new funding for the Trade Corridor Improvement Fund that has helped fund freight projects in the past. This study identifies the types of projects that may qualify for new funding and suggests strategies for advocacy on behalf of the goods movement needs of the U.S. 101 Corridor.

INTRODUCTION

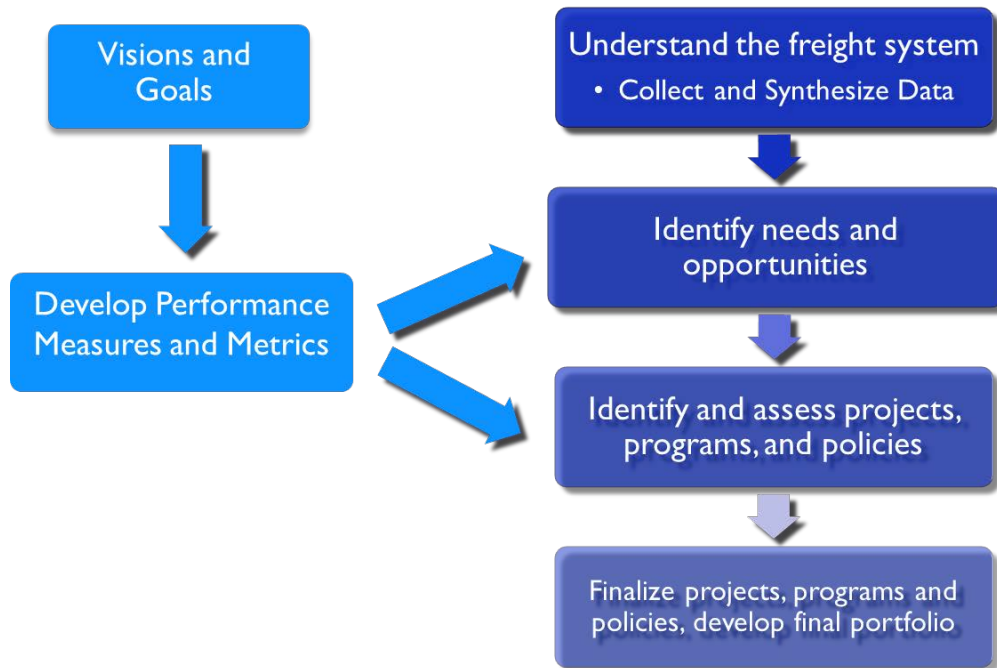
The Central Coast region, which includes San Benito, Monterey, Santa Cruz, San Luis Obispo, and Santa Barbara counties, is one of the most important agricultural production areas in the country and is known for its fresh produce and wine grape production. The region includes agriculture, manufacturing, food processing, and other freight-related business clusters which are critical to the region's economy. Growth in Central Coast population centers related to the region's proximity to the Silicon Valley in the north and the Los Angeles Metro area in the south has resulted in increased demand for products shipped via freight modes concurrently with an increase in demand for Central Coast products from outside of the region.

The Central Coast relies on U.S. 101 as the primary transportation artery for the region and the area's major truck route. While a highly efficient freight route, the route experiences a number of issues including congestion, safety issues, lack of modal alternatives, truck parking shortages, limited east-west connectivity and other issues that impact mobility of shippers and receivers who support the region's economy.

This study provides a list of priority strategies that can be used to address the most pressing goods movement problems along the U.S. 101 corridor in the Central Coast. Improvements are multimodal and include projects and programs that address intersecting highways as well as rail infrastructure. Specific funding and implementation strategies are suggested to provide guidance to implementing these strategies.

Figure 1.1 shows the planning steps which mirror the layout of this report.

Figure 1.1 Stages of Plan Development



The remainder of this report contains the following:

- Section 2 – Vision and Goals
- Section 3 – Goods Movement and the Economy
- Section 4 – Freight System Infrastructure
- Section 5 – Freight Needs and Issues
- Section 6 – Strategies, Projects, and Programs
- Section 7 – Implementation
- Appendix A – Full project list
- Appendix B-F – Each Appendix contains the full working paper associated with the above sections.¹

¹ Working papers were finalized at the time each interim task was accepted. Edits made since acceptance are reflected in the final report but are not incorporated into the individual working papers.

A VISION FOR THE FUTURE

Establishing the vision and goals is a critical early step in development of any study. These goals are meant to support and enhance goals found in other California statewide plans, including the California Freight Mobility Plan, in order to align projects in the U.S. 101 Corridor with larger state priorities. The goals informed the development of recommended performance measures that were used to identify corridor needs. The projects, programs, and strategies that comprise the study, discussed in Section 6.0, were chosen based on their ability to improve performance measures and achieve the study's goals.

The vision below lays out the strategic direction of this U.S. 101 Goods Movement Corridor in the Central Coast Region:

"The goods movement system in the U.S. 101 Corridor in the Central Coast Region will drive and support the regional economy by creating a technologically advanced, integrated, safe, and efficient multimodal corridor that provides critical connections to international and domestic markets and improves the quality of life of residents."

The vision is supported by three **goals** that involve collaboration of public and private sectors, community input, and investment to:

- Support **economic development** in the region through provisions such as reducing transportation costs for shippers/receivers, seamlessly integrating freight transportation modes, improving connectivity to international and domestic markets, and creating economic development opportunities around transportation and logistics facilities.
- Provide an **efficient, reliable, well-maintained, and safe** goods movement facility along the U.S. 101 corridor, increasing throughput using a variety of approaches.
- Reduce and mitigate **environmental, social, health, and economic impacts** from goods movement operations to create a healthy, clean environment and improve quality of life throughout the region.

Based on this vision and set of goals, twelve performance metrics were developed to analyze system conditions using both quantitative and qualitative data developed from this and previous studies and stakeholder comments. This analysis produced the following preliminary findings²:

- Two metrics, freight access/east-west connectivity and parking availability, were serious issues with poor current conditions
- Two metrics, tons of PM_{2.5}, PM₁₀, CO₂/NO₂ and rail vehicle crashes at at-grade rail crossings were not major issues in the study area
- Eight additional metrics had moderate needs

In order to address the issues identified through the conditions analysis, a priority list of projects and programs was developed containing³:

- Eight Interchange/Intersection Improvement Projects
- Seven Capacity Expansion/New Road Projects
- Five Rail Projects including new sidings, track realignment, and track upgrades
- Four Operational Improvement Projects including truck climbing lanes and Intelligent Transportation Systems improvements
- One Transload Project
- Five Programs to meet needs and issues that are difficult to address with a single project.

² Further details on the analysis and performance metrics can be found in Section 5.0 and Appendix D

³ Further details on the projects and programs can be found in Section 6.0 and Appendix F



3

GOODS MOVEMENT AND THE ECONOMY

3.1 Socio-Economic Conditions

Population growth is one of the main drivers and indicators of freight use in a region. The population in the Central Coast California region is growing, though at a lower rate than California as a whole. New residents will demand goods, services, and jobs, driving economic growth and the need for freight movement. Population growth will also likely contribute to congestion, which impacts the ability to move freight in the U.S. 101 corridor.

Goods movement-dependent industries represent approximately 33% of the jobs in the Central Coast region, heavily driven by agriculture, manufacturing, and transportation/warehousing sectors.

Goods movement-dependent industries⁴ provide approximately 33 percent of the jobs in the region, which is heavily driven by agriculture, manufacturing, and transportation/warehousing sectors. In total, the eight industries that comprise goods movement-dependent industries accounted for more than \$13 billion of the \$52.4 billion gross regional product. These industries are highly reliant on U.S. 101 for both local deliveries and as a connection to various east-west routes that allow goods to travel throughout the United States and the world.

Table 3.1 provides a summary of key socio-economic and infrastructure characteristics in the corridor that drive the movement of goods.

⁴ Goods movement-dependent industries are those for whom moving goods to markets is a critical aspect of their business operations. These goods movement-dependent industries include manufacturing, retail trade, wholesale trade, construction, utilities, mining, transportation/warehousing, and agriculture.

Table 3.1 Central Coast California Summary Economic Profile by County

	Monterey	San Benito	Santa Cruz	San Luis Obispo	Santa Barbara
Population (2010)	415,057	55,269	262,382	269,593	423,895
Population (2035)	495,086	81,332	308,582	315,636	507,482
Goods Movement Dependent Industry Employment (2013)	96,170	8,978 ^a	40,410 ^b	46,242 ^c	80,194
Total GRP (2009)	\$16,016	No Data	\$9,122	\$9,577	\$17,732
Key Industries	Agriculture (salad, wine), retail, manufacturing (includes food products)	Retail, manufacturing (includes food products), agriculture	Retail, construction, manufacturing (includes food products), agriculture	Retail, construction, manufacturing (includes food products)	Retail, manufacturing (includes food products), agriculture
Key Trading Partners	San Joaquin Valley, Southern California, San Francisco Bay Area	San Francisco Bay Area	San Francisco Bay Area	San Joaquin Valley, Southern California, San Francisco Bay Area	San Joaquin Valley, San Francisco Bay Area, Southern California
Major Connecting Roads to U.S. 101	SR 156	SR 152 (some truck restrictions) SR 129 SR 156	SR 17/I-880 SR 1/SR 129	SR 46 SR 41 SR 1 SR 166	SR 135 SR 154 SR 246 SR 1

Source: Bureau of Economic Analysis, RTP-MTP/SCS for each MPO, Central Coast California Commodity Flow Study. Population projections based off 2000 or 2010 Census figures. U.S. Census QuickFacts

^a Forestry, fishing, and related activities; Mining; Utilities; Wholesale trade not included to protect confidential information.

^b Forestry, fishing, and related activities; Mining; Utilities; Transportation and Warehousing not included to protect confidential information.

^c Utilities; Transportation and Warehousing not included to protect confidential information.

3.1.1 Employment

The regional economy is an important driver of freight demand. A highly active sector will typically have a large number of employees. However, with increases in productivity where fewer numbers of workers are needed to generate one unit of output, employment has not been growing at the same rate as output, especially for sectors that are increasingly using automation. Nonetheless, employment still provides useful insights into the key industries in a region. The five counties in the study region are projected to gain jobs at an annual rate of between 0.75 percent and 0.93 percent, indicating a lower level of growth in employment across all of the study area.

counties as compared to the U.S. as a whole.⁵ According to the Association of Monterey Bay Area Governments' (AMBAG) 2035 MTP, the AMBAG region in the northern California Central Coast experienced below average job growth in the period from 1990 to 2007. This trend was observed throughout the Central Coast. However, even with recent slowdowns in job growth, the economic output produced by goods movement dependent industries represents a significant portion of the region's economy.

Figure 3.1 shows the top goods movement-dependent industries in each county and the overall contribution of the eight goods movement-dependent industries to regional employment and gross regional product (GRP).

**Figure 3.1 Top Goods Movement-Dependent Industries by Employment (2013)
Central Coast California**



Source: U.S. Bureau of Economic Analysis. Agriculture Industry includes Forestry, Fishing, and Support Services.

⁵ U.S. Bureau of Labor Statistics, Employment Projections 2012-2022. Online at: <http://www.bls.gov/news.release/ecopro.nr0.htm>.

Table 3.2 lists the employment in goods movement-dependent industries in the study area counties. Agriculture, a category that includes farming, support services, and a small number of jobs in forestry and fishing, is the dominant industry in Monterey County by employment. Farming and agricultural support jobs in the Salinas area are a key contributor. The manufacturing industry employs the second highest number of people in Monterey County. Retail jobs are the top employment sector in the other four counties, followed by manufacturing in San Benito and Santa Cruz counties, construction in San Luis Obispo County, and agriculture in Santa Barbara County.

Table 3.2 Central Coast California Employment in Goods Movement Dependent Industries by County
2013

Industry	Monterey		San Benito		Santa Cruz		San Luis Obispo		Santa Barbara	
	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
Construction	7,887	3.4%	1,391	6.2%	7,092	4.9%	10,529	6.6%	11,631	4.4%
Agriculture	49,062	21.1%	1,182	5.3%	6,713	4.6%	7,066	4.4%	19,196	7.3%
Manufacturing	6,259	2.7%	2,848	12.7%	7,366	5.1%	6,573	4.1%	13,793	5.3%
Mining	680	0.3%	–	–	–	–	625	0.4%	2,029	0.8%
Retail trade	20,492	8.8%	2,978	13.7%	14,745	10.1%	17,903	11.2%	23,364	8.9%
Transportation and Warehousing	4,518	1.9%	579	2.6%	–	–	–	–	3,957	1.5%
Utilities	891	0.4%	–	–	–	–	–	–	339	0.1%
Wholesale trade	6,381	2.7%	–	–	4,494	3.1%	3,546	2.2%	5,885	2.2%
Goods Movement Dependent Industries	96,170	41.3%	8,978	40.2%	40,410	27.8%	46,242	28.9%	80,194	30.6%
All Industries	233,000	–	22,350	–	145,344	–	159,647	–	262,261	–

Source: Bureau of Economic Analysis.

Note: Data not reported in certain industries to protect confidential information. Employment in these industries is included in the Total Employment figures, but not in the Goods Movement-Dependent Industries Employment Total. Agriculture Industry includes Forestry, Fishing, and Support Services.

3.1.2 Gross Regional Product

The importance of farming in the Central Coast becomes readily apparent in data describing Gross Regional Product (GRP) by industry. GRP is a direct measure of the value of all final goods and services produced in an economy, and are perhaps the most telling measure for economic activity.

Table 3.3 shows the contribution of goods-dependent industries to each county's GRP. As can be seen in Table 3.3, in 2009 the agriculture industry makes up 17 percent of total GRP in Monterey County. In addition, manufacturing, retail and wholesale trade also generate significant GRP contributions based on available data. In total, goods-dependent industries produce between 22 percent (Santa Barbara County) and 38 percent (Monterey County) of each county's GRP.

Table 3.3 GRP in Goods Movement Dependent Industries by County, Central Coast California
Millions of Chained 2005 Dollars (2009)

Industry	Monterey		San Luis Obispo		Santa Cruz		Santa Barbara	
	GRP	Percent GRP	GRP	Percent GRP	GRP	Percent GRP	GRP	Percent GRP
Construction	–	–	\$529	6%	\$420	5%	–	–
Agriculture,	\$2,659	17%	–	–	–	–	\$895	5%
Manufacturing	\$1,047	7%	\$794	8%	\$534	6%	\$1,808	10%
Mining	–	–	–	–	–	–	–	–
Retail Trade	\$1,158	7%	\$834	9%	\$835	9%	1,252	7%
Transportation and Warehousing	–	–	–	–	–	–	–	–
Utilities	–	–	\$974	10%	–	–	–	–
Wholesale Trade	\$1,147	7%	–	–	\$656	7%	–	–
Total	\$6,011	38 %	\$3,131	33 %	\$2,445	27 %	\$3,955	22 %

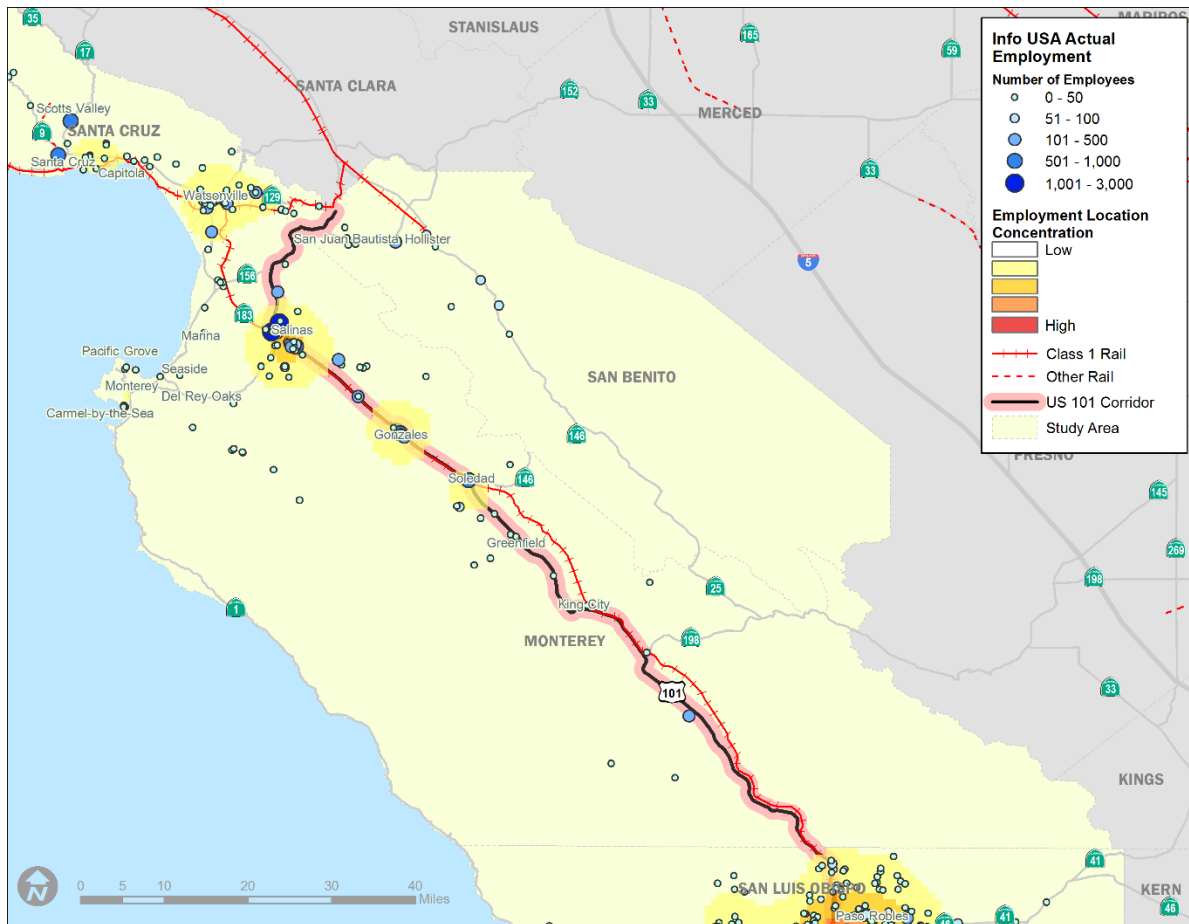
Source: Bureau of Economic Analysis Data, as used in the Central Coast California Commercial Flows Study, Cambridge Systematics. Agriculture Industry includes Forestry, Fishing, and Support Services.

Note: San Benito County did not have enough available data to include. Also, note that an “–” in the table indicates data have been suppressed to protect confidentiality. Chained dollars (2005) indicates real dollar value in 2005 to 2006. Chained is based on a two-year running average rather than a single year (constant).

3.1.3 Key Industries, Locations, and Land Use

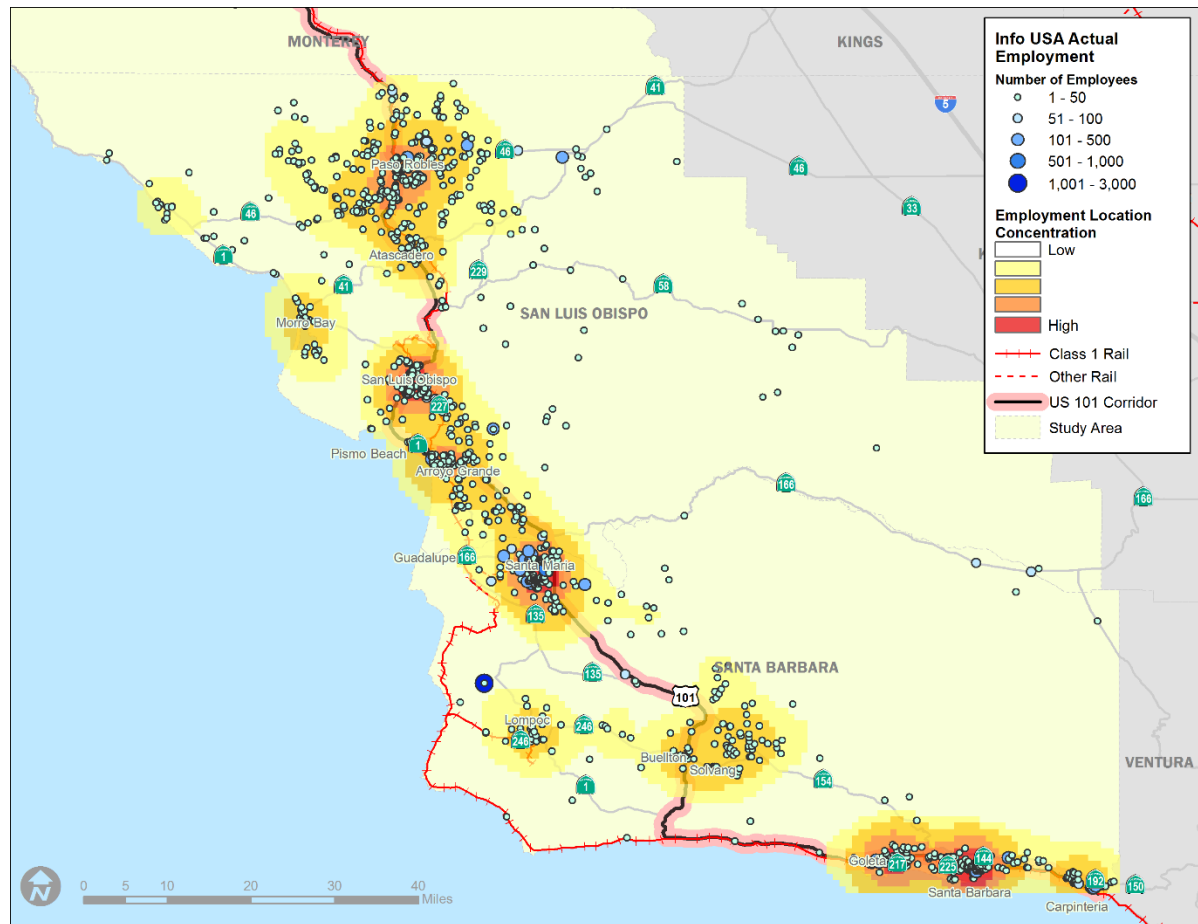
In addition to providing an overall understanding of key industries, it is important to look at where the key industries are clustered to better correlate truck traffic demand with these truck traffic generators/attractors. Key generators of freight in the region include the agricultural sector, manufacturing sector, and transportation and warehousing sector. The locations and number of employees of businesses in these sectors are shown in Figure 3.2 and Figure 3.3.

Figure 3.2 Agricultural, Manufacturing, and Transportation / Warehousing Employment in the Study Area
Santa Cruz, San Benito, and Monterey Counties



Source: CCCCFS Business Data obtained from ESRI Business Analyst, as used in the CCCCFS; InfoUSA Business Data obtained from individual regional MPOs (AMBAG, SBCAG, SLOCOG).

Figure 3.3 Agricultural, Manufacturing, and Transportation / Warehousing Employment in the Study Area
Santa Luis Obispo and Santa Barbara Counties



Source: CCCCFS Business Data obtained from ESRI Business Analyst, as used in the CCCCFS; InfoUSA Business Data obtained from individual regional MPOs (AMBAG, SBCAG, SLOCOG).

Agriculture

According to the Central Coast California Commercial Flows Study (CCCCFS)⁶, agriculture is one of the most important industries in California, and the Central Coast is a major producer of broccoli, lettuce, strawberries, and other specialty vegetables and fruits. Wine production is prevalent in the Central Coast, along with crop production. InfoUSA data shows high concentrations of agriculture businesses along the U.S. 101 corridor, with key clusters located around Salinas, South of Watsonville, Soledad, Santa Maria, and Paso Robles. In Monterey and Santa Cruz Counties, agricultural employment is concentrated among a smaller number of large employers. In San Luis Obispo and Santa Barbara Counties, agricultural employment is more distributed among a large number of small employers. Apart from U.S. 101, SR 46, SR 129, SR 152, and SR 156 are major interregional connecting routes between the Central Coast and the Central Valley that support these businesses and therefore their conditions must continue to be maintained/improved to ensure efficient delivery of goods to market.

⁶ Central Coast California Commercial Flows Study, prepared by Cambridge Systematics for the Association of Monterey Bay Area Governments, February 2012.

Manufacturing

Manufacturing is a diverse industry in the region, with key manufacturing clusters in Santa Cruz, near Paso Robles, San Luis Obispo, Santa Maria and Santa Barbara. Food manufacturing, which includes wine production, is a particularly important component of manufacturing in the region, given it is a region of major agricultural activities. The key food manufacturing clusters are located in Watsonville, along the northern U.S. 101 corridor, San Luis Obispo, Santa Maria, and Eastern Santa Barbara. Since these locations are in close proximity to U.S. 101, maintaining good travel conditions on it will be important to serving the industry. Connecting highways, such as SR 129, SR 156, SR 166, SR 41, SR 46, and local roads also should provide high levels of service to facilitate farm-to-market, and farm-to-factory movements.

Transportation and Warehousing

Transportation and warehousing are essential for supporting logistics operations of businesses in the region. These companies provide transportation of goods and warehousing and storage of such goods. For instance, some trucks are required to bring fresh vegetables to coolers, where these goods are then picked up and shipped to a variety of destinations by transportation logistics companies. An important aspect of this industry are coolers that store farm fresh produce until truck operators pick up the loads and deliver them to grocery stores. Throughout the region, freight transportation is conducted mainly with trucking and rail, with connections to other modes such as marine shipping at the Port of Oakland. Transportation and warehousing businesses are concentrated in areas that generally overlap agriculture and manufacturing clusters. Key clusters are in the Salinas Valley, northern U.S. 101, near Paso Robles, San Luis Obispo, Santa Maria and Santa Barbara. Truck connections include U.S. 101, SR 156/SR 152, SR 166, SR 41, and SR 46.

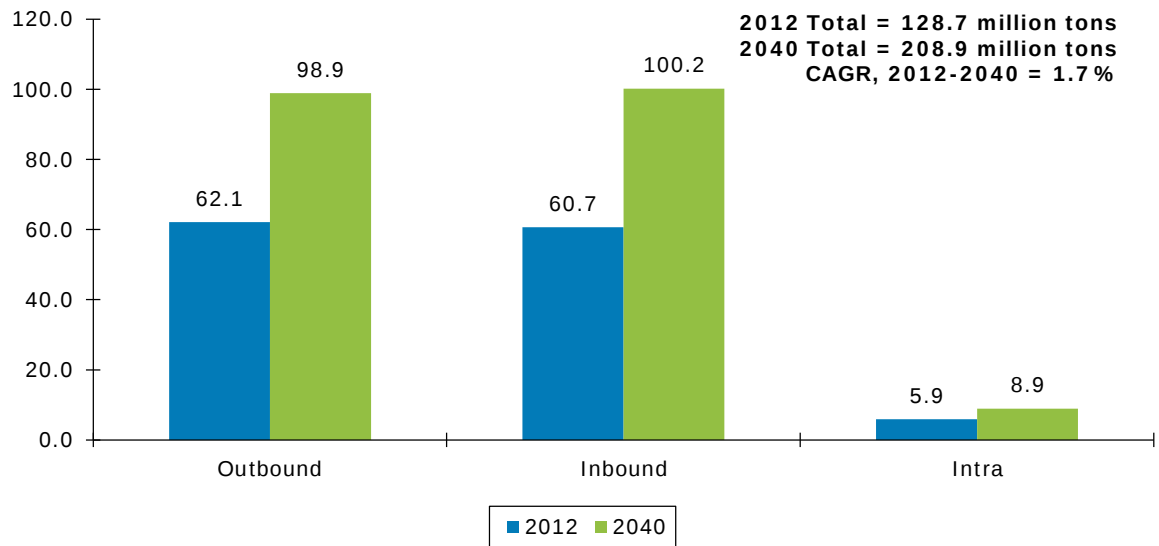
3.2 Goods Movement Flows

Transporting goods in, out, and through the Central Coast region is heavily dependent on trucking. Approximately 75 percent of all shipments, measured by both tons and value, move by truck. The split of goods moving inbound versus outbound is relatively even by weight, though there is a heavier inbound flow when measured by value. Due to the concentration of agriculture, manufacturing, transportation, and warehousing jobs in the region, this disparity in the value of goods makes sense. The region needs to import higher priced consumer goods and specialty products while exporting relatively lower value agricultural products and some manufactured goods, mostly tied to the agricultural industry. In terms of trade partners, other regions of California dominate though trade with the Midwest and Northeast regions of the U.S. are also critical. These more distant markets may represent potential opportunities to divert truck traffic to rail if improved rail access can be provided. This could potentially reduce costs for shippers and reduce truck traffic in congested areas of the corridor. For example, an AMBAG study on the potential for a Salinas Valley truck to rail intermodal terminal showed that transferring 47,000 annual truckloads to rail could decrease congestion in the area by about 10 percent. However, the decision to build, operate, and maintain a transload or intermodal facility in the area is dependent on a variety of factors including available land, consistent demand for service, and ultimately a private-sector determination that the facility would be cost effective to build and operate unless public subsidies are available to address revenue gaps.

Transporting goods in, out, and through the Central Coast region is heavily dependent on trucking. Approximately 75 percent of all shipments, measured by both weight and value, move by truck.

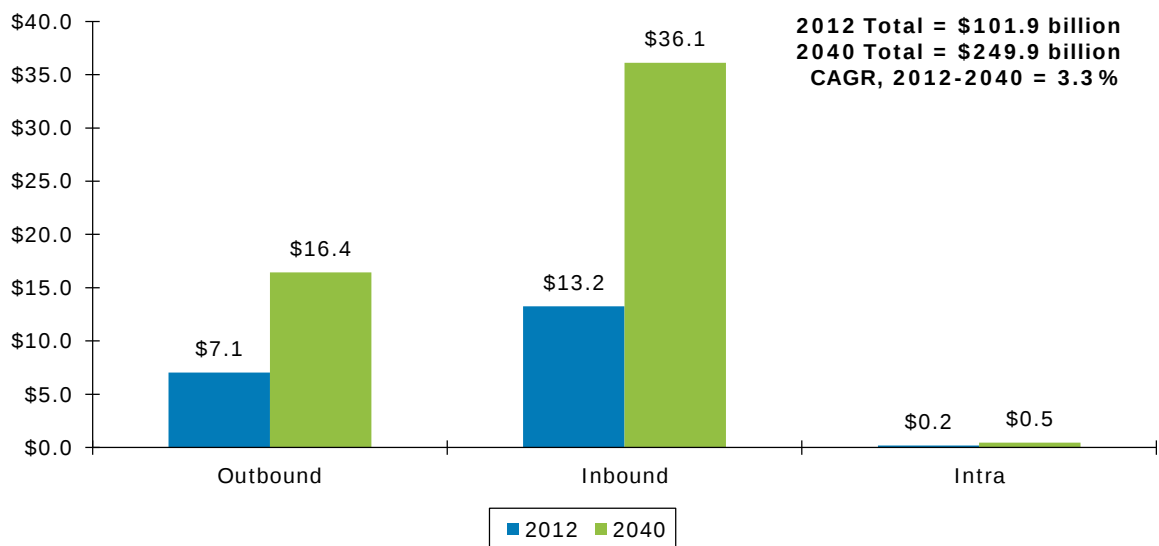
Figure 3.4 and Figure 3.5 shows the total amount of goods moving into, out of, and within the study region in 2012 and 2040 by weight and by value.⁷

Figure 3.4 Central Coast California Regional Freight Flows by Direction of Movement (2012 and 2040)
Millions of Tons



Source: Federal Highway Administration. Freight Analysis Framework 3. Additional analysis by Cambridge Systematics

Figure 3.5 Central Coast California Regional Freight Flows by Direction of Movement (2012 and 2040)
Billions of Dollars



⁷ The data used in this goods movement flow analysis was developed from the FHWA's Freight Analysis Framework (FAF3). Note that FAF3 does not contain measurements of through-traffic.

Source: Federal Highway Administration. Freight Analysis Framework 3. Additional analysis by Cambridge Systematics

By weight, there was a nearly even split between outbound (62.1 million tons) and inbound goods (60.7 million tons) in 2012, with movements within the study region accounting for less than five percent of the total. This relative share is projected to remain steady in 2040, though total inbound shipments are expected to overtake outbound shipments. The compound annual growth rate (CAGR) shows a constant rate of growth over a time period. In the study region, freight is projected to grow 1.7 percent a year by weight and 3.3 percent a year by value between 2012 and 2040.

By value, inbound shipments to the study region dominated in 2012, accounting for approximately 64 percent of the total value of goods. Outbound shipments accounted for approximately 35 percent, with intraregional shipments accounting for one percent. This suggests that higher value consumer goods and business supplies represent a more dominant flow in terms of value as compared to higher weight resource and agricultural products. 2040 projections show that over 68 percent of the total value of goods moved in the region will come through inbound shipments, 31 percent through outbound shipments, and approximately one percent in intraregional trade. It also should be noted that the rate of growth in value of shipments is higher than the rate of growth of population, indicating that growth in demand for consumer products is related not only to population growth but to income growth for families. This is an important trend to monitor and analyze moving forward as the growth in online e-commerce may increase the demand for freight shipments of parcels and other personal deliveries at a higher rate than population growth alone would suggest. These types of deliveries to local residences and businesses often place additional demand on transportation infrastructure that is not commonly used by freight including local roads and neighborhood streets.

Domestic shipments⁸ are the dominant type of movement by both measures for both 2012 and 2040. By weight in 2012, imports and exports combined only accounted for five percent of shipments. By value, imports and exports accounted for less than four percent of shipments. The dominance of domestic shipments is projected to continue in 2040. Since overall international trade growth in the California goods movement picture is higher than it is in the Central Coast, there appears to be a need to provide improved access to the West Coast port and airport system coupled with trade promotion for the region's products.

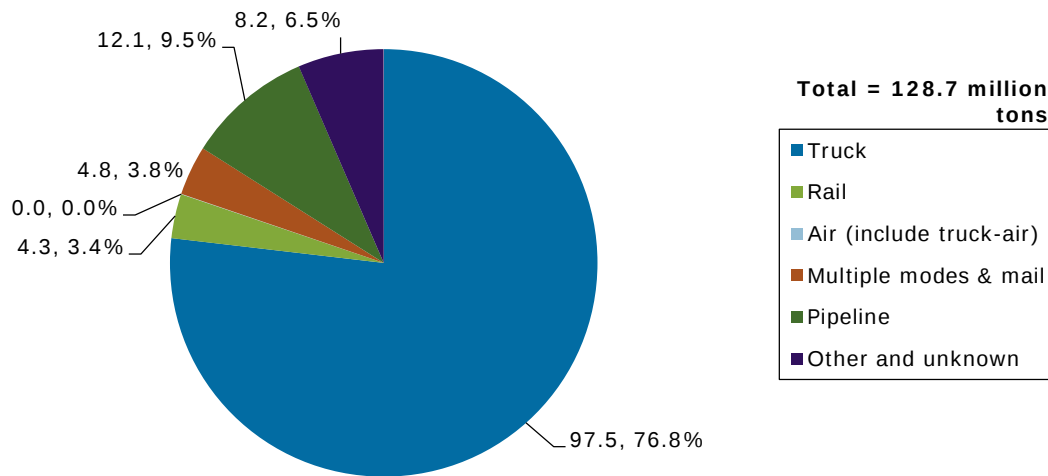
Figure 3.6 and Figure 3.7 shows the mode split for shipments into, out of, and within the study region in 2012 by weight and by value. A total of 128.7 million tons of goods were shipped in 2012, with nearly 77 percent going by truck. This highlights the dominance of trucking as the mode of choice for moving goods and reinforces the importance of U.S. 101 as well as adjacent and connecting corridors. Measured by value, trucking was the dominant mode in 2012, accounting for 74 percent of total shipments. Multiple modes and mail was the second highest mode, accounting for 13.3 percent of shipments. This reflects

The Central Coast Region has significant opportunities to expand international trade growth, especially related to specialty agricultural products. The Port of Oakland continues to expand facilities focused on these export markets and improved attention to strengthening transportation linkages coupled with trade promotion would benefit the region.

⁸ Domestic means the immediate origin or destination of the shipment was a U.S. Zone (based on BEA). It should be noted that FAF3 is not a chained trip model, thus portions of international flows can be counted as domestic if a transfer happened within the study region. For instance, outbound domestic flows from Monterey County to Alameda County in the Bay Area can both be "true" domestic flows, or international flows that moved from a temporary storage area in Monterey County, to a warehouse in Alameda County.

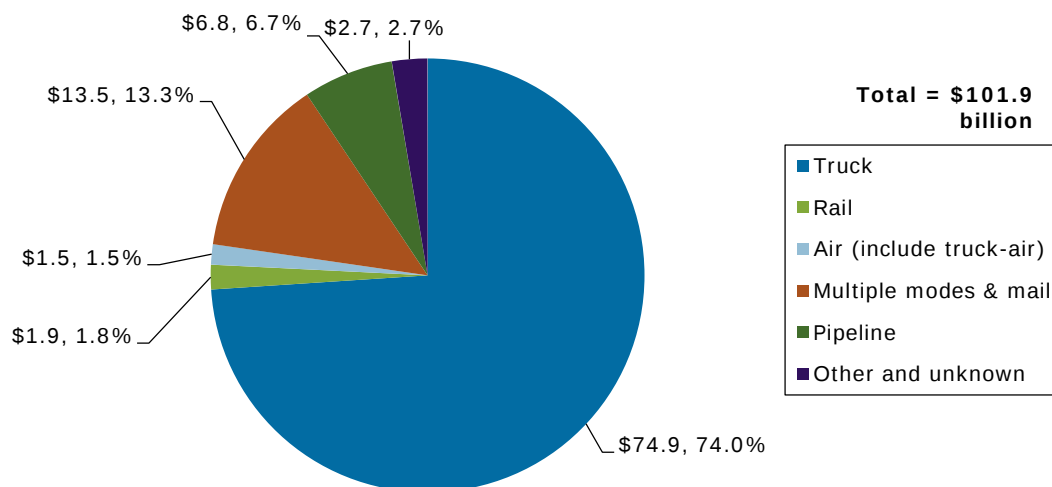
the use of multimodal and parcel services to carry higher value, lower weight shipments, as well as a continuing trend towards containerization (for intermodal truck-rail shipping). This also is seen in the lower share of goods moved by carload rail (only 1.8 percent) which typically carries lower value, bulk goods such as construction material, minerals, or waste/scrap. In 2040, the share of goods moving by truck is projected to decrease slightly from 74 to 71 percent of \$249.2 billion. Multiple modes (including intermodal truck-rail shipping) and mail will increase the most, accounting for 18.3 percent of shipments in 2040, with a smaller increase in air, rising to 3 percent. Other modes will see a decrease in share of shipments.

Figure 3.6 Central Coast California Regional Freight Flows by Mode (2012)
Millions of Tons



Source: Federal Highway Administration. Freight Analysis Framework 3. Additional analysis by Cambridge Systematics

Figure 3.7 Central Coast California Regional Freight Flows by Mode (2012)
Billions of Dollars

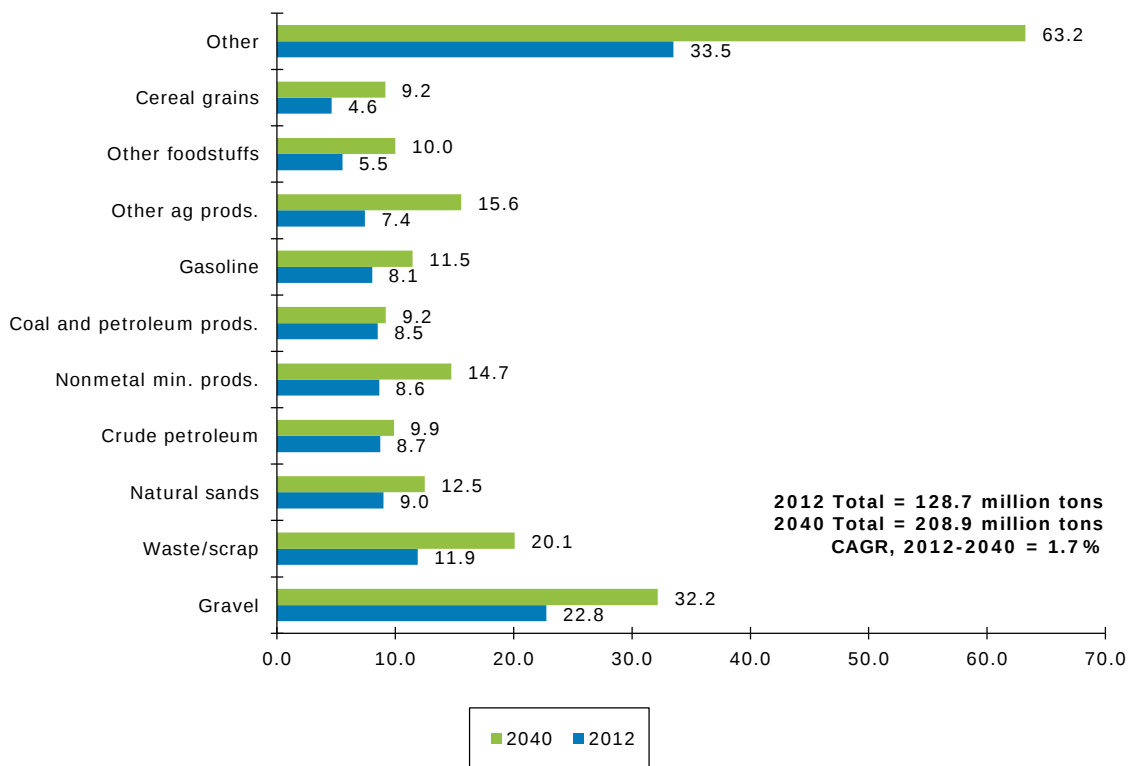


Source: Federal Highway Administration. Freight Analysis Framework 3. Additional analysis by Cambridge Systematics

Figure 3.8 shows the top ten commodities by weight transported into, out of, and within the study region in 2012 and projected for 2040. The largest single commodity transported by weight was gravel, accounting for 17.7 percent of all shipments. Much of this originates from quarries throughout the Central Coast Corridor. Combined with waste/scrap (9.2 percent) and natural sands (7.0), these top three commodities accounted for 33.9 percent of all tonnage moved in the study region. These figures are consistent with nearby regions as construction materials in general are very heavy. Agricultural goods, which play an important part in the regional economy, accounted for 13.7 percent of the total tons of goods shipped in 2012 (Other agricultural products, other foodstuffs, and Cereal grains).

Total tonnage shipped for the top ten commodities is projected to increase by 2040. Gravel (15.5 percent) and waste/scrap (9.7 percent) will remain the two top commodities by weight, but other agricultural products are expected to more than double and become the third most common commodity carried, accounting for 7.5 percent of the total. Combined with cereal grains and other foodstuffs, the agriculture sector will account for 16.5 percent of all tonnage moved into, out of, and within the region in 2040.

Figure 3.8 Central Coast California Regional Freight Flows by Top Commodities by Tonnage (2012 and 2040)
Millions of Tons



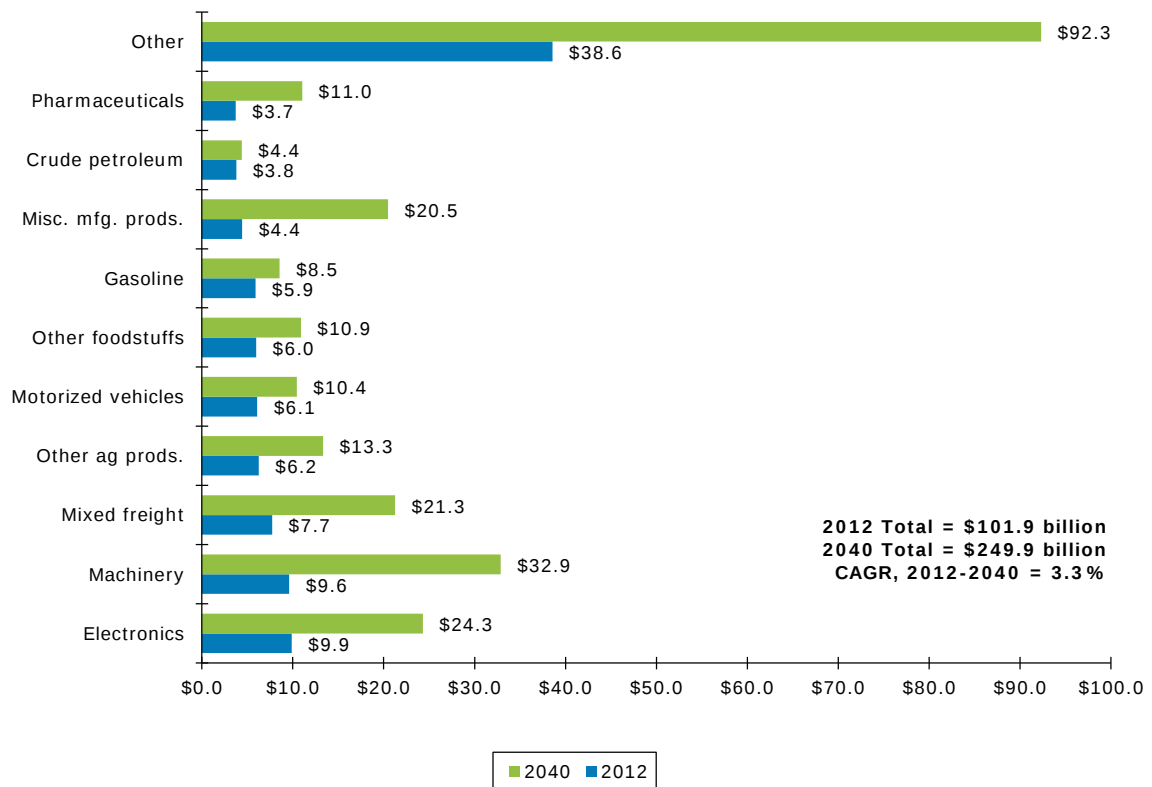
Source: Federal Highway Administration. Freight Analysis Framework 3. Additional analysis by Cambridge Systematics

Figure 3.9 shows the top 10 commodities by value in 2012 and 2040 shipped into, out of, and within the study region. Electronics (9.7 percent), machinery (9.4 percent) and mixed freight (7.6 percent) comprised the top three commodities moved by value and accounted for 26.7 percent of all shipments, which represents a strong consumer base, and high-tech and defense sector in the

region. Commodities directly related to agriculture include other agricultural products (6.1 percent) and other foodstuffs (5.8 percent). It also is important to note that other categories relate to the agriculture sector indirectly. Mixed freight shipments for example includes food bound for grocery stores or restaurants, and machinery, motorized vehicles (6 percent), and miscellaneous manufactured products (4.3 percent) can all indicate equipment bound for farms or used in the logistics chains for agricultural goods.

In 2040, machinery (13.2 percent), electronics (9.7 percent), and mixed freight (8.5 percent) are projected to remain the top three commodities by value. Miscellaneous manufactured products are projected to more than quadruple to become the fourth-largest commodity, representing 8.2 percent of goods moved. The total value of Other agricultural products and Other foodstuffs⁹ also will increase; however their share of total shipped value will decrease to 5.3 percent and 4.4 percent respectively.

Figure 3.9 Central Coast California Regional Freight Flows by Top Commodities by Value (2012 and 2040)
Billions of Dollars



Source: Federal Highway Administration. Freight Analysis Framework 3. Additional analysis by Cambridge Systematics

⁹ Other agricultural products includes vegetables, fruits and nuts, flowers, and seeds. Other foodstuffs includes dairy products, processed vegetables, fruits, and nuts, coffee, tea, plant and animal oils, sugars and cocoa. For a full list of each category, see the U.S. Census "SCTG Commodity Codes." Online at: <https://bhs.econ.census.gov/bhs/cfs/Commodity%20Code%20Manual%20%28CFS-1200%29.pdf>.

By trading partner, Texas is the second-biggest trading partner and the top state outside of California both by weight (1.1 percent) and by value (2.4 percent). By 2040, California will still account for 82.3 percent of shipments by weight, but Eastern Asia, the Rest of Americas, and Mexico will all overtake Texas as top trading partners. Though there could be a variety of factors that can lead to this; rapid economic development in those emerging economies which increases demand for consumer goods is likely a key reason.

Connectivity to the Eastern United States is important to support future freight flow growth, followed by north-south connectivity to the Pacific Northwest and Mexico. Connectivity to I-5 from U.S. 101 is critical, as I-5 serves as the main north-south connector in the western U.S. and interchanges with major east-west highways including I-80 and I-10.

FREIGHT SYSTEM INFRASTRUCTURE

The commodities that flow into, out of, within and through the U.S. 101 Central Coast region use a collection of multimodal freight systems infrastructure such as ports, airports, rail, and highway. Within the Central Coast region, the vast majority of goods move by truck on roads. Table 4.1 shows key highways by County that intersect with U.S. 101 in the study area. Many of these are critical freight corridors that move goods to and from local communities. They also form a vital link to Interstate 5 and the Central Valley of California to the east. Interstate 5 is the main North/South corridor on the West Coast of the United States connecting Central California to Los Angeles, San Diego, and Mexico to the south and Portland, Seattle, and Canada to the north as well as numerous East/West Interstates.

The U.S. 101 Central Coast Region is made up of a collection of multimodal freight infrastructure including U.S. 101, connecting highways, the Union Pacific Railroad as well as the Santa Maria Valley Railroad.

Table 4.1 Key Intersecting Highways with U.S. 101, by County

County	San Benito	Monterey	San Luis Obispo	Santa Barbara
Key Intersecting	SR 152	SR 156	SR 46	SR 135
Highways	SR 156		SR 41	SR 154
	SR 129		SR 1	SR 246
			SR 166	SR 1

Note: Bolded routes are included in Caltrans' ITSP as Priority Interregional Facilities

Within this wider set of roads, Caltrans has identified routes that are most critical to supporting interregional transportation as part of their Interregional Transportation Strategic Plan (ITSP).¹⁰ The ITSP identifies 11 Strategic Interregional Corridors in the state; these Corridors include multimodal facilities that link the major regions of the State and support the State's economic and social needs. In addition to U.S. 101 which is the major interregional transportation facility in the "Central Coast – San Jose/San Francisco Bay Area Corridor," State Routes 41/46 and 152/156 are included in the "Central Coast and San Joaquin Valley East-West Connections" Corridors.¹¹ The ITSP notes that these are the most active east-west corridors in the region and are important links between U.S. 101 and Interstate 5. They also provide critical connections to intermodal facilities, agricultural hubs, retail and distribution centers, and special generators such as Vandenberg Air Force Base. Completing expressways on SR 46 and SR 156 are identified as high priorities in the Corridor.

In addition to highways, the U.S. 101 Central Coast region is served by the Union Pacific Railroad (UP) as well as the Santa Maria Valley Railroad, providing additional modal alternatives to shippers. While there are no cargo airports in the area, the study region is served by cargo airports in nearby regions such as the Fresno Yosemite International Airport and the Norman Mineta San Jose international Airport. The study area also is connected to the rest of the U.S. and the world through several intermodal gateways in the Bay Area, Southern California, and Central Valley. Figure 4.1 and Figure 4.2 show the multimodal freight systems infrastructure in the study region.

¹⁰ Caltrans. Interregional Transportation Strategic Plan, Status Update. October 2013.

¹¹ U.S. 101 is included in the "Central Coast – San Jose/San Francisco Bay Area" Corridor.

Figure 4.1 Multimodal Freight Systems Infrastructure in the Study Area
Santa Cruz, San Benito, and Monterey Counties



Source: Data obtained from various sources, including Caltrans, National Transportation Atlas Data Base. Cambridge Systematics, Inc. analysis.

Figure 4.2 Multimodal Freight Systems Infrastructure in the Study Area
San Luis Obispo and Santa Barbara Counties



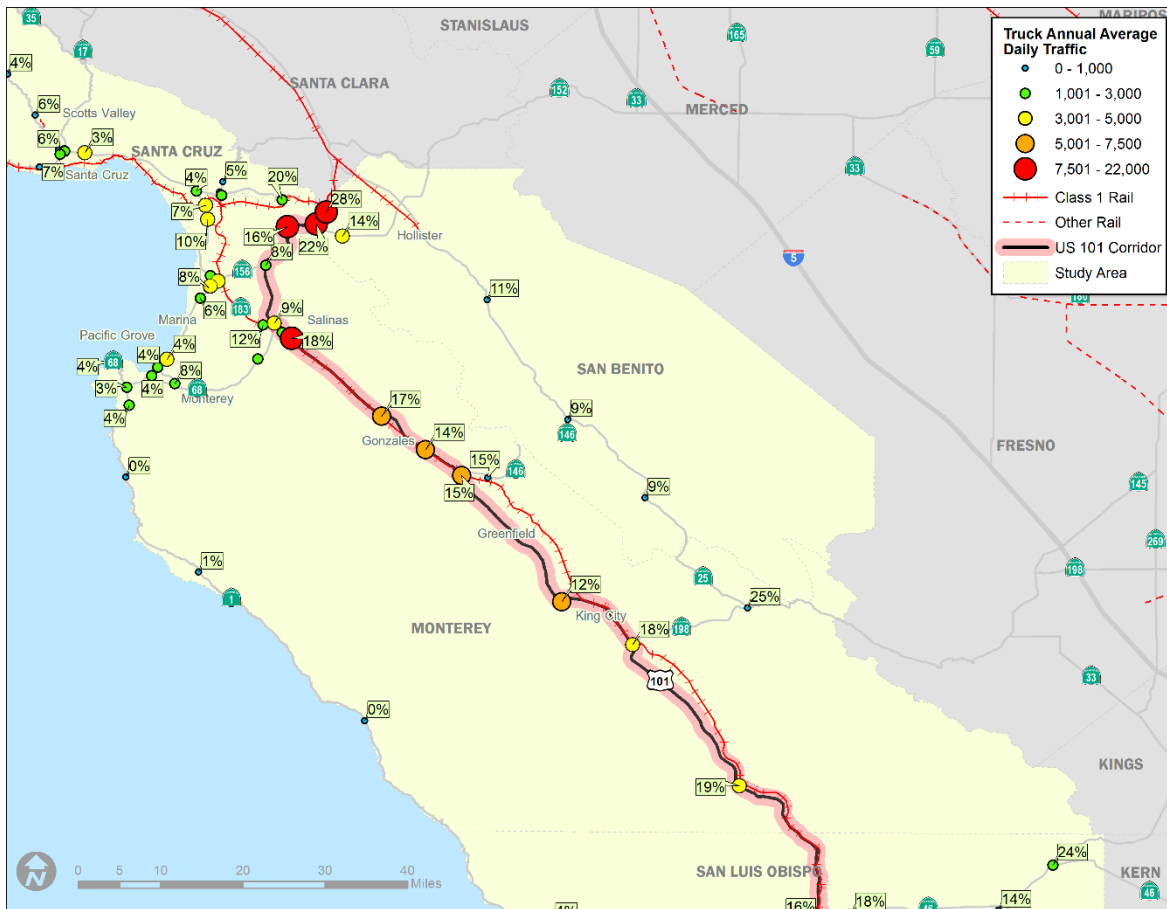
Source: Data obtained from various sources, including Caltrans, National Transportation Atlas Data Base. Cambridge Systematics, Inc. analysis.

Truck Traffic Volumes

U.S. 101 is the most critical highway for freight movement in the study area carrying the highest truck volume, as shown in Figure 4.3 and Figure 4.4. In 2013, the location with the highest absolute number of trucks was in San Benito County at the junction of U.S. 101 and Route 156 East, with 22,000 average daily trucks. This location also was the highest when measured by trucks as a percent of total vehicle Average Annual Daily Trucks (AADT), at 22 percent. The high truck volumes at this location are clearly due to a combination of agriculture activities in Monterey County, including transportation between coolers and shippers, as well as proximity to the Bay Area for trade. Five-axle trucks represented the majority of trucks in all but twelve count locations where two-axle trucks represented more than 50 percent of truck traffic. Of those twelve locations, two were in Monterey County, two in San Luis Obispo County, three in San Benito County, and five in Santa Barbara County.

Figure 4.3 and Figure 4.4 also show truck counts on major routes that intersect or run parallel to U.S. 101. The heaviest truck volume on routes other than U.S. 101 in 2013 was located at the intersection of SR 183 and SR 156 in Monterey County with 3,875 trucks accounting for 15.5 percent of all annual daily traffic. This again is likely due to agriculture activity in those regions around Salinas. In fact, the top ten highest truck count locations other than on U.S. 101 are almost exclusively located in the Northern 101 Corridor along SR 1. The highest percent of trucks was at the junction of U.S. 101 and Route 129 in San Benito County where 27.8 percent of all traffic was a truck. Further discussion of infrastructure conditions is found in Section 5, as well as Appendix D.

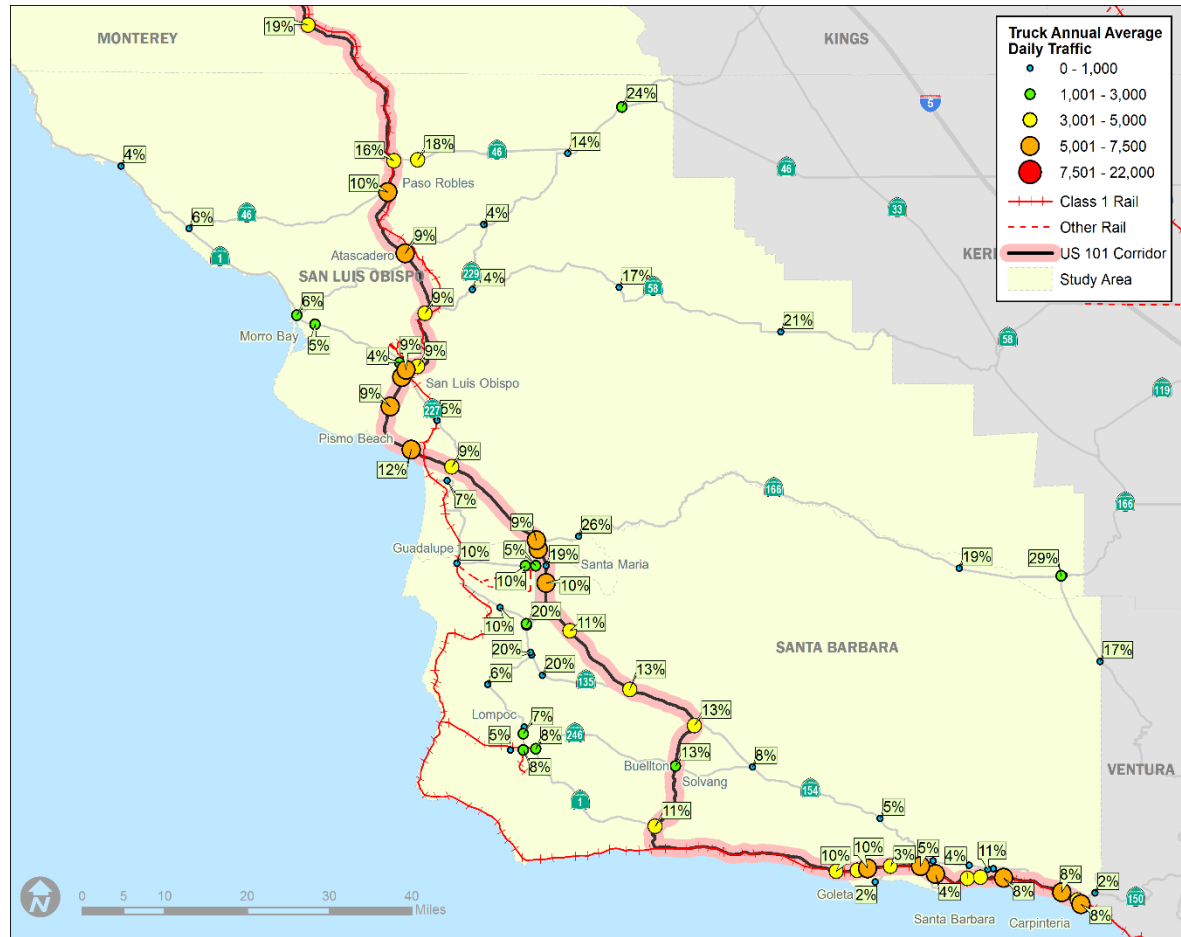
Figure 4.3 Truck Volumes and Percent Traffic that is Trucks on U.S. 101 and Adjacent Highways
Santa Cruz, San Benito, and Monterey Counties



Source: Caltrans data.

Note: AADT stands for Average Annual Daily Traffic.

Figure 4.4 Truck Volumes and Percent Traffic that is Trucks on U.S. 101 and Adjacent Highways
San Luis Obispo and Santa Barbara Counties



Source: Caltrans data.

Note: AADT stands for Average Annual Daily Traffic.



5

FREIGHT NEEDS AND ISSUES

Overall, the U.S. 101 Central Coast goods movement system supports a vibrant economy, enabling commerce and development of new industries. However, there are challenges that must be addressed. This section identifies the most important gaps, needs, issues, and deficiencies of the goods movement system as they relate to the vision and goals described earlier. Performance measures are used to evaluate the needs in a systematic manner that directly relate to the goals. This is also important to link the needs to strategies. As strategies are developed to address the needs, the performance measures are used to rate the strategies, with the highest rated ones included in the final plan recommendation as priority projects.

Table 5.1 lists the three goals developed as part of this study, the Performance Measures suggested within each goal category, the metrics that can be used to measure performance, a rating of current conditions based on the performance measure, and an explanation of how the rating was obtained. These ratings were determined qualitatively and should be used as a guide only until quantitative performance measure targets are developed. The sections that follow provide further details about conditions related to each of the study's goals.

Performance measures are data-driven tools that provide agencies a way to assess the condition of the transportation system, identify gaps and opportunities for system improvements, identify and evaluate strategies to meet goods movement goals, and monitor ongoing performance. They also can be used to help decision-makers allocate limited resources more effectively than would otherwise be possible.

Table 5.1 Central Coast California Summary of Needs Evaluation

Goals	Performance Measure(s)	Metric(s)	Current Condition Rating	Ratings Explanation
Support economic development	Access and Multimodal Connectivity	Freight routes access from/to locations with significant freight activities; east-west connection to parallel roadways; roadway/rail connectivity		Limited east-west connectivity to parallel routes leading to key freight markets was mentioned by several studies and stakeholders. Poor road conditions and delay and reliability issues exist along East-West routes SR 156, SR 41, SR 46 and SR 166, and SR 129. Rail freight faces several challenges including a lack of truck to rail facilities, limited use, and limited capacity.
Provide an efficient, reliable, well-maintained and safe goods movement facility	Travel-time delay on truck routes – Recurrent and Seasonal	Truck delay		Truck delay is a moderate problem in the area, and is most significant in East Santa Barbara County to Ventura County line, North of Salinas, and between San Luis Obispo and Santa Maria. Given seasonal variations, during summer the delays can be worse due to peak harvest and tourist season. Weekend delays during peak tourist seasons can be as bad as weekday delay.
	Travel-Time Reliability	Planning time index		Reliability is a moderate problem in the region. During the AM and PM peak, reliability is poorest along northbound U.S. 101 from Salinas to the Santa Clara County boundary, from the City of San Luis Obispo to Santa Maria, and in Eastern Santa Barbara to the Ventura County line.
	Freight-Related Crashes	Truck-involved crashes and crash rate		Intersection collisions are more severe than other types of collisions, and occur at uncontrolled intersections. Highway at-grade crossings are a safety challenge along the corridor. Top crash areas include U.S. 101 at 156, U.S. 101 between SR 41 and SR 227, and U.S. 101 between SR 1 and SR 154.
		Rail Vehicle crashes at at-grade rail crossings		Safety at at-grade rail crossing is not a major issue in the study area.

Goals	Performance Measure(s)	Metric(s)	Current Condition Rating	Ratings Explanation
Provide an efficient, reliable, well-maintained and safe goods movement facility	Freight Infrastructure Conditions	Bridge conditions rating		Bridge conditions along U.S. 101 are generally sufficient. However bridge conditions on intersecting and parallel routes, including SR 1, show a large number of structurally deficient and functionally obsolete structures with the worst rated bridges in Monterey and Santa Cruz County.
		Pavement condition rating		Segments identified for major or minor rehabilitation are concentrated in Monterey County between the Monterey/ San Luis Obispo County border and the SR 156 interchange in Prunedale. There is also a concentration of high-priority segments from Santa Barbara to the Santa Barbara/Ventura County line. Caltrans has a number of preventative maintenance projects programmed or in design to address U.S. 101 in Monterey County, and has identified projects in its 10 Year Plan to address other areas of concern.
	Trucking Parking	Number of parking spaces needed along corridor		Lack of truck parking has been an issue on the corridor for decades, especially for long-haul truckers who are subject to challenging Federal hours of service restrictions which require frequent rest periods. In addition, parking for deliveries and pickup is also inadequate.
	Truck Routes	Extent of Truck Routes Network		While U.S. 101 is well-signed and a designated truck route throughout the study area, the “first- and last-mile” routes that connect U.S. 101 to origins and destinations are often not designated as truck routes.
	Adoption of Advanced technologies	Degree of Implementation of ITS technologies		There is no single coordinated ITS system on U.S. 101, though there are some limited ITS technologies such as ramp metering.

Goals	Performance Measure(s)	Metric(s)	Current Condition Rating	Ratings Explanation
Reduce and mitigate impacts from goods movement operations	Air Quality	Tons of PM _{2.5} , PM ₁₀ , emissions (Air Quality) and tons of CO ₂ /NO ₂ emissions (Greenhouse Gas emissions) from truck sources		-Air quality in the region is generally good. Trucks produces less than 5 percent of PM _{2.5} pollution, and about 2.4 percent of PM ₁₀ pollution. Trucks are responsible for 28% of CO ₂ /NO ₂ emissions in the region. The region will benefit from continued efforts at the state level to promote zero and near-zero emission trucks (see below)
	Use of Clean Fuel Technologies	Use of Clean Fuel Technologies		Clean fuel technologies which are more appropriate for goods movement such as LNG are not currently being championed by the state. Lack of infrastructure also hinders clean fuel technology use.

Source:  Good Condition.  Fair Condition.  Poor Condition.

5.1 Economic Development Needs

East-west connectivity along SR 156/SR 152, SR 46, and SR 41, the main east-west corridors connecting the Central Coast with I-5, were found to be a concern. Many of these are critical freight corridors that move goods to and from local communities. They also form a vital link to Interstate 5 and the Central Valley of California to the east. U.S. 101 acts as a secondary collector route for shipments to and from I-5, and is also a critical alternative for north-south travel in the region when I-5 is closed, typically due to weather related causes. Several closures in the past year have reinforced the vital role these routes play in providing alternative routes for the movement of commercial goods. In October 2015, a mudslide closed Interstate 5 north of Los Angeles near the Grapevine, forcing commuters and truck traffic onto U.S. 101 causing the highway, intersecting, and parallel roads to exceed capacity. Caltrans measured a more than 85% increase in truck traffic on U.S. 101 during the I-5 closure.¹²

Of the connecting routes, truck volumes are currently highest on SR 156 and SR 46. Pavement condition data indicated several locations of pavement in poor condition on these major freight corridors, with concentrations of poor pavement conditions on SR 41 between Atascadero and Shandon and SR 46 east of Shandon and a short stretch of SR 156 west of Hollister. In addition, safety is a concern on some routes, with SR 156 having 21 incidents and 34 injuries, the second highest in the study area. SR 46/46E, 166, and 129 all had twelve incidents between 2010 and 2012. Other routes do not have sufficient conditions information, or have average conditions. Keeping these connections open and safe is a key consideration for the Central Coast economy—if

¹² Email from Kelly McClendon, Caltrans. October 23, 2015. Data from: <http://pems.dot.ca.gov/>

the routes linking U.S. 101 to I-5 and the rest of the country degrade, it could impact the ability of companies in the region to conduct business.

As shown in Section 4, a small percent of freight traffic in the region is moved on rail. One of the major challenges to increasing rail mode share in the region is the lack of an intermodal terminal in the California Central Coast and the need to connect with the Central Valley to meet this need. The high percentage of trade with other regions of California, and thus relatively short distances, also limits the amount of goods that could utilize a rail intermodal facility. However, multiple studies have shown some demand for an intermodal facility in the region, especially for moving agricultural goods.

5.2 Mobility Needs

5.2.1 Travel Time Delay and Reliability

Recurring delay is a measure of normal congestion, versus non-recurring delay which is delay attributed to random events such as an incident or weather. Congestion and delay are well established metrics in transportation modeling and analysis. The reduction of travel time is the most significant component in benefit-cost analysis for transportation projects because reductions in travel time provide the biggest benefit to travelers and businesses.¹³

The level of commercial or truck delay examines the amount of delay that trucks experience so a location with high congestion from automobiles but with low truck volumes might not be considered as an area of high commercial delay. The data indicates that commercial delays are concentrated on U.S. 101 in stretches near Santa Barbara and south of San Luis Obispo throughout the day. There also is significant delay north of San Luis Obispo in the PM peak, and on U.S. 101 where it runs concurrent with SR 156 in the AM peak. According to stakeholders, the stretches of 101 from Salinas to Gilroy, as well as the interchanges with SR 68 West, SR 156 West, SR 129, and SR 156 East are the most congested locations with high truck volumes. These locations are consistent with the data analysis.

One of the unique traffic patterns of the Central Coast region is the seasonal variability of traffic generated from peak harvest seasons from March to October, and the summer tourist traffic near SR 156, which may impact freight operations. When trucks are moving all at the same time during peak harvest season, there can be more serious congestions issues. Overall trends indicate a peak in all vehicle traffic between May and August with the lowest levels of traffic occurring in February and March. Truck traffic followed a similar pattern, with the highest annual daily truck counts occurring in July or August. February, March, November, and December were the months with the lowest number of trucks. In terms of time-of-day variations, all four locations studied showed distinctive peaks during the p.m. periods, with a lull during the midday for both trucks and all vehicles. Weekend and holiday traffic flows were more mixed, but there was a general increase in traffic at most locations from the a.m. period through about 2:00 or 3:00 p.m., with a gradual decline after that time.

¹³ Vovsha, P., M. Bradley, and H. Mahmassani. 2011. Value of Travel Time Reliability: Synthesis of Estimation Approaches & Incorporation in Transportation Models. Presentation for the Transportation Research Board Annual Meeting.

Based on seasonality patterns, the delay intensities at the worst delay locations are expected to be worse in the summer months. In addition, based on the daily variations we observed, we can assume that weekend delay in the worst hours will be on par with the peak AM and PM period delays. Thus, solutions that aim at reducing weekday delay should also benefit weekend traffic. One alternative to reduce AM and PM peak traffic already being studied is the introduction of expanded commuter rail service between Ventura County and Santa Barbara. Expansion of the Capital Corridor service to Gilroy could also help alleviate delay in the northern portion of the U.S. 101 corridor.

In addition to predictable recurring delay, a more recent concept in transportation modeling and planning is travel reliability. Motor carriers are held to very strict standards for on-time delivery by their customers. Being late can mean missing times when businesses are open or missing cutoff times for intermodal connections at ports, airports, and rail terminals. In order to avoid poor on-time performance, motor carriers often build in “buffers” or extra travel time to account for potential, unpredictable delays. This can translate into wasted time when conditions are not as bad as the worst case scenario. The reliability of a route is a crucial piece of information for the logistics community.

One way to measure travel-time reliability is through the planning time index (PTI). PTI represents how much total time a traveler should allow to ensure on-time arrival 95 percent of the time. For example, if a trip on a segment should take twenty minutes in free-flow conditions, a planning time index of 1.5 indicates that a traveler should allow for 30 minutes of travel to arrive on time 95 percent of the time ($20 \text{ minutes} \times 1.5 = 30$).

The highest PTI in the corridor occurred during the PM peak (3:00 p.m. to 7:00 p.m.) in Southern Santa Barbara County with a PTI of 1.26. Segments south of San Luis Obispo and a segment of road from the Monterey/San Benito line to SR 129 followed with evening PTIs of 1.15 each. During the AM peak between 6:00 a.m. and 9:00 a.m., U.S. 101 from the Ventura County line to Hollister Avenue had a PTI of 1.23, with U.S. 101 south of San Luis Obispo and from Airport Boulevard to SR 129 all having a PTI of 1.12. Over the entire day, the highway segment between Ventura County and Hollister Ave in Goleta had the highest PTI, averaging 1.18 between 6:00 a.m. and 7:00 p.m. Segments from Airport Boulevard in Salinas to the northern boundary of the study area had the second and third-highest PTIs at 1.09 and 1.10 respectively. The PM peak had the highest average PTI at 1.09, followed by the AM peak at 1.07, the full day at 1.05, and the midday (9:00 a.m. to 3:00 p.m.) at 1.03.

Figure 5.1 through Figure 5.4 illustrates the Planning Time Index for each of the segments.

Figure 5.1 Weekday Planning Time Index along U.S. 101, AM Peak
Santa Cruz, San Benito, and Monterey Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

Figure 5.2 Weekday Planning Time Index along U.S. 101, AM Peak
San Luis Obispo and Santa Barbara Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

Figure 5.3 Weekday Planning Time Index along U.S. 101, PM Peak
 Santa Cruz, San Benito, and Monterey Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

Figure 5.4 Weekday Planning Time Index along U.S. 101, PM Peak
San Luis Obispo and Santa Barbara Counties

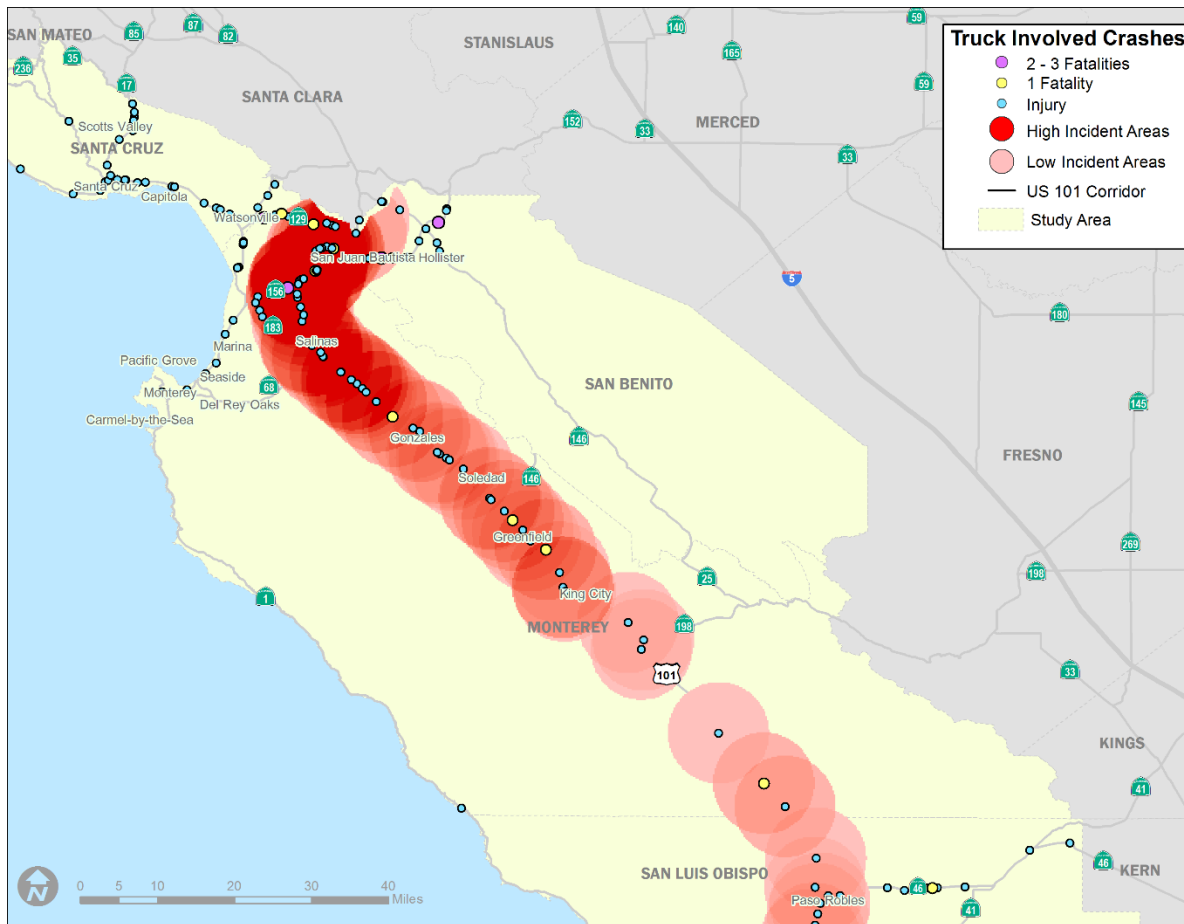


Source: SHRP Calculator, Caltrans AADT and Truck Data.

5.2.2 Safety

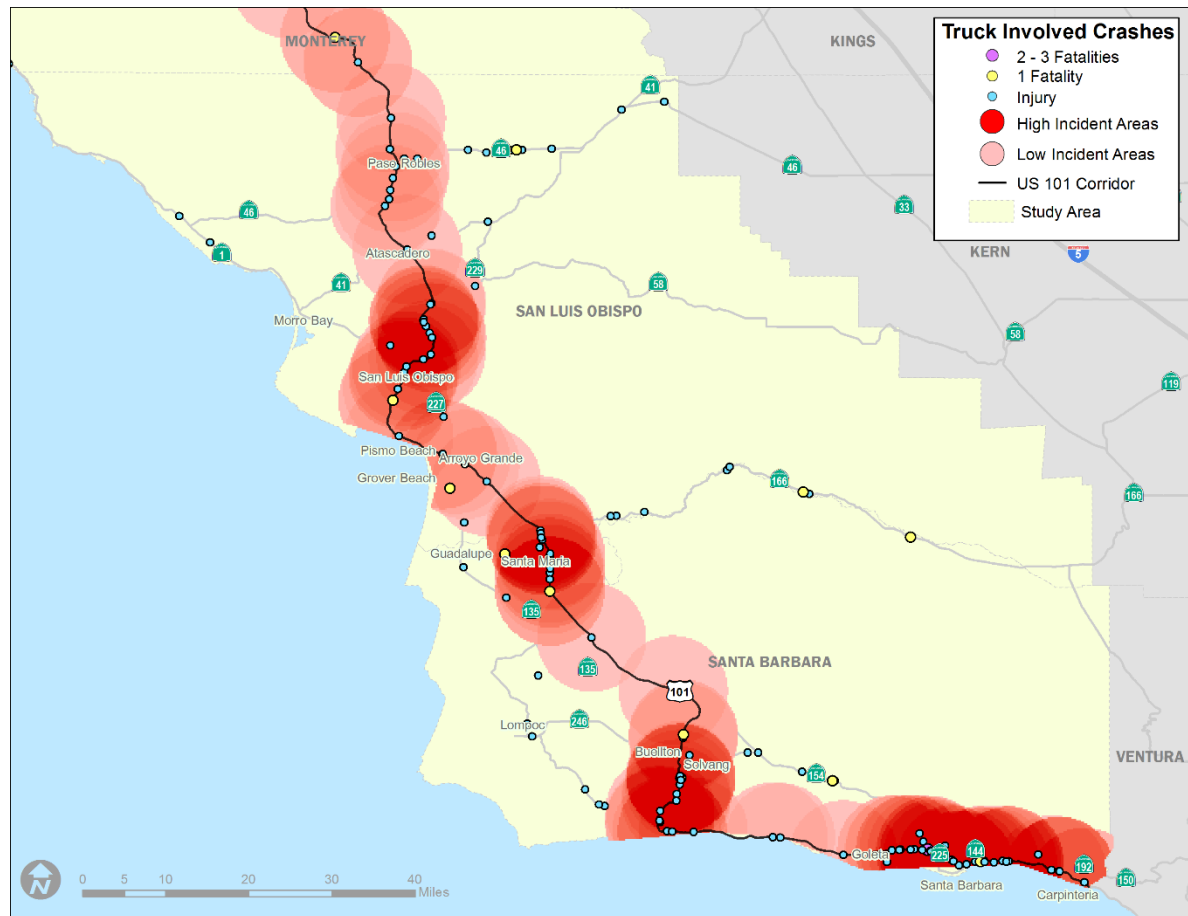
On U.S. 101, trucks and passenger vehicles face unique safety challenges due to congestion, mainly due to uncontrolled access to a high-speed facility. Figure 5.5 and Figure 5.6 show the location of crashes with injuries or fatalities involving trucks along U.S. 101 between 2010 and 2012. There were 156 incidents which injured 202 persons and resulted in eleven fatalities.

Figure 5.5 Truck-Involved Injury and Fatality Crashes on U.S. 101 and Intersecting Routes. 2010-2012
Santa Cruz, San Benito, and Monterey Counties



Source: Caltrans SWITRS data. Fatalities are weighted twice as heavily as injuries.

Figure 5.6 Truck-Involved Injury and Fatality Crashes on U.S. 101 and Intersecting Routes, 2010-2012
San Luis Obispo and Santa Barbara Counties



Source: Caltrans SWITRS data. Fatalities are weighted twice as heavily as injuries.

Ten of the crashes, representing 6.4 percent of the total, occurred at intersections. These crashes accounted for sixteen injuries (7.9 percent) and one fatality. Seven of the ten intersection incidents are listed as “broadside” collisions, with one each of “head-on,” “sideswipe,” and “rear end.” Half occurred in July, August, and September and seven took place on Thursdays. Six of these locations are at locations where traffic enters or exists from U.S. 101 without a ramp – uncontrolled intersections. Two more occurred at locations that were, but are no longer, uncontrolled intersections due to improvements made by Caltrans through the Prunedale Improvement Project. The fatality occurred at U.S. 101 and Santa Maria Way in Santa Barbara County. This location is access controlled via a ramp. Interviews with stakeholders identified highway at-grade crossings as a safety concern along the corridor. While the percent of total incidents at these locations during the examined period was low, they represent a significant percent of the injuries caused by truck-related incidents.

Locations with the highest number of truck-involved incidents include:

- Where U.S. 101 and SR 156 overlap (Monterey and San Benito Counties)
- U.S. 101 between SR 41 in Atascadero and just south of the junction with SR 227 south of San Luis Obispo City

- U.S. 101 between SR 1 and SR 154 in Santa Barbara County

Beyond U.S. 101, a number of additional intersecting or adjacent routes also had truck-involved collisions that resulted in injuries or fatalities. Between 2010 and 2012, there were 142 truck-involved collisions which injured 208 and killed 21 on State Routes in the study area. Four fatalities occurred on SR 129, four on SR 154, seven on SR 156, four on SR 166, and one each on SR 1 and SR 46.

5.2.3 Pavement and Bridge Conditions

Two measures of bridge condition were examined in this report. The first is whether a bridge is structurally deficient, functionally obsolete, or neither. A bridge is listed as structurally deficient when its deck, superstructure, or substructure receive a score of “4” or lower on a scale from 0 to 9, if it has a lower load carrying capacity, or if the waterway below the bridge frequently overtops the bridge. They are still safe to use, but may be examined further for rehabilitation or replacement. Functionally obsolete bridges are described by the U.S. DOT as lacking sufficient carrying capacity, having height restrictions, or being prone to flooding – it is not related to the structural condition of the bridge.¹⁴ Of the 233 bridges on U.S. 101 in the study region, 13.7 percent are structurally deficient, 21 percent are functionally obsolete, and 65.2 percent had no identified issues. A linear regression determined that traffic levels were not correlated with bridge condition, while the age of the bridges had about a 20 percent correlation with condition.

In addition to being classified either structurally deficient or functionally obsolete, bridges with a sufficiency rating (SR) below 50¹⁵ can compete for funding for rehabilitation or replacement. Of the 233 bridges on U.S. 101 in the study region, 3 have sufficiency ratings of 50 or below, two in Santa Barbara County and one in San Luis Obispo County. There are fourteen other bridges on State Routes in the study region with sufficiency ratings under 50. These structures are identified in Figure 5.8 and Figure 5.9.

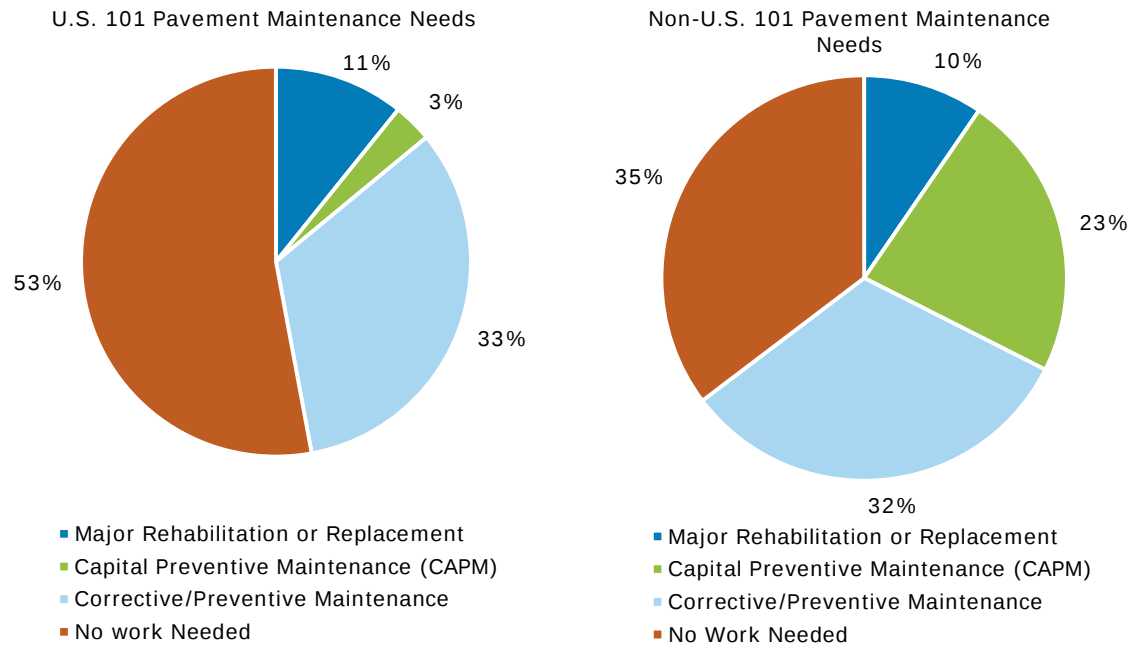
In addition to bridge conditions, pavement ratings are an important factor in determining the overall condition of U.S. 101’s infrastructure. Road segments in California are given a priority number (score) based on a combination of ride quality, structural distress, and the Maintenance Service Level (MSL) of the roadway which varies depending on the classification of the route and the traffic volume served. U.S. 101 is classified as MSL 1.¹⁶ Lower priority numbers indicate poorer conditions.

Figure 5.7 shows the percent of lane miles for U.S. 101 and other State Routes by the type of maintenance required. The maintenance need—preventive (roads are in good condition), corrective (roads are in fair condition) and Capital Preventive Maintenance (CAPM) or major rehabilitation/replacement (roads are in poor condition)—is based on the segment’s Priority Number.

¹⁴ Maryland DOT Bridge Inspection Fact Sheet. August 2007.

¹⁵ Rated on a zero (completely deficient) to 100 (entirely sufficient) scale

¹⁶ MSL 1 routes contain route segments in urban areas functionally classified as Interstate, Other Freeway/Expressway, or Other Principal Arterial. In rural areas, the MSL 1 designation contains route segments functionally classified as Interstate or Other Principal Arterial. For further information, see Caltrans’ “2015 State of the Pavement Report.”

Figure 5.7 Pavement Maintenance Needs in Central Coast Region

Note: Data for approximately 524 lane miles for U.S. 101, 1,064 lane miles on other State Highways.

Figure 5.8 and Figure 5.9 illustrate pavement conditions on U.S. 101 and other key State Routes in the study region developed in a 2011 survey and identifies the seventeen bridges with sufficiency ratings under 50. Segments with a priority number between 1 and fourteen are shown in red in the figures below, indicating the need for major rehabilitation or replacement or Capital Preventive Maintenance. Road segments requiring corrective or preventive maintenance are shown in yellow and segments requiring no work are in green. Segments in red are concentrated in Monterey County between the merger with SR 156 West and the Monterey/San Luis Obispo County border, with a notable exception adjacent to King City. There also is a concentration of high-priority segments from Santa Barbara to the Santa Barbara/Ventura County line. This is roughly correlated with the truck traffic levels along U.S. 101. Of the remaining state highways in the region, SR 41 and 58 in San Luis Obispo County, SR 146 and 25 in Monterey County, SR 156 in San Benito County, SR 9 in Santa Cruz County, and SR 135 and 192 in Santa Barbara County contain a large number of segments with Priority Numbers lower than 14.

Figure 5.8 2011 Pavement Conditions and Bridges with Sufficiency Ratings Less Than 50
Santa Cruz, San Benito, and Monterey Counties



Source: AMBAG.

Figure 5.9 2011 Pavement Conditions and Bridges with Sufficiency Ratings Less Than 50
San Luis Obispo and Santa Barbara Counties



Source: AMBAG.

5.2.4 Truck Parking and Truck Routes

California operates three Statewide Roadside Rest Areas (SRRA) within the study area, two of which – Gaviota NB/SB and Camp Roberts NB/SB – are on U.S. 101. The third – Shandon – is located on SR 46 in San Luis Obispo County, east of U.S. 101. These locations mainly serve long-haul trucking needs. A 2011 report¹⁷ found that the Gaviota and Camp Roberts locations were not facing current capacity issues for truck parking, and were projected to face only minor capacity constraints of between two and seven truck parking spots in the future. The study also found that additional parking on-site or developing adjacent parcels are not viable options. Additional parking will need to be found either at a new SRRA or other facility. There is a Caltrans' Truck Parking Area approximately 4 miles north of Gaviota N/B that may be available for additional truck parking. This site and others in the area should be examined in more detail as part of the freight parking program recommended in this report (see Section 6 for details).

17 Dornbusch Associates. Final Task 5 Report, Strategic Recommendations, Safety Roadside Rest Area Master Plan. April 2011.
http://www.dot.ca.gov/hq/LandArch/srra/docs/11_Final_SRRA_Master_Plan_Report.pdf.

Unauthorized parking along U.S. 101 is another issue that has been raised consistently in the study region since the early 1990s. Interviews with the California Highway Patrol in addition to searches utilizing Google Earth identified ten locations on or near U.S. 101 in the study region that experience unauthorized parking throughout the year. This poses a safety challenge, as trucks parked on the shoulder of U.S. 101 or on ramps can limit a driver's view. These locations are spread along the corridor, with one prominent cluster just south of King City. Interviews with stakeholders also identified seasonal parking issues near shipping hubs, delivery points, and harvest areas such as agricultural coolers, warehouses, manufacturing facilities, or other freight-producing industries. Drivers lack access to amenities such as food, showers, and services at these major freight generating locations. The Salinas area was specifically cited as lacking amenities for truck drivers.

Truck route maps and signage are key tools that allow drivers to adapt to congestion or incidents along their routes. It also is an important way for municipalities to direct trucks to routes that are able to accommodate them. While U.S. 101 is well-signed and a designated truck route throughout the study area, the "first- and last-mile" routes that connect U.S. 101 to origins and destinations are cause for concern. Many businesses that utilize U.S. 101 are located on local streets. Routing trucks from U.S. 101 to and from these locations in the most efficient and safest manner is critical to safety, reducing wear on local roads, and to saving time and money for carriers.

5.2.5 Hours of Service Rules

Truck driver Hour of Service (HOS) rules contain a number of requirements related to the amount of time operating a truck, the working day length, rest periods, and time off. Each of these stipulations in the most recently adopted HOS rules is important to ensure the goods movement system is as safe as possible, but they also create several unintended consequences. By reducing the truck drivers' work week by twelve hours, the productivity of each truck is reduced. For companies to maintain the same level of productivity after recent rule changes, they need to put more trucks with more drivers on the road. In addition, they may force the truck to stop wherever they are when the time is up, sometimes illegally. On top of that, many freight businesses are moving truck tracking to e-logs. An e-log is a small, computerized device similar to a GPS unit for a personal vehicle, that when installed in the dashboard of a transport truck, records when and where the truck goes, its speed, idle time, and even miles per gallon. E-logs track trucker hours more accurately, preventing drivers from flexing hours by falsifying logs. However, this loss of flexibility can make hours of service restrictions more onerous for drivers, requiring drivers to leave larger time and distance buffers between their stops in order to ensure that they have sufficient time to access trucking service centers which can accommodate large truck parking and hotels, or contemplate parking in illegal areas in order to fulfil delivery requirements and comply with the HOS rules.

5.2.6 Intelligent Transportation System

Intelligent Transportation Systems (ITS) can reduce congestion and increase system performance. Examples of ITS systems include closed circuit televisions, changeable message signs, ramp metering, weigh-in-motion systems, transportation management centers, and 511 information which are described in further detail below. Many of these systems were

identified and described in the 2010 Central Coast ITS Implementation Plan.¹⁸ However, there is still a lack of coordination between the various ITS systems, and between the municipalities and agencies that control their installation and use.

5.3 Environmental/Quality of Life Needs

The study region is comprised of three California Air Pollution Control Districts (APCD), also called air districts. Monterey Bay Air Resources District consists of Monterey County, San Benito County, and Santa Cruz County. San Luis Obispo and Santa Barbara are their own separate air districts. The California Environmental Protection Agency Air Resources Board has primary responsibility for controlling air pollution from stationary sources, but also collects data from mobile sources, including trucks.¹⁹ There are two types of air quality concerns that receive the greatest level of attention and are the subject of various regulations in California – pollutants regulated under the Federal and California Clean Air Act (called criteria pollutants) and greenhouse gases. Criteria pollutants generally have affects in regions around their sources whereas greenhouse gases contribute to global climate change concerns. In terms of criterial pollutant levels, the study region's air quality is generally very good, meeting most of the National Ambient Air Quality Standards. Only San Luis Obispo County is designated as a nonattainment area for 8-Hour Ozone.²⁰ With respect to criteria pollutants, the biggest concern from trucks is particulate matter (PM) pollution. PM is measured in terms of the size of the particles – less than 2 microns in size (PM_{2.5}) and less than 10 microns (PM₁₀). Trucks produce less than five percent of all PM_{2.5} and 2.4 percent of PM₁₀ in the five-county region.²¹

Trucks are a more significant contributor to greenhouse gases, producing a total of 160 tons of CO₂ and NO₂ daily in the five counties and accounting for 27.6 percent of all greenhouse gas produced in the study area. CO₂ and NO₂ emissions must meet Assembly Bill 32 greenhouse gas reduction targets.

California is a leader in the adoption of clean fuel technology, including electric and natural gas fueled vehicles. California is home to nearly half of the nation's plug-in electric vehicles (PEV).²² An additional 33,000 vehicles are fueled with compressed natural gas or liquefied natural gas (LNG).²³ The number of vehicles utilizing alternative fuels helps drive and is driven by the availability of charging and fueling infrastructure. One of the main constraints stopping commercial truck fleets from changing to alternative fuel sources is the lack of changing/fueling infrastructure. Trucks that do not move on a set route and do not return to a home base every

¹⁸ California Department of Transportation. Central Coast ITS Implementation Plan. September 16, 2010.

¹⁹ Totals exclude trucks explicitly listed as "passenger."

²⁰ County is "Marginal." *Current Nonattainment Counties for All Criteria Pollutants*. U.S. EPA. Online at: <http://www.epa.gov/airquality/greenbook/ancl.html>. Current as of January 31, 2015.

²¹ <https://www3.epa.gov/pm/implement.html>.

²² "California a Leader in Electric Vehicle Adoption." *Pure Green Cars*. December 11, 2014. Online at: <http://puregreencars.com/Green-Cars-News/markets-finance/california-a-leader-in-electric-vehicle-adoption.html>.

²³ California Energy Commission. "Natural Gas and Liquefied Natural Gas for Transportation in California. 2015. Accessed 21 March 2015. Online at: <http://energyalmanac.ca.gov/transportation/cng-lng.html>.

night are more affected by this.²⁴ More reliable sources of fuel, more fuel efficient freight vehicles, and alternative fuels which allow longer ranges will help reduce one of the concerns about switching to alternate vehicles. The U.S. Department of Energy's Alternative Fuels Data Center lists 78 alternative fuel stations on or within five miles of U.S. 101 between the San Benito/Santa Clara County line and the Santa Barbara/Ventura County border.²⁵ Of these, 71 are electric charging stations, four are compressed natural gas, two are biodiesel, and one is liquefied natural gas. While this may seem significant, currently electric powered freight vehicles are severely limited in range due to the high drain heavy loads place on electric batteries, limiting the feasibility of electric power for freight vehicles until higher capacity batteries or more efficient vehicles are made available. However, anti-idling technology is available and is a promising approach to reducing emissions from trucks. This technology and other low emissions technologies are covered in more detail in Section 6 – Strategies, Projects, and Programs.

5.4 Additional Needs

There are a couple of issues that are not specifically addressed in the performance measures matrix. These issues cut across a number of topic areas, and so are difficult to measure with a single performance measure. However, they are crucial components to evaluating and improving the flow of goods along U.S. 101 both currently and in the future.

- Truck driver shortage: The American Trucking Association (ATA) estimates that in 2014, there was a shortfall of 35,000 drivers in the industry. That number is projected to rise to 240,000 by 2020 if current trends continue.²⁶ The lack of qualified drivers constrains total truck fleet capacity even as market conditions have rebounded. It also is a contributing factor to higher transportation prices.
- Need for additional data collection efforts. Caltrans' Truck Counts are the only reliable source of information for truck movements in the study region, and they do not contain the detail needed to fully understand the movements of goods. Two areas of need stand out:
 - » Regular surveys of freight movement on intersecting truck routes that go to/from Interstate 5; and
 - » Data collection on seasonality trends. Qualitative observations and assumptions indicate a heavy seasonal shift in driver pattern and quantity.

²⁴ Stakeholder Interviews, FAST Meeting 3/10/15.

²⁵ This total does not include propane stations.

²⁶ Reuters. "Driver shortage makes capitalizing on low oil hard for truckers." February 6, 2015. <http://www.reuters.com/article/2015/02/06/usa-truckers-railways-idUSL1N0VF1ZY20150206>.



6

STRATEGIES, PROJECTS, AND PROGRAMS

This section recommends strategies that can be used to address the needs along the U.S. 101 corridor in the Central Coast. Strategies can include both projects and programs. More than 100 projects and strategies were initially identified to improve freight movement on U.S. 101. The process of scoring projects based on performance measures helped guide the development of a program of freight projects and the following lists reflect high priority projects and several high priority programs for the five counties along the California Central Coast. These projects and programs will address the goals of this Study:

- Support **economic development** in the region
- Provide an **efficient, reliable, well-maintained, and safe** goods movement facility along the U.S. 101 corridor
- Reduce and mitigate **environmental, social, health, and economic impacts** from goods movement operations

In order to provide a comparison between the projects and identify the top priority projects for the corridor, a numerical score was given based on four key criteria:

- The first score is based on the overall importance of the need, as determined by the *current condition* identified in Task 2. To better prioritize conditions that need immediate attention, projects that address a corridor condition rated as poor received a higher score, while projects that address a corridor condition rated as good received a lower score.
- Second, the degree to which the project met the project goal of *supporting economic development*.
- Third, the degree to which the project met the project goal of *providing an efficient, reliable, well-maintained and safe goods movement facility*.

- Fourth, the degree to which the project met the project goal of *reducing and mitigating impacts from goods movement operations*.

For each criteria, projects were given a high (H), medium (M), or low (L) rating. For example, a freeway conversion in an area with high truck travel time delay (TTD) and a high planning time index which indicates a low travel time reliability (TTR) would get an “H” under the mobility goal. If there is no serious delay in that segment, it would get an “M” rating. Letter grades from these three goal areas were then converted to numeric scores (H=3, M=2, L=1) to calculate an overall score. Projects on Focus Routes identified in the Caltrans Interregional Transportation Strategic Plan (ITSP) were given an additional point to account for their importance at the state level, giving routes with the highest freight volumes increased priority.

The top projects in the region were compiled in the priority list of projects found below. In cases of a tie in composite score, projects that have a stronger freight emphasis or were identified as key freight projects by the project partners and stakeholders were selected for inclusion in this list. For example, a project to expand truck parking facilities throughout the corridor would be included over a project that improved a single interchange since the interchange project is beneficial to freight traffic in one specific location, while the truck parking project would be specific to freight movement and would result in system-wide benefits for freight.

Given the significant role that U.S. 101 plays as a primary goods movement corridor in the Central Coast and the likelihood that it may be eligible for new sources of goods movement funding that other roads in the region may not be eligible for, stakeholders in the region wanted to call greater attention to the U.S. 101 projects. In order to highlight projects on U.S. 101 that meet the vision and goals of this study, the priority projects were divided into two separate lists. One list only contains projects located on U.S. 101 or at interchanges with U.S. 101.

A second list contains projects on intersecting routes to U.S. 101 and rail projects in the region. Based on the conditions analysis and stakeholder comments, these intersecting routes provide critical links between Central Coast businesses and the Interstate highway system are most in need of improvement. Projects that enhance capacity and mobility for truck traffic dominate, and many of the projects will also improve safety in the corridor. Rail projects that maintain or upgrade the rail infrastructure in the region provide alternatives to truck transportation, reducing dependence on some long-haul trucking and increasing freight system resiliency.

6.1 Priority Projects

Table 6.1 lists the top projects in each county based on the composite score for projects on U.S. 101. Table 6.2 lists the top projects in each county based on composite scores for projects on facilities other than U.S. 101 including rail and important east-west connecting routes.

Table 6.1 U.S. 101 Priority Projects by County

County	Route or Facility ID	Project Location / Description	Measure Addressed	Details
Monterey	Hwy 101	U.S. 101 @ Sanborn Rd (Salinas) Operational Improvements at intersections and modification of SB off-ramps to address truck congestion	Travel Time Delay (TTD), Travel Time Reliability (TTR)	Reliability and delay issues in segment. Stakeholders note congestion issues in Salinas.
Monterey	Hwy 101	U.S. 101 from Harris Rd to Russell Rd/Espinosa Rd (north Salinas). Operational Improvements: modify interchanges; ramp metering	TTD, TTR	Reliability and delay issues in segment. Stakeholders note congestion issues in Salinas
Monterey	Hwy 101	Harris Road - Construct new interchange with U.S. 101	Access/Mobility, TTD, TTR	High travel time volatility, starting at location going north
Monterey	Hwy 101	Sanborn/Elvee - Off ramp and intersection improvements	Access/Mobility, TTD, TTR	High travel time volatility, moderate travel time delay in segment. Multiple truck destinations near intersection including Pilot Travel Center and Valley Truck Stop.
Monterey	Hwy 101	U.S. 101 from Soledad to Harris Rd/Abbott St (south Salinas). Conversion from highway to freeway. Addition of new frontage roads (refer to US 101 Mainline Study).	TTD, TDR, Potential Safety Improvements	Segment not noted for PTI, travel time delay issues. Large number of crashes between Salinas and Soledad. Stakeholders note congestion issues in Salinas. Priority project for TAMC
San Luis Obispo	Hwy 101	SR 46E interchange Northbound off-ramp	Access/Mobility, TTD, TTR	Moderate travel time volatility in this section due to congestion. Stakeholders note high congestion and safety issues at interchange
San Luis Obispo	Hwy 101	Interchange Improvements SB/NB ramps at SR 166 and Thompson Ave intersection	Access/Mobility, TTD, TTR, Potential Safety Improvement	Improve congestion in interchange due to close proximity of frontage roads.

County	Route or Facility ID	Project Location / Description	Measure Addressed	Details
San Luis Obispo	Hwy 101	U.S. 101 Pismo Beach Congestion Relief Project. Extension of existing southbound truck lane near Spyglass Drive, reconstruct inside shoulder to serve as a managed shoulder. Mattie Rd. on and off ramps	TTD, TTR	Moderate delay and poor reliability, problematic on-ramp at intersection
San Luis Obispo	Hwy 101	U.S. 101 at Wellsona Rd (North of Paso Robles). Freeway Conversion: new interchange to address corridor and truck mobility, safety	Access/Mobility, TTD, TTR, Potential Safety Improvement	Cross traffic safety improvements, at grade crossing for major truck & RV truck stop.
Santa Barbara	Hwy 101	U.S. 101 from Carpinteria to Santa Barbara: Add HOV lanes to reduce commuter travel and truck congestion; modify interchanges at Olive Mill Road and at Hot Springs Road/Cabrillo Boulevard and North Jameson Lane and US 101	TTD, TTR, Potential Safety Improvement	Addresses poor reliability, high delay, and high crash rates along this segment
Santa Barbara	Hwy 101	Extended 3rd NB lane, Fairview to Glen Annie Rd.	Access/Mobility, TTD, TTR	High travel time volatility and delay in segment. High Crash Rate
Santa Barbara	Hwy 101	Linden Ave/Casitas Pass Interchanges Widening Phase 3	TTD, TTR	High travel time volatility and delay in segment. High Crash Rate
Santa Barbara	Hwy 101	San Ysidro Interchange Improvement	TTD, TTR	High travel time volatility and delay in segment. High Crash Rate

Source: Individual sources for projects are identified in Appendix D. TTD = Travel Time Delay; TTR = Travel Time Reliability.

Table 6.2 Non-U.S. 101 Priority Projects by County

County	Route or Facility ID	Project Location / Description	Measure Addressed	Details
Monterey	SR 156	New four-lane freeway on SR 156 from Castroville Boulevard to U.S. 101. New interchange at US 101 and SR 156 connection and new interchange at Castroville Boulevard and SR 156	Access/Mobility, TTD, TTR, Potential Safety Improvement	Connecting route between 101 and SR 1. Congestion issues as described by stakeholders, intersection with 101 rated as one of the worst in the region.
San Benito	SR 152	New alignment of SR 152 between U.S. 101 and the Merced County line, including changes in Santa Clara County, and adding an eastbound truck climbing lane over Pacheco Pass	Access/Mobility, TTD, TTR, Potential Safety Improvement	Main east-west connection U.S. 101 to I-5. E-W connectivity mentioned by stakeholders to be very important
San Benito	SR 25	New four-lane highway from San Felipe Road in Hollister to Hudner Lane North of SR 156, 3.8 miles total	Access/Mobility, TTD, TTR	Connection between U.S. 101 and SR 156
San Benito	SR 156	SR 156 Alameda St. to San Benito River Bridge. Add Capacity & Access Control: widen to four lanes to address congestion and truck mobility	Access/Mobility, TTD, TTR	Project is currently fully funded, and will help ease congestion

County	Route or Facility ID	Project Location / Description	Measure Addressed	Details
San Luis Obispo	Union Pacific	Implement Centralized Traffic Control (CTC) for rail between McKay and Santa Margarita (MP 202.3 to 229.6)	Access and Multimodal Connectivity, Adoption of Advanced Technologies	New signal equipment will be installed at various locations along the Coast Corridor between MP 202.3 and MP 229.6 to implement Centralized Traffic Control (CTC) for rail which will allow automatic signal control for trains, allow the railway centralized dispatch to track the location of the train with a high level of precision, and allowing the controlling of switching and interlocking from a central location.
San Luis Obispo	SR 41	Operational Improvements: extend truck climbing lane	Access/Mobility, TTD, TTR	Major east-west connection between U.S. 101 to I-5. This area has limited shoulders and is mountainous. Per stakeholders, less appropriate for trucks due to bad terrain
Santa Barbara	Union Pacific	MP 276 Track Realignment and Highway 1 Overpass Replacement	Access and Multimodal Connectivity	This track realignment project, located 4 miles south of Guadalupe, would relocate 1.80 miles of main track between MP 275.2 to 277 to reduce the curvature. Two existing curves would be reduced to two degrees maximum, allowing maximum train speeds to increase from 45 to 79 mph with the possibility of future speeds up to 90 mph. The project also includes the replacement of the Highway 1 overpass at MP 276.13, which would be required as part of the track realignment.

County	Route or Facility ID	Project Location / Description	Measure Addressed	Details
Santa Barbara	Union Pacific	Devon to Tangair Curve Realignment	Access and Multimodal Connectivity	This major curve realignment project, located 14 miles south of Guadalupe, would relocate 12.10 miles of main line track between MP 279.80 to MP 296.80, to reduce track curvature. The project constructs 8.90 miles of new main track and 2.00 miles of retaining walls. The 24 existing curves would either be eliminated or reduced to three degrees maximum curvature each. This infrastructure improvement project would reduce trip times by allowing maximum train speeds to increase from 50 to 79 mph, with the possibility of future speeds up to 90 mph.
Santa Barbara	Union Pacific	From MP 423.0 to MP 368.6, Pacific Surfliner route, complete environmental clearance, design, engineering and permitting for siding projects in Santa Barbara and Ventura Counties.	Access and Multimodal Connectivity	Providing additional rail sidings to allow for additional capacity and reduced delays for rail freight.

County	Route or Facility ID	Project Location / Description	Measure Addressed	Details
Santa Cruz	Santa Cruz Branch Line	Upgrade rail to Federal Rail Administration Class 2 rail, allowing freight train speeds of up to 25 MPH on sections of rail throughout Santa Cruz County. Construct improvements to efficiently integrate freight and planned passenger rail, as needed.	Access and Multimodal Connectivity	Upgrading to Class 2 track standards would provide speeds of 25 mph for freight and 30 mph for passenger service. Current conditions allow for 10 mph for freight and 15 mph for passenger trains. Many sections of the FAST Act permit local authorities or regional agencies to apply for funds for applicable projects. A more viable Santa Cruz Branch line can provide an alternative to moving goods on heavily congested segments of SR 1 corridor
Santa Cruz	Santa Cruz Branch Line	Construct transload facility at Watsonville to facilitate truck loading onto rail, increase rail shipping, and reduce truck traffic on roadways	Access and Multimodal Connectivity	Accessibility to rail was mentioned as important by stakeholders. Potential to convert some long-distance truck trips to rail
Santa Cruz	SR 129	SR 129 and Lakeview intersection improvements: Construct a roundabout at the intersection of Lakeview Rd and SR 129. Associated infrastructure improvements.	Access/Mobility, TTD, TTR, Advanced Technology, Potential Safety Improvement	The project will improve safety at the intersection by reducing the potential and severity of broadside collisions

6.2 Programs and Other Recommendations

While it is important for the study to identify specific projects to fund, many other important needs cannot be addressed with a specific project. In those instances, a program is needed to address the particular need. This study prioritizes the development of these programs to facilitate seeking funding as appropriate.

6.2.1 Intelligent Transportation System Program

This program would implement projects identified and developed in the Central Coast ITS System Plan and Caltrans Ramp Metering Development Plan as discussed below. Cost estimates for each system are taken from the *Central Coast ITS Implementation Plan* which was finalized in 2007.²⁷

Programs are a tool to meet needs that cannot be addressed with a single project. In addition, programs create a vehicle for creating new projects in the future that address identified needs

Changeable Electronic Message Sign (CMS)

This program would seek to add additional electronic changeable message signs along U.S. 101 and key east-west routes, including State Routes 46, 41, 152, 156, 166, and 135. Signage would provide information related to congestion, scheduled road work, detours, safety information, and recommended truck routes, in addition to information for regular traffic. Signs will be integrated with Caltrans District 5 Traffic Management Center. Signs can either be placed permanently above the roadway or as mobile units placed along the side of the highway. Any new signs need to come with a plan to fund the maintenance, operation, and ongoing communication costs associated with the unit.

Current CMS sites in the study region include²⁸:

- Las Positas Rd in City of Santa Barbara
- SR 154 in City of Santa Barbara
- SR 154 in Santa Ynez Valley
- U.S. 101 Postmile 65.2 (south of Los Alamos)
- Prado Rd in City of San Luis Obispo
- Stockdale Rd north of Paso Robles
- Mallory Cyn Rd in Prunedale

²⁷ Association of Monterey Bay Area Governments & CCITS Coordinating Group. Central Coast ITS Implementation Plan. Fall 2007. Online at: http://local.iteris.com/ccits-admin/assets/CCITS_Imp_Plan_complete_2.pdf

²⁸ <http://pems.dot.ca.gov/>

- Postmile R1.951 in San Benito County
- Anzar Rd in San Benito County

Closed-Circuit Television Cameras (CCTV)

Closely linked with the need for CMS is the addition of CCTV monitoring cameras along U.S. 101 and key east-west intersecting routes to fill gaps in the existing CCTV network. In addition to providing a resource to the traveling public, cameras allow responders to quickly find an incident location and operations personnel to monitor weather, congestion, or other conditions of the roadway and transmit that information to changeable message signs or public alert systems. There is a significant gap in CCTV coverage on U.S. 101 between Paso Robles and Salinas, a similar gap between Santa Barbara and Santa Maria, and no coverage on east-west State Routes that link U.S. 101 and I-5. CCTV gaps exist due to the lack of affordable high speed communication infrastructure which is available near population centers, but not in remote highway locations. While using cell phone broadband service can transmit CCTV signal, it is not ideal due to cost and reliability issues. An alternate solution is to fill gaps with vehicle detection technology, such as Microwave Vehicle Detection System (MVDS), which can provide speed, flow, occupancy, vehicle classification, and other information. MVDS systems would not require a continuous data uplink. All project components will integrate into the Caltrans QuickMap web site which provides real-time access to CCTV and electronic message sign information. New cameras need to come with a plan to fund the maintenance, operation, and ongoing communication costs associated with the unit.

Ramp Metering Program

This ITS feature is essentially a stop/go light on a highway entrance ramp which controls vehicle entry onto the highway from a slower road in order to maintain the flow of existing highway traffic and prevent bottlenecks. This increases safety, produces more consistent and reliable travel times, and helps smooth traffic flow on the main road for all vehicles. This program would implement a ramp metering program on U.S. 101 and key east-west routes in or adjacent to urban locations, emphasizing onramps particularly congested during peak harvest season times. This would primarily help relieve recurring traffic in urban areas, improving the efficiency and safety of the U.S. 101 Corridor, and will also help mediate harvest season agricultural related shipping congestion peaks. This program would implement a ramp meter program on U.S. 101 at locations identified in the Caltrans 2015 Ramp Metering Development Plan. These locations include:

- Santa Barbara County at various interchanges between the Ventura County and Santa Barbara County line and Goleta.
- Monterey County, at various interchanges in the City of Salinas.
- San Luis Obispo County at various urban area interchanges throughout the region. Segments include Traffic Way to Avila Beach Drive; Los Osos Valley Road to Monterey Street; Santa Barbara Road to Vineyard Drive; Spring Street (south) to Spring Street (north).

Additional locations that may be explored include other key east-west routes, including SR 46, SR 41, and SR 156.

Costs for the technology described above are identified in Table 6.3.

Table 6.3 ITS Technology Costs (2016 estimated cost)

Technology	Capital Cost (per unit)	Additional Costs*	Total Cost	Operations and Maintenance (Annual)	Communication Cost (Annual)
Closed Circuit Television Camera	\$52,500	\$26,250	\$78,750	\$5,250	\$2,500
Ramp Metering	\$72,250	\$36,250	\$108,500	\$7,250	\$250
Changeable Message Signs (Fixed)	\$262,750	\$131,500	\$394,250	\$26,250	\$1,000
Changeable Message Signs (Portable)	\$149,500	\$75,000	\$224,250	\$15,000	\$1,000
Microwave Vehicle Detection Systems (MVDS)	\$50,000	\$23,000	\$73,000	\$4,500	No Data
CCTV & MVDS	\$53,000	\$23,000	\$76,000	\$4,500	No Data

Source: http://local.iteris.com/ccits-admin/assets/CCITS_Imp_Plan__complete_2.pdf *Additional costs include Project Admin (10%), Requirements & Design (15%), Installation & Integration (15%), Testing & Evaluation (10%). Total cost does not include any right-of-way acquisition or road work needed to make site ready for ITS technology installation. Costs updated to 2015 using Bureau of Labor Statistics Inflation Calculator. Communications Cost from FHWA Tool for Operations Benefit Cost Analysis (TOPS-BC). Values rounded to nearest \$250.

Other Potential Freight Technology Improvements

Another ITS technology that is in the beginning stages of development but could have a significant impact on future freight movement is Connected/Automated Vehicles. Connected/Automated Vehicles (C/AV) are vehicles that are either equipped with Dedicated Short-Range Communications (DSRC), allowing vehicles to communicate with other vehicles or infrastructure equipment. Autonomous vehicles take this technology a step further, as the communication with other modes of transportation allows the vehicle to operate on its own. This technology has the potential to revolutionize both freight movement and transportation in general through increases to safety and network efficiency for all users.

Currently, the U.S. DOT is investigating the use of DSRC technology through three different pilot projects across the country. These pilot locations include stretches of I-80 in southern Wyoming, multiple locations in Manhattan and Brooklyn in New York City, and areas on or adjacent to reversible lanes on highways in Tampa, Florida. The pilot project in Wyoming is particularly interesting for commercial vehicle operations as it focuses entirely on improving commercial vehicle safety and efficiency in the corridor.²⁹ The other projects are focused on non-commercial vehicle road users, though they both include commercial vehicle aspects and applications such as curve speed warnings. The results from this test-bed could validate the use of this technology to enable communication between trucks and all other types of vehicles and infrastructure. Furthermore, some truck manufacturers have taken an extra step and started testing

²⁹ The Concept of Operations for this project is complete. See: <http://ntl.bts.gov/lib/56000/56900/56997/FHWA-JPO-16-287.pdf>

autonomous trucks. In 2014, the first autonomous truck, the “Freightliner Inspiration Truck,”³⁰ was tested on top of the Hoover Dam, in Nevada.

As this technology is still in the planning and development phases, cost estimates for deployment are not yet available. However, deployment of connected/automated vehicle technology will likely require a substantial up-front capital cost as well as continual funding for ITS systems and personnel in addition to costs to the private sector for the installation and maintenance of equipment in vehicles.

The recently passed Federal surface transportation act (FAST Act) does provide new funding for ITS projects including vehicle-to-vehicle and vehicle-to-infrastructure technology and explicitly makes ITS related projects eligible for funding under several formula programs. Further information on funding is provided in Section 7 of this report.

One potential drawback of this technology is it may make the freight system even more reliant on trucks, especially if the systems under development can reduce the necessary work force to help cope with truck driver shortages and can reduce the environmental impact of truck traffic. While these benefits are substantial, they do not address the infrastructure damage caused by truck travel, and an increase in truck traffic may further stretch the ability of Caltrans and local partners to maintain or improve infrastructure conditions on U.S. 101 and priority intersecting highways.

6.2.2 *Grade Crossing Improvement Program*

The goal of this program would be to improve at-grade highway interchanges and intersections. Highway interchanges and at-grade intersections are a safety concern along the U.S. 101 Corridor. Highway interchanges, especially with SR 156 and SR 41/46 are some of the most congested locations on U.S. 101, and increased congestion typically results in increased potential for collisions. Between 2010 and 2012, U.S. 101 and SR 156 in Monterey and San Benito Counties saw 20 incidents involving trucks that claimed two lives and injured 30.

At-grade intersections are also recognized as safety challenges due to the high speeds involved and potential for more dangerous types of incidents. Interviews with stakeholders identified highway at-grade intersections as a concern along the corridor. Although the total number of incidents at these locations was low, they represent a significant percent of the injuries caused by truck-related crashes.

6.2.3 *Freight Parking Program*

A lack of legal and safe truck parking has been identified in numerous plans as a challenge for commercial vehicle movements along the U.S. 101 Corridor. Truck parking is difficult to expand due to capital and operating costs and difficulty in identifying suitable locations. Freight, especially truck traffic, may be seen as having a negative impact on local roads. Most municipalities want to limit the number of trucks in their area, and building a truck stop, may increase truck traffic on local roads. Because land use zoning is controlled at the local level, municipalities may restrict the ability of private operators to open a truck stop to locations

³⁰ <https://www.daimler.com/dccom/0-5-1809607-1-1809608-1-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0.html>

conducive to absorbing such traffic such as existing industrial zones and areas on the edge of town.

A program should be developed to incentivize the creation of additional truck parking along the U.S. 101 corridor. A feasibility and truck intercept study should be undertaken in the corridor to determine the best locations for additional parking based on truck origins/destinations and truck needs. State and regional governments should work with local municipalities to ensure that there is an available supply of appropriately zoned land to allow for parking. Agencies should also consider pursuing public-private partnerships to attract private investments in additional freight infrastructure. This report recommends an additional study be undertaken to identify the best way to improve truck parking along the U.S. 101 corridor.

At the national level, FHWA released the results from Jason's Law Truck Parking Survey in August 2015. In addition, The National Coalition on Truck Parking may develop new recommendations that could help municipalities and regions that are facing truck parking shortages. Stakeholders in the study region should closely monitor this group's proceedings and aid in data collection or other activities as best as possible.

6.2.4 *Truck Route Signage Improvement Program*

Only 14 municipalities and counties in the study region currently have truck routes. Expanding the number of municipalities with designated truck routes and improving truck route education amongst drivers will help focus truck trips on routes that can best handle the traffic. Locally based truck route analyses, improved signage, and improved truck route education programs can improve goods movement into and out of freight nodes located in cities and counties along the U.S. 101 corridor.

While U.S. 101 is well-signed as a designated truck route throughout the study area, the "first-and last-mile" routes that connect U.S. 101 to origins and destinations near the highway are not well signed. Most businesses that utilize U.S. 101 are located off of local streets. Improving signage for routing trucks between U.S. 101 and local roadways is critical to efficiency and safety of truck-based goods movement and will reduce wear and maintenance costs for local roads. This will also save time and money for carriers by reducing delays related to truckers taking long detours after entering local roads with insufficient turn space, insufficient overhead clearance, or other navigational barriers. This program should accomplish two objectives: (1) Designating and improving truck routes to better guide truck movement to/from U.S. 101, and (2) Employing wayfinding tools to help trucks find fueling stations, parking locations, key freight origins and destinations, or other truck related infrastructure located in local municipalities.

While key wayfinding guides can be implemented along the U.S. 101 at a regional level, there should be additional freight truck guidance at the local level. This program should be implemented at the local level in a way that takes into consideration locally specific truck routing issues in each city and county. A key step in designing a local truck signage program is performing a truck routing analysis on local streets to identify critical truck routes between U.S. 101 and local origins and destinations. Leveraging existing resources, cities and counties may build off of the truck volume analysis and needs identified in this study and truck movement data found in the Regional Travel Demand Models maintained by regional Metropolitan Planning Organizations. A truck routing analysis should also contain an assessment of jurisdictionally-specific issues and truck routing concerns.

Signs to help direct pedestrian or tourist traffic are common in most towns and cities. However, signs to direct commercial vehicle traffic are limited. A comprehensive local truck routing analysis should lead to recommendations on how to improve the existing truck signage network, including standards for signage, improved signage, and demarcation along the truck route network. For example, major entrance and exit points along U.S. 101 should have standardized signage directing trucks to fueling stations, parking or rest areas, and major freight sites nearby. This would help trucks avoid getting lost, protecting roadway infrastructure, and reducing the miles traveled and emissions produced as truckers search for amenities. A similar program is currently being developed in the San Francisco Bay Area.

An education program would facilitate a self-enforcing truck route program. Among truck drivers there is a lack of awareness about city and county-based truck routes, related regulations, and policies. Further complicating the issues, there is a lack of truck route information available from local jurisdictions, with only one municipality in the region providing truck route information in an easily accessible map. An education program would improve understanding about designated routes and policies, providing for a higher level of voluntary adherence to truck route regulations and policies. It is recommended that jurisdictions work with external partners such as business associations, trucking associations, industry associations, and individual businesses to expand outreach through the distribution of maps, truck route information, and regulations. Jurisdictions should also pursue increased dialogue and interaction with local stakeholders to understand the needs of individual users.

6.2.5 Environmental Programs

Early Environmental Impact Report for Freight Industrial Zones

For municipalities interested in attracting freight business, one possible approach is designating Freight Industrial Zones. These areas provide incentives for freight related businesses such as tax incentives, the ability to complete early Environmental Impact Reports (EIR) for pre-approval of a wide range of freight uses, designating specific areas for full-service freight travel centers and providing incentives for alternative fueling locations, local sourcing of fuel, and technology that would reduce idling. This has been done to a certain extent in areas of the City of Gonzales in Monterey County and has met with moderate success. A pilot project, led by AMBAG, to develop guidelines, zoning ordinances, plan language, and economic development strategies was submitted to the California Air Resources Board in response to a call for pilot project ideas that could be included in the California Sustainable Freight Action Plan: Pilot Project Proposals.³¹ The Sustainable Freight Action Plan is being developed in response to the Governor's Executive order B-32-15, which requires a number of state agencies to work together to identify targets for improving the efficiency of California's freight system, transitioning to zero-emission technologies, and promoting the competitiveness of California's freight system. The Action Plan, which will be completed in July 2016, will recommend specific pilot projects to accomplish these goals.

Anti-Idling and Zero/Near-Zero Emissions Vehicles Technology

Increasing governmental regulations limiting idling have caused many fleets to look at ways to cut down on vehicle idling to reduce associated air pollution. Idling of large vehicle freight engines can cause increased GHG and criteria pollutant emissions. EPA studies show that, nationwide,

³¹ For further information, see: <http://www.arb.ca.gov/gmp/sfti/pilotprojectsub.htm>

truck idling uses more than one billion gallons of diesel fuel annually, and idling emits more than 11 million tons of carbon dioxide, more than 180,000 tons of nitrogen oxides annually, in addition to particulate matter. The Environmental Protection Agency states a typical commercial vehicle wastes half a gallon to a gallon of diesel fuel for every hour it idles. Reducing freight vehicle idling can lead to a 5 to 9 percent reduction in fuel consumption with proportional reductions to GHG and criteria pollutant emissions.³²

In California, heavy-duty diesel vehicles with a Gross Vehicle Weight Rating (GVWR) of 10,000 pounds or heavier cannot idle their engines for more than five minutes unless their engines meet the low-NOx idling emissions standard and the vehicle is over 100 feet from a residential area.³³ However, freight vehicles often need to idle to run cooling units for perishable agricultural products in the trailer, and provide air conditioning to the cab while drivers are sleeping or waiting in the vehicle to pick up/drop off their load. This has made electric power a more attractive option for freight trucks when stopped, and has led to advancements in anti-idling technology. These systems can be installed at fleet locations, rest areas, warehouses, truck terminals and other parking areas.

Truck stop electrification systems provide plug-in power for heating, air conditioning and electrical needs. Single-system electrification does not require on board equipment for the vehicle but may be more complicated to use, while dual-system options require on board and off board equipment to be installed on the vehicle but offer increased convenience to the drivers.

- In single-system electrification, off-board equipment at the truck stop provides heating, air conditioning, power, and sometimes TV and internet. These systems are contained in a structure beside the truck parking spaces. A hose from the system is connected to the truck window to provide services.
- Dual-system electrification requires both onboard and off-board equipment so trucks can plug into electrical outlets at the truck stop. To use dual-system electrification, trucks must be equipped with an inverter to convert 120-volt power, electrical equipment, and hardware to plug into the electrical outlet. Necessary electrical equipment might include an electrical HVAC system. Retrofitting a freight truck to include on-board equipment can be expensive, but this cost is often defrayed by fuel savings and savings on engine maintenance from running the engine less often. Some truck OEMs now offer on-board shore power compatible electrification modules.

³² North American Council for Freight Efficiency. *Trucking Efficiency – Anti Idling Technology Overview*. July 24, 2013. Online at: <http://nacfe.org/wp-content/uploads/2013/08/Trucking-Efficiency-Anti-Idling-Tech-Overview-072413.pdf>

³³ California Environmental Protection Agency. Air Resources Board. "Facts About California's Commercial Vehicle Idling Regulations." May 23, 2013. Online at: <http://www.arb.ca.gov/msprog/truck-idling/factsheet.pdf>

IMPLEMENTATION

7.1 Funding Gaps and Funding Options

Table 7.1 summarizes the identified costs for the high-priority projects identified in Section 6 of this report. These cost estimates are based on submitted cost estimates for projects that are already in development and project cost estimates from other plans (the California Freight Mobility Plan and the California State Rail Plan). Costs for the transload facility and the programs requires further scoping and estimates of these costs are not included in Table 7.1 —future plans should include estimates once available.

Table 7.1 Cost of Projects by Category
Thousands \$

Category	Total Cost (Thousands \$)
Highway Operational Improvements	1,005,110
Highway Interchange Improvements	227,182
Highway Capacity Expansion Projects/New Roads	1,136,811
Rail Improvements	308,000

Source: Multiple sources.

Funding for these projects can come from a variety of sources which are described in further detail below.

7.2 Funding Sources

Securing Federal, state, regional, or local funds for goods movement projects has historically been a challenge, and the projects and programs included in Section 6.0 above face a significant

funding gap and competition with other U.S., State, and regional/local transportation needs and priorities. However, the passage of the Fixing America's Surface Transportation (FAST) Act in December 2015 provides new federal funding dedicated to freight needs that may be leveraged to advance the projects and programs needed to maintain and improve goods movement on U.S. 101 and the surrounding network.

Current and anticipated funding for freight projects at each level of government are briefly described below.

7.2.1 Federal Funding

In the fall of 2015, Congress passed the Fixing America's Surface Transportation (FAST) Act, ending the period of extensions of the past Federal surface transportation act and creating a new, long term funding program for the nation's transportation system. The FAST Act, signed by the President on December 4, 2015, provides multiple funding sources that could be used for the projects and programs identified in this study. The FAST Act represents approximately \$225 billion in dedicated contract authority for the Federal-aid highway program. This is a 15 percent increase from FY 2015 realized after FY 2020. Approximately half of that funding increase will be used to support two new freight-specific funding programs, with the remainder providing a marginal increase to core highway program funding.

The first freight-related initiative is the Nationally Significant Freight and Highway Projects (NSFHP) Program, which has been renamed the Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) Grant Program by the U.S. DOT. The FASTLANE Program is a \$4.5 billion program over five years, approximately \$900 million per year in competitive discretionary grant funding. Projects can receive up to \$500 million total and eligible projects must be anticipated to equal or exceed \$100 million in cost, with a grant request of at least \$25 million. There are three set-asides in this program. One is a ten percent set-aside for smaller projects that are under the \$100 million total cost threshold, with a minimum \$5 million grant request. The second is a 25 percent set-aside for projects in rural areas. The third is \$500 million total set-aside for port, rail, and intermodal projects. Funds set aside for port, rail, and intermodal projects must improve freight movement on the National Highway Freight Network (discussed below) and must provide public benefits. While the majority of FASTLANE Program funding appears to be intended for large freight investments that have national or regional significance, Central Coast region freight projects are eligible, and may be especially competitive for the set-aside programs. The competitive grant process will determine eligibility of individual freight projects.

The second freight-specific funding program in the FAST Act of 2015 is the National Highway Freight Program (NHFP). The NHFP will provide \$582.4 million to California over the next five years, with apportionment to states by formula based on the number of Primary Highway Freight Network miles in the state.³⁴ While the primary purpose of this program is to fund improvements benefitting the primary highway freight system, of which the Central California Coast region currently has only a tiny portion in the north, the legislation also allows projects which benefit routes feeding to and from the primary freight network and on designated Critical Urban and

³⁴ The Draft Comprehensive Freight Network developed by FHWA under MAP-21 forms the basis for the apportionment. California has 3,117.7 miles on that network, approximately 7.5% of the total. http://ops.fhwa.dot.gov/freight/infrastructure/pfn/state_maps/states/california.htm

Critical Rural Freight Corridors to be funded. How these details are interpreted by the implementing federal and state agencies and how the formula distribution is established will determine whether the region is eligible for these funds.

Up to 10 percent of apportioned funds can be spent on rail and intermodal projects including projects such as those on this study's priority list. The remaining NHFP funds can be spent on projects that are located on the National Highway Freight Network, which has four components:

- The Primary Highway Freight System
- Critical Urban Freight Corridors (75 miles statewide or 10% of state's Primary Highway Freight Network, whichever is greater)
- Critical Rural Freight Corridors (up to 150 miles or 20% of the Primary Highway Freight Network, whichever is greater)
- The remainder of the Interstate Highway System

California should be able to nominate approximately 624 miles of Critical Rural Freight Corridors under this apportionment process.

The Critical Rural Freight Corridor designation should be a key concern for the Central Coast region, as these routes have not yet been identified. The California Freight Mobility Plan also points out that the state would like to expand provisions of the Critical Rural Freight Corridors to consider routes with high seasonal peak truck traffic (e.g., those that serve agricultural areas like the Central Coast region). California has identified ten Focus Routes within the Interregional Road System (IRRS), which are Caltrans' priority for the allocation of interregional funds.³⁵ Included in this list are U.S. 101, SR 41/46, and SR 152/156. As will be described later in the discussion, it is important that the Central Coast transportation agencies continue to work with Caltrans and the California Freight Advisory Committee (CFAC) to ensure that these routes, and especially U.S. 101, are designated as priority rural corridors.

The state may also designate approximately 312 miles of roads in urbanized areas as Critical Urban Freight Corridors. Corridors in urbanized areas with populations under 500,000 are designated by the State; in urbanized areas over 500,000, the MPO is responsible for the designation. In order to receive the designation, one of the following conditions must apply:

- Road connects an intermodal facility to the primary highway freight system, the interstate system, and intermodal freight facility;
- Road is located within a corridor of a route on the primary highway freight system and provides an alternative highway option important to goods movement;
- Road serves a major freight generator, logistic center, or manufacturing and warehouse industrial land; or
- Road is important to the movement of freight within the region, as determined by the State.

³⁵ Caltrans. Interregional Transportation Strategic Plan, Status Update. October 2013.

This designation should be explored for routes in urbanized areas that connect important local generators of freight, such as manufacturing hubs or agricultural cooler locations, or that are important to the movement of freight within the region, including U.S. 101 or the other key east-west routes in the region.

Goods movement can also be enhanced by projects funded through other sources in the FAST Act, many of which are a continuation of MAP-21 programs. Projects that are not explicitly freight-related could be considered for funding through these “general” highway programs. For example, safety improvements that benefit both trucks and passenger vehicles (such as a truck climbing lane) or projects that reduce heavy truck delay, reducing idling and decreasing greenhouse gas emissions, could obtain some funding from these sources which include: National Highway Performance Program (NHPP),³⁶ Congestion Mitigation and Air Quality (CMAQ) Program,³⁷ Local Assistance Program (LAP), Highway Safety Improvement Program (HSIP),³⁸ and the Surface Transportation Program (STP) which has been modified to become the Surface Transportation Block Grant Program (STBGP).³⁹ STBGP funding is flexible and could be used for a number of programs including ITS and Freight Parking.

“Innovation” is another key theme found throughout the FAST Act. The FAST Act provides new funding for ITS projects such as vehicle-to-vehicle and vehicle-to-infrastructure technology as well as infrastructure maintenance systems, alternative charging systems, and information sharing systems that could involve a freight component. The bill also explicitly makes ITS-related projects eligible for funding under several formula programs including the NHFP and FASTLANE Program. These new programs are included in Section VI of the bill called the “Transportation for Tomorrow Act of 2015.”

One new funding program in the Innovation Section is the Advanced Transportation and Congestion Management Technologies Deployment Program. This competitive grant program will focus on the development of pilot projects and model deployment sites for the installation and operation of advanced transportation technology. The national scope of this program could be a challenge for the U.S. 101 corridor, but there may be opportunities to combine needs and seek funding from multiple sources. For example, the federal emphasis on truck parking could be combined with an ITS component such as real-time space availability to address multiple federal priorities and increase the chance of receiving funds.

Table 7.2 shows California's share of federal FAST Act money in different programs over the next five years.

³⁶ The FAST Act adds two permissible uses for NHPP funds beyond those specified in MAP-21 including the ability to pay subsidy and administrative costs for TIFIA projects and for improvements to bridges that are not on the National Highway System.

³⁷ CMAQ funds can now be used to maintain air quality standards in an attainment area (not just for attainment of standards in the first place).

³⁸ States do not have the ability to shift funds designated for infrastructure safety programs to behavioral/educational activities. This ensures that resources remain in construction-related programs. HSIP also designates several new safety improvements eligible for funding including vehicle-to-infrastructure communication, roadway improvements that provide separation between pedestrians & motor vehicles.

³⁹ The FAST Act simplified the list of uses eligible for program funds and increases the way that STP funds can be used on local roads and rural minor collectors. STBGP receives the same percentage of formula funds that the STP program did under MAP-21

Table 7.2 California Funding from FAST Act (in \$ millions)

	NHPP	National Freight	Metro-politan Planning	STP	HSIP	TAP	Railway-Highway Crossings	CMAQ
FY 2015	1,930.3	N/A	48.5	887.9	196.8	Unknown	15.3	463.6
FY 2016	1,924.7	106.3	49.8	894.1	195.5	74.7	15.7	462.2
FAST Act 5 year annual average	2,006.5	116.5	52.0	936.1	203.5	75.5	16.2	481.4
FAST Act FY 2016-2020 TOTAL	10,032.5	582.4	259.8	4,680.5	1,017.6	377.3	82.1	2,407.0

Source: <http://www.dot.ca.gov/hq/transprog/map21/reauthorization/ca-fedtranliaison-fastactmemo.pdf>

Finally, the FAST Act requires development of a National Freight Strategic Plan to implement the goals of the National Multimodal Freight Policy. These goals include:

- Identify infrastructure improvements, policies, and operational innovations that—
 - strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States;
 - reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network; and
 - increase productivity, particularly for domestic industries and businesses that create high-value jobs;
- Improve the safety, security, efficiency, and resiliency of multimodal freight transportation;
- Achieve and maintain a state of good repair on the National Multimodal Freight Network;
- Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network;
- Improve the economic efficiency and productivity of the National Multimodal Freight Network;
- Improve the reliability of freight transportation;
- Improve the short- and long-distance movement of goods that—
 - travel across rural areas between population centers;
 - travel between rural areas and population centers; and
 - travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network;

- Improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address multimodal freight connectivity; and
- Reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network;

A draft National Freight Strategic Plan was released in the fall of 2015.⁴⁰ The FAST Act requires the designation of a National Multimodal Freight Network that includes all modes in addition to the National Highway Freight Network discussed above. A draft of this network was also released in the fall of 2015.⁴¹ However, no additional funding is specifically provided for this network.

7.2.2 State

The last major statewide freight investment program was approved by voters in November 2006 as part of the Proposition 1B bond package. That program, the Trade Corridor Improvement Fund (TCIF), totaled \$2.5 billion statewide. It provides funding for infrastructure improvements along federally designated "Trade Corridors of National Significance" in California or other corridors with a high volume of freight movement. Most of the original TCIF funding has been allocated by the California Transportation Commission, with only small amounts available from project savings in the original allocations. The state legislature and the governor continue to look for a comprehensive approach to meeting funding needs for the state's transportation system for the future that looks beyond current funding programs. Various funding proposals for TCIF have been included in the discussions, but at this time, no state action has been taken to renew TCIF funding. Currently, the only project in the Central Coast California region with allocated funding through TCIF is \$1.7 million for improvements to the U.S. 101/Sanborn Road Interchange in Monterey County.

One possible route forward for new state funding is through the use of money from California's Cap and Trade provision. Approximately 40 percent of the revenue from this source is unallocated. To receive funding from the legislature, projects will need to reduce greenhouse gas emissions and improve the environment. Rail or intermodal/transload projects that will help divert goods from truck to rail and thereby reduce emissions, may be good candidates for this unallocated revenue, should the legislature elect to spend the money on transportation projects. Alternatively, this funding could help provide seed money for programs in the region that reduce greenhouse gas emissions from trucks such as anti-idling technology, truck stop electrification, or partial/full zero emissions vehicles.

Another potential state revenue source is the 25 percent of funds from the State Transportation Improvement Program (STIP) used to fund the Interregional Transportation Improvement Program (ITIP). ITIP funds are reserved for "projects that improve interregional movement for people and goods across California on the State Highway System." However due to a large reduction in STIP funding and a forecasted revenue reduction through 2020-21, the Draft 2016

⁴⁰ FHWA. Online at: https://www.transportation.gov/sites/dot.gov/files/docs/DRAFT_NFSP_for_Public_Comment_508_10%2015%20v1.pdf

⁴¹ <https://www.transportation.gov/freight/StateMFNs>

ITIP⁴² does not include any new programming. It does, however, re-prioritize and adjust funding for projects within the ITIP. Continued advocacy for keeping U.S. 101 Corridor projects on this list is needed. Priority projects identified in Section 6 that are included in ITIP programming include:

- Monterey – State Route 156 West Corridor Project
- San Benito – State Route 156 Improvement Project – cost increase
- San Luis Obispo – State Route 41/46 Wye
- Santa Barbara – South Coast 101 HOV Lanes.

Other highway-related programs, specifically the State Highway Operations and Protection Program (SHOPP) and various funding programs through the State Transportation Improvement Program, can also be used to improve conditions on U.S. 101 and intersecting highways. Similar to federal funding, these funding sources are not freight-specific but the majority of the projects identified in Section 6 may be eligible due to their location and positive impact on non-freight road users.

7.2.3 Regional/Local

Regional and local freight transportation funding in the Central California Coast region is sparse. The largest local source of money for transportation projects comes through local sales tax measures passed at the county level. The Self-Help Counties Coalition (SHCC) is an organization representing the twenty local transportation agencies in counties where such a tax has passed. In the Central Coast California region, Santa Barbara County is the only member, though San Benito County was a Self-Help County between 1989 and 1999. Measure A, approved in 2008 by a 79% vote in Santa Barbara County, includes \$140 million to widen U.S. 101 from four to six lanes south of the City of Santa Barbara.⁴³ This is not a freight-specific project, though its completion will potentially benefit freight movement in the region through reduced congestion and delay (at least in the short-term). San Benito County is considering a one-cent tax to be sent to voters in 2016. Santa Cruz County will place a half-cent sales tax measure in front of voters in 2016 expected to generate \$450 million over 30 years.⁴⁴ Monterey County is considering a three-eighths of one cent tax that would generate approximately \$20 million per year.⁴⁵ Details about spending priorities are limited—it is likely that the majority of this money would go to projects that improve road conditions and benefit local populations. However, projects that overlap with freight needs (e.g., pavement conditions on U.S. 101 or intersecting highways) should be championed. Alternatively, a small amount of “seed” money could be set aside from the tax increase to help develop future funding and provide local matches for the state and federal programs identified in the previous section.

⁴² http://www.dot.ca.gov/hq/transprog/ocip/draft_2016_itip/draft_2016_itip.pdf

⁴³ <http://meetings.sbcag.org/Meetings/SBCAG/2015/04%20April/Item%2011%20Measure%20A%20Annual%20Report.pdf>

⁴⁴ <http://benitolink.com/2016-sales-tax-initiative-closer-reality>, <http://sccbusinesscouncil.com/2015/transportation-sales-tax-measure-draft-expenditure-plan-dec-2015/>
It is unclear how much of this money would be available for projects on or connecting to U.S. 101 that would address the vision and goals of this study.

⁴⁵ http://www.montereycountyweekly.com/news/local_news/transportation-agency-for-monterey-county-launches-effort-to-get-sales/article_41080160-3629-11e5-8d5f-ab8d929f61fc.html

Finally, the Carl Moyer Memorial Air Quality Standards Attainment Program also provides limited funding for the retrofitting of engines and equipment with “cleaner-than-required” technology. However, funding is limited, and only San Luis Obispo County currently allows money to be spent on road fleet modernization. The other counties in the Central Coast region restrict funding to marine and off-road equipment.

Table 7.3 presents the cost and potential funding sources for each of the priority projects identified in this study.

Table 7.3 Priority Projects, Programs, and Potential Funding Sources

County	Route or Facility ID	Project Location / Description	Measure Addressed	Cost (\$ in thousands)	Possible Funding Source
Monterey	SR 156	New four-lane freeway on SR 156 from Castroville Boulevard to U.S. 101. New interchange at U.S. 101 and SR 156 connection and new interchange at Castroville Boulevard and SR 156	Access/Mobility, TTD, TTR, Potential Safety Improvement	304,000	ITIP
Monterey	Hwy 101	Sanborn/Elvee - Off ramp and intersection improvements	Access/Mobility, TTD, TTR	3,100	NHPP
Monterey	Hwy 101	Harris Road - Construct new interchange with U.S. 101	Access/Mobility, TTD, TTR	57,662	NHPP
Monterey	Hwy 101	U.S. 101 from Harris Rd to Russell Rd/Espinosa Rd (north Salinas). Operational Improvements: modify interchanges; ramp metering	TTD, TTR	52,000	NHPP, ITS
Monterey	Hwy 101	U.S. 101 @ Sanborn Rd (Salinas) Operational Improvements at intersections and modification of SB off-ramps to address truck congestion	TTD, TTR	3,100	\$1.7 million from current TCIF, NHPP
Monterey	Hwy 101	U.S. 101 from Soledad to Harris Rd/Abbott St (south Salinas). Conversion from highway to freeway. Addition of new frontage roads (refer to US 101 Mainline Study).	TTD, TDR, Potential Safety Improvements	169,700	NHPP
San Benito	SR 25	New four-lane highway from San Felipe Road in	Access/Mobility, TTD, TTR	76,300	NHPP. \$6.9 million

County	Route or Facility ID	Project Location / Description	Measure Addressed	Cost (\$ in thousands)	Possible Funding Source
		Hollister to Hudner Lane North of SR 156, 3.8 miles total			already funded through variety of federal/state/local sources
San Benito	SR 152	New alignment of SR 152 between 101 and the Merced County line, including changes in Santa Clara County, and adding an eastbound truck climbing lane over Pacheco Pass	Access/Mobility, TTD, TTR, Potential Safety Improvement	888,000	\$5 million from VTA (Santa Clara County), \$5 million from State IIP for EIR, design and construction.
San Benito	SR 156	SR 156 Alameda St. to San Benito River Bridge. Add Capacity & Access Control: widen to four lanes to address congestion and truck mobility	Access/Mobility, TTD, TTR	69,611	ITIP
San Luis Obispo	Hwy 101	U.S. 101 at Wellsona Rd (North of Paso Robles). Freeway Conversion: new interchange to address corridor and truck mobility, safety	Access/Mobility, TTD, TTR, Potential Safety Improvement	32,350	NHFP
San Luis Obispo	Hwy 101	Interchange Improvements SB/NB ramps at SR 166 and Thompson Ave intersection	Access/Mobility, TTD, TTR, Potential Safety Improvement	8,939	NHPP
San Luis Obispo	SR 41	Operational Improvements: extend truck climbing lane	Access/Mobility, TTD, TTR	32,760	ITIP, NHFP
San Luis Obispo	Hwy 101	U.S. 101 Pismo Beach Congestion Relief Project. Extension of existing southbound truck lane near Spyglass Drive, reconstruct inside shoulder to serve as a managed shoulder. Mattie Rd. on and off ramps	TTD, TTR	36,000	NHPP, NHFP, STIP, CMAQ
San Luis Obispo	Hwy 101	SR 46E interchange Northbound off-ramp	Access/Mobility, TTD, TTR	3,814	NHPP, NHFP
San Luis Obispo	Union Pacific	Implement Centralized Traffic Control (CTC) for rail between McKay and Santa	Access and Multimodal Connectivity,	30,000	NHFP rail set-aside

County	Route or Facility ID	Project Location / Description	Measure Addressed	Cost (\$ in thousands)	Possible Funding Source
		Margarita (MP 202.3 to 229.6)	Adoption of Advanced Technologies		
Santa Barbara	Hwy 101	U.S. 101 from Carpinteria to Santa Barbara: Add HOV lanes to reduce commuter travel and truck congestion; modify interchanges at Olive Mill Road and at Hot Springs Road/Cabrillo Boulevard and North Jameson Lane and U.S. 101	TTD, TTR, Potential Safety Improvement	477,200	NHPP, CMAQ, ITIP
Santa Barbara	Hwy 101	Extended 3rd NB lane, Fairview to Glen Annie Rd.	Access/Mobility, TTD, TTR	10,000	NHPP
Santa Barbara	Hwy 101	Linden Ave/Casitas Pass Interchanges Widening Phase 3	TTD, TTR	95,067	NHPP
Santa Barbara	Hwy 101	San Ysidro Interchange Improvement	TTD, TTR	50,000	NHPP
Santa Barbara	Union Pacific	From MP 423.0 to MP 368.6, Pacific Surfliner route, complete environmental clearance, design, engineering and permitting for siding projects in Santa Barbara and Ventura Counties.	Access and Multimodal Connectivity	62,000	NHFP rail set-aside
Santa Barbara	Union Pacific	Devon to Tangair Curve Realignment	Access and Multimodal Connectivity	196,000	NHFP rail set-aside
Santa Barbara	Union Pacific	MP 276 Track Realignment and Highway 1 Overpass Replacement	Access and Multimodal Connectivity	62,000	NHFP rail set-aside
Santa Cruz	Santa Cruz Branch Line	Construct transload facility at Watsonville to facilitate truck loading onto rail, increase rail shipping, and reduce truck traffic on roadways	Access and Multimodal Connectivity	TBD	FASTLANE, CMAQ, NHFP rail set-aside
Santa Cruz	SR 129	SR 129 and Lakeview intersection improvements: Construct a roundabout at the intersection of Lakeview Rd and SR 129. Associated infrastructure	Access/Mobility, TTD, TTR, Advanced Technology, Potential Safety Improvement	5,500	NHPP

County	Route or Facility ID	Project Location / Description	Measure Addressed	Cost (\$ in thousands)	Possible Funding Source
Santa Cruz	Santa Cruz Branch Line	Upgrade rail to Federal Rail Administration Class 2 rail, allowing freight train speeds of up to 25 MPH on sections of rail throughout Santa Cruz County. Construct improvements to efficiently integrate freight and planned passenger rail, as needed.	Access and Multimodal Connectivity	20,000	NHFP rail set-aside

Source: NHFP – National Highway Freight Program. FASTLANE – Fostering Advancements in Shipping and Transportation for the Long-term Achievement of Efficiencies grant program. HSIP – Highway Safety Improvement Program. NHPP – National Highway Performance Program. CMAQ – Congestion Mitigation and Air Quality. STBGP – Surface Transportation Block Grant Program. ITS – Intelligent Transportation Systems Funding. ITIP - Interregional Transportation Improvement Fund. TCIF - Trade Corridor Improvement Fund. PPP – Public-private partnerships.

Note: Currently, no highways in the Central Coast Region are designated as part of the National Highway Freight Network (NHFN). However, under the Act, states are authorized to designate critical urban and rural corridors which then become part of the NHFN. Caltrans has not made these designations yet. Any of the projects for which NHFP is identified as a potential source of funding would only be eligible for this funding if designated as a critical urban or rural corridor by Caltrans.

7.3 Partnerships

Most of the recommended projects in this report are fairly standard infrastructure improvements on highways or local roads. Typically, these projects can be funded through a variety of Federal, state, regional, and local sources. However goods movement projects often do not receive the same level of priority as more traditional passenger-serving projects and potential sponsors may lack funds to conduct the project scoping and planning activities necessary to define these projects. Caltrans, the various MPOs and RTPAs can encourage development of these projects by supporting initial planning and scoping and ensuring that these projects receive priority in the regional planning and programming process. Caltrans, AMBAG, SLOCOG, and SBCAG can also ensure that the performance targets for future state or regional transportation plans take into account the types of needs that were identified in the needs assessment conducted for this study so that projects that address these needs score higher against these criteria.

Another avenue to consider is public-private partnerships. In a public-private partnership, the public and private sectors work cooperatively in the planning, financing, and construction of development projects adjacent to and integrated with transportation facilities. Public-private partnerships require financial buy-in from both sectors. The first step in obtaining buy in from the private sector is communication between the parties and ensuring business needs and concerns are heard and addressed. This study included extensive outreach to both the public and private sector, including the creation of an advisory working group which included private sector representatives, interviews with private sector employers, outreach through a mailing list and several workshops in the region.

In the AMBAG region, public-private partnerships could be created to encourage intermodal facility development or address the need to add capacity to truck parking facilities and to build

new truck parking facilities. These types of projects include a potential revenue-generator which is needed to attract private partners. Another option is for the state or local/regional governments to incentivize or help finance the development of truck parking facilities on private land. Finally, there may be limited opportunities to explore a public-private partnership with the Santa Maria Valley Railroad, the lone Class III shortline in the region, to improve or help extend freight rail service to other businesses in the region—reducing the demand on U.S. 101. To the extent that these projects are turned over to private developers/operators to make the improvements and recoup the investments through revenues from the projects after they are built, this represents an effective approach to financing the project.

Whether it is to foster public-private partnerships or to provide a unified voice during advocacy for funding, cooperation between the public and private sectors is critical to the success of the Central Coast goods movement planning efforts. This study involved a variety of outreach programs that involved both public and private organizations. Building on this foundation, the region should consider creating a permanent program of public-private engagement. An annual freight summit to discuss needs and issues and report on progress in implementing the recommendations of this study is one option that should be considered.

7.4 Continuing Collaboration among the Central Coast Transportation Agencies

Freight needs and issues are regional. The development of the U.S. 101 Highway Central Coast California Freight Plan relied on input from a variety of agencies in the region including:

- Association of Monterey Bay Area Governments
- Caltrans
- Santa Cruz County Regional Transportation Commission
- Transportation Agency for Monterey County
- San Benito Council of Governments
- San Luis Obispo Council of Governments
- Santa Barbara County Association of Governments

These agencies form the basis for future cooperation on needs that impact everyone along the corridor. Collaboration is vital for projects that cross multiple jurisdictions and require coordination during implementation. Collaboration also helps ensure that the jurisdictions are all working towards the same vision and goals for the Corridor. Although the majority of projects identified in this study are confined to a single (or at most two) jurisdiction, there is an opportunity to coordinate on the ITS, Freight Parking, and Truck Route Signage Improvement Programs. ITS in particular offers an opportunity for collaboration due to the corridor-wide nature of the program and the opportunity to build on the work of the Central Coast Intelligent Transportation Systems Coordinating Group.

Collaboration is also important when reaching out to the private sector for feedback on plans, project ideas, or consideration of public-private partnerships. Creating a single, overarching group in the region dedicated to freight needs reduces the number of contacts or meetings for the private sector, allowing them to focus their time and energy more effectively. This collaboration could provide an opportunity for a regional Freight Advisory Committee that coordinates the

private outreach side of freight planning for each of the MPOs in the region. As suggested in the previous section, the study partners could create an annual freight conference that rotates through the region (with web streaming available) that provides freight stakeholders, specifically in the private sector, an opportunity to comment on project ideas, identify operational issues, and learn about upcoming work or project progress would help maintain the links initiated in this study. Other potential partnerships include additional inter-agency collaboration like the San Benito/Santa Clara Mobility Partnerships.

An example of inter-agency cooperation on freight movement, the San Benito/Santa Clara Mobility Partnership provides policy oversight and direction to staff of the two agencies regarding potential mobility improvements between U.S. 101 and Interstate 5 in the northern San Benito and Southern Santa Clara Counties. More specifically, the Mobility Partnership will provide leadership, coordinate and champion the development of transportation projects in the northern San Benito/Southern Santa Clara County area to address the movement of goods and people between Highway 101 on the west and I-5 on the east and safety of travel in this corridor. As agreed by the members, the Mobility Partnership will actively support potential improvements and seek additional funding to further the development of studies and/or project development efforts.

7.5 Advocacy

Perhaps the key reason for maintaining close ties between stakeholders in the U.S. 101 Corridor in the Central Coast region is advocacy. The new FAST Act will require new processes at the state level to set freight priorities, designating new routes (rural and urban corridors), and develop funding procedures. Working together, the region has a better chance at shaping those processes to benefit the region if they speak with a unified voice for projects on U.S. 101 and intersecting routes. The region needs a strong voice at the state level, especially in the California Freight Advisory Committee (CFAC), to advocate for regional freight needs, be a visible and engaged presence, and provide knowledge and updates back to the region on freight activities under consideration by the CFAC.

The designation of rural corridors as described in the discussion of Federal funding is one where regional advocacy could be critical. Ensuring that U.S. 101 and the main intersecting routes are included in the designation would greatly increase the possibility that projects on those routes would receive funding from the NHFP and improve their ability to compete for FASTLANE grant program funding.

In setting an agenda for an ongoing advocacy coalition for freight issues in the Central Coast U.S. 101 Corridor, the following agenda for the next several years should take priority:

- Ensuring that U.S. 101 and key connectors are designated as priority rural corridors (working with Caltrans).
- Monitoring the process that is developed to allocate California's apportioned freight funds under the NHFP program. This could be done through representation on the CFAC. There has been some early discussion about using a process similar to the TCIF process where regions are allocated a portion of the total funds and asked to develop regional priorities. This study represents a good start in developing a priority project list subject to further prioritization criteria from Caltrans.

Implementation

- Continue to monitor and lobby for a permanent TCIF appropriation at the state level. The actions of the state legislature this year could result in such an appropriation.
- Continue to work with Caltrans and CARB to lobby for a set-aside for freight projects from the 40 percent unallocated Cap and Trade funds.
- Begin to meet with neighboring regional freight coalitions in the San Joaquin Valley and the San Francisco Bay Area to plan for projects of mutual interest (such as the SR 152 improvements).

A

FULL PROJECT LIST

Table A.1 lists the 41 projects in the study area that would help meet the three goals identified in this study. The source of each project is also included in this table. Note that projects in **bold** are included in the priority project list found in Section 6.

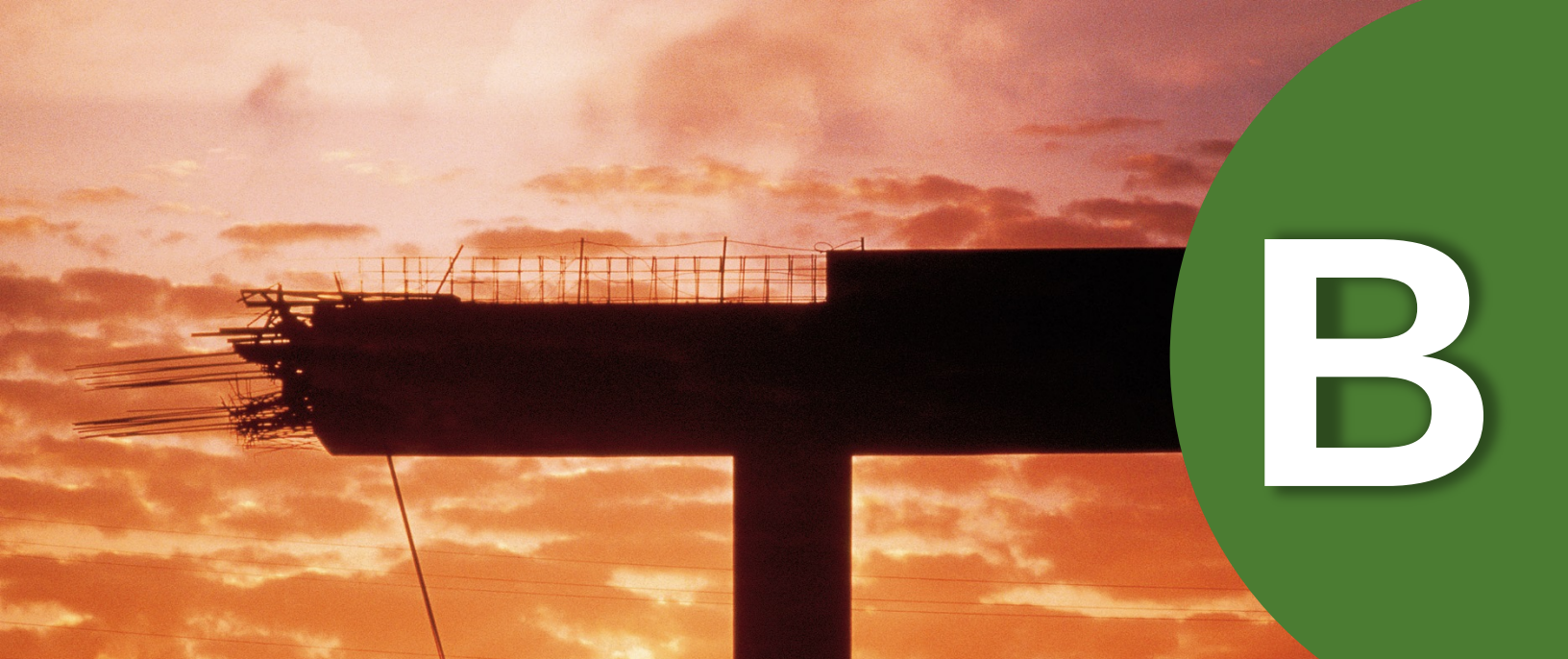
Table A.1 U.S. 101 Central Coast California Full Project List

County	Route or Facility ID	Project Category	Project Location / Description	Project Source
Monterey	SR 156	Capacity Expansion. Modify interchange	New four-lane freeway on SR 156 from Castroville Boulevard to U.S. 101. New interchange at U.S. 101 and SR 156 connection and new interchange at Castroville Boulevard and SR 156	CFMP
Monterey	Hwy 101	Modify ramps	U.S. 101 @ Sanborn Rd (Salinas) Operational Improvements: modify SB off-ramps to address truck congestion	CFMP
Monterey	River Road (SR 68 to Arroyo Seco Rd)	Route designation	Designate River Road as a tourism/freight wine corridor between Salinas and Soledad, parallel to US 101	Email from Partners
Monterey	Intermodal	Intermodal	Construct a new intermodal truck-rail facility Gonzales or Chualar along UP Coast Mainline	CFMP
Monterey	Hwy 101	Modify ramps. ITS	U.S. 101 from Harris Rd to Russell Rd/Espinosa Rd (north Salinas). Operational Improvements: modify interchanges; ramp metering	CFMP
Monterey	Hwy 101	Capacity Expansion	Salinas Corridor (Widening)	MTP/SCS

County	Route or Facility ID	Project Category	Project Location / Description	Project Source
Monterey	Hwy 101	Modify interchange	Harris Road - Construct new interchange with U.S. 101	MTP/SCS
Monterey	Hwy 101	Modify interchange	Sanborn/Elvee - Off ramp and intersection improvements	MTP/SCS
Monterey	Hwy 101	New Road	U.S. 101 from Soledad to Harris Rd/Abbott St (south Salinas). Conversion from highway to freeway. Addition of new frontage roads (refer to US 101 Mainline Study).	CFMP/TAMC
Monterey	Hwy 101	Modify interchange	1st Street Interchange	MTP/SCS
Monterey	Hwy 101	Modify interchange	Gloria Road Interchange Improvements	MTP/SCS
Monterey	Hwy 101	Modify interchange	Walnut Ave Interchange	MTP/SCS
Monterey	Hwy 101	Modify interchange	North and South Interchange (Front Street), Soledad	MTP/SCS
San Benito	SR 152	New truck infrastructure	New alignment of SR 152 between 101 and the Merced County line, including changes in Santa Clara County, and adding an eastbound truck climbing lane over Pacheco Pass	Email from Partners
San Benito	SR 25	New Road	New four-lane highway from San Felipe Road in Hollister to Hudner Lane North of SR 156, 3.8 miles total	Email from Partners
San Benito	SR 156	Capacity Expansion. ITS	SR 156 Alameda St. to San Benito River Bridge. Add Capacity & Access Control: widen to 4 lanes to address congestion and truck mobility	CFMP
San Luis Obispo	Hwy 101	Modify interchange	SR 46E interchange Northbound on-ramp	RTP/SCS
San Luis Obispo	Hwy 101	Modify interchange	Interchange Improvements SB/NB ramps and SR 166 and Thompson Ave intersection	RTP/SCS
San Luis Obispo	SR 41	New truck infrastructure	Operational Improvements: extend truck climbing lane	CFMP
San Luis Obispo	Hwy 101	New truck infrastructure. Modify ramps	U.S. 101 Pismo Beach Congestion Relief Project. Extension of existing southbound truck lane near Spyglass Drive, reconstruct inside shoulder to serve as a managed shoulder. Mattie Rd on and off ramps	Email from Partners

County	Route or Facility ID	Project Category	Project Location / Description	Project Source
San Luis Obispo	Hwy 101	Modify interchange	U.S. 101 at Wellsona Rd (North of Paso Robles). Freeway Conversion: new interchange to address corridor and truck mobility, safety	CFMP
San Luis Obispo	Union Pacific	Rail Capacity	Implement Centralized Traffic Control (CTC) for rail between McKay and Santa Margarita (MP 202.3 to 229.6)	CFMP
Santa Barbara	Hwy 101	Capacity Expansion. Modify interchange	U.S. 101 from Carpinteria to Santa Barbara: Add HOV lanes to reduce commuter travel and truck congestion; modify interchanges at Olive Mill Road and at Hot Springs Road /Cabrillo Boulevard and North Jameson Lane and US 101	CFMP
Santa Barbara	Hwy 101	Capacity Expansion	Extended 3rd NB lane, Fairview to Glen Annie Rd.	RTP/SCS
Santa Barbara	Hwy 101	ITS	Patterson Avenue Ramp Meter	RTP/SCS
Santa Barbara	Hwy 101	ITS	Intelligent Transportation System (ITS) Ramp Metering	RTP/SCS
Santa Barbara	Hwy 101	Modify interchange	Linden Ave /Casitas Pass Interchanges Widening Phase 3	RTP/SCS
Santa Barbara	Hwy 101	Modify interchange	San Ysidro Interchange Improvement	RTP/SCS
Santa Barbara	Union Pacific	Rail Capacity	From MP 423.0 to MP 368.6, Pacific Surfliner route, complete environmental clearance, design, engineering and permitting for siding projects in Santa Barbara and Ventura Counties.	
Santa Barbara	Hwy 101	Capacity Expansion	Widening from Clark Ave to Santa Maria Way	RTP/SCS
Santa Barbara	Hwy 101	Modify interchange	McCoy Interchange	RTP/SCS
Santa Barbara	Hwy 101	Modify interchange	SR 135 Interchange (Santa Maria)	RTP/SCS
Santa Barbara	SR 1	Modify ramps	U.S. 101 at Betteravia Rd (South Santa Maria). Operational Improvements: modify NB on-ramp to address truck congestion	CFMP
Santa Barbara	Union Pacific	Rail Capacity	Devon to Tangair Curve Realignments	CFMP

County	Route or Facility ID	Project Category	Project Location / Description	Project Source
Santa Barbara	Union Pacific	Rail Crossing	MP 276 Track Realignment and Highway 1 Overpass Replacement	
Santa Barbara	Hwy 101	Modify interchange	Castillo Interchange Improvement (Castillo Street)	RTP/SCS
Santa Cruz	Santa Cruz Branch Line	Intermodal	Construct transload facility at Watsonville to facilitate truck loading onto rail, increase rail shipping, and reduce truck traffic on roadways	Email from Partners
Santa Cruz	Santa Cruz Branch Line	Rail Capacity	Upgrade rail to Federal Rail Administration Class 2 rail, allowing freight train speeds of up to 25 MPH on sections of rail throughout Santa Cruz County	CFMP
Santa Cruz	SR 129	Modify intersection	SR 129 and Lakeview intersection improvements: Construct a roundabout at the intersection of Lakeview Road and Route 129. Associated infrastructure improvements.	Email from Partners



B

VISION AND GOALS WORKING PAPER

U.S. 101 Central Coast California Freight Strategy

Appendix B. Visions and Goals

working paper

prepared for

AMBAG

prepared by

Cambridge Systematics, Inc.

working paper

U.S. 101 Central Coast California Freight Strategy

Appendix B. Visions and Goals

prepared for

AMBAG

prepared by

Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

date

November 19, 2014

Table of Contents

1.0	Introduction	1-1
2.0	Proposed Visions and Goals	2-1
3.0	Supporting Materials.....	3-1
3.1	Goals from Previous Plans	3-2
3.1.1	Monterey Bay 2035 Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) (2014).....	3-2
3.1.2	Caltrans U.S. 101 Transportation Concept Report (TCR) (2014)	3-2
3.1.3	California Freight Mobility Plan (2014).....	3-3
3.1.4	SLOCOG U.S. 101 Mobility Master Plan 2014 (2014)	3-3
3.1.5	SBCAG U.S. 101 in Motion (2006)	3-3
3.1.6	Santa Barbara CAG (SBCAG) Regional Transportation Plan and Sustainable Communities Strategy (2013)	3-4
3.1.7	Monterey County Regional Transportation Plan (2014)	3-5
3.1.8	On the Move: 2035 San Benito Regional Transportation Plan (2014)	3-5
3.1.9	Santa Cruz County Regional Transportation Plan 2014 (2014)	3-6
3.2	Issues/Opportunities Matrix	3-6

List of Tables

Table 3.1 Comparison of Goals and Issues/Opportunities..... 3-1

1.0 Introduction

Establishing the vision and goals is a critical first step in development of any plan. The projects and strategies that comprise the plan will be evaluated based on how well they meet the vision and goals. Building off of these goals, performance measures will be developed that can help identify corridor needs and facilitate project evaluation. This memo proposes a draft vision statement and goals for the U.S. Highway 101 Central Coast California Freight Plan, followed by a discussion of how these goals relate to issues, needs, and goals from previous plans.

2.0 Proposed Visions and Goals

The **vision** below lays out the strategic direction of this U.S. 101 Goods Movement Corridor in the Central Coast Region:

“The goods movement system in the U.S. 101 Corridor in the Central Coast Region will drive and support the regional economy by creating a technologically advanced, integrated, safe, and efficient multi-modal corridor that provides critical connections to international and domestic markets and improves the quality of life of residents.”

The vision is supported by three **goals** that involve collaboration of public and private sectors, community input, and investment to:

1. Support economic development in the region through provisions such as reducing transportation costs for shippers/receivers, seamlessly integrating freight transportation modes, improving connectivity to international and domestic markets, and creating economic development opportunities around transportation and logistics facilities.
2. Providing an efficient, reliable, well-maintained and safe goods movement along the U.S. 101 corridor, increasing throughput using a variety of approaches.
3. Reducing and mitigating environmental, social, health, and economic impacts from goods movement operations to create a healthy, clean environment and improve quality of life throughout the region.

3.0 Supporting Materials

The proposed visions and goals related directly to previous plans developed for the U.S. 101 area relevant for our study. These visions and goals also support the key goods movement issues identified from our literature review. This section summarizes these supporting materials. Table 3.1 links the goals developed for this plans with the goals/visions developed for other relevant plans, as well as issues and opportunities.

Table 3.1 Comparison of Goals and Issues/Opportunities

	Number	1	2	3
	Draft U.S. 101 Central Coast California Freight Plan Goals	Support economic development in the region.	Provide an efficient, reliable, well-maintained and safe goods movement corridor.	Reduce and mitigate impacts from goods movement operations to create a healthy and clean environment and promote quality of life.
Relevant goals from related plans and issues/opportunities	Monterey Bay MTP/SCS	1, 2	1, 2, 6	3, 4, 5
	Caltrans 101 TCR	1, 2, 5	1, 3, 4, 5	
	California Freight Mobility Plan	1, 5	2, 3, 6	4, 6
	SLOCOG U.S. 101 Mobility	Overall Vision		
	SBCAG U.S. 101 in Motion	1, 2, 5, 7	1, 3, 6, 10	5, 7, 9
	SLOCOG RTP/SCS	1, 2, 9	1, 3, 4, 5	4, 6, 7, 8
	SBCAG RTP/SCS	5	2, 3	1, 3, 4
	Monterey County RTP	1, 5	1, 2, 5	3, 4
	San Benito County RTP	1, 2	1, 6	3, 4, 5
	Santa Cruz County RTP	1, 3	2, 3	3
	Goods Movement Issues/Opportunities	1, 4, 6, 11	1, 2, 3, 5, 7, 8, 9, 10	12

Note: The numbers in the table columns refer to goals/objectives and issues/opportunities described in the following sections.

3.1 Goals from Previous Plans

3.1.1 *Monterey Bay 2035 Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) (2014)*

This study sets out a vision of a more efficient transportation system with a wide range of options, which provide access to jobs and education in a sustainable manner in order to improve quality of life. To achieve this vision, AMBAG focused on six broad goals for the region:

1. **Access and Mobility.** Convenient, accessible, and reliable travel options for people while maximizing productivity for people and goods;
2. **Economic Vitality.** Raise the region's standard of living;
3. **Environment.** Promote sustainability and protection of the natural environment;
4. **Healthy Communities.** Protect the health of residents, foster efficient development patterns, and encourage active transportation;
5. **Social Equity.** Provide transportation services to all segments of the population; and
6. **System Preservation and Safety.** Preserve and ensure a safe and sustainable regional transportation system.

It should be noted that the goals of the 2014 Monterey County Regional Transportation Plan (RTP), Santa Cruz County RTP, and San Benito RTP are consistent with the goals listed above.

3.1.2 *Caltrans U.S. 101 Transportation Concept Report (TCR) (2014)*

The goal of this document is to identify trends and deficiencies within U.S. 101 among multiple transportation modes, to provide a basis for considering future action to preserve the corridor long-term, and to develop the data resources necessary to plan and monitor progress on the above two goals. The TCR addresses improvements for transportation modes in the corridor and is not limited to freight movement.

Caltrans' vision for U.S. 101 is to optimize the existing corridor by:

1. Optimizing existing facilities to improve capacity through improvements that encourage mode-shifts and a reduction of single occupancy vehicle (SOV) travel. This includes Transportation Demand Management (TDM) strategies, High Occupancy Toll (HOT)/High Occupancy Vehicle (HOV), ITS, ramp metering, and other options.
2. Increasing opportunities for multimodal options and integration, including development of a parallel road network.
3. Improving safety and operations by managing access and reducing conflict points.
4. Providing a sustainable transportation system through asset management and life-cycle cost considerations.
5. Supporting efficient and reliable travel.

3.1.3 California Freight Mobility Plan (2014)

The California Freight Mobility Plan (CFMP) is a statewide planning document that examines freight movement across every mode of transportation. The Plan's vision state reads: "As the national gateway for international trade and domestic commerce, California enhances economic competitiveness by collaboratively developing and operating an integrated, multimodal freight transportation system that provides safe, sustainable freight mobility. This system facilitates the reliable and efficient movement of freight while ensuring a prosperous economy, social equity, and human and environmental health."

The six goals for the freight movement system are:

1. Improve Economic Competitiveness;
2. Congestion Relief;
3. Improve Safety and Security;
4. Freight System Infrastructure Preservation;
5. Support Innovative Technology and Practices; and
6. Environmental Stewardship.

3.1.4 SLOCOG U.S. 101 Mobility Master Plan 2014 (2014)

This plan's vision is, "Connecting communities within and across the region to improve travel time reliability, safety and modal choices for the efficient movement of people and goods." The main goal was to develop a list of projects in four focus segments that would improve future conditions on U.S. 101 for all users using a cost/benefit analysis and through evaluating success according to 12 performance measures.

3.1.5 SBCAG U.S. 101 in Motion (2006)

The goal of this study is to find long term solutions to growing congestion problems along 27 miles of Highway 101 in Southern Santa Barbara County. Detailed goals include:

1. Provide a comprehensive, multimodal transportation system of facilities and services that is balanced, coordinated, safe, cost effective, environmentally sound and meets the public's need for the movement of people, goods and services;
2. Improve transportation linkages between communities and regions;
3. Provide demand management strategies and viable mode options to reduce SOV commutes during peak hours;
4. Assure that safety, efficiency, preserving the visual ambience, history, and heritage in the corridor are key points of emphasis for all modes;
5. Promote alternative transportation modes to reduce traffic congestion and air pollution;
6. Seek new revenue/funding sources and make efficient use of limited local transportation funds;

7. Encourage land use and growth patterns that enhance the livability of the corridor communities;
8. Encourage sustainability of the natural environment by utilizing renewable resources during construction and operation;
9. Assure equitable distribution of benefits and impacts among individuals and groups;
10. Provide solutions that offer lasting benefits and can be phased in over time; and
11. SLOCOG Regional Transportation Plan (Draft 2014).

The overall vision of the 2014 Regional Transportation Plan is, “To create a fully integrated and intermodal transportation system that facilitates the safe movement of people, goods, and information within and through the region while encouraging the development of more sustainable communities.” In order to achieve this vision, the following of goals and corresponding policy objectives were developed:

1. **Mobility and congestion reduction.** Provide reliable, integrated, and flexible travel choices and a reduction in congestion within and through the region.
2. **Accessibility.** Improve accessibility to goods, services, and jobs.
3. **Safety and Security.** Enhance public safety and security in all modes of travel and achieve a significant reduction in accidents, fatalities, and serious injuries on all public roads.
4. **Sustainability.** Maintain and improve the efficiency of the surface transportation system and the project development and delivery process.
5. **System reliability.** Maximize the efficiency of the existing transportation system.
6. **Equity.** Avoid a disproportionately adverse impact to all sectors of the population. Provide equitable levels of funding and transportation services to all areas, users, communities, and socioeconomic groups.
7. **Livability.** Support livable community concepts and efforts. Reflect community values while integrating land use and transportation planning.
8. **Environmental protection.** Conserve and protect natural and sensitive resources. Preserve aesthetic resources, and promote environmental enhancements with all transportation projects.
9. **Freight movement and economic vitality.** Improve the freight network and strengthen the ability of rural communities to access national and international trade markets. Support regional economic development.

3.1.6 Santa Barbara CAG (SBCAG) Regional Transportation Plan and Sustainable Communities Strategy (2013)

Although no overall vision for the region was identified in the plan, the purpose of the RTP is to “set forth a plan for how the region will invest limited transportation funds to maintain, operate, and improve an integrated, multimodal transportation system that facilitates the efficient movement of people and goods.” In

order to achieve this, five goals were developed, with freight movement topics included under Mobility & System Reliability goal:

1. **Environment.** Foster patterns of growth, development, and transportation that protect natural resources and promote a healthy environment;
2. **Mobility and System Reliability.** Improve access to jobs, schools, and services and allow unimpeded movement of people and goods by all modes;
3. **Social Equity.** Meet transportation and housing needs of all socioeconomic groups;
4. **Health and Safety.** Improve public health and ensure the safety of the regional transportation system.
5. **Prosperous Economy.** Promote regional prosperity and economic growth by pursuing economically efficient transportation patterns.

3.1.7 Monterey County Regional Transportation Plan (2014)

Though no vision statement is presented in the Regional Transportation Plan for Monterey County, the Plan does identify five goals. These were developed to be consistent with goals put forward in the *Monterey Bay 2035: Moving Forward* plan prepared by AMBAG. The goals include:

1. **Access and Mobility.** Improve the ability of residents to meet most daily needs without having to drive while improving convenience and quality for all types of trips, including freight movement.
2. **Safety and Health.** Design, operate, and manage the transportation system to reduce injuries and fatalities; promote active living; and reduce exposure to pollution.
3. **Environmental Stewardship.** Protect and enhance the County's built and natural environment and act to reduce emissions of greenhouse gases from the transportation system.
4. **Social Equity.** Reduce disparities in health, increase access to key destinations for transportation-disadvantaged populations, and ensure that new investments do not adversely impact transportation-disadvantaged populations.
5. **Economic Benefit.** Invest in transportation improvements – including operations – that improve economic access and improve reliability and speed consistency, while optimizing the effectiveness of investments.

Freight movement, while not a specific goal, is included under the Access and Mobility and Economic Benefit goals.

3.1.8 On the Move: 2035 San Benito Regional Transportation Plan (2014)

The Long-Range Transportation Plan for San Benito County developed six goals that are consistent with those in the *Monterey Bay 2035: Moving Forward* plan prepared by AMBAG. The six goals include:

1. **Access and Mobility.** Provide convenient, accessible, and reliable travel options while maximizing productivity for all people and goods in the region.

2. **Economic Vitality.** Raise the region's standard of living by enhancing the transportation system's performance.
3. **Environment.** Promote environmental sustainability and protect the natural environment.
4. **Healthy Communities.** Protect the health of residents; and foster development patterns that optimize travel, housing, and employment choice while encouraging active transportation.
5. **Social Equity.** Provide an equitable level of transportation services to the entire population.
6. **System Preservation and Safety.** Preserve and ensure a safe and sustainable regional transportation system.

Freight considerations are mainly addressed under the Economic Vitality and System Preservation and Safety goals.

3.1.9 Santa Cruz County Regional Transportation Plan 2014 (2014)

Santa Cruz County developed a Regional Transportation Plan that is consistent with the goals of in the *Monterey Bay 2035: Moving Forward* plan prepared by AMBAG. The County focused on three goals, with freight movement included as a Target under Goal 1 below:

1. **Goal 1.** Improve access to jobs, schools, health care, and other regular needs in ways that improve health, reduce pollution, and retain money in the local economy. This includes improving travel time reliability for freight trips.
2. **Goal 2.** Reduce transportation-related fatalities and injuries across all modes.
3. **Goal 3.** Deliver access and safety improvements that are environmentally beneficial, cost effective, within available revenues, equitable, and responsive to the needs of all users.

3.2 Issues/Opportunities Matrix

The accompanying matrix lists issues and opportunities for the U.S. 101 Central Coast that were identified in related documents and plans. Those issues can be condensed into 12 categories that are listed below and included in Table 3.1 above.

1. Mobility issues, including those due to congestion (both recurrent and seasonal);
2. Safety issues;
3. Need for alternative route choices;
4. Need for better alternative mode choices, including rail, barge, and air cargo;
5. Truck parking issues for short-haul/delivery activities and long haul;
6. Industry issues, including HOS regulation and driver shortage;
7. Need for better truck route signage, mapping, and definition;

8. Need for better data, including information on truck parking and movement;
9. Need for improved maintenance and upkeep, including improved maintenance funding;
10. Lack of coordinated performance based ITS system;
11. Rail issues including capacity issues, traffic conflicts, impacts on traffic delay, and safety; and
12. Environmental/health impacts from freight.



LITERATURE REVIEW WORKING PAPER

U.S. 101 Central Coast California Freight Strategy

Appendix C. Literature Review

working paper

prepared for

AMBAG

prepared by

Cambridge Systematics, Inc.

working paper

U.S. 101 Central Coast California Freight Strategy

Appendix C. Literature Review

prepared for

AMBAG

prepared by

Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

date

November 19, 2014

Table of Contents

1.0	Introduction	1
2.0	Literature Review	1
2.1	California Central Coast Commercial Flows Study (2012)	1
2.2	California Freight Mobility Plan (2014).....	4
2.3	Caltrans U.S. 101 Transportation Concept Report (2014)	6
2.4	San Luis Obispo Council of Government (SLOCOG) U.S. 101 Mobility Master Plan (2014).....	7
2.5	Santa Barbara CAG 101 in Motion Final Report (2006).....	12
2.6	Monterey Bay 2035 Metropolitan Transportation Plan/Sustainable Communities Strategy (2014).....	14
2.7	SLOCOG Regional Transportation Plan (Draft 2014)	16
2.8	Santa Barbara CAG (SBCAG) Regional Transportation Plan and Sustainable Communities Strategy (2013)	18
2.9	Salinas Valley Truck to Rail Intermodal Facility Feasibility Study (2011).....	20
2.10	Other Regional/State-Level Plans	21
2.11	Data and Needs Identification.....	26

1.0 Introduction

This literature review is conducted to help fulfill four goals of the project:

1. Understand the visions and goals of past studies in order to incorporate them into this project.
2. Develop an issues and opportunities matrix based on past studies in order to understand key issues along the corridor which can inform this plan.
3. Understand performance measures that were used in previous studies which are applicable to this project.
4. Document all data used in previous studies. This will help us to evaluate the needs, trends, and economics of the corridor using the most effective and convenient methods and data.

The literature review is split into four sections. The first is a detailed review of documents that have a direct bearing on the U.S. Highway 101 Central Coast California Freight Plan development. The second is a brief survey of documents that focus on alternative modes, other regions, or which contain limited information on the region. The third is a preliminary list of data needs and possible resources. The fourth is a list of additional documents that may be of use later in the study, but that are incomplete, summary documents, or are otherwise less critical to this particular topic and geography.

2.0 Literature Review

2.1 California Central Coast Commercial Flows Study (2012)

2.1.1 Summary

This study focused on studying freight flows, issues, needs, and deficiencies in the five county region of the Central California Coast (Santa Barbara, Monterey, San Luis Obispo, Santa Cruz, San Benito). A growing population is projected to increase freight traffic, especially by truck, and focused in the agriculture, manufacturing, and transportation/warehousing industries. In 2007, approximately 63 million tons of freight worth approximately \$50 billion were transported into, out of, and within the Central Coast region. In 2007, approximately 50 percent of shipments are outbound (by both value and weight) with inbound and internal split (by tons), and inbound accounting for 43 percent (by value)—mostly to other parts of California¹. Agriculture makes up the largest category of freight by volume with over 14 million tons of agricultural products moved in 2007. By value, the top grossing agricultural products in the five county area berries, lettuce, grapes, broccoli, flowers, and other vegetables. Data shows that sand, gravel, and aggregate is the second largest freight product by weight, accounting for over 13 million tons of freight movement in 2007. Recommendations included a new truck parking strategy, increased connections to the Central Valley (East-West), improved intermodal capacity, and maintaining a focus on freight issues specific to the region such as seasonal swings (especially in the U.S. 101 Corridor – the primary truck artery) during periods such as summer weekends and the harvesting season. A full list of prioritized projects without funding (as of 6/2011) is available on page 95 of the report.

¹ Data used is FHWA Freight Analysis Framework Data and IMPLAN data.

2.1.2 Visions and Goals

This study's main goal is to highlight freight needs and deficiencies in the Central Coast region and to development recommendations to help the region address freight issues in a future with growing needs and constrained budgets. No overarching vision for the region was developed in this report.

2.1.3 Issues and Recommendations

The study identified a number of key issues and needs for the region as well as some recommendations including:

- Support development of multimodal distribution centers and supporting infrastructure by developing an analysis framework and public-private task force. A key goal is to try to shift some of the long distance movements that currently occur by truck to rail.
- Gather better economic and transportation data in order to support goods movement strategies. Gaps exist in the data, especially about seasonal shifts in traffic patterns.
- Address freight mobility concerns due to traffic congestion on U.S. 101 as well as Highways 1, 17, 29, 156, and 25. Highway segments through Watsonville and Salinas are of special concern due to congestion. Conversion of U.S. 101 into a highway is a long-term goal to help relieve these issues.
- The Santa Maria region is a rapidly growing area that has the potential to add significant stress to the U.S. 101 Corridor. Growth must be accommodated and managed in order to minimize impacts.
- Better understand freight congestion concerns due to agricultural movements. This need is tied to the need for better data.
- Parking locations for trucks in the study area are limited, with only two official rest areas (Gaviota and Camp Roberts) open. Interviews with stakeholders raised the concern about truck parking specific to cooler locations in the Salinas Valley, San Luis Obispo region, and Santa Maria.
- Improve truck connections between U.S. 101 and Interstate 5 (I-5). I-5 is a key route in the nation's freight network as well as the Central Valley, which is a key trading partner for the Central Coast. Improving connector routes such as State Route (SR) 41, 46, 166 would increase commerce between the two regions.

Other issues highlighted in the report include the need to:

- Take a regionwide truck count on routes outside U.S. 101 and SR 46. These two routes have the most data available on them, but the connector routes to U.S. 101 are mostly unknown. This will help increase the amount of data available to draw on in order to determine future performance measures and direct funding.
- Restructure the Freight Action Strategy Taskforce (FAST) and define clear purpose/goals to allow it to advocate effectively.

- Identify funding options and opportunities in order to advance prioritized projects.
- Develop performance measures.

2.1.4 Performance Measures

As of writing, the FAST had limited performance measures in place. This study recommended a number of performance measures for future implementation including:

Performance Measure	Performance Metric	Description	Data Needs	Potential Sources of Data
System Demand	Truck Freight Demand	Heavy truck Vehicle Miles Traveled (VMT)	Annual average daily truck traffic (AADTT), roadway section lengths (centerline)	Caltrans
	Rail Freight Demand	Rail freight tonnage	Tons originating/terminating by rail in the region	Carload waybill sample
	Air Cargo Demand	Air freight tonnage	Tons enplaned, deplaned or both	Caltrans CA Air Traffic Statistical Reports
Freight Delay	Truck Delay	Travel time above that needed to complete a trip at free-flow speed	Average travel time, free-flow travel time	Need travel time estimates for corridors, not currently available
	Rural National Highway System (NHS) Travel Speed	Global Positioning System (GPS) truck speed data	GPS position records for trucks in Central Coast region	Contract with vendor for GPS data
	Rural Congestion	% of rural miles congested	Volume to Capacity (V/C) ratios for rural highways	Not readily available
Freight Cost/Value	Truck Congestions Cost	Annual cost of wasted time and fuel for large trucks due to congestion	Daily veh. Hours of delay, % commercial vehicles, value of commercial vehicle time, annual conversion factor	Not readily available
	Truck Commodity Value	Value of commodities carried by truck in region	Commodity value for Central Coast truck moves	FAF3 database (FHWA Commodity flow database)
System Condition	Pavement Condition	% pavement/lane miles in good or better condition	International Roughness Index for high-speed roads, conditional ratings for low-speed roads	Caltrans
	Bridge Condition	% of bridges in good or better condition	# of bridges that are not Structurally Deficient (SD), Functionally obsolete (FO), SD, FO, or substandard for load only, total number of bridges	Caltrans
	Deficient Bridges	# of structurally deficient/functionally	Bridge condition ratings for all bridge	Caltrans

Performance Measure	Performance Metric	Description	Data Needs	Potential Sources of Data
		obsolete bridges	components	
	Short Line 286K Railcar Capacity	% of short line track miles capable of handling 286K cars	Short line/region track miles capable of handling 286K cars, total shortline/regional track miles	Caltrans
Safety	Truck-Involved crashes	# of truck-involved injury/fatal crashes	Crash incident records including vehicle types involved	Caltrans
	Grade Crossing Collisions	# of highway-grade crossings collisions/fatalities	Grade crossing accident reports/records	Caltrans
Services	Truck rest area/parking utilization	# of trucks that use rest areas/truck parking facilities	Time-of-day truck counts at truck parking facilities, capacity	Not readily available

2.2 California Freight Mobility Plan (2014)

2.2.1 Summary

The California Freight Mobility Plan (CFMP) is a statewide planning document that examines freight movement across every mode of transportation. It serves as a high-level analysis of the transportation system and identifies initiatives and projects needed to strengthen California's position in the global market. Four purposes were identified for the plan, including: 1) building on previous freight plans such as the Goods Movement Action Plan (2008) and programs such as the Trade Corridors Improvement Fund, 2) prepare a freight plan consistent with Federal guidelines, 3) provide a foundation for air quality improvements and energy transition programs that will guide and support the freight sector in achieving pollutant and GHG reductions, and 4) serve as a catalyst to normalize freight as a regular part of transportation planning in California. The CFMP is developed out of requirements of MAP-21, which encouraged states to develop state freight plans. Thus, the goals are closely aligned with the six MAP-21 guidelines.

2.2.2 Vision and Goals

The Plan's vision state reads: "As the national gateway for international trade and domestic commerce, California enhances economic competitiveness by collaboratively developing and operating an integrated, multimodal freight transportation system that provides safe, sustainable freight mobility. This system facilitates the reliable and efficient movement of freight while ensuring a prosperous economy, social equity, and human and environmental health."

The six goals for the freight movement system are: 1) Improve Economic Competitiveness, 2) Congestion Relief, 3) Improve Safety and Security, 4) Freight System Infrastructure Preservation, 5) Support Innovative Technology and Practices, and 6) Environmental Stewardship.

2.2.3 Issues and Recommendations

The Plan's 11 identified needs include:

- **Funding.** Obtaining a substantial, predictable, long term freight funding source(s) is the highest priority identified in the CFMP.
- **Strengthen Multi-Agency Coordination to Achieve Air Quality and Other statewide Goals.** Transportation projects and issues extend beyond any single municipality and require a coordinated, cooperative response.
- **Needed Guidance.** Near-term guidance (next one to three years) is needed to ensure that transportation, environmental, and land use projects are implemented in accordance with Caltrans' mission, the vision of the CFMP and the State's environmental sustainability goals.
- **Dedicated Truck Facilities.** With few exceptions, trucks utilize the same road network as automotive travelers. Delays on this system harm the economic competitiveness of companies in the state. The need for dedicated truck facilities is largely unmet.
- **Identification of State's Highest Priority Freight Corridors and Facilities for Investment.** Projects that are located on high priority corridors or at gateways, hubs, and last-mile connectors served by those corridors should be prioritized for funding. The Trade Corridors Improvement Fund Program is identified as a key funding resource.
- **Mode Shift.** There is a need to explore an new mode to serve inter-urban freight movements beyond roads and rail.
- **Maintain Competitive Edge.** California will always have a substantial freight sector. However, as the rest of the United States and the world expand their ability to move goods, California must be diligent in order to keep discretionary freight shipments and their related jobs in the State.
- **Maintain and Preserve the Freight System.** Maintenance and preservation work is needed. California's road network was mostly built in the 1950s and 1960s and is the most in need of care.
- **Capacity Expansion.** An increasing population and economy are placing additional pressure on an already stretched system.
- **Climate Change Planning.** Develop a sea-level-rise plan that addresses the freight industry through coordination among industry, government, and communities.
- **Education.** Create a comprehensive education strategy to train the next generation of transportation planners and freight/supply chain managers that can work towards enhancing the freight system in the future.

2.2.4 Performance Measures

Performance measures are split into three modes and are aligned with the CFMP goals above:

Highway Metrics	Rail Metrics	Seaport Metrics
Pavement Condition	Train Height Clearances	Navigation Channel Depths
Bridge Condition	Track Weight Limits	Waterway Bridge Clearance
Truck Travel Speed	Posted Max. Train Speed	
Truck Hours of Delay	Rail Bottlenecks/Chokepoints	
Highway Bottlenecks/Chokepoints	Railroad Grade Crossing Fatalities and Injuries	
Corridor Reliability Buffer Index		
Roadway Truck Collisions, Fatalities, and Injuries		

2.3 Caltrans U.S. 101 Transportation Concept Report (2014)

2.3.1 Summary

This study is a multimodal look at the entire U.S. 101 corridor that identifies trends and deficiencies, providing a basis for long-term preservation strategies. This technical document does not define policy, and is largely informational. U.S. 101 is the main alternate route to Interstate 5 which fully closed 17 times between January 2006 and January 2011. Agriculture and manufacturing are key freight-generating economic sectors in the corridor. Union Pacific owns the main rail right-of-way parallel to U.S. 101 which handles freight, commuter, and inter-city traffic, but conducts only limited loading/unloading in the region. Conversion to freeway is a key recommendation. The 2035 concept also includes conversion from a four-land to a six-lane highway at strategic locations. This concept will have a number of benefits for the freight sector. A mixture of high-volume, high-speed traffic with uncontrolled access on a conventional highway can interrupt traffic flow, compromise interregional mobility and increase the likelihood for vehicle accidents at conflict points. Highways with limited access onto and off of the right-of-way allow for improved vehicle flow, reducing congestion concerns. Both of these upgrades will allow trucks more predictable and faster access to origins and destinations within and beyond the region.

2.3.2 Visions and Goals

The goal of this document is to identify multimodal transportation trends and deficiencies within U.S. 101, provide a basis for considering future action to preserve the corridor long-term, and develop the data resources necessary to plan and monitor progress on these goals. Caltrans' vision for the corridor is to optimize existing facilities to improve throughput, increase opportunities for intermodal operation, improve safety and operations, provide a sustainable transportation system, and support efficient and reliable travel for all modes.

2.3.3 Issues and Recommendations

The main freight need identified in this study is to evaluate existing and future truck access, parking, and overall travel needs. Growing congestion on the route due to population and employment will also impact

freight movement, though the solutions do not necessarily involve freight-related projects. An example is the U.S. 101 South Coast HOV lanes in Santa Barbara that has built an HOV lane as a way to relieve congestion caused mainly by personal vehicles that will have an ancillary impact on freight movement. Ramp metering, which would manage the flow of traffic entering U.S. 101 at on-ramps, electronic toll collection, and other system management approaches would also benefit freight movement in the corridor without specifically targeting freight. Transportation Demand Management strategies such as carpools, ridesharing, and alternate work schedules may help.

A specific project mentioned by the study is the Unikool agricultural processing facility just south of Salinas. This new operation is projected to generate a large number of trips, including 5,839 heavy-truck trips per day that will have significant impacts on U.S. 101 operations. Better understanding of agricultural freight movements is needed, as is incorporating defense related shipments into planning, especially as it relates to Vandenberg Air Force Base, located off of U.S. 101 in Santa Barbara County. San Benito County and the area between San Luis Obispo and Santa Maria are also mentioned as sources of future traffic on the route due to both agricultural output and increasing opportunities for commercial and residential growth.

2.3.4 Performance Measures

A list of specific performance measures for the corridor related to freight movement was not developed in this report. However, for each of the segments of U.S. 101 in District 5, Caltrans measured the following during the PM Peak:

- Traffic volume;
- Vehicle miles traveled;
- Vehicle hours traveled;
- Volume/capacity ratio;
- Level of service;
- Average speed; and
- Capacity per lane.

Trucks utilize the same road network as other vehicles, therefore, these performance measures all have a bearing on freight movement. Segments of U.S. 101 with a high volume/capacity ratio or low average speed, for example, indicate congested sections which negatively impacts the movement of freight. As these performance measures improve, freight movement will also improve. The appendix also includes the percent of roadway in each segment with truck climbing lanes – a freight specific metric that indicates areas with geographic constraints and high volumes of trucks.

2.4 San Luis Obispo Council of Government (SLOCOG) U.S. 101 Mobility Master Plan (2014)

2.4.1 Summary

This study examined U.S. 101 in San Luis Obispo County. Four sections of the route (totaling 25 out of 70 miles) were studied in detail in order to develop a final recommendation list of multimodal projects on the corridor that should be included in requests for funding. More efficient goods movement was considered as an ancillary benefit for each of the proposed projects but was not the motivating factor for any of them.

2.4.2 Visions and Goals

The plan's vision is, "Connecting communities within and across the region to improve travel time reliability, safety and modal choices for the efficient movement of people and goods." The main goal of this plan was to

develop a list of projects that would improve future conditions on U.S. 101 for all users using a cost/benefit analysis and through evaluating success according to 12 performance measures.

2.4.3 Issues and Recommendations

Four sections of the route (totaling 25 out of 70 miles) were studied in detail. Specific needs were identified for each and can be grouped into five general categories:

- Increase capacity on U.S. 101 and important cross streets.
- Simplify and improve design and management of intersections in the interim while looking to transition the entire stretch of U.S. 101 to highway condition. This includes design features such as expanded acceleration lanes.
- Provide better access management to U.S. 101 mostly by converting intersections to ramps.
- Close bicycle and pedestrian system gaps and extend routes when possible.
- Increase access to and availability of park and ride lots for all vehicles.

These needs were then divided into Short-Term (Within 5 years), Short-Medium Term (5 to 10 years), Medium-Long Term (10 to 20 years) and Long Term (20+ years) recommendations. Addressing these needs, except for the bicycle/pedestrian connectivity issue, would improve freight capacity and congestion issues along the corridor by reducing the amount of congestion created by personal vehicle use.

2.4.4 Performance Measures

Twelve performance measures were used to select the four segments that were studied in detail. The initial screening criteria, which were not specific to freight, include the following:

Group	Phase I Performance Measure	Score Criteria
Corridor Vehicle Operations	U.S. 101 Mainline Level of Service	Level of Service (LOS) A-C=0, LOS D=2.5, LOS E=5, LOS F=10
	U.S. 101 Merge-Diverge Level of Service	LOS A-C=0, LOS D=2.5, LOS E=5, LOS F=10
	U.S. 101 Weave Level of Service	LOS A-C=0, LOS D=2.5, LOS E=5, LOS F=10
	Parallel Roadway / Intersection Level of Service	LOS A-C=0, LOS D=2.5, LOS E=5, LOS F=10
Corridor Safety	U.S. 101 Safety (Collisions)	Crashes per MVMT < expected (using TASAS, as compared to facilities in California)=0 0.1675>expected=2.5 0.335>expected=5 0.5025>expected=7.5 0.67>expected=10
	Parallel Roadway Safety (Collisions)	Number of parallel network crashes(0)=0 Number of parallel network crashes(31)=2.5 Number of parallel network crashes(62)=5 Number of parallel network crashes(92)=7.5 Number of parallel network crashes(123)=10

Group	Phase I Performance Measure	Score Criteria
Emissions	U.S. 101 Emissions	Tons of CO ₂ with Pavley I+LCFS (0)=0 Tons of CO ₂ with Pavley I+LCFS(0.755)=2.5 Tons of CO ₂ with Pavley I+LCFS(1.51)=5 Tons of CO ₂ with Pavley I+LCFS(2.265)=7.5 Tons of CO ₂ with Pavley I+LCFS(3.02)=10
Vehicular Connectivity	Parallel Roadway Connectivity	Frontage roads or adjacent route=0 Alternate route that is slower or longer=5 No alternate routes=10

Other performance measures with limited applicability to the current study included park and ride coverage, transit coverage, bicycle connectivity, and pedestrian connectivity.

2.5 Santa Barbara CAG 101 in Motion Final Report (2006)

2.5.1 Summary

This 2006 study produced a consensus package of projects to improve mobility in the U.S. 101 Corridor in Santa Barbara County, from the Ventura County line north/west for approximately 27 miles to Winchester Canyon. This section of U.S. 101 saw the highest traffic volumes in the county, with up to 66,000 vehicles per day. This volume is projected to increase between 20 percent and 45 percent in different sections in the coming decades.

While not specific to freight needs, reducing congestion on the route will help increase the efficient movement of freight in the corridor. Overall, truck traffic was not seen as a major contributor to congestion during the peak period, accounting for only 5 percent of all trips on U.S. While the planned HOV lane has been completed, commuter rail is on hold pending negotiations with Union Pacific for use of their tracks. Off-hours delivery is a voluntary part of the operations improvement goal that may warrant exploration in other segments of the route.

2.5.2 Visions and Goals

The main goal of this study is to find long term solutions to growing congestion problems along 27 miles of Highway 101 in Southern Santa Barbara County. Goals focus on managing demand, creating multimodal options for travel, and increasing operations and safety capacity. Freight movement is tangential to main goal of improving commuter travel. No overarching vision was identified in the plan.

2.5.3 Issues and Recommendations

A full list of identified needs and issues from this study is below:

Problem/Need	Description
Recurrent Traffic Congestion	22 miles of U.S. 101 during the AM Peak and 27 miles during the PM Peak hours already experience congested levels of service. This is expected to spread both geographically and in time of day over the next 25 years.
Physical Constraints	The built environment along with physical geography and distinct vegetation make expanding U.S. 101 difficult, as well as severely limits the options for new construction.
Design Deficiencies	Inadequate weave distances, left-side egress and ingress, limited acceleration lanes, and other design features lead to congestion and safety issues on U.S. 101.
Discontinuity of Arterial System	There are limited continuous parallel routes that could take pressure off of U.S. 101 forcing nearly all traffic to use U.S. 101, and limiting alternative routing options during incidents.
Insufficient Mode Choice	Auto dependency is due to lack of viable alternative modes in the corridor, increasing the use of SOV and congestion
System Management	There is no coordinated freeway management, incident management, or traveler information system for the entire U.S. 101 corridor.
Population and Employment Density and Growth	Population is forecasted to grow by 30% and jobs by 44% between 2000 and 2030.
Jobs-Housing Imbalance	The high cost of housing is driving up commute times, as people move north in the county for affordability, while jobs remain in the southern part of the county.
Safety	Congestion has led to an elevated number and severity of crashes on this section of U.S. 101 compared to similar California routes.

All of these issues impact the movement of goods in the region. Congestion and incidents especially impact the movement of goods, leading to delays, increased pollution, and higher costs for producers and consumers.

Projects recommended to improve this corridor include:

- Adding a lane for HOV between Milpitas and the Ventura County Line and adding commuter rail service to Goleta to reduce congestion.
- Improving transit and carpool use through the creation of bus priority lanes on select arterials using queue jumps and signal priority, converting inside shoulders of the freeway to bus only lanes during peak hours, and the creation of HOV lanes.
- Manage transportation demand by offering incentives for vanpools, carpools, and other trip reduction strategies, and encouraging telecommuting and flextime to reduce congestion.
- Improving operations and communications using ITS, ramp metering, real-time arrival information at bus stops, and 511 services.
- Improvements including auxiliary or additional lanes where needed, demand management, rideshare programs, long-term planning for expansion, commuter rail, and other projects.

2.5.4 Performance Measures

Evaluation criteria in this report were divided into three sections: Transportation Performance, Community/Environmental Considerations, and Cost/Implementation. The most relevant ones to freight movement are:

Transportation Performance Criteria	Objectives	Measures
Improve Mobility/Increase Capacity	• Increase peak hour person trip capacity • Reduce peak hour corridor person trip demand • Increase network capacity	• Added person trip capacity (PPH) • Reduced demand, PPH • Reduce number of gaps and lane drops
Reduce Congestion	• Improve LOS to “D” or better • Reduce person hours of congestion	• Number of “D” or better locations • Total reduce hours of congestion
Improve Safety	• Reduce Corridor Accident Potential	• Rating from 1-5 based on representative accident rates
Improve Goods Movement	• Increased Goods movement capacity and reduce conflicts	• Added Highway/Rail capacity usable for freight reduced conflicts/regulatory constraints
Economic Vitality	• Minimized Impacts	• Congestion Relief • Potential Pricing and Job Creation Impacts

2.6 Monterey Bay 2035 Metropolitan Transportation Plan/Sustainable Communities Strategy (2014)

2.6.1 Summary

The Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) is the Long Range Transportation Plan (LRTP) for the AMBAG region and includes land use, housing, and environmental considerations in addition to transportation projects. The region is growing, with 2035 projections of 885,000 (more than 150,000 person increase) and will add 65,000 jobs. Growth in all modes of travel is projected with accompanying congestion and environmental concerns. Agriculture is a critical economic sector in the region and agricultural goods are almost entirely transported by truck. A long-term goal of the region is to transition some these shipments to rail in order to alleviate pressure on the region’s highways, reduce congestion and infrastructure costs, improve safety, and generate environmental benefits.

2.6.2 Visions and Goals

This study sets out a vision of a more efficient multimodal transportation system that provides sustainable access to jobs and education while improving quality of life. To achieve this vision, AMBAG focused on six broad goals for the region:

- **Access and Mobility.** Convenient, accessible, and reliable travel options for people while maximizing productivity for people and goods;
- **Economic Vitality.** Raise the region’s standard of living by improving the economy;

- **Environment.** Promote sustainability and protection of the natural environment;
- **Healthy Communities.** Protect the health of residents, foster efficient development patterns, and encourage active transportation;
- **Social Equity.** Provide transportation services to all segments of the population; and
- **System Preservation and Safety.** Preserve and ensure a safe and sustainable regional transportation system.

2.6.3 Issues and Recommendations

Topics addressed in this study spanned across all modes of transportation. Those related to freight movement include:

- Transition freight from truck to rail whenever possible with an emphasis on agricultural goods movement. The planned Salinas Valley intermodal station is highlighted as a model project.
- Study impacts of goods movement on major arterials and corridors. Continue to support projects to improve mobility.
- Population growth and job growth will lead to increased congestion that will impact freight movement, as well as increased demand for goods. This will create the need for more trucks on the road.
- Develop a new, reliable, and long-term source of funding for transportation projects. The Highway Trust Fund, which is the main funding source for transportation projects is not sustainable in its current form.

2.6.4 Performance Measures

Freight-related performance measures and goals proposed in this study include:

- Daily truck delay goals (Economic Vitality). 2,802 hours in 2010. 11,471 in 2035 no-build scenario, 10,667 in 2035 MTP/SCS scenario.
- Greenhouse gas reduction goals (Environment) –Comply with Senate Bill 375, California Global Warming Solution Act, (Nunez, 2006), which requires the AMBAG region to reduce GHG by 5 percent per capita by 2035.
- Maintenance of the transportation system goals (System Preservation and Safety). 50% of total spending goes to rehabilitation and maintenance.
- Fatalities and Injuries per capita goals (System Preservation and Safety). 0.4% in 2010, and remaining 0.4% in both 2035 no-build and MTP/SCS scenarios.

2.7 SLOCOG Regional Transportation Plan (Draft 2014)

2.7.1 Summary

This is the regional transportation plan (RTP) for San Luis Obispo (SLO) County, and includes a Sustainable Communities Strategy (SCS) plan that together provide a blueprint for the region's transportation system that enhances the quality of life while meeting current and future mobility needs. San Luis Obispo County is growing, both in terms of population and employment, with most of the growth focused in urban areas along the U.S. 101 corridor.

Key freight dependent industries are similar to other areas of the Central Coast. Commute patterns, and therefore most congestion, is focused around the City of San Luis Obispo, with AM peak congestion inbound from both north and south, and PM peak congestion outbound. Truck traffic, while lower than that found around Salinas is still high, with at least 5,500 trucks per day recorded at two locations south of San Luis Obispo. U.S. 101 is the main corridor for the region, both for personal movement and commodity flow.

2.7.2 Visions and Goals

The overall vision of the 2014 Regional Transportation Plan is, "To create a fully integrated and intermodal transportation system that facilitates the safe movement of people, goods, and information within and through the region while encouraging the development of more sustainable communities." In order to achieve this vision, a number of goals and corresponding policy objectives were developed, including:

Goal	Objective
Mobility and Congestion Reduction	Provide reliable, integrated, and flexible travel choices and a reduction in congestion within and through the region
Accessibility	Improve accessibility to goods, services and jobs
Safety and Security	Enhance public safety and security in all modes of travel and achieve a significant reduction in accidents, fatalities, and serious injuries on all public roads
Sustainability	Maintain and improve the efficiency of the surface transportation system and the project development and delivery process
System Reliability	Maximize the efficiency of the existing transportation system
Equity	Avoid a disproportionately adverse impact to all sectors of the population Provide equitable levels of funding and transportation services to all areas, users, communities, and socioeconomic groups
Livability	Support livable community concepts and efforts Reflect community values while integrating land use and transportation planning
Environmental Protection	Conserve and protect natural and sensitive resources Preserve aesthetic resources and promote environmental enhancements with all transportation projects
Freight Movement and Economic Vitality	Improve the freight network and strengthen the ability of rural communities to access national and international trade markets Support regional economic development

Key policies include the following:

1. Support the economic vitality of the region by improving highways and regionally-significant local streets and roads to increase multimodal access and mobility;
2. Improve the efficiency of the transportation system and minimize the adverse impact of commodity movement throughout the region;
3. Establish appropriate modern electronic and other controls and procedures to assure the safe transportation of hazardous materials by all transportation modes;
4. Promote integration of bikeways and other active modes of transportation within existing, replacement, newly proposed pipeline and utility corridor easements, where feasible; and
5. Support mitigation of freight rail impacts on the efficiency of passenger train movement.

2.7.3 Issues and Recommendations

1. Work with local jurisdictions and Caltrans to improve truck routes and facilities to maximize their safe use by large trucks and prioritize construction for a number of projects;
2. Replace existing interchange bridge structures on U.S. 101 to meet 16'-6" minimum vertical clearance and provide sufficient bridge length allowing construction of six lanes on US 101;
3. Review any proposals to truck heavy cargos on non-designated truck routes with applicable agencies to address adverse impacts on the maintenance of streets and roads;
4. Work with Caltrans an the Central Coast to identify appropriate locations along the U.S. 101 Corridor to establish truck parking facilities and support improvements;
5. Request consideration of onshore oil pipelines as an alternative to truck transport systems;
6. Review all routes proposed by state and federal agencies for hazardous/explosive/nuclear materials transport in and through the region;
7. Coordinate with county and city emergency services and other appropriate regulatory and enforcement agencies to ensure an effective emergency response network;
8. Review and comment on all major proposals to ship hazardous materials by rail, ship, or truck through the region;
9. Request Caltrans and the CHP hold public hearings in San Luis Obispo to consider any route designation request should PG&E desire to ship high-level radioactive material;
10. Support the de-certification of SR 1, SR 41, and SR 46 as explosive shipment routes; and
11. Continue to monitor the separation of hazardous materials by classification and routing and shipping restrictions by class, and discourage the shipment of hazardous materials during peak hours.

2.8 Santa Barbara CAG (SBCAG) Regional Transportation Plan and Sustainable Communities Strategy (2013)

2.8.1 Summary

This study is the Long Range Transportation Plan for SBCAG and includes land use, housing, and environmental considerations in addition to transportation. Freight-specific topics coalesce around U.S. 101's importance to the region and the heavy reliance on truck trips to move goods. Population growth, combined with a current job/housing imbalance that sees the majority of the jobs located in the southern part of the region while housing is growing in the northern portion creates a dependence on automobiles (65.5 percent of workers use SOV), and thus congestion for both automobiles and trucks centered on U.S. 101.

2.8.2 Vision and Goals

Although no overall vision for the region was identified in the plan, the purpose of the RTP is to, “set forth a plan for how the region will invest limited transportation funds to maintain, operate, and improve an integrated, multimodal transportation system that facilitates the efficient movement of people and goods.” In order to achieve this, five goals were developed: 1) Environmental Sustainability, 2) Mobility and System Reliability, 3) Safety and Public Health, 4) Social Equity, and 5) Prosperous Economy. Freight movement topics are included under Mobility and System Reliability goals, with identified policy objectives listed below:

- Make efficient use of the existing transportation system
- Identify and construct projects to improve freight movement, including rail projects, highway projects, and projects to improve ground access to airports and rail terminal in the region.
- Regularly collect and update information on freight and goods movement and facility needs.
- Address freight and goods movement facility improvement needs as a high priority, including needs identified in the Central Coast Coalition Commercial Flow Study, with special focus on U.S. 101 Corridor projects.
- Consider freight and goods movement in the design and planning of all projects.
- Plan for intermodal connectivity in freight and goods movement in order to shift more freight to rail.

2.8.3 Issues and Recommendations

The Plan identifies a number of issues and challenges facing Santa Barbara County, one of which—Goods Movement—is directly concerned with freight.

Issue or Challenge	Sub-topics	Explanation
Jobs/Housing Imbalance	Housing Affordability	The majority of housing in the region is located in the northern part of the county, most jobs are in the southern sections. This generates a large number of commuters and produces congestion. This is driven by lower housing costs in the north of the region, and by the limited amount of housing stock available in the Southern Coast—partially due to retirees choosing to remain in their homes.
	Aging in Place	
Population Growth		The county is expecting to grow by approximately 520,000 people by 2040, an increase of 23% over the 2010 population. This will place further burden on the road network, both in terms of commuters and by increasing demand for goods.
Auto Dependence	Lengthening Commutes	Although more people are using transit (up 91.4% between 1990 and 2010), the majority of workers in the region still utilize single occupancy vehicles (SOV). As the population increases and the jobs/housing imbalance continues, more automobiles enter the road system leading to congestion, longer commutes, and increasing costs for both road users and repair work.
	Increasing Congestion	
	Increasing Costs	
Social Equity		14% of the Santa Barbara County lives in poverty, with the highest rates found in Lompoc, Santa Maria, and Guadalupe.
Air Quality and Climate Change		Federal and state restrictions will decrease the amount of reactive organic gases by 69% and the amount of nitrogen oxide by 65% by 2030. Transportation is the second largest source of GHG, and is forecasted to increase 25% over 2005 by 2035 without State and Federal controls.
System Security		Resiliency in transportation network is critical to protect the transportation network from disruptions.
Public Health and Safety	Physical Activity and Active Transportation	Public health and safety is closely tied to transportation choices.
	Collision Injuries and Fatalities	
	Air Pollution	
	Climate Change	
	Stress and Mental Health	
Goods Movement		The economy and quality of life in the SBCAG region depend on the ability of shippers to move goods safely, efficiently, and cost-effectively. More than 16 million tons of freight moved to, from or within Santa Barbara County in 2007.
Intermodal Connectivity		The ability to link a trip between various modes is critical in creating an effective transit network.
Financial Constraints, Growing Needs, and Infrastructure Maintenance		Constrained funding combined with growing needs and an aging infrastructure places a burden on the ability of Santa Barbara County to maintain its transportation system.

2.8.4 Performance Measures

Performance measures for the Mobility and System Reliability goal include:

- Roadway Level-of-Service;
- Average travel distance (all trips and work trips);
- Average travel time;
- Average commute time (workers);
- Transit ridership;
- Transit accessibility (% of population and jobs within ½ mile of bus stop with frequent and reliable service);
- Percent mode share (all trips); and
- Percent mode share (workers).

These performance measures are not specific to freight but may impact goods movement performance. Since trucks utilize the same road network as other users, decreases in average travel time or improved level-of-service will have positive impacts on truck movement.

2.9 Salinas Valley Truck to Rail Intermodal Facility Feasibility Study (2011)

2.9.1 Summary

This 2011 study was produced by AMBAG to analyze the potential for building and operating a truck-to-rail intermodal facility to improve the movement of perishable, agricultural goods from the region. The study shows that there is a compelling case for building the facility, with two alternative sites selected utilizing GIS to determine site suitability. The most urgent considerations driving this are labor costs, labor shortages, and volatile fuel costs. The project would provide congestion relief to the U.S. 101 corridor, reduced air pollution emissions, and encourage mode-share shifts from truck to rail which would reduce truck traffic along the U.S. 101. Priority site locations were chosen to minimize truck congestion to and from the facility by routing truck traffic off of U.S. 101 and onto frontage roads.

2.9.2 Visions and Goals

Building off of a 2008 study from the Growers-Shippers Association of Central California, the goal of this study was to identify how to provide an alternative mode for Monterey County agricultural producers to maintain economically competitive by reducing their reliance on truck-based goods movement. This would be accomplished by implementing a rail mode to rapidly transport perishable agricultural products to key east coast markets. Implementing a rail mode would result in cost savings for producers, and reducing truck traffic would reduce congestion, improve air quality, and improve safety for the region. To that end, this study determined whether a truck-to-rail intermodal facility in the Salinas Valley was feasible, identified the best potential sites, created a preliminary operating plan, and conducted preliminary environmental assessments on potential sites.

2.9.3 Issues and Recommendations

Needs and issues revolve around site specific concerns and did not include traditional planning concerns. Needs for an intermodal facility included:

- Access to roads;
- Access to rail;
- Access to cooler locations;
- Suitable land use; and
- Topography and flooding concerns.

Based on the above criteria, two candidate sites were selected. The first is located just north of the City of Gonzales. This site provides for adequate truck access while limiting the possibility of vehicles queuing on public roads, is adjacent to existing Union Pacific tracks, and avoids sensitive areas such as a cemetery and wineries on the southern side of town. The second site selected is on the west side of Chualar. This site would also limit trucks queuing on public roads, would avoid the need for a new at-grade rail crossing, and utilizes existing ramps on U.S. 101.

An intermodal facility at either location would reduce future truck traffic on the U.S. 101 Corridor by 46,800 truck trips a year. Truck-mileage savings vary depending on destination. For shipments to the Eastern Seaboard, the study estimates that over 126 million truck-miles could be saved by using rail to move goods from the Salinas Valley to Philadelphia, PA. Local drayage trips to the intermodal location in the Salinas Valley would average only 8.5 miles. This switch would also increase the resiliency of the regional freight network by providing an alternative mode of transport to growers in the region and reduce greenhouse gas emissions.

2.9.4 Performance Measures

Performance measures were not developed beyond those used to determine site suitability within the study. It was determined that two sites, Gonzales and Chualar, would offer a viable location and could sustain profitable operations in the region.

2.10 Other Regional/State-Level Plans

2.10.1 Safety Roadside Rest Area Master Plan Final Task 5 Report (2011)

This study looked at the Safety Roadside Rest Area (SRRA) system and recommended sites for closure, rehabilitation, or new construction throughout California. At current SRRAs statewide, approximately 26 percent of vehicles entering are buses or trucks. There are 10 total SRRAs on U.S. 101, of which four are within the primary study area. Camp Roberts NB/SB and Gaviota SRRA (NB/SB) are separated by 117 miles. Camp Roberts NB sees 23 percent trucks/buses, SB sees 32 percent trucks/buses; Gaviota NB sees 17 percent trucks/buses, Gaviota SB sees 13 percent trucks/buses. Shandon SRRA on SR 46 is also within the study region, and receives moderate daily traffic (16,400 vehicles per day) with only minor capacity issues for automobiles forecasted. 27 percent of entering vehicles are trucks/buses. The need for a new rest area on U.S. 101 between Gaviota and Camp Roberts is identified as a second-tier need, with the possibility of developing a location near the Betteravia Rd (Exit 169) interchange into an Alternative Rest Area Stopping

Opportunity (public/private commercial rest area). The California Highway Patrol noted limited occurrences of illegal truck parking on U.S. 101, mostly on the shoulder of interchanges or along the mainline.

2.10.2 California State Rail Plan (2013)

California's State Rail Plan addresses both freight and passenger rail in the state. The Plan's vision for the future is, "California has a premier, customer-focused rail system that successfully moves people and products while enhancing economic growth and quality of life." The report predicts that the Panama Canal expansion and related port projects will not significantly change trade on California freight railroads as railroads will adjust pricing to remain competitive, among other economic factors. The study also identifies freight chokepoints and bottlenecks. Class I railroads in the area receive enough traffic from businesses on the line to vindicate maintenance of the system, though the financial justification to expand offerings remains in doubt. The plan stresses the importance of short line railroads, including the Santa Cruz Branch Line, Santa Maria-Valley Rail, and Monterey Bay Railway Company, identifies \$16 billion in trade corridor and grade-separation projects, and recognizes the need to confront the potential for conflict between freight and growing passenger rail operations. Freight railroad goals include integration with other freight modes and with passenger rail, lowering energy use and pollution, maintaining global competitiveness, and aiding in developing livable and vibrant communities. Trends projected through 2040 include:

- Outbound moves will overtake inbound moves. This is an important trend as it increases the need for an intermodal facility in the Salinas Valley.
- Intermodal shipments will overtake train carloads as the ability to transfer shipments between different modes of transportation improves.
- Mixed freight—carloads with more than one type of commodity in them—will continue to be the dominant commodity moved by rail.
- Currently, shipments that do not utilize the port outnumber port-related shipments two-to-one. This will change to an even split as California's economy continues to globalize.
- Security planning and routing may force changes on routes for hazmat shipments. Although already tightly regulated, railroads moving hazardous material may face new, more restrictive limits on moving hazardous material through communities.

2.10.3 Southern California Association of Governments (SCAG), On the Move, Southern California Delivers the Goods (2013)

This plan focuses on freight movement in the South California Region including Inland Empire and Imperial Valley. The vision for this plan is to ensure that the region continues to play a vital role in the global supply chain while meeting regional economic goals, addressing mobility issues, preserving the environment, and contributing to quality of life and livability goals. Truck traffic in the region is projected to grow (along with population and economic output), especially for goods moving from/to the San Pedro Bay Ports of Los Angeles and Long Beach. More than 90 percent of these truck trips are intraregional, which limits the possibility of increasing the shift to rail for these goods. Two locations on U.S. 101 in Ventura County are identified as a Top 50 truck bottleneck, and the below projects would help alleviate congestions on U.S. 101 in Ventura County. This area is critical as a large portion of truck traffic from the study area travels through Ventura County when entering and exiting the southern part of the study area.

- In the City of Oxnard at Rice Ave: Interchange reconstruction to improve access and reduce truck congestion; and
- Various improvements in the City of Thousand Oaks including converting an auxiliary lane to mixed flow, adding a lane in each direction, widening three bridges, and realigning ramps. U.S. 101/SR 23 connectors are also slated for improvement.

2.10.4 San Francisco Bay Area Freight Mobility Study (2014)

Major trends identified in this study that will impact the nine-county Bay Area (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties) include anticipated growth of agricultural exports through the Port of Oakland as well as distribution of imports from warehouses in the San Francisco Bay area to the Central Coast. Both of these movements are heavily reliant on truck traffic, and U.S. 101 is a major corridor into and out of the San Francisco Bay area. The growth of e-commerce is also expected to change distribution patterns with an increase of urban deliveries by trucks. U.S. 101 is identified as a core component of the intraregional system, with multiple bottlenecks due to high levels of truck delay including one in Santa Clara County near the intersection with SR 85. There is an extensive list of performance measures that fit into California's six goals: 1) Economic Competitiveness, 2) Safety and Security, 3) Congestion Relief, 4) Freight System Infrastructure Preservation, 5) Innovative Technology and Practices, and 6) Environmental Stewardship. These performance measures are grouped into the following topics:

- **Demand.** Tons of freight moved via truck, air, rail, and at ports;
- **Safety.** At-grade crashes, truck involved crashes/fatalities, truck-involved crash injury rate;
- **Condition.** Pavement and bridge conditions, track miles rated for 286k and above, track miles rated Class 2 or higher;
- **Mobility.** Travel time index on freight significant routes, percent on-time departures and arrivals for air;
- **Economic.** Multimodal value of freight, percent of through freight versus locally generated; and
- **Environmental.** Metric tons of GHG per ton-mile.

Future studies were also recommended for the following topics: Data and Modeling Capabilities; Global Gateway Needs Analysis; Interregional Corridor Analysis; Industry Supply Chain Studies; Urban Goods Movement Toolbox and Guidance for Priority Development Areas; Freight System Resiliency Study; Freight ITS and Technology Applications; and Freight/Environment Studies including converting drayage trucks to cleaner engines, market and site selection for alternate fuels, and climate change adaptation strategies for vulnerable freight resources.

2.10.5 Monterey County Regional Transportation Plan (2014)

This study is the Regional Transportation Plan for the Transportation Agency for Monterey County. The study is Monterey County's detailed version of the transportation projects included in AMBAG's *Monterey Bay 2035* plan. Population and employment are expected to grow in the county through 2035 with agriculture representing the major industry in the area.

The mission of the Transportation Agency is to plan and proactively fund a transportation system that enhances mobility, safety, access, environmental quality and economic activities in Monterey County by investing in regional transportation projects. Goals were derived that are consistent with *Monterey Bay 2035* and include the following: 1) Access and Mobility, 2) Safety and Health, 3) Environmental Stewardship, 4) Social Equity, and 5) Economic Benefit.

Projects and needs related to goods movement in the county include:

- Tolling on SR 156 which would raise funds to help cover construction costs as well as potentially fund other projects in the area. This would create a new four-lane highway while converting the existing roadway into a frontage road, expanding capacity and reducing congestion.
- Extending daily passenger service to Salinas from Sacramento would reduce congestion from automobiles on U.S. 101 which would aid freight movement.
- Widen U.S. 101 to six lanes from Boronda Road to south of Airport Boulevard in Salinas.
- Address a bottleneck at U.S. 101/Sanborn Rd interchange which is a major access route for trucks to coolers and truck facilities in south Salinas.
- Numerous ramp improvements and interchange alignments that will improve traffic flow on U.S. 101.

The study also acknowledges the overall lack of funding available to meet current and future needs.

Performance measures were tied to the five goals outlined above are shown in the table below. Performance measures in **bold** represent those specifically related to freight movement, as congestion in all forms impacts the ability of trucks to reach destinations, and funding of the entire transportation system is required in order to keep roads, bridges, and rails in a state of good repair.

Goal	Performance Measure
Access and Mobility	• % of work trips less than 30 minutes • Average work trip travel time
Safety and Health	• Number of fatalities and injuries per capita • Bicycle, pedestrian, and transit mode share • Congested vehicle miles travel • Harmful airborne pollutants (tons/day)
Environmental Stewardship	• Projected Green House Gas emissions in 2020 and 2035 • Impacts to open space (acres) • Impacts to farmland conservation (acres)
Social Equity	• Distribution of investments • Equitable transit access (low income/minority population within ½ mile of high quality transit stop)
Economic Benefit	• Jobs near transit • Truck delay (hours) • % funding of transportation system

2.10.6 Santa Cruz County Regional Transportation Plan 2014 (2014)

This plan provides guidance for transportation policy and projects through the year 2035 in Santa Cruz County. This RTP, along with those from Monterey County and San Benito County were incorporated into the *Monterey Bay 2035* Metropolitan Transportation Plan/Sustainable Communities Strategy discussed above. The Plan developed three goals: 1) Improve people's access to regular needs in ways that improve health, reduce pollution and benefit the local economy, 2) Reduce transportation-related fatalities and injuries across all modes, and 3) Deliver access and safety improvements cost effectively, within available revenues, equitably, and responsive to the needs of all users and beneficially for the environment

Transportation challenges facing Santa Cruz County include the following:

- **System Preservation.** Maintenance needs are increasing, leading to worse conditions on the road network that trucks rely on.
- **Safety.** Vehicle operator safety in the county has improved, but fatality rates for bicyclists and pedestrians remains a challenge.
- **Congestion.** Population growth and regionwide jobs/housing imbalance will continue to create congestion, which negatively impacts the ability to move goods.
- **Environmental and Public Health.** A sustainable transportation system is critical to quality of life.
- **Energy.** Alternative sources of energy for transportation are needed.
- **Economy.** Transportation projects provide jobs, improvements in the network can reduce costs and free income for residents, and a well-maintained and resilient network creates economic growth opportunities for businesses.
- **Funding.** Existing funding sources are not sufficient to finance maintenance and major transportation improvements. New revenue sources are needed.

Performance measures were developed based on the above three goals. Those that relate to freight movement include:

- Improve travel time reliability for vehicle trips, especially for transit, freight, car/vanpool (Goal 1).
- Decrease single occupancy vehicle mode share (Goal 1)—reduced SOV trips will lower congestion for all road users.
- Reduce injury and fatal collisions by (Goal 2). Crashes are a nonrecurring delay that impact reliability for freight movement (in addition to the economic and social impacts).
- Reduce total number of high collision locations (Goal 2). Crashes are a nonrecurring delay that impact reliability for freight movement (in addition to the economic and social impacts).

- Increase the average local road pavement index: Better road conditions will increase efficiency and safety for freight movements.
- Reduce the number of transportation facilities in “distressed” condition.

2.10.7 On The Move: 2035 San Benito Regional Transportation Plan (2014)

This Plan is the Long Range Transportation Plan for San Benito County. Information from these documents, along with those from Monterey County and Santa Cruz County, were incorporated into the *Monterey Bay 2035 Metropolitan Transportation Plan/Sustainable Communities Strategy* discussed above. The most persuasive reason for developing the Regional Transportation Plan is to address the increased pressure from population growth on transportation infrastructure in the County. The Plan developed six goals and related performance measures to those goals, as show in the table below.

Policy Goal	Performance Measures
Access and Mobility	• Trips within 30 minutes • Commute travel time
Economic Vitality	• Jobs near transit • Truck delay
Environment	• GHG reductions • Open space preservation • Farmland conservation
Healthy Communities	• Alternative transportation trips • Air quality • Congestion
Social Equity	• Distribution of transportation investments • Equitable transit access
System Preservation and Safety	• Maintain the transportation system

Freight mobility is one of the recognized challenges in the Plan. The ability to move agricultural goods from farmers and producers to consumers outside the County will rely on investment in transportation infrastructure—a further challenge in a fiscally constrained atmosphere. The increasing population is also identified as a driver of freight demand. Finally, the need for a truck route network that meets Caltrans and engineering requirements is hampered by geometric restrictions and length/weight restrictions in many locations.

2.11 Data and Needs Identification

This section summarizes the data analysis performed in the documents reviewed above which can be relevant for this study. The highlighted data sources are new data we have identified that could be potentially useful for this study. Data sources not highlighted are either being collected currently or already obtained.

Data Source	Description	Type	What is it used for?	Geographic Extent	Do we need it?	Do we have it?
2035 MTP	Employment by industry growth forecast	Economic	Understanding economic importance of freight industries around corridor, currently and in future	City-level for each county	Yes, but we need it at the more detailed TAZ level if possible	Yes
2035 MTP	Revenue Sources	Economic	Understand how much money (and from where) will be available to fund projects	?	Yes	Yes (MPOs/Caltrans funding allocations)
2035 MTP	Land Use	Economic	Understand potential O/D locations and tie land use with transportation	Subcounty	Yes (urban areas only?)	Yes (AMBAG O/D study)
Central Coast Freight Flows	Truck Count Data	Transportation	Physical count of trucks used to verify model projections— helpful on routes not covered by PEMS	Location-specific	Yes	Yes
Central Coast Freight Flows	GRP by industry	Economic	Understanding economic importance of freight industries in the corridor	?	Ideally Yes	No
Central Coast Freight Flows/SLOCO G 101 Mobility	Truck-involved crashes and fatalities	Trans/Safety	Find high incident locations that impact safety and efficiency	Entire corridor	Yes	Statewide Integrated Traffic Records System (SWITRS)
SBCAG 101 in Motion	Significant Accident Types	Trans/Safety	Understanding the prevalent type of accident at different locations can lead to better understanding of cause/prevention	Entire Corridor	Yes	Yes (Caltrans)
U.S. 101 TCR Caltrans	Lane/Lane miles	Trans	Understand current road condition and capacity	Monterey County	Yes	Yes—need other counties
AMBAG	Agriculture	Econ/Trans	Cooler	County?	Yes	Yes (through

Data Source	Description	Type	What is it used for?	Geographic Extent	Do we need it?	Do we have it?
Salinas Intermodal Study	Cooler Locations		locations are major freight sites			Google Search)
AMBAG Salinas Intermodal Study	Railroad at-grade crossings	Trans/Safety	At-grade crossing are safety concerns, and can cause delays for traffic	National	No	Yes (FRA)
Final SRRA Master Plan	Truck parking study	Trans	Understanding use of truck rest stops in the 101 corridor will help show flows and may aid with truck counts in areas (includes unauthorized locations).	Corridor specific	No	Yes – Truck parking inventory data from AMBAG received
CA Freight Mobility Plan	Pavement and Bridge Condition Data	Trans	Highlights specific rehabilitation needs on roadway system	Statewide	Yes	Yes
Other	Weigh-in-motion	Trans	Allows tracking of truck traffic by weight, time of day, axle count	One location (King City Monterey County)	No	Yes?
AMBAG Freight Mobility Study	Travel Time Index	Trans	Reliability is the key variable for supply chain movements	State-wide	Yes	Yes and needs to be calculated
Caltrans 101 TCR	Volume/ Capacity Ratio	Trans	V/C ratio helps show what segments of the route are facing congestion and projected into the future	U.S. 101 by Segment	Yes	Yes. Use model output to calculate
CA Freight Mobility Plan	Corridor Reliability Buffer Index	Trans	Reliable trip time estimates allow freight movers to accurately arrive at O/D	Corridor	Yes	Yes, Caltrans Mobility Performance Report 2010 Appendix B

2.11.1 Other Information Documents

The below table represents studies or reports that do not heavily impact the study region, are incomplete, or are summaries/fact sheets only. They are listed as additional resources that may be of use in the future.

Title	Description	Source
System Analysis Study of Focus Routes 101, 152, and 156 (2008)	This study looked at different build scenarios for U.S. 101 and surrounding state highways in northern San Benito and southern Santa Clara counties. Information derived is specific to each scenario. All scenarios envision a widening of U.S. 101 between SR 156 and SR 25, with varying degrees of construction on those two routes creating the different build scenarios.	http://www.dot.ca.gov/dist05/planning/sys_plan_docs/system_analysis_study/sas_final_report.pdf
M-5 Marine Highway Corridor (n.d.)	This is a short fact sheet on the M-5 Marine Highway Corridor. It would mirror the I-5 Corridor, and potentially help reduce truck traffic on I-5 as well as U.S. 101.	http://www.marad.dot.gov/documents/MHI_Route_Designation_Description_Page.pdf
West Coast Corridor Coalition Trade and Transportation Study (2008)	The three emerging megaregions on the West Coast area a critical part of the world and national economies. The network is heavily truck reliant, with the main corridor being I-5, followed by SR-99 in California. Continued population growth will have an impact on adjacent and feeder routes to the main system, including U.S. 101. U.S. 101 at SR 156 is identified as an urban interchange chokepoint (AADTT 11,902; 23,197 in 2030).	http://westcoastcorridors.org/library/T&TStudy_FinalReportCOMPLETE.pdf
SR 156 Planning Fact Sheet (2007)	Cross-highway for U.S. 101. Trucking through San Juan Bautista is a particular concern, though the volume of trucks in the entire county is higher than average. Primary goods are agricultural and quarry materials.	http://www.dot.ca.gov/dist05/planning/sys_plan_docs/tcr_factsheet_combo/sbt_sr156_tcrfs.pdf
Route 156 Final Environmental Impact Report (2013)	Environmental Impact Assessment on two build scenarios for expanding SR 156 and rebuilding the U.S. 101 and SR 156 interchange. The preferred alternative would change SR 156 into a four-lane freeway (Phase I) and reconfigure the interchange with U.S. 101 (Phase II).	http://www.dot.ca.gov/dist05/projects/mon_156w/156_feir.pdf
Transportation Planning Fact Sheet SR 46 in San Luis Obispo County (2009)	Cross-highway for U.S. 101 just south of study area. Primarily a farm-to-market connection for goods movement, trucks account for 20% of total traffic and the route is a major east-west connector between U.S. 1, U.S. 101 and I-5	http://www.dot.ca.gov/dist05/planning/sys_plan_docs/tcr_factsheet_combo/slo_sr46_tcrfs.pdf
Route 101 North County Corridor Study (2010)	This study examines the operational needs for U.S. 101 from the San Luis Obispo/Monterey County line south to the Cuesta Grade Overhead. Recommendations are to pursue transportation system management strategies, transportation demand strategies, and operational efficiencies in order to maintain an acceptable level of service in the corridor.	https://library.slocog.org/PDFS/PLANNING/HIGHWAYS.CORRIDORS/HWY%20101/NO_CO_CORRIDOR_STUDY.PDF
TAMC Investment Plan for Transportation Sales Taxes in Monterey County (2008)	50% of available funds are going to safety and congestion relief project, 25% to local road and street maintenance, and 25% to alternative driving options. Projects in the near term include widening SR 156 and interchange improvements at U.S. 101/SR 156 (above), U.S. 101 Harris Road Interchange (interchange construction) and U.S. 101 San Juan Road Interchange (interchange construction and expressway to freeway upgrade-under way).	http://www.tamcmonterey.org/programs/plan/pdf/Investment_Plan.pdf

Title	Description	Source
U.S. Highway 101 Traffic Calming and Gateway Study (2010)	This study examined the need for traffic calming measures on U.S. 101 in the Crescent City, CA region (Northern California). It also included a discussion of techniques to create a better gateway on the route for Crescent City.	http://www.dnltc.org/wp-content/uploads/2014/11/U.S.-101-Final-Report-v1.pdf
Know About Freight Surveys (2010)	This slideshow presented findings and suggestions derived from a O/D freight survey in KernCOG. This may provide useful information if AMBAG is looking to conduct truck counts or surveys in the U.S. 101 Corridor.	http://www.slideserve.com/jesse/freight-studies-joel-falter
Airport Boulevard Interchange Project (2005)	This is an initial environmental study on the reconstruction and upgrade of the roads and ramps at U.S. 101/Airport Boulevard in Salinas. The study notes that this is one of two major access points for trucks from the Salinas industrial and agricultural hub, with trucks representing 20% of all vehicles at the two interchanges. Accident rates at the intersection are slightly above state norms.	http://www.dot.ca.gov/dist6/environmental/envdocs/d5/us101_airportblvd.pdf
Transportation Concept Reports	Fact Sheets offer a starting point for information on connecting routes to U.S. 101 in the study area.	http://www.dot.ca.gov/hq/tpp/corridor-mobility/d5-page.html
San Joaquin Valley Interregional Goods Movement Plan (2012)	Detailed description of logistics patterns in the SJV. Some of the goods/processing facilities could impact freight flows on U.S. 101. East-west connectivity is again identified as a major constraint, along with limited rail service.	http://www.sjvcogs.org/pdfs/2012/2012-06-14%20Task%204.pdf
Analysis of Economic, Environmental, and Social Impact of Rail Service in Santa Maria Valley 2013 (2013)	A shortline RR in San Luis Obispo County, SMVRR serves a number of customers along its 14 miles route (connecting with Union Pacific). This line keeps prices down for customers, reduces long-haul truck trips, and limits air pollution in the corridor. Business is expected to grow in coming years.	Santa Maria Valley Railroad— file in CS Library
Electric Vehicle Infrastructure for the Monterey Bay Area, AMBAG (2013)	Electric vehicles would help meet air quality standards in the Central Coast Region. Private companies such as Fresh Express and Dole Fresh Vegetables are highlighted as organizations with large numbers of vehicles that may be open to some conversion efforts.	http://www.ambag.org/sites/default/files/documents/Electric%20Vehicle%20Infrastructure%20for%20the%20Monterey%20Bay%20AreaFNL%20DELIVERABLE.pdf



PERFORMANCE MEASURES WORKING PAPER

U.S. 101 Central Coast California Freight Strategy

Appendix D. Performance Evaluation Framework

white paper

prepared for

AMBAG

prepared by

Cambridge Systematics, Inc.

white paper

U.S. 101 Central Coast California Freight Strategy

Appendix D. Performance Evaluation Framework

prepared for

AMBAG

prepared by

Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

date

August 2015

Table of Contents

1.0 Introduction 1-1

2.0 Overview of Performance Measures 2-1

2.1 Purpose of Performance Measures 2-1

2.2 Choosing Performance Measures 2-3

2.3 State of the Practice..... 2-3

2.4 “Best Practice” Performance Measures 2-8

3.0 Performance-Based Evaluation Process 3-9

3.1 Proposed Performance Measures 3-10

List of Tables

Table 1.	California Freight Mobility Plan Performance Measures	2-5
Table 2.	San Luis Obispo Council of Governments U.S. 101 Mobility Master Plan.....	2-6
Table 3.	Santa Barbara County Association of Governments 101 in Motion	2-7
Table 4.	Recommended Set of Performance Measures and Metrics, by Goal Area	3-11

List of Figures

Figure 1.	U.S. 101 Performance Measurement Framework.....	3-10
-----------	---	------

1.0 Introduction

A robust set of performance measures will be implemented as part of the U.S. Highway 101 Central Coast California Freight Study to evaluate the goods movement system. These measures will provide stakeholders with a method to gauge the condition and use of the current system, identify freight-related priorities, develop policy, and prioritize investment. The performance measures will provide a continuing method to monitor conditions and evaluate progress towards the Plan's Vision and Goals.

The recommended performance measures highlighted in this technical memorandum will become the basis for evaluating projects, programs, and policies identified in the Plan. A performance-based evaluation process will help stakeholders and decision makers understand the benefits of proposed goods movement actions through the analysis of objective qualitative and quantitative information.

This memorandum contains the following sections:

- **Section 2.0 – Overview of Performance Measures:**

This section explains the purpose of performance measures and how they are selected. It also highlights freight-specific performance measures utilized in Federal and State studies and plans that were identified through the literature review and discusses “best practice” performance measures that appear in all of the listed documents.

- **Section 3.0 – Performance-Based Evaluation Process:**

This section explains the process developed to arrive at a final set of recommended performance measures, explains their relevance to the Plan, identifies the source of information, and proposes methodology to complete the needs analysis.

2.0 Overview of Performance Measures

The use of performance measures in the public sector has matured and expanded significantly in recent years. However, the use of freight-specific performance measures remains limited nationally, and varies significantly between states and regions. This section explains: 1) the purpose of performance measures; 2) how performance measures are evaluated and chosen; 3) the state of the practice at both the Federal and state level, including a discussion of current efforts in California to develop freight-specific measures; and 4) commonly utilized “best practice” performance measures.

2.1 Purpose of Performance Measures

Performance measures are tools that provide a way to assess the condition of the transportation system, identify challenges and opportunities for system improvement, identify and evaluate strategies to meet goods movement goals, and monitor ongoing performance. They can also be used to help decision-makers allocate limited resources more effectively than would otherwise be possible. It is common for different performance measures to be applied to each of these unique purposes, situations and system needs. Performance measures can be applied as follows:

- **Linking Strategies to Vision and Goals.** Performance measures can be developed and applied to help link Plan strategies to the Vision and Goals of the Plan. Only when strategies address the goals of the plan are they truly effective in determining the progress being made to meet the goals, and in identifying gaps.
- **Needs Assessment and Strategy Development.** Performance measures can be used to assess condition, performance, and use of the transportation system through the establishment of performance measurement benchmarks. They also help identify system challenges where projects, programs or policies may be needed.
- **Project Evaluation and Prioritization.** Performance measures can provide information to guide when and where to invest in projects and programs that provide the greatest benefits. Projects can be identified and prioritized by understanding the potential impact a given project could have on system performance as measured by the developed performance measures.
- **Managing Performance.** Applying performance measures can improve the management and delivery of programs, projects and services by showing a link between project implementation and resulting changes in conditions. Performance measures for system performance can also be used to highlight the technical, administrative, and financial issues critical to managing any program or project.
- **Communicating Results.** Performance measures may help communicate the value of public investments in transportation, contributing to state and Federal reporting, and providing a way for stakeholders to see an agency's progress on improving the transportation system. This can help build support for future transportation investments.
- **Strengthening Accountability.** Performance measures promote accountability on the use of taxpayer resources and reveal whether transportation investments are providing the expected performance improvements.

Identifying performance measures is the first step in better understanding a transportation system. However, the ability to measure a system at a large scale does not, by itself, provide sufficient knowledge to fully understand that system. In practice, quantitative performance measures are used to represent a complicated set of activities, phenomena, and human behavior, using one number. While quantitative performance measures are generally considered the best way to measure transportation system performance, practitioners must assure that the measure accurately represents the phenomena of interest, and that the measure being used is not oversimplifying the subject of analysis. For example, while measures may show that freight congestion increases along with regular automobile traffic, they do not explain the complicated human behavior that could be the basis of these changes such as tourism cycles, commute behavior, business logistics practices, the impact of weather on travel choice, and other causal factors.

To effectively use performance measures, organizations must understand the complex relationship between measures and real-world phenomena, including what can and cannot be accurately measured. Practitioners must also understand how changes impact real-world conditions and the causal links between projects and performance measure change.

2.2 Choosing Performance Measures

Performance measures should be carefully selected to align with Plan goals and the available data and resources. When considering performance measures, questions related to how they will be applied and the availability of data should be considered. The most appropriate performance measures will also vary depending on regional and local characteristics and unique features.

While performance measures provide many benefits, a few pitfalls should be avoided when implementing performance measurement systems, including:

- **Selecting performance measures based solely on data availability.** High quality data may not be immediately available to measure performance relative to vision and goals. Although it is prudent to begin with measures for which data are available, performance measures which link to visions and goals should not be excluded solely due to a current lack of data. While the costs for collecting data on new performance measures may be high, if a measure is critical enough to monitoring progress towards a key goal, an agency should examine strategies for collecting data on an ongoing basis.
- **Selecting performance measures based on their quantitative nature and strength while discounting qualitative or low tech measures.** While high quality data is important to performance evaluation, qualitative information can also be applied and provide insight into system conditions and use. In addition, quantitative measures may not adequately address all political and community value considerations and/or project types. Likewise, while robust tools such as travel demand and economic models can provide detailed evaluation of discrete projects, other lower tech tools such as spreadsheets and sketch analyses can also be applied and provide useful results.
- **An inappropriate number of performance measures can undermine the agency's ability to utilize them effectively.** Too many performance measures may cause a lack of focus and foster wide-ranging data collection efforts that consume valuable resources. As states and regions progress in their efforts to incorporate performance measures they tend to reduce their number of measures to a "critical few." However, utilizing too few performance measures can leave agencies with gaps in critical areas, undermining the effectiveness of their performance measurement program.

2.3 State of the Practice

Prior to the most recent transportation legislation, freight performance measures were not widely used, in part due to the difficulty in obtaining freight-specific data. Unlike passenger transportation, freight transportation is essentially a private sector activity that involves businesses (shippers/receivers), carriers (logistics companies and shipping lines) and logistics service providers that help move goods. The public sector interacts with freight transportation through the provision of infrastructure, setting rules and regulations and establishing policies. Because most of the freight data is kept by private companies, data, projects, or plans that the public sector could use to further the movement of goods are sometimes difficult to obtain due to privacy concerns.

The signing of the Moving Ahead for Progress in the 21st Century (MAP-21)¹ transportation legislation in July 2012, brought performance measures into the spotlight. Under MAP-21, State Departments of Transportation

¹ MAP-21 §2002; 23 USC 601-609.

(DOT) and Metropolitan Planning Organizations (MPOs) will be required to establish and use a performance-based approach to transportation decision-making and the development of short and long-range transportation plans.

The U.S. DOT will establish performance measures to align with seven National Goals established as part of the legislation, including: 1) safety, 2) infrastructure condition, 3) congestion reduction, 4) system reliability, 5) freight movement and economic vitality, 6) environmental sustainability, and 7) reduced project delivery delays. Several of these core goal areas can be directly tied to the freight system. At this time, national performance measures in the “freight movement and economic vitality” area have not been formalized, however, dialog on the subject indicates the need to include system condition and system performance (e.g., travel time, delay and travel time reliability) as meaningful freight system measures. Other categories of measures may also be applied to the freight system. The U.S. DOT is required to establish performance measures for States and MPOs to use to assess the Interstate and National Highway Systems. Once performance measures are set, States and MPOs must establish performance targets in coordination with other State and local transportation agencies.

2.3.1 Current Status of U.S. DOT Mandated MAP-21 Performance Measure Development

In March 2014, the U.S. DOT published a Notice of Proposed Rulemaking (NPRM) for State DOT and MPO performance measure development as part of the requirements to implement MAP-21 performance provisions. The Safety Performance Measures NPRM proposes safety performance measures and specifies State DOT and MPO requirements for establishing and reporting specific annual targets for fatalities and serious injuries. A Pavement and Bridge Condition Performance Measure NPRM was released in January 2015 that established measures to carry out the National Highway Performance Program to assess pavement and bridges on the National Highway System, and pavement on the Interstate System. Future NPRMs will focus on congestion, emissions, system performance, freight, and public transportation.²

2.3.2 U.S. DOT Freight Condition and Performance Report

The U.S. DOT is developing a multimodal freight system condition and performance report to supplement required state reports on highway-focused performance measures. This report was due for release in the fall of 2014, but as of writing has not yet been published. FHWA staff now anticipates a release date of late spring/early summer 2015.

2.3.3 Performance Measures in California

A number of recent studies in California contain robust performance measures associated with goods movement. The plans and performance measures listed below are from studies on freight movement in California, studies specific to U.S. 101 in the Central Coast region, or from other transportation plans for the counties that are included in the U.S. Highway 101 Central Coast California Freight Plan.

² FHWA Publishes Performance Management NPRMs Required by MAP-21. Accessed 8 June 2015. Online at: <http://www.fhwa.dot.gov/tpm/rule.cfm>.

California Freight Mobility Plan

The California Freight Mobility Plan (CFMP) is a statewide planning document that examines freight movement across every mode of transportation. It serves as a high-level analysis of the transportation system and identifies initiatives and projects needed to strengthen California's position in the global market.

Performance measures are split between three modes and are aligned with the CFMP goals. The performance measures in the plan are identified in Table 1 below.

Table 1. California Freight Mobility Plan Performance Measures

Highway Metrics	Rail Metrics	Seaport Metrics
Pavement Condition	Train Height Clearances	Navigation Channel Depths
Bridge Condition	Track Weight Limits	Waterway Bridge Clearance
Truck Travel Speed	Posted Max. Train Speed	
Truck Hours of Delay	Rail Bottlenecks/Chokepoints	
Highway Bottlenecks/Chokepoints	Railroad Grade Crossing Fatalities and Injuries	
Corridor Reliability Buffer Index		
Roadway Truck Collisions, Fatalities, and Injuries		

Caltrans Transportation Concept Report: U.S. 101

This report is a multimodal look at the entire U.S. 101 corridor that identifies trends and deficiencies, providing a basis for long-term preservation strategies. A list of specific performance measures for the corridor related to freight movement was not developed in this report. However, for each of the segments of U.S. 101 in District 5, Caltrans measured the following during the PM Peak:

- Traffic volume,
- Vehicle miles traveled,
- Vehicle hours traveled,
- Volume/capacity ratio,
- Level of service,
- Average speed, and
- Capacity per lane.

Trucks utilize the same road network as other vehicles; therefore the above data has a direct bearing on freight movement. Segments of U.S. 101 with a high volume/capacity ratio or low average speed, for example, indicate congested sections which negatively impact the movement of freight. As these performance measures improve, freight movement will also improve.

San Luis Obispo Council of Governments U.S. 101 Mobility Master Plan

This study examined U.S. 101 in San Luis Obispo County. Twelve performance measures were used to select four segments of the route for detailed analysis. The initial screening criteria and the related scoring criteria, which were not specific to goods movement, are identified in Table 2 below. Other performance measures with limited applicability to the current study included park-and-ride coverage, transit coverage, bicycle connectivity, and pedestrian connectivity.

Table 2. San Luis Obispo Council of Governments U.S. 101 Mobility Master Plan

Group	Phase I Performance Measure	Score Criteria
Corridor Vehicle Operations	U.S. 101 Mainline Level of Service	LOS A-C=0, LOS D=2.5, LOS E=5, LOS F=10
	U.S. 101 Merge-Diverge Level of Service	LOS A-C=0, LOS D=2.5, LOS E=5, LOS F=10
	U.S. 101 Weave Level of Service	LOS A-C=0, LOS D=2.5, LOS E=5, LOS F=10
	Parallel Roadway/Intersection Level of Service	LOS A-C=0, LOS D=2.5, LOS E=5, LOS F=10
Corridor Safety	U.S. 101 Safety (Collisions)	Crashes per MVMT < expected (using TASAS, as compared to facilities in California)=0 0.1675>expected=2.5 0.335>expected=5 0.5025>expected=7.5 0.67>expected=10
	Parallel Roadway Safety (Collisions)	Number of parallel network crashes(0)=0 Number of parallel network crashes(31)=2.5 Number of parallel network crashes(62)=5 Number of parallel network crashes(92)=7.5 Number of parallel network crashes(123)=10
Emissions	U.S. 101 Emissions	Tons of CO ₂ with Pavley I+LCFS (0)=0 Tons of CO ₂ with Pavley I+LCFS(0.755)=2.5 Tons of CO ₂ with Pavley I+LCFS(1.51)=5 Tons of CO ₂ with Pavley I+LCFS(2.265)=7.5 Tons of CO ₂ with Pavley I+LCFS(3.02)=10
Vehicular Connectivity	Parallel Roadway Connectivity	Frontage roads or adjacent route=0 Alternate route that is slower or longer=5 No alternate routes=10

Santa Barbara County Association of Governments 101 in Motion

This 2006 study produced a consensus package of projects to improve mobility on the U.S. 101 Corridor in Santa Barbara County, from the Ventura County line north/west for approximately 27 miles to Winchester Canyon. Performance measures in this report were divided into three sections: Transportation Performance, Community/Environmental Considerations, and Cost/Implementation. The most relevant ones to freight movement are identified in Table 3 below.

Table 3. Santa Barbara County Association of Governments 101 in Motion

Transportation Performance Criteria	Objectives	Measures
Improve Mobility/Increase Capacity	Increase peak hour person trip capacity Reduce peak-hour corridor person trip demand Increase network capacity	Added person trip capacity (PPH) Reduced demand, PPH Reduce number of gaps and lane drops
Reduce Congestion	Improve LOS to "D" or better Reduce person hours of congestion	Number of "D" or better locations Total reduce hours of congestion
Improve Safety	Reduce corridor accident potential	Rating from 1-5 based on representative accident rates
Improve Goods Movement	Increased Goods movement capacity and reduce conflicts	Added Highway/Rail capacity usable for freight reduced conflicts/regulatory constraints
Economic Vitality	Minimized impacts	Congestion Relief Potential Pricing and Job Creation Impacts

Monterey Bay 2035 Metropolitan Transportation Plan/Sustainable Communities Strategy

The Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) is the long-range transportation plan for the AMBAG region and includes land use, housing, and environmental considerations in addition to transportation projects. Freight-related performance measures and goals included in the MTP/SCS include:

- **Daily truck delay goals (Economic Vitality).** 2,802 hours in 2010; 11,471 in 2035 No Build scenario; 10,667 in 2035 MTP/SCS scenario.
- **Greenhouse gas reduction goals (Environment).** Comply with Senate Bill 375, California Global Warming Solution Act, (Nunez, 2006) which requires the AMBAG region to reduce GHG by 5 percent per capita by 2035.
- **Maintenance of the transportation system goals (System Preservation and Safety).** 50 percent of total spending goes to rehabilitation and maintenance.
- **Fatalities and Injuries per capita goals (System Preservation and Safety).** 0.4 percent in 2010, and remaining 0.4 percent in both 2035 No Build and MTP/SCS scenarios.
- **Peak Period Congested Vehicle Miles of Travel (Healthy Communities).** 130,455 miles reduction in MTP/SCS scenarios versus 2035 No Build. Reducing congestion overall will aid the movement of goods.
- **Commute Travel Time (Access and Mobility).** Keep commute travel time at 2010 existing levels. Since trucks often use the roads at the same time as commuters, holding commute times at current levels will increase goods movement predictability.

Santa Barbara County Association of Governments Regional Transportation Plan and Sustainable Communities Strategy

This study is the Long-Range Transportation Plan for SBCAG and includes land use, housing, and environmental considerations in addition to transportation. Freight specific topics cluster around U.S. 101's importance to the region and the heavy reliance on truck trips to move goods. Performance measures for the Mobility and System Reliability goal include:

- Roadway Level-of-Service;
- Average travel distance (all trips and work trips);
- Average travel time;
- Average commute time (workers);
- Transit ridership;
- Transit accessibility (percent of population and jobs within one-half mile of bus stop with frequent and reliable service);
- Percent Mode share (all trips); and
- Percent Mode share (workers).

These performance measures are not specific to freight but may impact goods movement performance. Since trucks utilize the same road network as other users, decreases in average travel time or improved level of service will have positive impacts on truck movement.

2.4 “Best Practice” Performance Measures

There are a limited number of performance measures which are common throughout all of studies and related to freight movement. These represent widely used “best practice” performance measures for freight movement. Note that this list is not meant to be comprehensive. Additional performance measures are viable and critical to different geographies or modes depending on the specific circumstances present. All four categories of performance measures identified below are included in the U.S. 101 Central Coast California Freight Plan.

- **Pavement and Bridge Condition.** Measured through a pavement rating system and bridge inspections. Information is widely available, updated regularly and can be used to quantify safety, reliability and/or state of repair of the freight transportation system.
- **Truck-involved fatalities/injuries.** This measure is an important indicator of safety, and can be paired with/compared with overall fatalities/injuries. It is measured in total number, per capita, or per vehicle miles (truck) traveled. Measuring per vehicle miles travelled (truck) is the most accurate approach as a rise or fall in total count may be due to an increase or decrease in activity and not necessarily a change in safety conditions. However, this approach requires additional data that may not be readily available.
- **Emissions and Air Quality.** Measured through Greenhouse Gas levels, varying Particulate Matter (PM) size, or other available metrics. This is a common metric used to evaluate the environmental impacts of goods movement. However, freight specific data may be scarce as not all location collect information by type of vehicle.

- **Congestion.** Measured by Volume/Capacity Ratio, Level of Service, Hours of Delay, or a Reliability Index such as Buffer Time Index or Planning Time Index. Measures of reliability are particularly useful for freight movement as reliability is often cited as the most important consideration by those involved in logistics.³ Buffer time index measures the amount of *additional* time that should be added to a trip to ensure on time arrival 95 percent of the time. Planning time index calculates the *total* travel time needed to arrive on time 95 percent of the time.

3.0 Performance-Based Evaluation Process

The intent of employing a performance-based evaluation process is to provide an objective means of evaluating projects, programs and policies (i.e., strategies) relative to the Goods Movement Plan vision and goals. The performance measures should inform strategy development and advance key needs and issues. This section details the process that is being used to develop a final portfolio of projects, programs, and policies using performance measures as part of this Plan. Figure 1 shows the overall performance-based evaluation framework, with steps corresponding to the discussion bullets below.

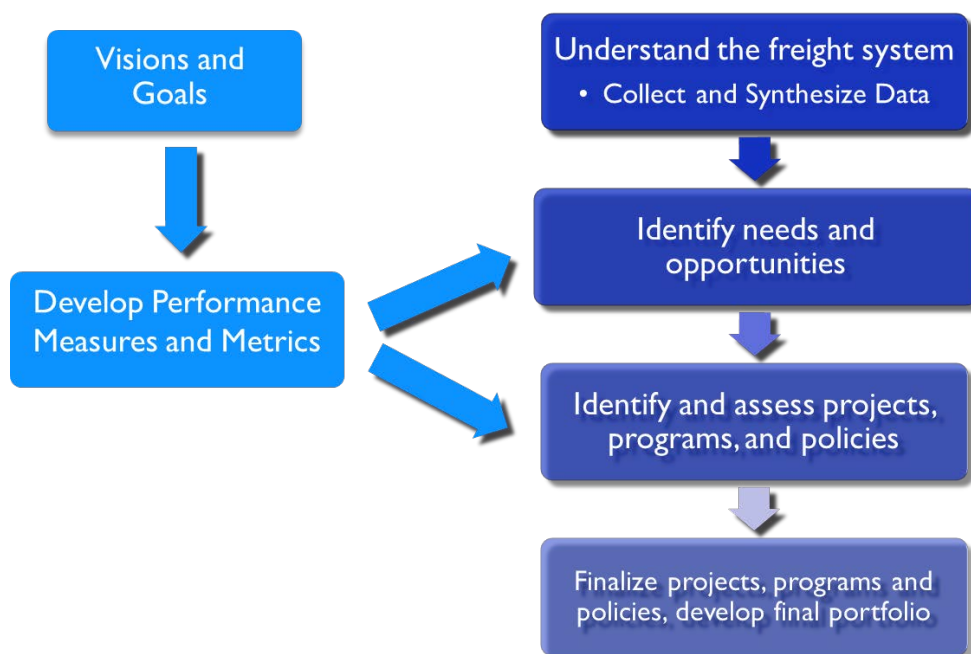
- **Develop Vision and Goals.** The Vision and Goals of the U.S. Highway 101 Central Coast California Freight Plan is the foundational element of the Plan. The development of strategies and the effectiveness of the plan will be guided and determined by the Vision and Goals.
- **Develop Performance Measures and Metrics.** Performance measures should evaluate progress towards the Plan Visions and Goals and align with existing (or potential) data and resources available. However, they should not be constrained by quantitative measures alone – stakeholder input, qualitative analysis, and policy considerations should also inform chosen measures. These performance measures and metrics will be used to evaluate needs and opportunities and assess projects, programs and policies.
- **Understand the Freight System.** Data from State, regional, and local plans and studies, and input from stakeholders will be collected and synthesized in order to provide a base level of information about current conditions in the corridor.
- **Identify Needs and Opportunities.** An “Issues and Opportunities” matrix will be created based on collected data. The matrix will detail both how the needs and opportunities relate to different parts of the goods movement system, and where they fit into the Plan’s Goals. This step will also drive and be shaped by the formulation of performance measures. After needs and opportunities are identified, they will be assessed to determine which should be considered priority concerns. Those that directly relate to a Plan goal, or that cut across multiple functions or facilities of the goods movement system may deserve more attention and a higher priority. Stakeholder input (discussed below) in addition to the developed list of performance measures can help focus attention on important topics or ensure that topics lacking a large quantitative presence are not missed.
- **Identify and Assess Projects, Programs and Policies.** A comprehensive list of potential projects, programs, and policies will be drawn from the above sources. These will address the developed matrix of needs, issues, and opportunities. After the initial compiling of potential projects, programs, and policies,

³ Information from numerous interviews with industry.

an evaluation and assessment phase begins. Strategies will be screened to determine: 1) if they address each of the identified issues, needs, and opportunities, 2) if they have sufficient impact on goods movement along U.S. Highway 101, and 3) if there are potential synergies or tradeoffs between specific projects, programs, and policies that require further consideration and examination. Performance measures will be a key source of input in determining which strategies will best address issues, needs, and opportunities.

- **Finalize Projects, Programs, and Policies and Develop Final Recommendations.** Based on the assessment described above, a final recommended projects, programs, and policies that address the identified needs and opportunities will be developed. The recommendations can inform decision-makers on how best to achieve the Plan's Vision and Goals.
- **Stakeholder and Community Input (not included in Figure 1).** Input and recommendations from the communities, businesses, and other stakeholders along U.S. 101 is critical to the Plan's success. While feedback will be sought throughout the process, comments are critical during the identification and evaluation process. Quantitative performance measures, while ideal, may not fully capture conditions that impact freight movement. Qualitative input from those who rely on U.S. 101 can aid in prioritizing the issues, needs, and opportunities and developing the best projects, programs, and policies to address them.

Figure 1. U.S. 101 Performance Measurement Framework



3.1 Proposed Performance Measures

Based on the review of best practices, visions and goals, and feedback from stakeholders regarding the unique needs and opportunities facing the region, a recommended set of performance measures and metrics is established and shown in Table 4. In addition, performance measures and metrics have been selected based on ability to be quantified, data availability and resource capability, and ease of understanding. The

current condition column indicates whether the measure will evaluate current conditions, and the future conditions column indicates whether the measure will evaluate future conditions with planned improvements.

Note that the terms *performance measures* and *performance metrics* are different as used in the memo. Performance measures are broad categories of measures that address specific goal areas. Within these categories, specific performance metrics can be developed that are essentially the evaluation criteria that can be used to determine needs and benefits. Metrics can be evaluated using models, quantitative data from prior studies, or can be evaluated qualitatively.

Table 4. Recommended Set of Performance Measures and Metrics, by Goal Area

Goals	Measure(s)	Metric(s)	Description and Relevance
Support economic development	Access and Multimodal Connectivity	Freight routes access from/to locations with significant freight activities; parallel roadway/rail connectivity	Freight or industrial land uses adjacent to U.S. 101 or intersecting routes generate truck traffic. Alternative route choice and rail choices are important to support economic competitiveness. Measurements include road and traffic conditions on connecting routes and distribution of freight producing industries.
Provide an efficient, reliable, well-maintained and safe goods movement facility	Travel time delay on truck routes – Recurrent and Seasonal	Truck delay	Measured in vehicle-hours of delay, this represents the amount of delay that trucks encounter on a recurrent basis.
	Travel Time Reliability	Planning time index (PTI)	This represents the additional time that a traveler must add to an average trip to ensure on-time arrival 95 percent of the time.
	Freight-Related Crashes	Truck-involved crashes and crash rates	Total crashes, crash types, and crash locations are key indicators of system safety and can highlight areas with safety concerns.
		Rail-Vehicle crashes at at-grade rail crossings	Rail-vehicle incidents are a safety concern and cause delays for both truck and rail freight movement.
	Freight Infrastructure Conditions	Bridge conditions ratings	Facilities with low ratings indicate potential rough travel, delays due to maintenance/repair work, and the need for investment.
		Pavement conditions ratings	
	Trucking Parking	Number of parking spaces along corridor	Lack of parking is cited as a major issue along the corridor, both short and long haul. Locating parking in areas where demand is high (origins and destinations) is also critical.
	Truck Routes	Extent and signage of truck route network	Availability of truck networks and the degree to which they are publicized are key measurements. An identified truck route network increases safety and transportation system conditions by directing trucks to approved and appropriate routes. This is especially important for “first and last mile” routes connecting U.S. 101 to origins and

Goals	Measure(s)	Metric(s)	Description and Relevance
	Adoption of Advanced technologies	Degree of Implementation and Coordination of ITS technologies	destinations. ITS systems can increase safety and efficiency of the U.S. 101 corridor. Measurements include the number of locations with ITS and the degree of coordination between municipalities.
Reduce and mitigate air quality impacts from goods movement operations	Emissions and Air Quality	Tons of PM _{2.5} , PM ₁₀ , and CO ₂ /N ₂ O emissions from trucks.	Air quality is a key indicator of environmental impacts of freight movement. PM _{2.5} is the most telling indicator of freight pollution.
	Use of Clean Fuel Technology	Use of clean fuel technology	The number of alternative fueling locations and level of implementation by the truck fleet are potential measurements.



EXISTING CONDITIONS, DATA COLLECTION, AND FREIGHT ANALYSIS WORKING PAPER

U.S. 101 Central Coast California Freight Strategy

*Appendix E. Existing Conditions, Data Collection, and Freight
Analysis*

working paper

prepared for

Association of Monterey Bay Area Governments

prepared by

Cambridge Systematics, Inc.

working paper

U.S. 101 Central Coast California Freight Strategy

Appendix E. Existing Conditions, Data Collection, and Freight Analysis

prepared for

Association of Monterey Bay Area Governments

prepared by

Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

date

August 2015

Table of Contents

1.0	Introduction	1-1
2.0	Regional Economic, Industrial, and Freight Flow Trends.....	2-1
2.1	Population	2-2
2.2	Economy	2-4
2.3	Commodity Flows and Trade Patterns	2-18
2.4	Freight System Infrastructure	2-63
2.5	Summary of Economic, Industrial and Freight Flow Profile	2-79
3.0	Performance-Based Needs Assessment	3-1
3.1	Economic Development Needs	3-3
3.2	Mobility Needs	3-4
3.3	Environmental/Quality of Life Concerns	3-35
3.4	Additional Needs	3-40

List of Tables

Table 2.1	U.S. 101 Central Coast Counties Employment	2-5
Table 2.2	Employment in Goods Movement Dependent Industries by County 2013.....	2-6
Table 2.3	GRP and GDP in Goods Movement Dependent Industries by County, <i>Millions of Chained 2005 Dollars (2009)</i>	2-8
Table 2.4	GRP in Goods Movement Dependent Industries by Metropolitan Statistical Areas <i>Millions of Chained Dollars (2013)</i>	2-9
Table 2.5	Freight Flows by County by Tonnage	2-27
Table 2.6	Freight Flows by County by Value	2-28
Table 2.7	Monterey County Total Trade with California Regions.....	2-35
Table 2.8	San Benito County Total Trade with California Regions	2-42
Table 2.9	San Benito County Total Trade with California Regions	2-49
Table 2.10	Santa Barbara County Total Trade with California Regions.....	2-56
Table 2.11	Santa Cruz County Total Trade with California Regions.....	2-63
Table 2.12	Key Intersecting Highways with U.S. 101, by County	2-64
Table 2.13	Summary of Economic Profile by County	2-79
Table 3.1	Summary of Needs Evaluation	3-1
Table 3.2	U.S. 101 Segments for Travel-Time Delay.....	3-5
Table 3.3	Extend of Truck Route Guidance by County	3-30
Table 3.4	Particulate Matter < 2.5 Microns Emissions (2012).....	3-37
Table 3.5	Particulate Matter <10 Microns Emissions (2012).....	3-37
Table 3.6	CO ₂ and N ₂ O Emissions (2012)	3-38

List of Figures

Figure 2.1	Elements of the Freight Transportation System	2-1
Figure 2.2	U.S. 101 Central Coast County Population Growth	2-2
Figure 2.3	Population Density of Study Area Counties <i>Santa Cruz, San Benito, and Monterey Counties, 2010</i>	2-3
Figure 2.4	Population Density of Study Area Counties <i>San Luis Obispo and Santa Barbara Counties, 2010</i>	2-4
Figure 2.5	Agriculture Business Locations in the Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	2-10
Figure 2.6	Agriculture Business Locations in the Study Area <i>San Luis Obispo and Santa Barbara Counties</i>	2-11
Figure 2.7	Manufacturing Business Locations in the Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	2-12
Figure 2.8	Manufacturing Business Locations in the Study Area <i>San Luis Obispo and Santa Barbara Counties</i>	2-13
Figure 2.9	Food Manufacturing Business Locations in the Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	2-14
Figure 2.10	Food Manufacturing Business Locations in the Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	2-15
Figure 2.11	Transportation and Warehousing Business Locations in the Study Area <i>San Luis Obispo and Santa Barbara Counties</i>	2-16
Figure 2.12	Transportation and Warehousing Business Locations in the Study Area <i>San Luis Obispo and Santa Barbara Counties</i>	2-17
Figure 2.13	Regional Freight Flows by Direction of Movement <i>Millions of Tons</i>	2-19
Figure 2.14	Regional Freight Flows by Direction of Movement <i>Billions of Dollars</i>	2-19
Figure 2.15	Regional Freight Flows by Trade Type <i>Millions of Tons</i>	2-20
Figure 2.16	Regional Freight Flows by Trade Type <i>Billions of Dollars</i>	2-21
Figure 2.17	Regional Freight Flows by Mode <i>Millions of Tons</i>	2-22
Figure 2.18	Regional Freight Flows by Mode <i>Billions of Dollars</i>	2-22
Figure 2.19	Regional Freight Flows by Top Commodities by Tonnage <i>Millions of Tons</i>	2-23
Figure 2.20	Regional Freight Flows by Top Commodities by Value <i>Billions of Dollars</i>	2-24
Figure 2.21	Top Trading Partners with Central Coast Region <i>by Tonnage</i>	2-25
Figure 2.22	Top Trading Partners with Central Coast Region <i>by Value</i>	2-26
Figure 2.23	Trading Partners Map	2-27
Figure 2.24	Monterey County Freight Flows by Direction of Movement <i>Millions of Tons</i>	2-28
Figure 2.25	Monterey County Freight Flows by Direction of Movement <i>Billions of Dollars</i>	2-29
Figure 2.26	Monterey County Freight Flows by Trade Type <i>Millions of Tons</i>	2-29
Figure 2.27	Monterey County Freight Flows by Trade Type <i>Billions of Dollars</i>	2-30
Figure 2.28	Monterey County Freight Flows by Mode <i>Millions of Tons</i>	2-31

Figure 2.29	Monterey County Freight Flows by Mode <i>Billions of Dollars</i>	2-31
Figure 2.30	Monterey County Freight Flows by Top Commodities by Tonnage <i>Millions of Tons</i>	2-32
Figure 2.31	Monterey County Freight Flows by Top Commodities by Value <i>Billions of Dollars</i>	2-33
Figure 2.32	Monterey County Trading Partners <i>Millions of Tons (2012)</i>	2-34
Figure 2.33	Monterey County Trading Partners <i>Billions of Dollars (2012)</i>	2-34
Figure 2.34	San Benito County Freight Flows by Direction of Movement <i>Millions of Tons</i>	2-35
Figure 2.35	San Benito County Freight Flows by Direction of Movement <i>Billions of Dollars</i>	2-36
Figure 2.36	San Benito County Freight Flows by Trade Type <i>Millions of Tons</i>	2-36
Figure 2.37	San Benito County Freight Flows by Trade Type <i>Billions of Dollars</i>	2-37
Figure 2.38	San Benito County Freight Flows by Mode <i>Millions of Tons</i>	2-38
Figure 2.39	San Benito County Freight Flows by Mode <i>Billions of Dollars</i>	2-38
Figure 2.40	San Benito County Freight Flows by Top Commodities by Tonnage <i>Millions of Tons</i>	2-39
Figure 2.41	San Benito County Freight Flows by Top Commodities by Value <i>Billions of Dollars</i>	2-40
Figure 2.42	San Benito County Trading Partners <i>Millions of Tons</i>	2-41
Figure 2.43	San Benito County Trading Partners <i>Billions of Dollars</i>	2-41
Figure 2.44	San Luis Obispo County Freight Flow by Direction of Movement <i>Millions of Tons</i>	2-42
Figure 2.45	San Luis Obispo County Freight Flow by Direction of Movement <i>Billions of Dollars</i>	2-43
Figure 2.46	San Luis Obispo County Freight Flows by Trade Type <i>Millions of Tons</i>	2-43
Figure 2.47	San Luis Obispo County Freight Flows by Trade Type <i>Billions of Dollars</i>	2-44
Figure 2.48	San Luis Obispo County Freight Flows by Mode <i>Millions of Tons</i>	2-45
Figure 2.49	San Luis Obispo County Freight Flows by Mode <i>Billions of Dollars</i>	2-45
Figure 2.50	San Luis Obispo County Freight Flows by Top Commodities by Tonnage <i>Millions of Tons</i>	2-46
Figure 2.51	San Luis Obispo County Freight Flows by Top Commodities by Value <i>Billions of Dollars</i>	2-47
Figure 2.52	San Luis Obispo County Trading Partners <i>Millions of Tons (2012)</i>	2-48
Figure 2.53	San Luis Obispo County Trading Partners <i>Billions of Dollars (2012)</i>	2-48
Figure 2.54	Santa Barbara County Freight Flows by Direction of Movement <i>Millions of Tons</i>	2-49
Figure 2.55	Santa Barbara County Freight Flows by Direction of Movement <i>Billions of Dollars</i>	2-50
Figure 2.56	Santa Barbara County Freight Flows by Trade Type <i>Millions of Tons</i>	2-50
Figure 2.57	Santa Barbara County Freight Flows by Trade Type <i>Billions of Dollars</i>	2-51
Figure 2.58	Santa Barbara County Freight Flows by Mode <i>Millions of Tons</i>	2-51
Figure 2.59	Santa Barbara County Freight Flows by Mode <i>Billions of Dollars</i>	2-52
Figure 2.60	Santa Barbara County Freight Flows by Top Commodities by Tonnage <i>Millions of Tons</i>	2-53
Figure 2.61	Santa Barbara County Freight Flows by Top Commodities by Value <i>Billions of Dollars</i> ..	2-54
Figure 2.62	Santa Barbara Trading Partners <i>Millions of Tons (2012)</i>	2-55
Figure 2.63	Santa Barbara Trading Partners <i>Billions of Dollars (2012)</i>	2-55

Figure 2.64	Santa Cruz County Freight Flows by Direction of Movement <i>Millions of Tons</i>	2-57
Figure 2.65	Santa Cruz County Freight Flows by Direction of Movement <i>Billions of Dollars</i>	2-57
Figure 2.66	Santa Cruz County Freight Flows by Trade Type <i>Millions of Tons</i>	2-58
Figure 2.67	Santa Cruz County Freight Flows by Trade Type <i>Billions of Dollars</i>	2-58
Figure 2.68	Santa Cruz County Freight Flows by Mode <i>Millions of Tons</i>	2-59
Figure 2.69	Santa Cruz County Freight Flows by Mode <i>Billions of Dollars</i>	2-59
Figure 2.70	Santa Cruz County Freight Flows by Top Commodities by Tonnage <i>Millions of Tons</i>	2-60
Figure 2.71	Santa Cruz County Freight Flows by Top Commodities by Value <i>Billions of Dollars</i>	2-61
Figure 2.72	Santa Cruz County Trading Partners <i>Millions of Tons (2012)</i>	2-62
Figure 2.73	Santa Cruz County Trading Partners <i>Billions of Dollars (2012)</i>	2-62
Figure 2.74	Multimodal Freight Systems Infrastructure in the Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	2-64
Figure 2.75	Multimodal Freight Systems Infrastructure in the Study Area <i>San Luis Obispo and Santa Barbara Counties</i>	2-65
Figure 2.76	Number of Lanes along U.S. 101 <i>Santa Cruz, San Benito, and Monterey Counties</i>	2-66
Figure 2.77	Number of Lanes along U.S. 101 <i>San Luis Obispo and Santa Barbara Counties</i>	2-67
Figure 2.78	Truck Volumes and Percent Traffic that is Trucks on U.S. 101 and Adjacent Highways <i>Santa Cruz, San Benito, and Monterey Counties</i>	2-68
Figure 2.79	Truck Volumes and Percent Traffic that is Trucks on U.S. 101 and Adjacent Highways <i>San Luis Obispo and Santa Barbara Counties</i>	2-69
Figure 2.80	Traffic Volumes by Month on U.S. 101 near Gilroy	2-70
Figure 2.81	Total Traffic by Time Period on U.S. 101 near Gilroy.....	2-71
Figure 2.82	Truck Traffic by Time Period on U.S. 101 near Gilroy.....	2-72
Figure 2.83	Traffic Volumes by Month on U.S. 101 near King City	2-72
Figure 2.84	Total Traffic by Time Period on U.S. 101 near King City <i>April 2008</i>	2-73
Figure 2.85	Truck Traffic by Time Period on U.S. 101 near King City <i>April 2008</i>	2-74
Figure 2.86	Traffic Volumes by Month on U.S. 101 near Templeton	2-74
Figure 2.87	Total Traffic by Time Period on U.S. 101 near Templeton <i>April 2009</i>	2-75
Figure 2.88	Truck Traffic by Time Period on U.S. 101 near Templeton <i>April 2009</i>	2-76
Figure 2.89	Traffic Volumes by Month on U.S. 101 near Santa Barbara	2-76
Figure 2.90	Total Traffic by Time Period on U.S. 101 near Santa Barbara <i>April 2009</i>	2-77
Figure 2.91	Truck Traffic by Time Period on U.S. 101 near Santa Barbara <i>April 2009</i>	2-78
Figure 3.1	Weekday Recurrent Commercial Delay AM Peak <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-7
Figure 3.2	Weekday Recurrent Commercial Delay AM Peak <i>San Luis Obispo and Santa Barbara Counties</i>	3-8
Figure 3.3	Weekday Recurrent Truck Delay PM Peak <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-9
Figure 3.4	Weekday Recurrent Truck Delay PM Peak <i>San Luis Obispo and Santa Barbara Counties</i>	3-10

Figure 3.5	Weekday Planning Time Index along U.S. 101, AM Peak <i>San Luis Obispo and Santa Barbara Counties</i>	3-12
Figure 3.6	Weekday Planning Time Index along U.S. 101, AM Peak <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-13
Figure 3.7	Weekday Planning Time Index along U.S. 101, PM Peak <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-14
Figure 3.8	Weekday Planning Time Index along U.S. 101, PM Peak <i>San Luis Obispo and Santa Barbara Counties</i>	3-15
Figure 3.9	Truck-Involved Injury Crashes on U.S. 101 2010 to 2012.....	3-17
Figure 3.10	Truck Involved Injury Incidents by Month on U.S. 101 2012 to 2010.....	3-18
Figure 3.11	Collision Type for Truck Involved Incidents 2012 to 2010.....	3-19
Figure 3.12	At-Grade Rail Incidents 2010 to 2014	3-20
Figure 3.13	Bridge Conditions in Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-21
Figure 3.14	Bridge Conditions in Study Area <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-22
Figure 3.15	2011 Pavement Conditions <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-24
Figure 3.16	2011 Pavement Conditions <i>San Luis Obispo and Santa Barbara Counties</i>	3-25
Figure 3.17	Rest Areas, Alternative Stopping Locations, and Unauthorized Parking <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-27
Figure 3.18	Rest Areas, Alternative Stopping Locations, and Unauthorized Parking <i>San Luis Obispo and Santa Barbara Counties</i>	3-28
Figure 3.19	CMS – SBCAG U.S. 101 in Motion	3-31
Figure 3.20	Example of Ramp Metering from FHWA	3-32
Figure 3.21	FHWA Advantage I-75 Corridor Weigh Station Layout	3-32
Figure 3.22	Locations of ITS Technologies along U.S. 101 <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-34
Figure 3.23	Locations of ITS Technologies along U.S. 101 <i>San Luis Obispo and Santa Barbara Counties</i>	3-35
Figure 3.24	Counties Designated “Nonattainment”	3-36
Figure 3.25	Alternative Fuel Locations along U.S. 101 <i>Santa Cruz, San Benito, and Monterey Counties</i>	3-39
Figure 3.26	Alternative Fuel Locations along U.S. 101 <i>San Luis Obispo and Santa Barbara Counties</i>	3-40

1.0 Introduction

The Central Coast region along the U.S. 101 corridor is one of the most important agricultural production areas in the country, and the most important in the region, with significant clusters of goods movement-dependent industries. However it also experiences transportation challenges that must be addressed to ensure the region's continued competitiveness. This memorandum provides an in-depth analysis of the region as it pertains to goods movement, economics, freight flow trends and patterns. It also contains a performance-based needs assessment that determines the current and future needs along the corridor that cut across different goal areas that have been defined for the corridor and across goods movement modes. The needs analysis will identify the gaps and opportunities for the region in order to inform development of strategic improvement concepts.

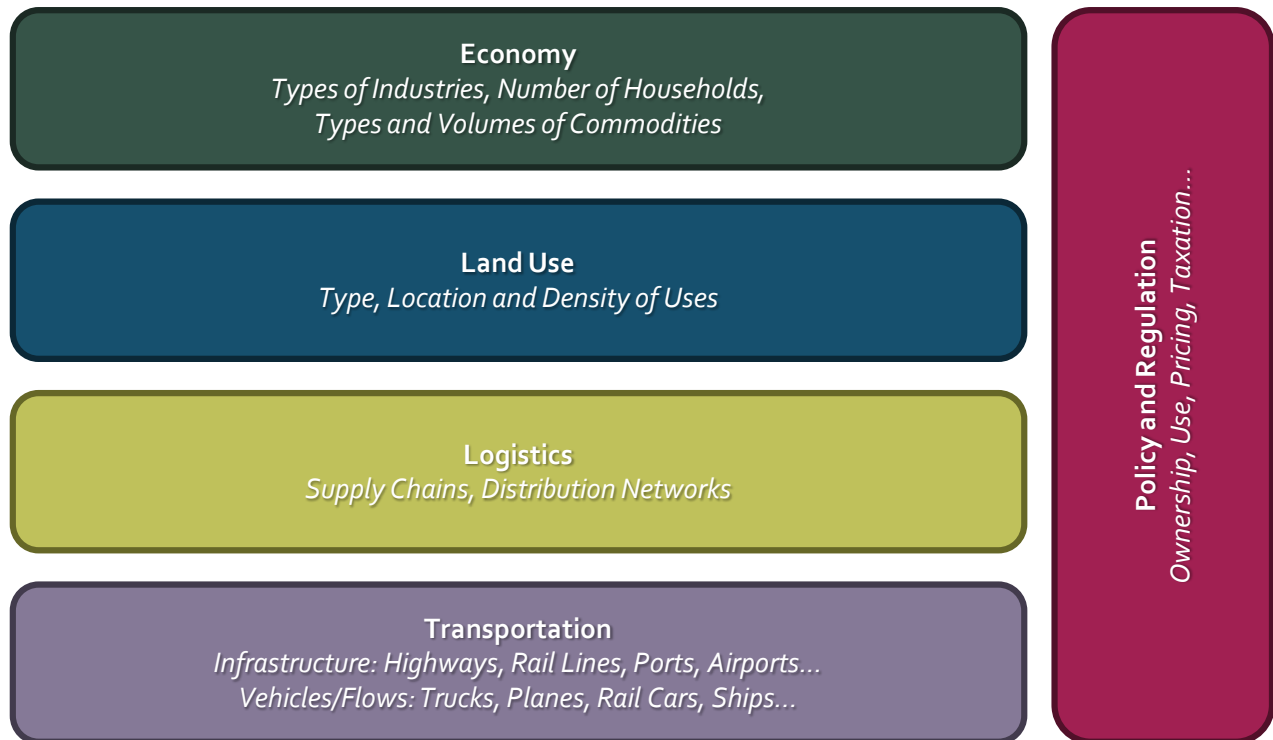
The report is organized as follows:

- **Section 2.0 – Regional Economic, Industrial, and Freight Flow Trends:** This section summarizes the importance of goods movement to the economy of the region, the key industries supported by the region, and the future trends that will influence freight movement in the region. A commodity flow analysis is conducted as part of this section that complements the economic profile.
- **Section 3.0 – Performance-Based Needs Analysis:** This section applies the performance metrics developed as part of this study to assess the needs, issues, and opportunities along the U.S. 101 Corridor in the Central Coast region. It also identifies gaps and opportunities.

2.0 Regional Economic, Industrial, and Freight Flow Trends

The economic structure of the U.S. 101 study region, specifically the types of industries and the number of households, determines the types and volumes of freight that are moved into, out of, through, and within the region. This study identifies the businesses and industries that generate demand for freight movement, their growth prospects, and how they contribute to the economy both now and in the future. This is important to understand as the economic conditions dictate and drive land use, logistics, and transportation systems. The linkages between the economy and the rest of the freight transportation system are shown in Figure 2.1. To understand the economic profile of the study region, this study examines population, employment, gross regional product (GRP), and key industries. More information, including a detailed analysis of industry-specific economic profiles, is available in the Central Coast California Commercial Flows Study (CCCCFS), completed in 2013.

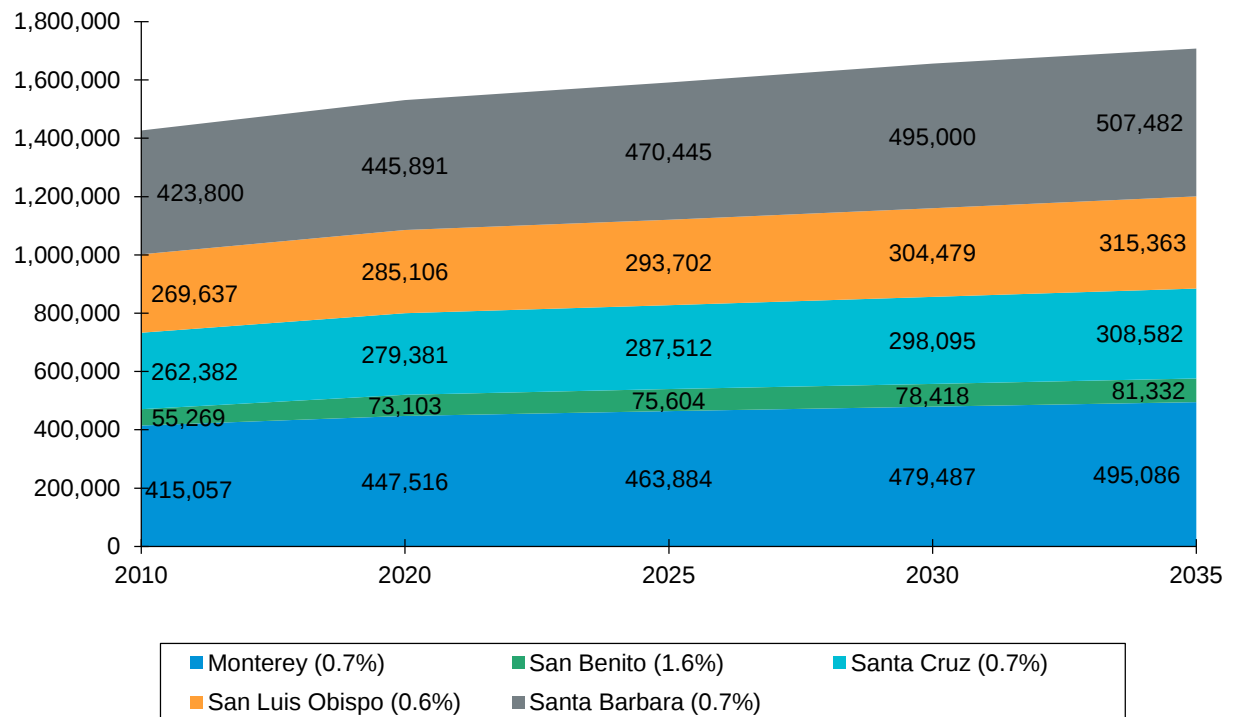
Figure 2.1 Elements of the Freight Transportation System



2.1 Population

Figure 2.2 below illustrates 2010 population and projected population through 2035 in the five Central California Coast counties, with the Compound Annual Growth Rates¹ (CAGR) shown in the legend. Total population for the five-county Central Coast region is projected to reach approximately 1.7 million by 2035, an increase of about 20 percent from 2010. Annual growth rates range from 0.6 percent in San Luis Obispo County to 1.6 percent in San Benito County. These numbers show that the local population growth is slow to moderate over the next decades and, as a result, annual population growth is not likely to be a major driver of freight growth. These growth rates are relatively low when compared to the population growth rates of California and the U.S. as a whole. However, the approximately 275,000 new residents expected by 2035 will increase demand for freight, increase the number of truck trips, and add commute congestion to roadways, causing more incidents, increasing travel time delay, and further impacting truck movement along the U.S. 101 corridor.

Figure 2.2 U.S. 101 Central Coast County Population Growth



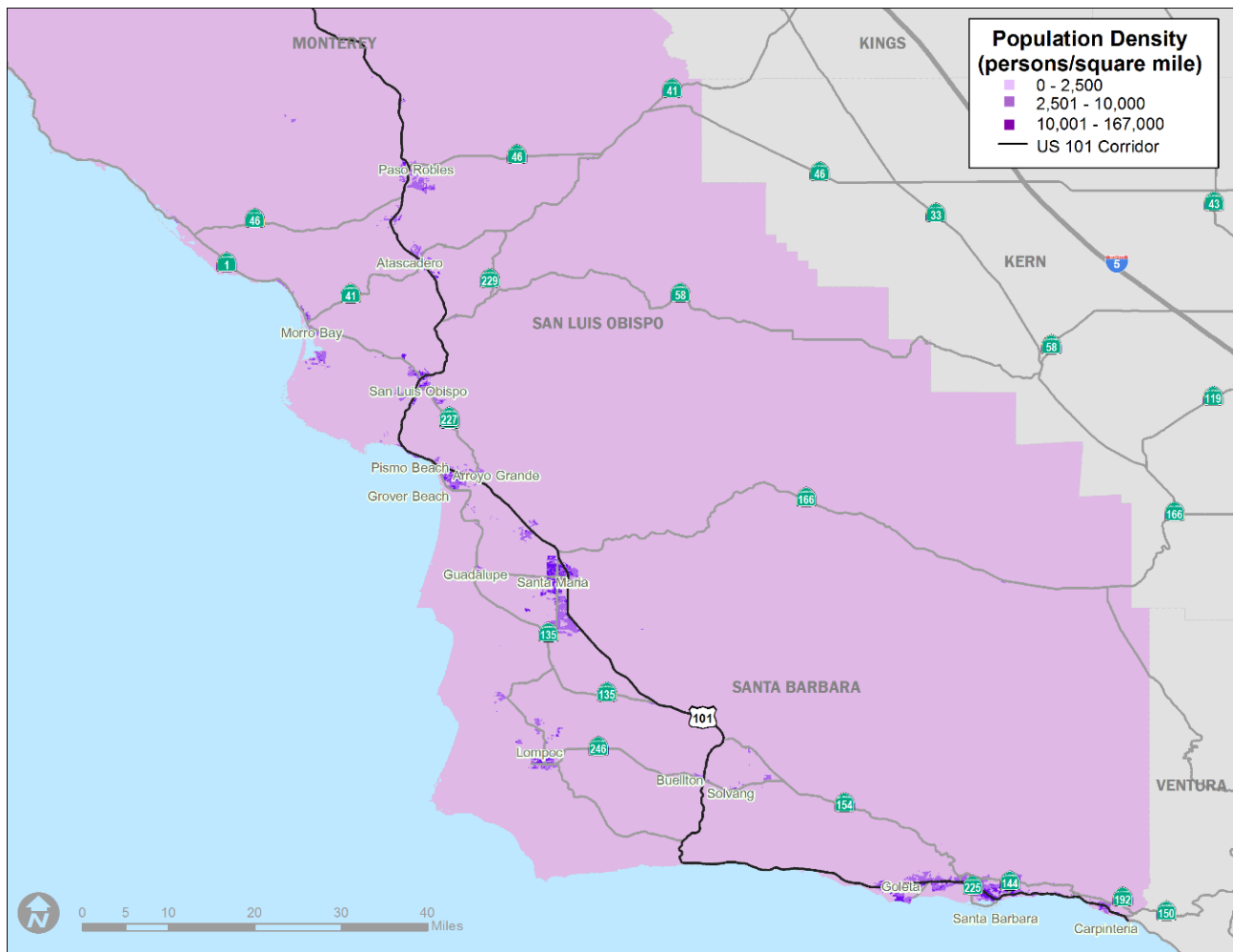
Source: MTP/SCS for AMBAG, RTP/SCSs for SBCAG, and SLOCOG.

Note: Projections based on 2000 Census figures.

Most of the population of the California Central Coast is located along U.S. 101. Figure 2.3 and 2.4 shows the population density for census tracts within the Central California Coast counties in 2010, showing areas with high population density. Population density is highest in the urbanized areas near U.S. 101, including Santa Barbara, San Luis Obispo, Salinas, and Santa Cruz. In Salinas, population is most concentrated east

¹ CAGR calculates the growth rates that assumes constant rate of growth over a period of time. It dampens the effect of periodic ups and downs in growth to provide a constant growth rate over a particular time horizon.

Figure 2.4 Population Density of Study Area Counties
San Luis Obispo and Santa Barbara Counties, 2010



Source: U.S. Census.

2.2 Economy

2.2.1 Employment

The regional economy is an important driver of freight demand. A highly active sector will typically have a large number of employees. However, with increases in productivity where fewer numbers of workers are needed to generate one unit of output, employment has not been growing at the same rate as output, especially for sectors that are increasingly using automation. Nonetheless, employment still provides useful insights into the key industries in a region. Table 2.1 below shows total employment by county in 2010 and projected for 2035 (2040 for Santa Barbara County).

The five Counties in the study region are projected to gain jobs at an annual rate of between 0.75 percent and 0.93 percent, indicating a lower level of growth in employment across all of the study area counties as

compared to the U.S. as a whole.² According to the AMBAG 2035 MTP, the AMBAG region experienced below average job growth in the period from 1990 to 2007 as well and this trend is expected to continue. Monterey County is projected to grow by over 65,000 jobs, the largest numerical increase for any of the five counties.

Table 2.1 U.S. 101 Central Coast Counties Employment

County	2010	2035 Projection	Compound Annual Growth Rate
Monterey	308,400	372,800	0.76%
San Benito	16,201	19,546	0.75%
Santa Cruz	110,201	131,117	0.70%
San Luis Obispo	95,900	120,800	0.93%
Santa Barbara	197,400	257,600 (2040)	0.89%

Source: MTP-RTP/SCS for each MPO.

To better understand these employment numbers and how they are relevant to goods movement, this study examines employment in goods movement-dependent sectors. Certain segments of the economy produce goods that are dependent on freight transportation more than others. These industries are referred to as goods movement-dependent industries. These industries include agriculture/farming, forestry and fishing, construction, utilities, manufacturing, retail, wholesale, and transportation/warehousing.

Table 2.2 lists the employment in these goods movement dependent industries in the study area counties. In 2013, Monterey County employed the largest number of workers in 2013 with a total of 96,170. This is followed by Santa Barbara County with 80,194 employees and San Luis Obispo with 46,242 employees. In terms of percentages, however, goods movement-dependent industries account for 42.8 percent of employees in San Benito County, the most in the region. The lowest percent is 18.6 percent in Santa Barbara County. For Monterey County, the most significant goods movement dependent sectors are forestry, fishing and related activities, followed by retail trade and farm employment. For Santa Barbara County, the most significant goods movement-dependent industries with the highest employment are retail trade and manufacturing.

What becomes immediately apparent when looking at employment is that farming is not at the top of the employment figures, even though it is one of the most important industries in the region. This is due to several factors, including technological advances, such as automation, and the absence of casual/seasonal employees in the employment database.

² U.S. Bureau of Labor Statistics, Employment Projections 2012-2022. Online at: <http://www.bls.gov/news.release/ecopro.nr0.htm>.

Table 2.2 Employment in Goods Movement Dependent Industries by County
2013

Industry	Monterey		San Benito		Santa Cruz		San Luis Obispo		Santa Barbara	
	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
Construction	7,887	3.4%	1,391	6.2%	7,092	4.9%	10,529	6.6%	11,631	4.4%
Farm Related	17,211	7.4%	1,182	5.3%	6,713	4.6%	4,196	2.6%	10,250	3.9%
Forestry and Fishing	31,851	13.7%	–	–	–	–	2,870	1.8%	8,946	3.4%
Manufacturing	6,259	2.7%	2,848	12.7%	7,366	5.1%	6,573	4.1%	13,793	5.3%
Mining	680	0.3%	–	–	–	–	625	0.4%	2,029	0.8%
Retail trade	20,492	8.8%	2,978	13.7%	14,745	10.1%	17,903	11.2%	23,364	8.9%
Transportation and Warehousing	4,518	1.9%	579	2.6%	–	–	–	–	3,957	1.5%
Utilities	891	0.4%	–	–	–	–	–	–	339	0.1%
Wholesale trade	6,381	2.7%	–	–	4,494	3.1%	3,546	2.2%	5,885	2.2%
Goods Movement Dependent Industries	96,170	41.3%	8,978	40.2%	40,410	27.8%	46,242	28.9%	80,194	30.6%
All Industries	233,000	–	22,350	–	145,344	–	159,647	–	262,261	–

Source: Bureau of Economic Analysis.

Note: Data not reported in certain industries to protect confidential information. Employment in these industries is included in the Total Employment figures, but not in the Goods Movement Dependent Industries Employment Total.

2.2.2 Gross Regional Product

The importance of farming in the Central Coast becomes readily apparent when we look at Gross Regional Product (GRP) by industry. GRP is a direct measure of the value of all final goods and services produced in an economy, and are perhaps the most telling measure for economic activity. As can be seen in Table 2.3, in 2009 the agriculture industry makes up 17 percent of total GRP in Monterey County. In addition, manufacturing, retail and wholesale also generate significant GRP contributions based on available data.

In addition to GRP by county, it is also useful to look at the most recent data on GRP by metropolitan statistical area (MSA)³ to see the importance of various industries within a smaller geographic area. As Table 2.4 shows, in Salinas, the agriculture industry accounts for nearly 20 percent of the GRP in the Salinas MSA, more than retail and wholesale trade combined. In San Luis Obispo MSA, the key goods movement-dependent industries include manufacturing, retail and construction. In Santa Barbara MSA, the key goods movement-dependent industries include manufacturing, retail, and agriculture.

It should be pointed out that comparing data in Table 2.3 with data in Table 2.4 can lead to erroneous interpretations because of the following reasons:

- The county-level data in Table 2.3, used in the CCCCFS used IMPLAN data in conjunction with BEA data. The metro-level data using in Table 2.4 is solely from BEA.
- The county-level data in Table 2.3 is from 2009 in chained 2005 dollars whereas the metropolitan-level data in Table 2.4 is from 2013 in 2013 dollars. Since the year of the data reported and the reporting units differ for these two tables, they are not comparable.
- Due to privacy concerns, some industry gross domestic GDP totals were not reported. The industries missing data are not consistent between the two charts, leading to different totals.

³ Metropolitan Statistical Areas (MSA) are geographic areas defined by the Office of management and Budget (OMB) for use in collecting, tabulating, and publishing Federal statistics. It is typically a core urban area of 50,000 or more and adjacent counties with a high degree of social and economic integration with the urban core. For more information, see: <http://www.census.gov/population/metro/>.

Table 2.3 GRP and GDP in Goods Movement Dependent Industries by County,
Millions of Chained 2005 Dollars (2009)

Industry	Monterey County		San Luis Obispo County		Santa Cruz County		Santa Barbara County	
	GRP	Percent GDP	GRP	Percent GDP	GRP	Percent GDP	GRP	Percent GDP
Construction	–	–	\$529	6%	\$420	5%	–	–
Agriculture, Forestry, Fishing, Hunting, and Related Industries	\$2,659	17%	–	–	–	–	\$895	5%
Manufacturing	\$1,047	7%	\$794	8%	\$534	6%	\$1,808	10%
Mining	–	–	–	–	–	–	–	–
Retail Trade	\$1,158	7%	\$834	9%	\$835	9%	1,252	7%
Transportation and Warehousing	–	–	–	–	–	–	–	–
Utilities	–	–	\$974	10%	–	–	–	–
Wholesale Trade	\$1,147	7%	–	–	\$656	7%	–	–
Total	\$6,011	38%	\$3,131	33%	\$2,445	27%	\$3,955	22%

Source: Bureau of Economic Analysis Data, as used in the Central Coast California Commercial Flows Study, Cambridge Systematics.

Note: San Benito County did not have enough available data to include. Also, note that an – in the table indicates data have been suppressed to protect confidentiality. Chained dollars (2005) indicates real dollar value in 2005 to 2006. Chained is based on a two-year running average rather than a single year (constant).

Table 2.4 GRP in Goods Movement Dependent Industries by Metropolitan Statistical Areas
Millions of Chained Dollars (2013)

Industry	Salinas (Monterey County)		San Luis Obispo- Paso Robles-Arroyo Grande (San Luis Obispo County)		Santa Cruz- Watsonville (Santa Cruz County)		Santa Maria-Santa Barbara (Santa Barbara County)	
	GDP	Percent	GDP	Percent	GDP	Percent	GDP	Percent
Construction	\$489	2.4%	\$685	5.5%	\$610	5.6%	\$756	3.2%
Agriculture, Forestry, Fishing, Hunting, and Related Industries	\$3,938	19.4%	\$396	3.2%	–	–	\$1,325	5.6%
Manufacturing	\$591	2.9%	\$991	8.0%	\$1,030	9.4%	\$1,914	8.1%
Mining	\$146	0.7%	\$63	0.5%	–	–	\$971	4.1%
Retail trade	\$1,158	5.7%	\$962	7.8%	\$779	7.1%	\$1,393	5.9%
Transportation and Warehousing	\$373	1.8%	–	–	–	–	\$243	1.0%
Utilities	\$380	1.9%	–	–	–	–	\$103	0.4%
Wholesale Trade	\$1,447	7.1%	\$421	3.4%	\$697	6.4%	\$942	4.0%
Total	\$8,522	41.9%	\$3,518	28.4%	\$3,116	28.5%	\$7,647	32.3%

Source: Bureau of Economic Analysis. Data not reported in certain industries to protect confidential information. GDP output from these industries is included in MSA Total.

2.2.3 Key Industries Locations and Land Use

In addition to providing an overall understanding of key industries, it is important to look at where the key industries are clustered so that we can better correlate truck traffic demand with these truck traffic generators/attractors. Consistent with the CCCCFS, this section highlights several key industries: agriculture, manufacturing and transportation/warehousing. To determine the industry locations, business establishment data from InfoUSA⁴ is mapped by business size, and then overlaid with key business locations from the CCCCFS for validation and comparison.

Agriculture

According to the CCCCFS, Agriculture is one of the most important industries in California, and the Central Coast is a major producer of broccoli, lettuce, strawberries and other specialty vegetables and fruits. Wine production is prevalent in the Central Coast, along with crop production. As shown in Figure 2.5 and 2.6, the InfoUSA data shows high concentrations of agriculture businesses along the U.S. 101 corridor, with key clusters located around Salinas, South of Watsonville, Soledad, Santa Maria, and Paso Robles. In Monterey and Santa Cruz Counties, agricultural employment is concentrated among a smaller number of large employers. In San Luis Obispo and Santa Barbara Counties, agricultural employment is more distributed

⁴ InfoUSA is a company that provides business establishment data. The datasets used in this report are InfoUSA aggregated to the MPO and RTPA scale.

among a large number of small employers. Apart from U.S. 101, SR 46, SR 129, SR 152, and SR 156 are major interregional connecting routes between the Central Coast and the Central Valley that support these businesses and therefore their conditions must continue to be maintained/improved to ensure efficient delivery of goods to market.

Figure 2.5 Agriculture Business Locations in the Study Area
Santa Cruz, San Benito, and Monterey Counties

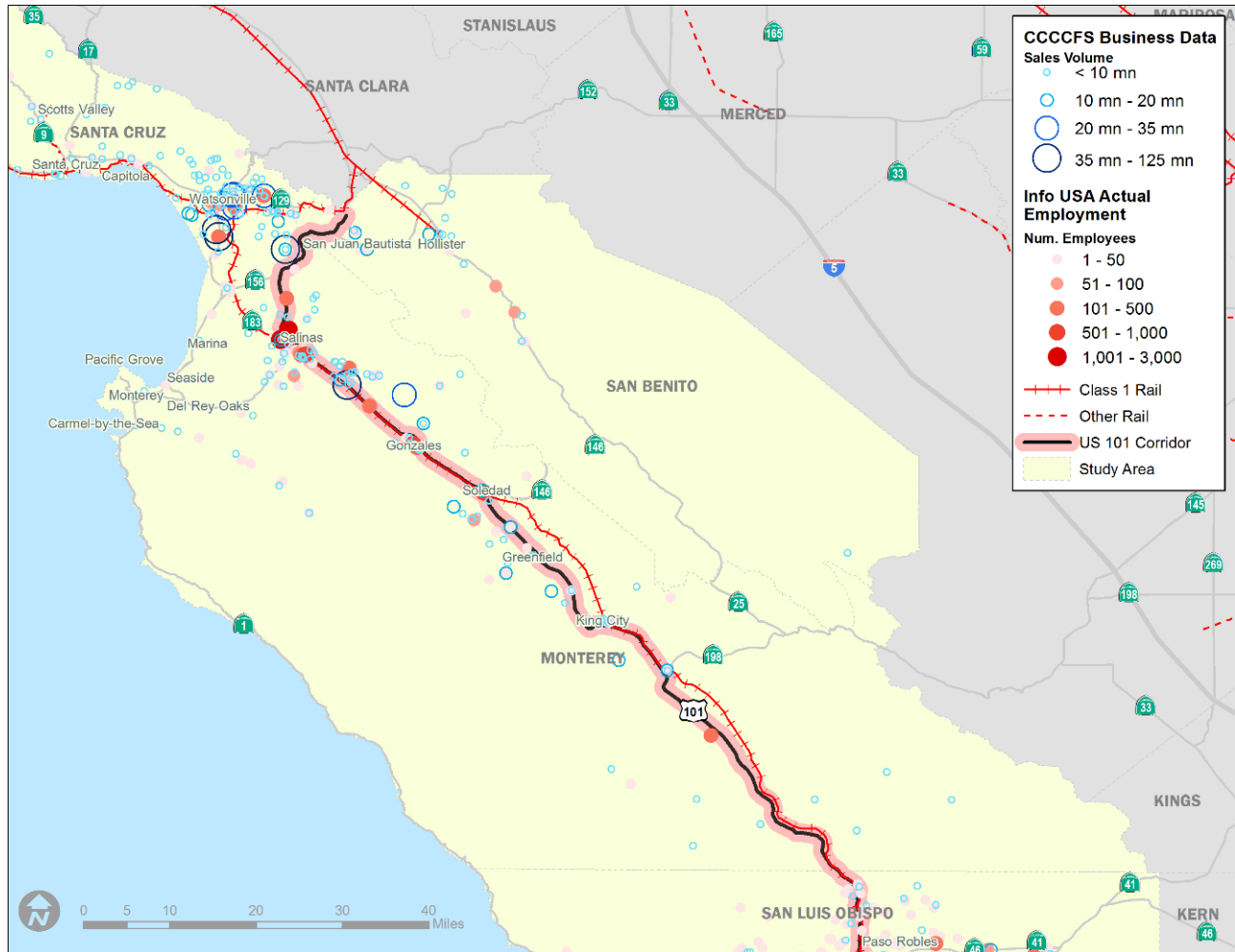
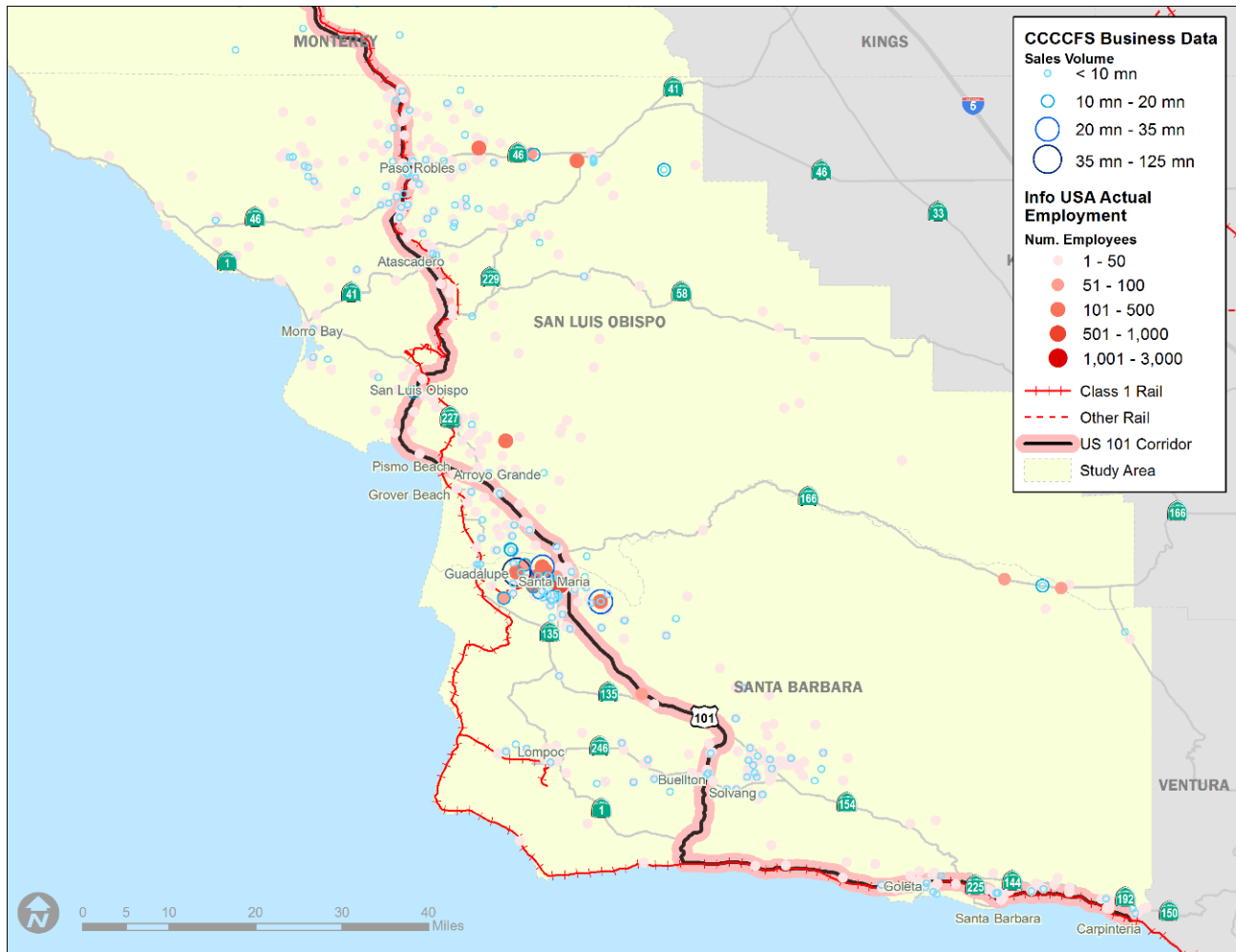


Figure 2.6 Agriculture Business Locations in the Study Area
San Luis Obispo and Santa Barbara Counties



Note: Sales volume is in million dollars. Source: CCCCFS Business Data obtained from ESRI Business Analyst, as used in the CCCCFS; InfoUSA Business Data obtained from individual regional MPOs (AMBAG, SBCAG, SLOCOG).

Manufacturing

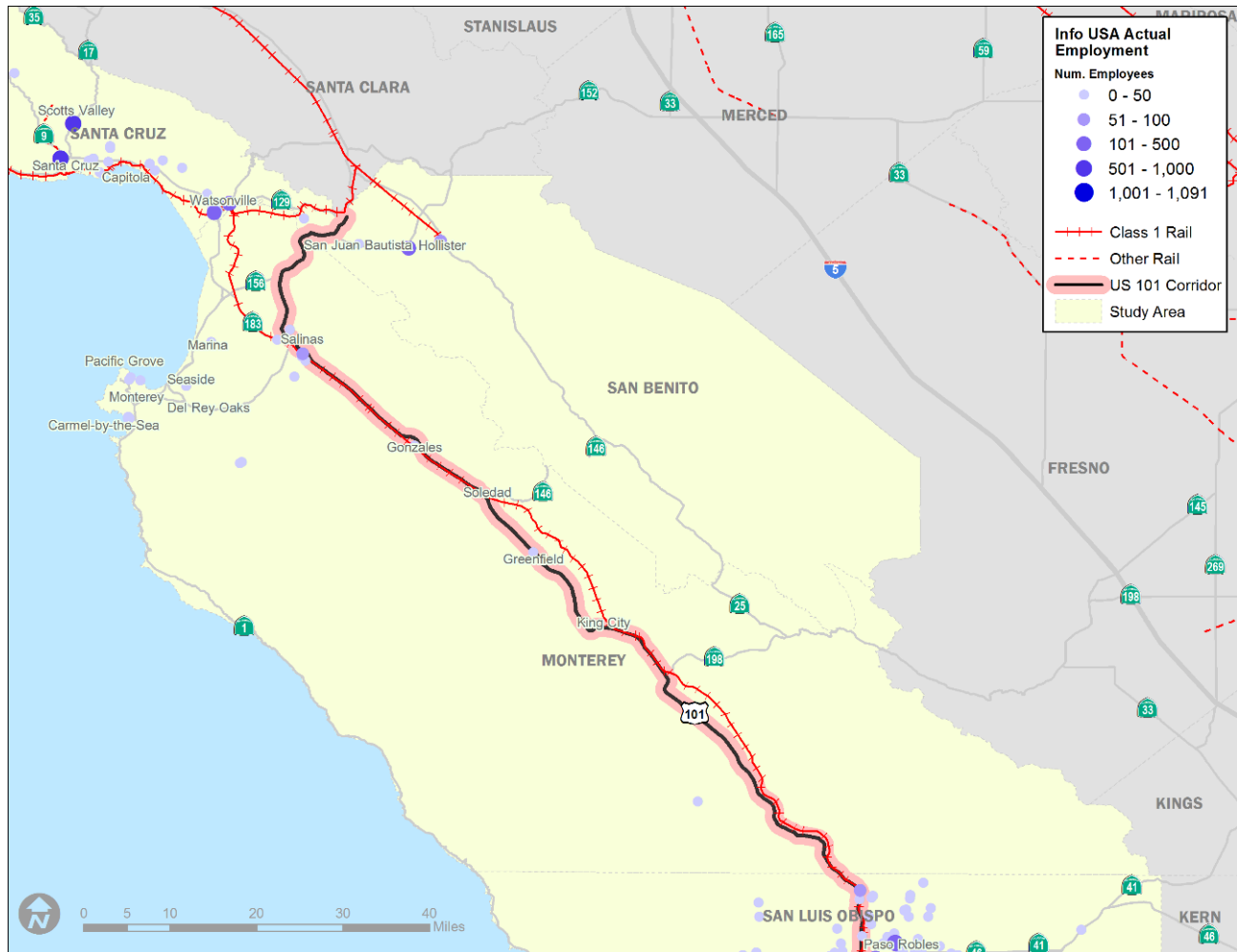
Manufacturing is a diverse industry in the region, with key manufacturing clusters in Santa Cruz, near Paso Robles, San Luis Obispo, Santa Maria and Santa Barbara (Figure 2.7 and 2.8). Food manufacturing is a particularly important component of manufacturing in the region, given it is a region of major agricultural activities.

According to Figure 2.9 and 2.10, the key food manufacturing clusters are located in Watsonville, along the northern U.S. 101 corridor, San Luis Obispo, Santa Maria, and Eastern Santa Barbara. While these areas all coincide with the clusters identified in the CCCCFS, key manufacturing clusters in the Salinas Valley near Soledad and King City are noticeably missing. One of the reasons why this may be the case is that the CCCCFS data used North American Industry Classification System (NAICS) data that located many jobs at business headquarters in more urban areas, while in reality most employees were field workers or stationed

at satellite facilities in King City and Soledad. As a result, jobs that would usually be more spread around are concentrated in a few clusters in Figure 2.7 through Figure 2.9.

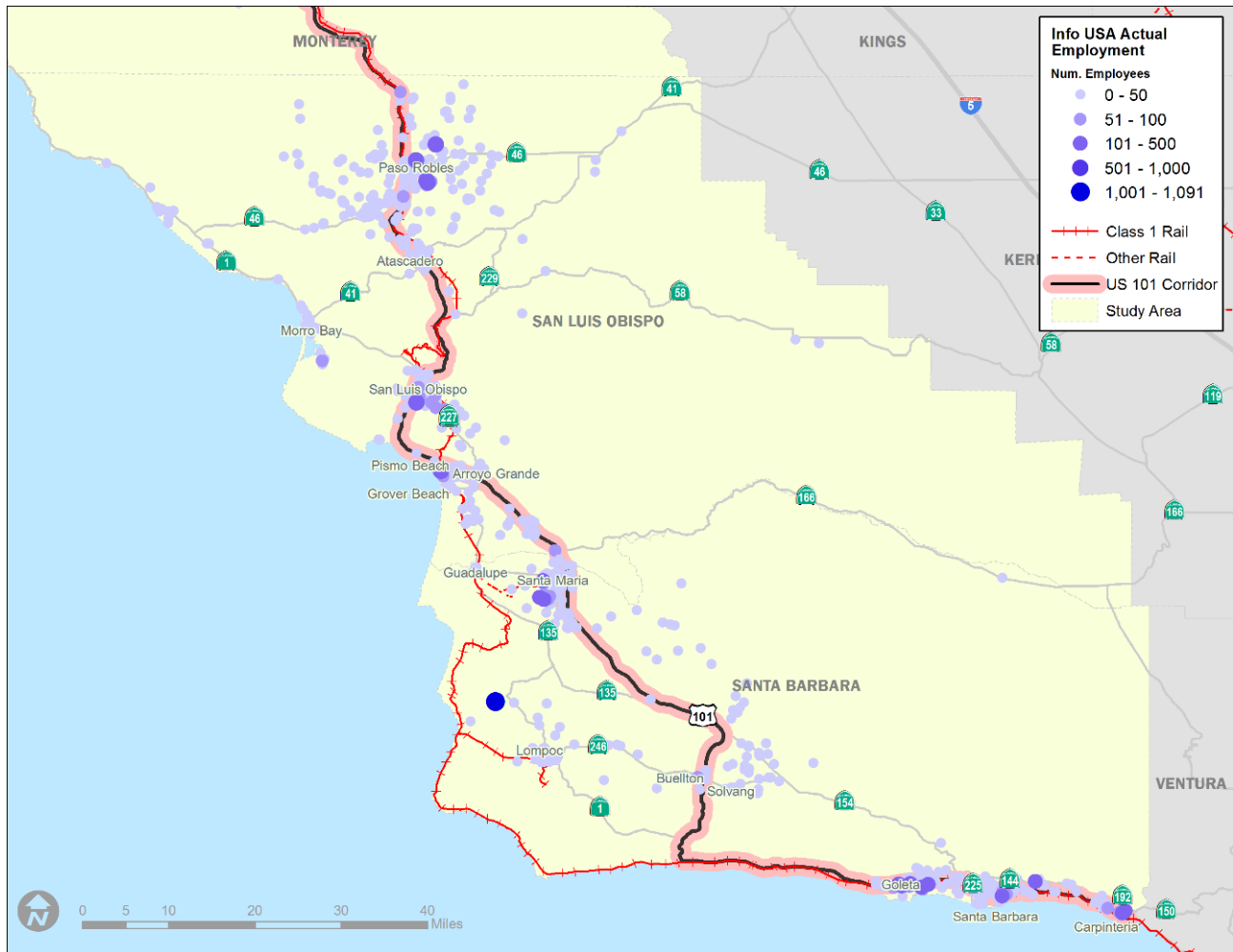
Since these locations are in close proximity to U.S. 101, maintaining good travel conditions on it will be important to serving the industry. Connecting highways, such as SR 129, SR 156, SR 166, SR 41, SR 46, and local roads also should provide high levels of service to facilitate farm-to-market, and farm-to-factory movements.

Figure 2.7 Manufacturing Business Locations in the Study Area
Santa Cruz, San Benito, and Monterey Counties



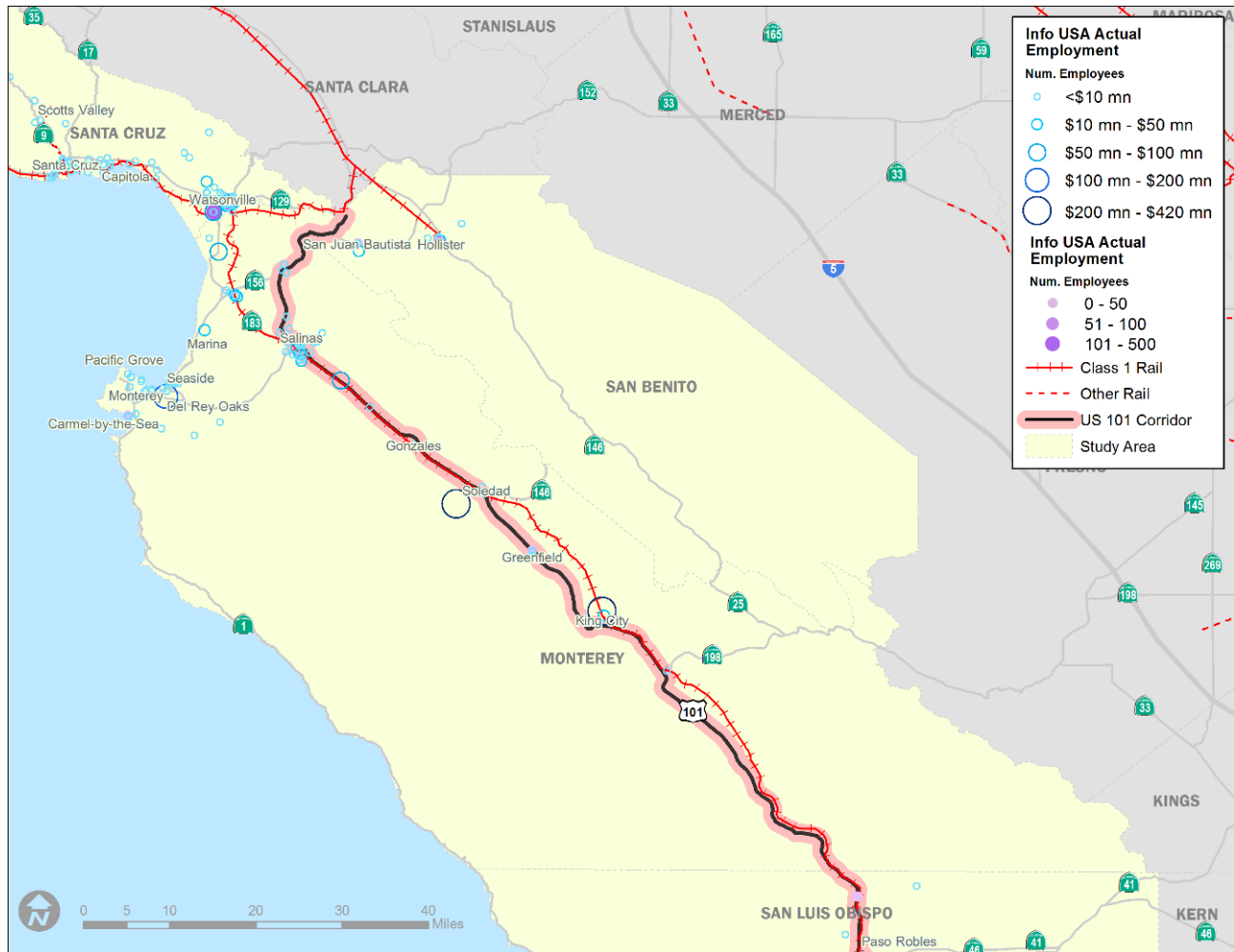
Source: InfoUSA Business Data obtained from individual regional MPOs (AMBAG, SBCAG, SLOCOG).

Figure 2.8 Manufacturing Business Locations in the Study Area
San Luis Obispo and Santa Barbara Counties



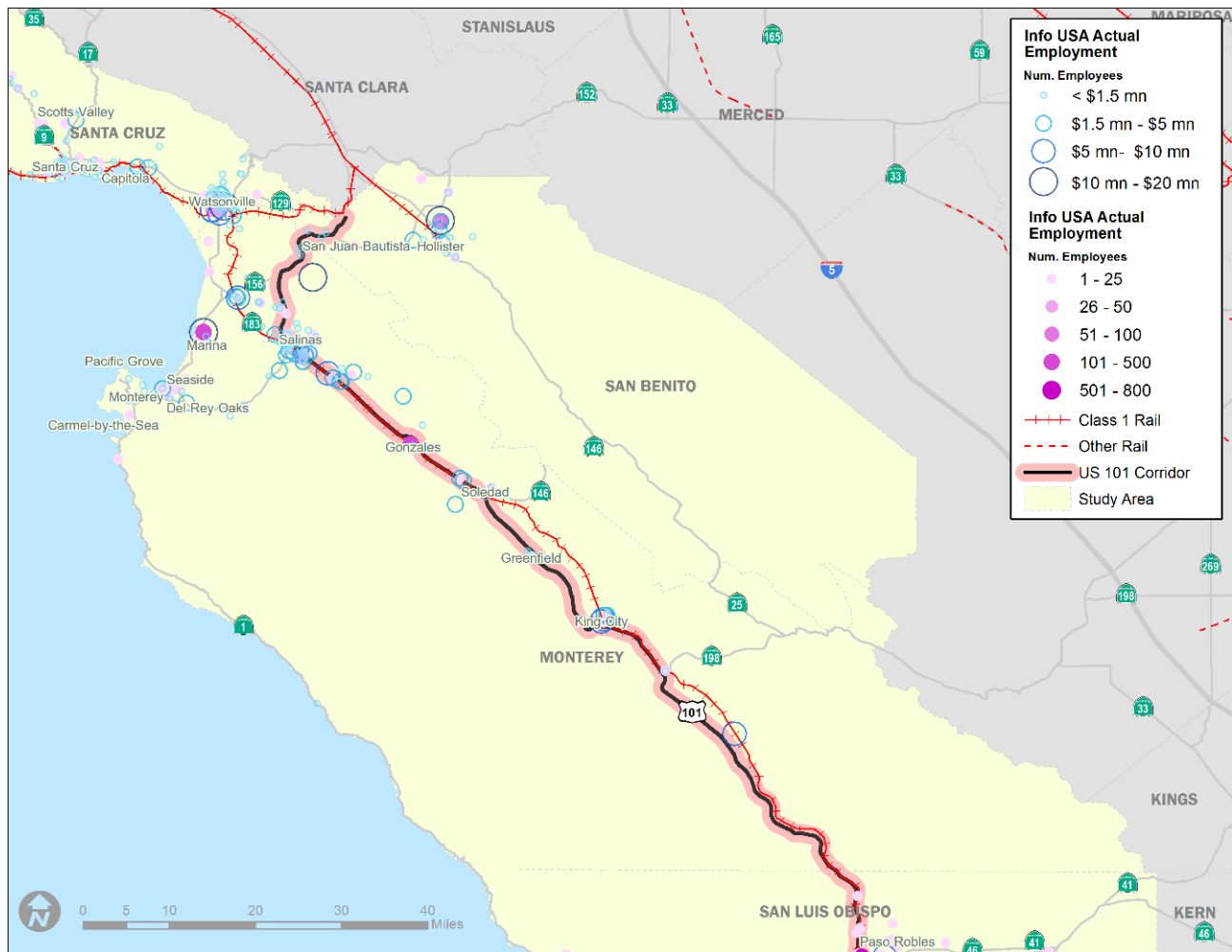
Source: InfoUSA Business Data obtained from individual regional MPOs (AMBAG, SBCAG, SLOCOG).

Figure 2.9 Food Manufacturing Business Locations in the Study Area
Santa Cruz, San Benito, and Monterey Counties



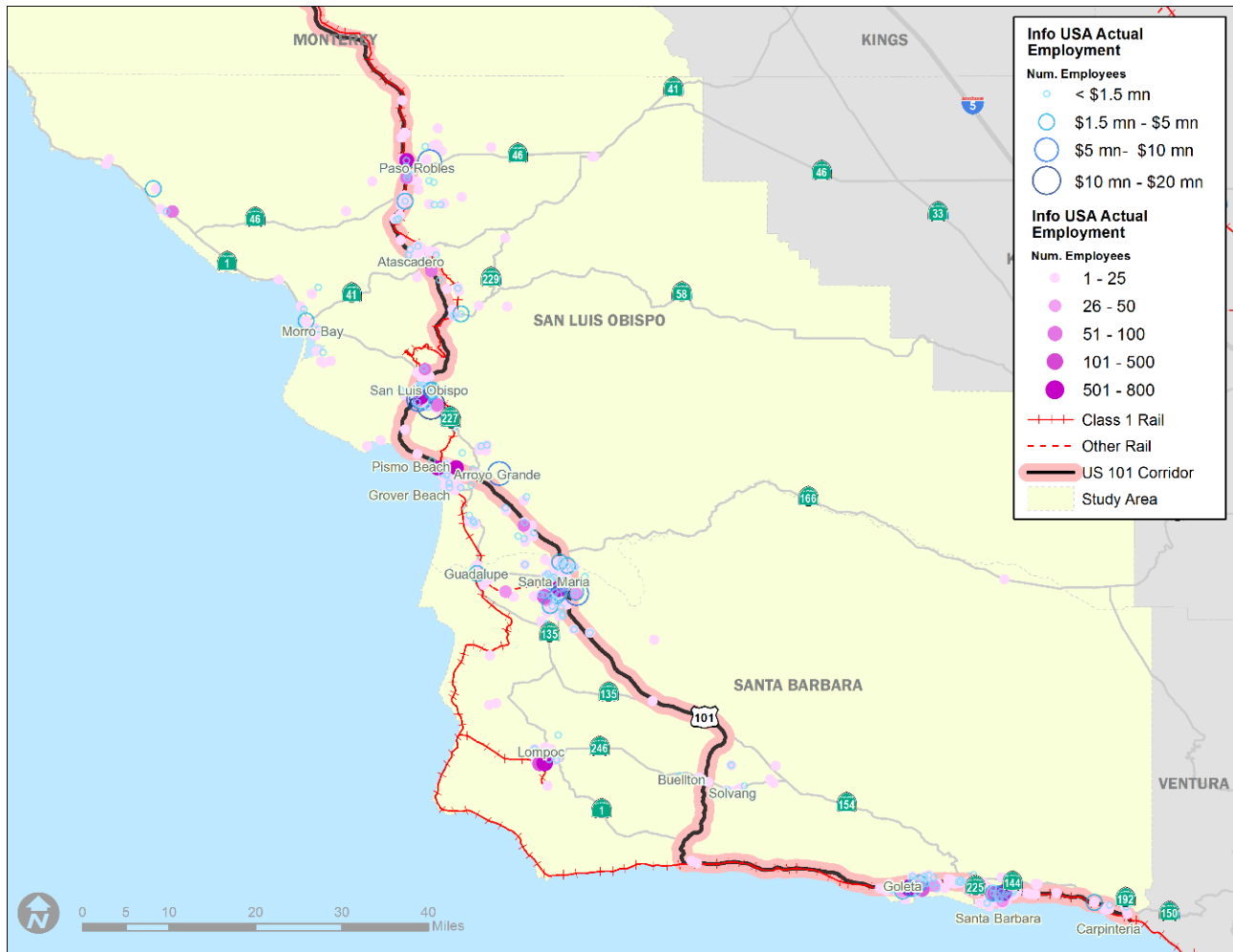
Source: CCCCFs Business Data obtained from ESRI Business Analyst, as used in the CCCCFs; InfoUSA Business Data obtained from individual regional MPOs (AMBAG, SBCAG, SLOCOG).

Figure 2.11 Transportation and Warehousing Business Locations in the Study Area
San Luis Obispo and Santa Barbara Counties



Source: CCCCFs Business Data obtained from ESRI Business Analyst, as used in the CCCCFs; InfoUSA Business Data obtained from individual regional MPOs (AMBAG, SBCAG, SLOCOG).

Figure 2.12 Transportation and Warehousing Business Locations in the Study Area
San Luis Obispo and Santa Barbara Counties



Source: CCCCFS Business Data obtained from ESRI Business Analyst, as used in the CCCCFS; InfoUSA Business Data obtained from individual regional MPOs (AMBAG, SBCAG, SLOCOG).

In addition to understanding the specific freight-generating land uses along the corridor, changes in specific land uses that happen in the future should be considered. Conversion of agriculture land to other uses and vice versa can impact freight flow patterns in the future. However, impacts on goods movement from land uses in the study area are expected to be minor.

Parcel-level land use data was used to determine the changes of land use between 2010 and 2035. Land use is expected to remain largely unchanged to 2035 with less than 0.01 percent of parcels having changes. About 83 acres of existing industrial land use parcels which may be related to goods movement will likely change by 2035. Out of these, about 53.6 acres of land are projected to change to neighborhood commercial land use, while the remaining 29 acres will change to town commercial land use type. These land use changes are expected to have a minimal impact on goods movement along the U.S. Highway 101 corridor.

2.3 Commodity Flows and Trade Patterns

The economic activities discussed above are translated into millions of tons and dollars of goods moving through the region. To better understand the magnitude and nature of these flows, and how they will change in the future, we applied a data disaggregation process devised by Cambridge Systematics.

For this project, the Federal Highway Administration's (FHWA) Freight Analysis Framework version 3 (FAF3) commodity flows database⁵ was used as the primary data source. The FAF3 database is commonly used by many state and regional agencies for freight planning, and FAF3 provides estimates for freight tonnage, value, and domestic ton-miles by origin and destination zone,⁶ commodity type, and mode⁷ for 2007, and forecast through 2040. It integrates data from a variety of sources, including the 2007 Commodity Flow Survey (CFS), U.S. border crossings data, Port Import/Export Reporting Service (PIERS)⁸ import/export data and others, to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation. In the most recent version of FAF3, (version 3.5) regional provisional annual data for 2012 were included. The FAF3 database takes into account the effect of the 2008 to 2009 global recession, and the economic recovery since then.

The results of our analysis are discussed in the sections below for the U.S. 101 Central Coast region as a whole, as well as for each of the counties. At the county level, freight flows are linked to the specific distinguishing goods movement characteristic of the county.

2.3.1 Regional Flows

Figures 2.13 and 2.14 below shows the total amount of goods moving into, out of, and within the study region in 2012 and 2040 by weight and by value.⁹ By weight, there was a nearly even split between outbound (62.1 million tons) and inbound goods (60.7 million tons) in 2012, with movements within the study region accounting for less than 5 percent of the total. This relative share is projected to remain steady in 2040, though total inbound shipments are expected to overtake outbound shipments. The compound annual growth rate (CAGR) shows a constant rate of growth over a time period. In the study region, freight is projected to grow 1.7 percent a year by weight and 3.3 percent a year by value between 2012 and 2040.

By value, inbound shipments to the study region dominated in 2012, accounting for approximately 64 percent of the total value of goods. Outbound shipments accounted for approximately 35 percent, with intraregional shipments accounting for 1 percent. This suggests that higher value consumer goods and business supplies represent a more dominant flow in terms of value as compared to higher weight resource and agricultural products. 2040 projections show that over 68 percent of the total value of goods moved in the region will come through inbound shipments, 31 percent through outbound shipments, and approximately 1 percent in

⁵ http://www.ops.fhwa.dot.gov/freight/freight_analysis/faf/ (last accessed on July 15, 2014).

⁶ A FAF zone is typically a combined statistical area, or a metropolitan statistical area, or remaining parts of a State. However, in some cases, it can also represent an entire State.

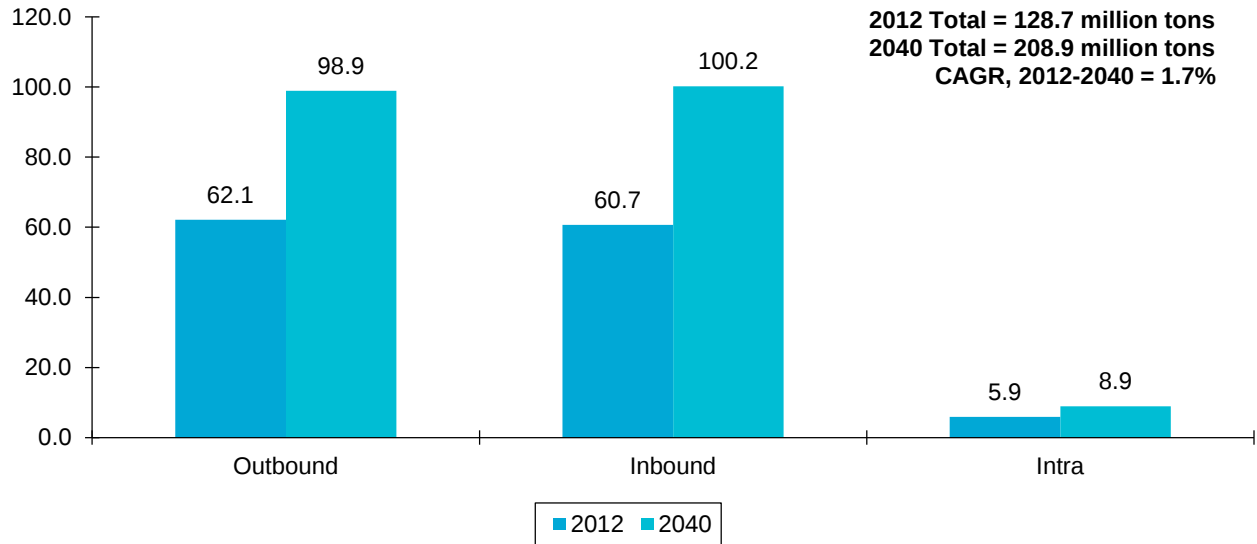
⁷ For international trade, FAF provides the inland transportation mode. For example, FAF provides data on whether imports to the Port of Oakland leave the port via rail or truck.

⁸ Port Import-Export Reporting System (PIERS) is a data product of the Journal of Commerce and is based on analysis of customs data.

⁹ Note that FAF3 does not contain measurements of through-traffic.

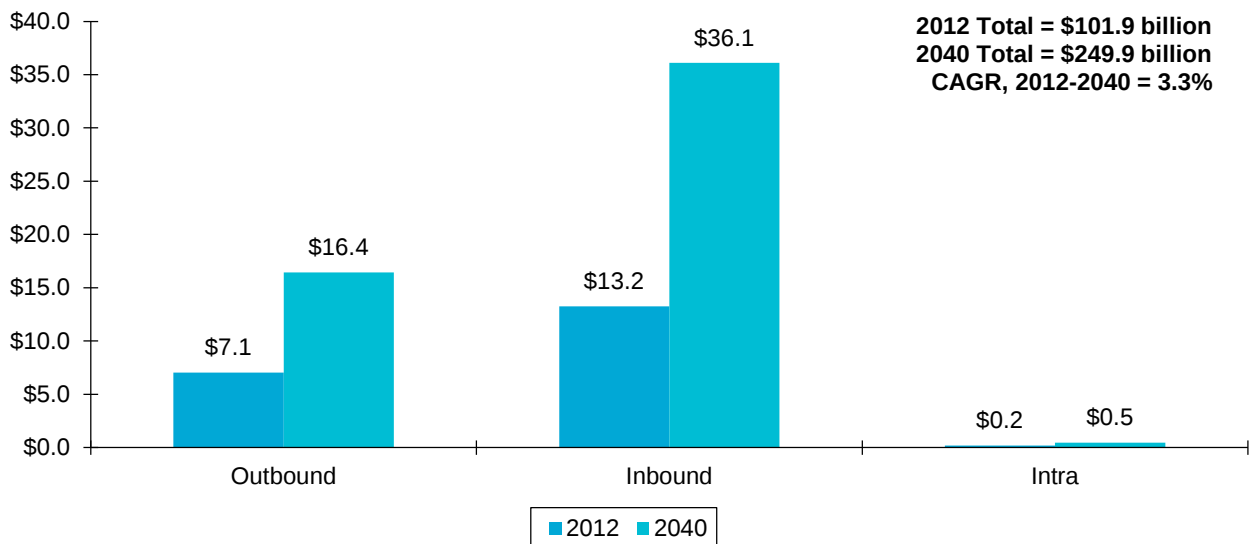
intraregional trade. It also should be noted that the rate of growth in value of shipments is higher than the rate of growth of population indicating that growth in demand for consumer products is related not only to population growth but to income growth for families.

Figure 2.13 Regional Freight Flows by Direction of Movement
Millions of Tons



Source: FAF3.

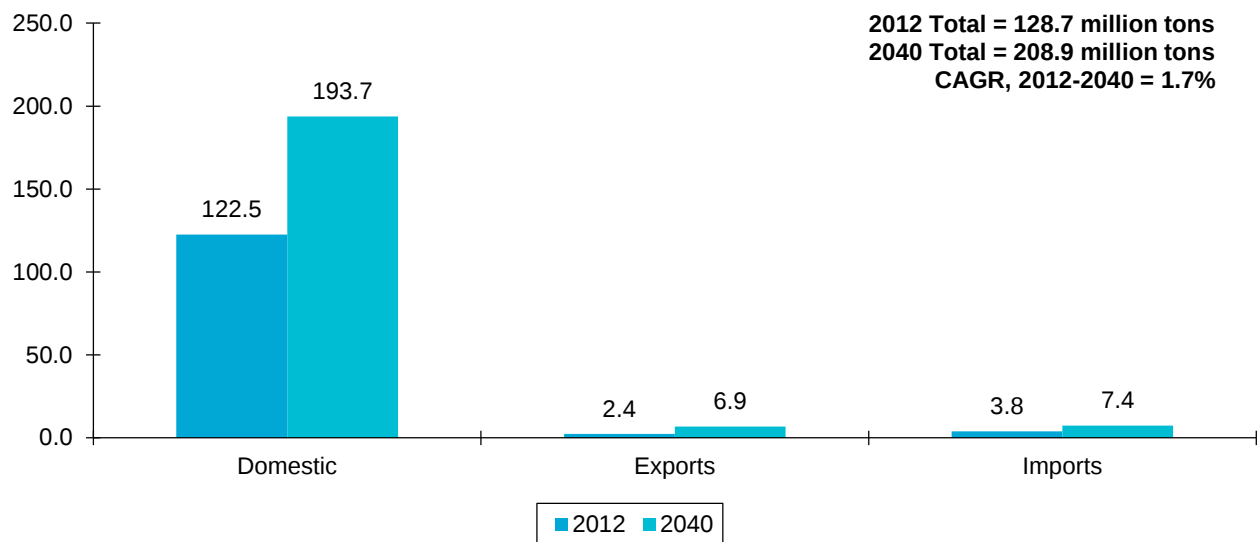
Figure 2.14 Regional Freight Flows by Direction of Movement
Billions of Dollars



Source: FAF3.

Figures 2.15 and 2.16 below shows the trade type of shipments by weight and value in 2012 and 2040 for the study region. Domestic shipments¹⁰ are the dominant type of movement by both measures for both 2012 and 2040. By weight in 2012, imports and exports combined only accounted for five percent of shipments. By value, imports and exports accounted for less than four percent of shipments. The dominance of domestic shipments is projected to continue in 2040. Measured by weight, the percent of imports and exports is expected to rise to nearly seven percent in 2040, with imports accounting for just more than half of the 14.3 million tons. By value, imports and exports combined are projected to rise to more than six percent of total shipments, with imports accounting for more than 70 percent of the \$3.4 billion total. Since overall international trade growth in the California goods movement picture is higher than it is in the Central Coast, there appears to be a need to provide improved access to the West Coast port and airport system coupled with trade promotion for the region's products.

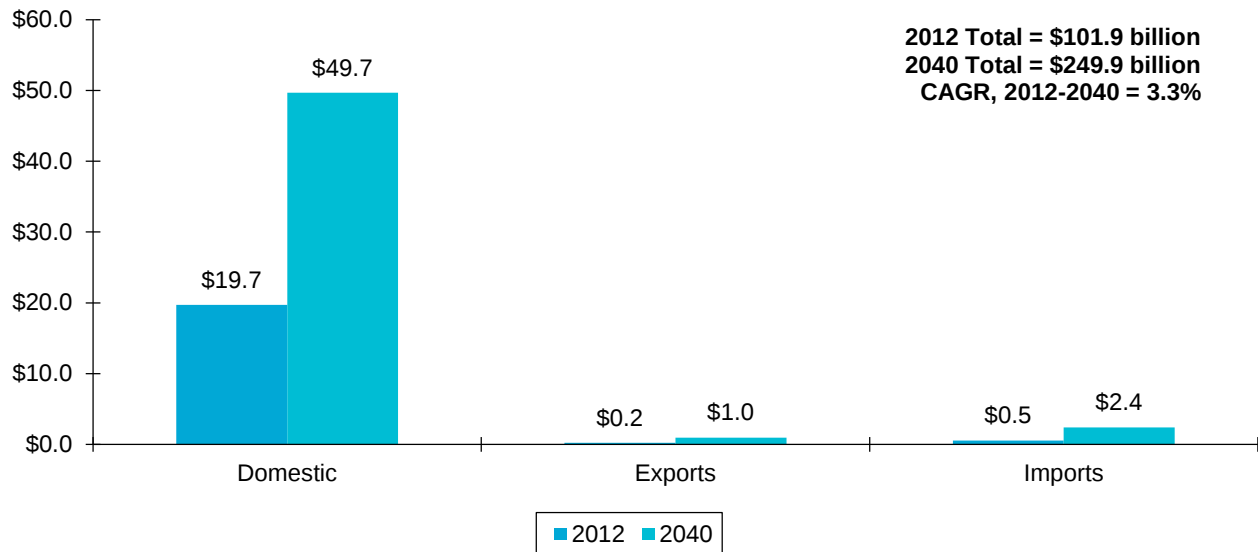
Figure 2.15 Regional Freight Flows by Trade Type
Millions of Tons



Source: FAF3.

¹⁰ Domestic means the immediate origin or destination of the shipment was a U.S. Zone (based on BEA). It should be noted that FAF3 is not a chained trip model, thus portions of international flows can be counted as domestic if a transfer happened within the study region. For instance, outbound domestic flows from Monterey County to Alameda County in the Bay Area can both be “true” domestic flows, or international flows that moved from a temporary storage area in Monterey County, to a warehouse in Alameda County.

Figure 2.16 Regional Freight Flows by Trade Type
Billions of Dollars



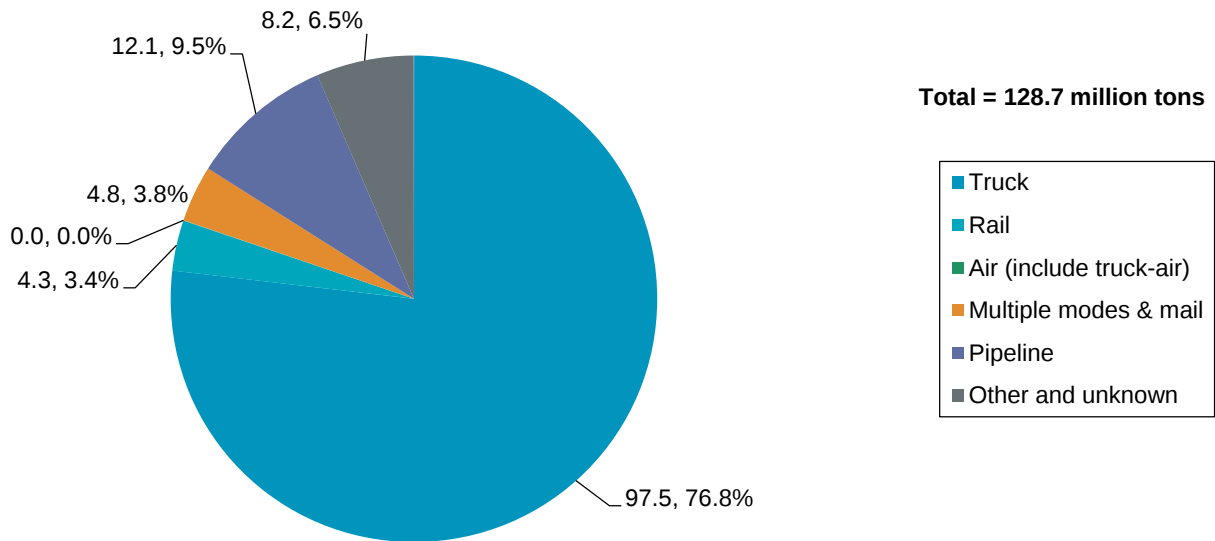
Source: FAF3.

Figures 2.17 and 2.18 below shows the mode split for shipments into, out of, and within the study region in 2012 by weight and by value. A total of 128.7 million tons of goods were shipped in 2012, with nearly 77 percent going by truck. This highlights the dominance of trucking as the mode of choice for moving goods and reinforces the importance of U.S. 101 as well as adjacent and connecting corridors. Pipeline accounted for the second highest mode share by weight at 9.5 percent, followed by multiple modes and mail¹¹ (3.8 percent), rail (3.4 percent), and water (2.9 percent). The other/unknown category contributes 6.5 percent while air shipments in the study region are less than 0.1 percent. By 2040, trucks are projected to carry nearly 79 percent of the projected 206.5 million tons of goods. Pipeline shipments are estimated to decline slightly but retain the second highest mode share at 7.8 percent, followed by other/unknown (5.7 percent), multiple modes and mail (4.2 percent), rail (3.6 percent), and air with less than 0.1 percent.

Measured by value, trucking was the dominant mode in 2012, accounting for 74 percent of total shipments. Multiple modes and mail was the second highest mode, accounting for 13.3 percent of shipments. This reflects the use of multimodal and parcel services to carry higher value, lower weight shipments, as well as a continuing trend towards containerization. This also is seen in the lower share of goods moved by rail (only 1.8 percent) which typically carries lower value, bulk goods such as construction material, minerals, or waste/scrap. Pipeline (6.7 percent) and other/unknown (2.7 percent) are all lower shares measured by value than by weight. Finally, air shipments accounted for 1.5 percent of goods shipped in 2012 measured by value, representing the higher value, lower weight types of goods that are typically moved by air. In 2040, the share of goods moving by truck is projected to decrease slightly from 74 to 71 percent of \$249.2 billion. Multiple modes and mail will increase the most, accounting for 18.3 percent of shipments in 2040, with smaller increases in air, rising to 3 percent. Other modes will see a decrease in share of shipments.

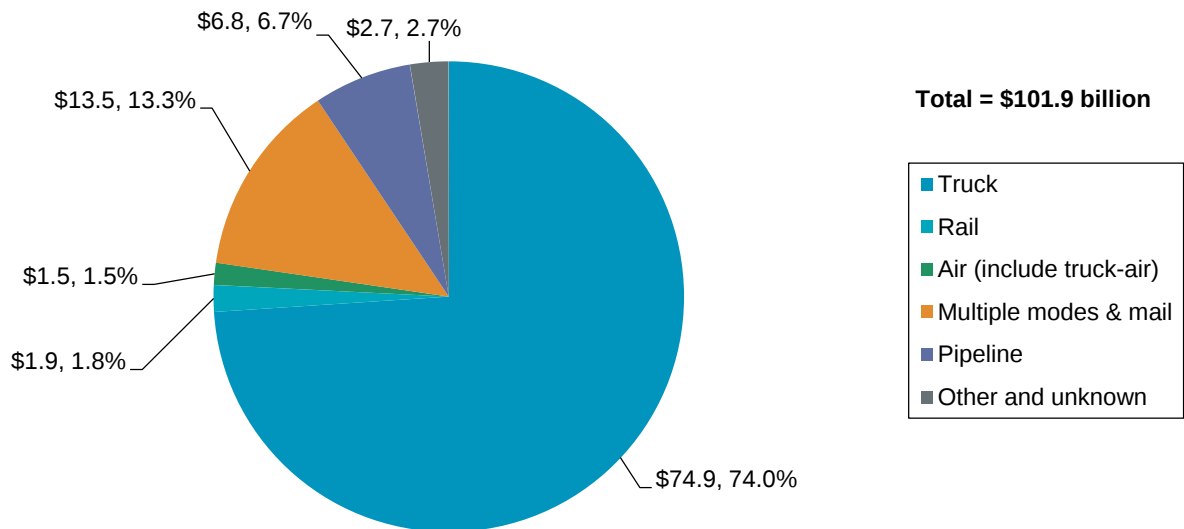
¹¹ The mode "multiple modes and mail" in the FAF3 database includes truck-to-rail intermodal and mail (or parcel delivery) freight demand. To breakdown of this mode to its constituent sub-modes cannot be determined, however, in most cases this consists of intermodal rail traffic, or containers.

Figure 2.17 Regional Freight Flows by Mode
Millions of Tons



Source: FAF3.

Figure 2.18 Regional Freight Flows by Mode
Billions of Dollars

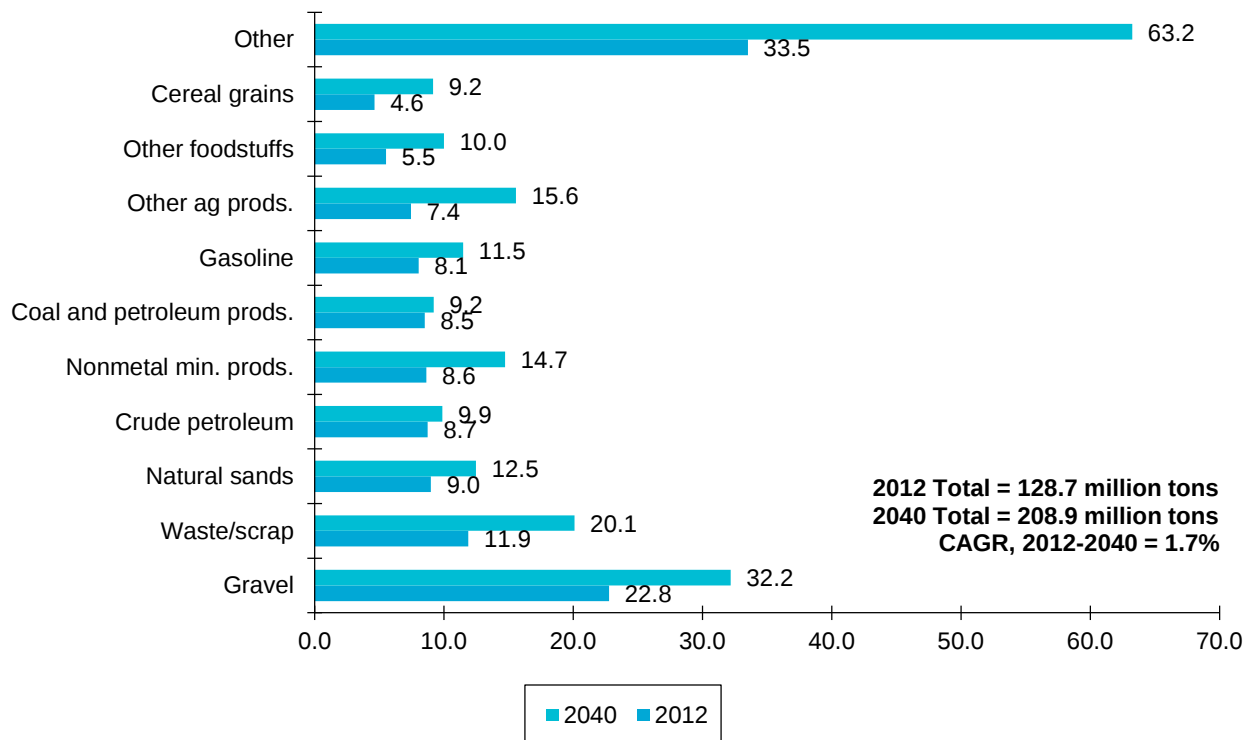


Source: FAF3.

Figure 2.19 below shows the top 10 commodities by weight transported into, out of, and within the study region in 2012 and projected for 2040. All other commodities are aggregated into the “Other” category. The largest single commodity transported by weight was gravel, accounting for 17.7 percent of all shipments. Much of this originates from quarries throughout the Central California Coast. Combined with waste/scrap (9.2 percent) and natural sands (7.0), these top three commodities accounted for 33.9 percent of all tonnage

moved in the study region. These figures are consistent with nearby regions as construction materials in general are very heavy. Agricultural goods, which play an important part in the regional economy, accounted for 13.7 percent of the total tons of goods shipped in 2012 (Other agricultural products, other foodstuffs, and Cereal grains). Total tonnage shipped for the top 10 commodities is projected to increase by 2040. Gravel (15.5 percent) and waste/scrap (9.7 percent) will remain the two top commodities by weight, but other agricultural products are expected to more than double and become the third most common commodity carried, accounting for 7.5 percent of the total. Combined with cereal grains and other foodstuffs, the agriculture sector will account for 16.5 percent of all tonnage moved into, out of, and within the region in 2040.

Figure 2.19 Regional Freight Flows by Top Commodities by Tonnage
Millions of Tons

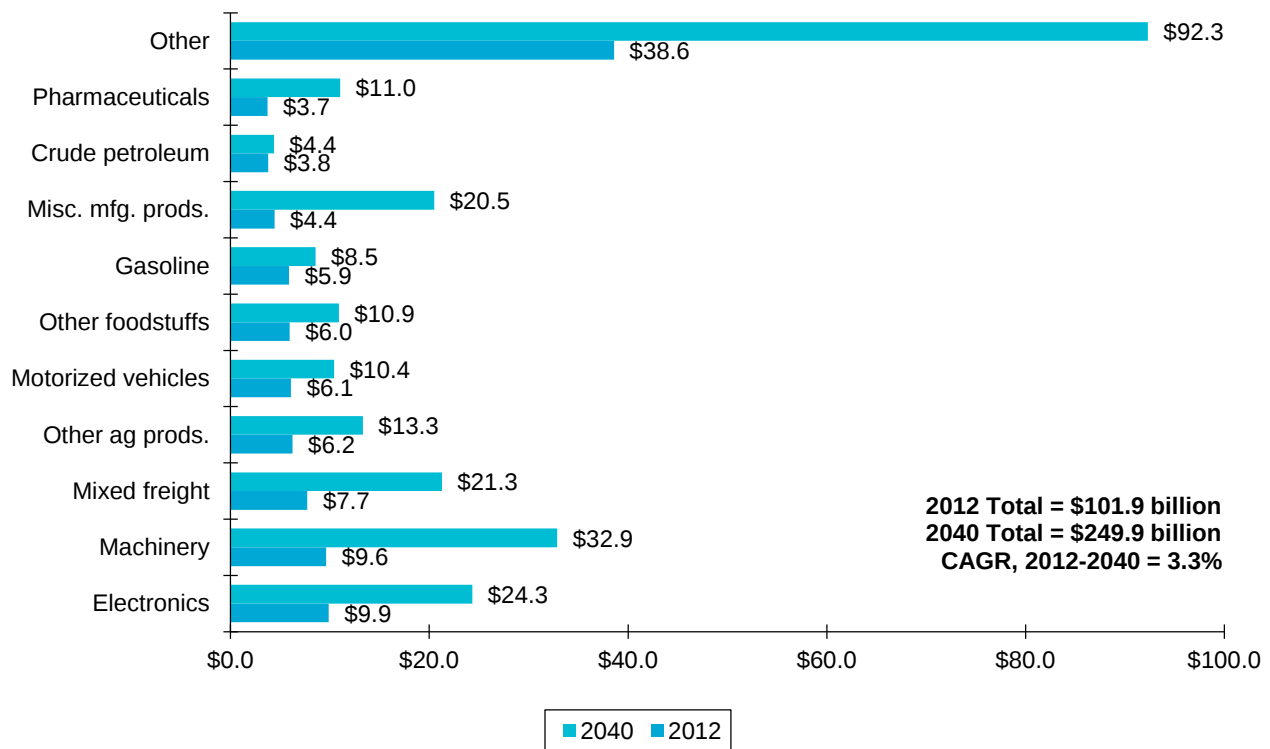


Source: FAF3.

Figure 2.20 below shows the top 10 commodities by value in 2012 and 2040 shipped into, out of, and within the study region. Electronics (9.7 percent), machinery (9.4 percent) and mixed freight (7.6 percent) comprised the top three commodities moved by value and accounted for 26.7 percent of all shipments, which represents a strong consumer base, and high-tech and defense sector in the region. Commodities directly related to agriculture include other agricultural products (6.1 percent) and other foodstuffs (5.8 percent). It also is important to note that other categories relate to the agriculture sector indirectly. Mixed freight shipments for example includes food bound for grocery stores or restaurants, and machinery, motorized vehicles (6 percent), and miscellaneous manufactured products (4.3 percent) can all indicate equipment bound for farms or used in the logistics chains for agricultural goods.

In 2040, machinery (13.2 percent), electronics (9.7 percent), and mixed freight (8.5 percent) are projected to remain the top three commodities by value. Miscellaneous manufactured products are projected to more than quadruple to become the fourth-largest commodity, representing 8.2 percent of goods moved. The total value of Other agricultural products and Other foodstuffs¹² also will increase; however their share of total shipped value will decrease to 5.3 percent and 4.4 percent, respectively.

Figure 2.20 Regional Freight Flows by Top Commodities by Value
Billions of Dollars



Source: FAF3.

For outbound shipments only in 2012, gravel (23.3 percent), waste/scrap (8.8 percent) and natural sands (8.3 percent) were the top three commodities by weight, and electronics (11 percent), machinery (9 percent) and gasoline (8 percent) were the top three commodities by value. By 2040, gravel and waste/scrap will remain the top two commodities by weight, but other agricultural products are expected to grow and become the third-highest commodity type, accounting for 7 percent of all tons shipped. Measured by value, machinery will become the top commodity (13.8 percent) followed by miscellaneous manufactured products (10 percent) and mixed freight (7.7 percent) in 2040.

For inbound shipments, gravel (10.7 percent) waste/scrap (10 percent) and crude petroleum (8.2 percent) were dominant in 2012 measured by weight. By 2040, other agricultural products and other foodstuff

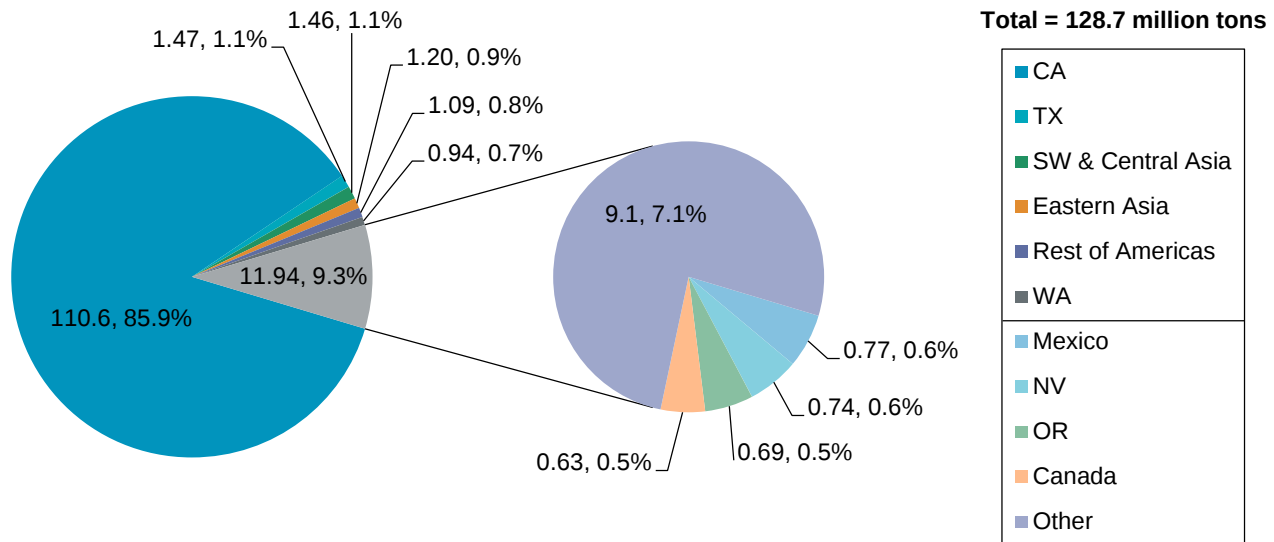
¹² Other agricultural products includes vegetables, fruits and nuts, flowers, and seeds. Other foodstuffs includes dairy products, processed vegetables, fruits, and nuts, coffee, tea, plant and animal oils, sugars and cocoa. For a full list of each category, see the U.S. Census "SCTG Commodity Codes." Online at: <https://bhs.econ.census.gov/bhs/cfs/Commodity%20Code%20Manual%20%28CFS-1200%29.pdf>.

combined will account for 14.1 percent of shipments, up from 11.8 percent in 2012. By value, machinery (9.5 percent), electronics (8.8 percent) and mixed freight (8.6 percent) were the dominant commodities in 2012. Miscellaneous manufactured products are projected to overtake electronics by 2040 and join machinery and mixed freight as the top inbound commodities by value.

For shipments within the region, gravel, natural sands, gasoline, and waste/scrap were the top commodities by weight in 2012, accounting for 53.2 percent of all shipments, and are projected to remain the top four commodities in 2040. By value in 2012, machinery, electronics, and gasoline were the top three commodities. Miscellaneous manufactured products are projected to become the second highest commodity total by 2040, replacing gasoline and pushing electronics to third.

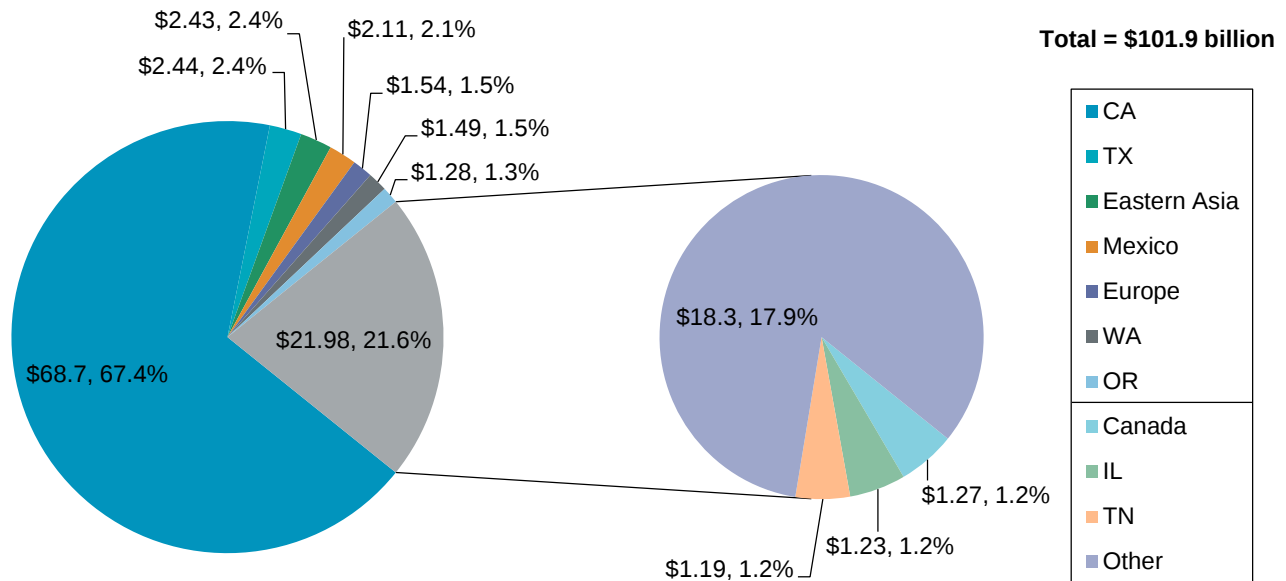
Figures 2.21 and 2.22 below show the top trading partners for all goods associated with the study region. Other locations in California outside of the study region dominate, accounting for nearly 86 percent of shipments by weight and more than 67 percent by volume in 2012. Texas is the second-biggest trading partners and the top state outside of California both by weight (1.1 percent) and by value (2.4 percent). By weight, Southwest and Central Asia is third; by value Eastern Asia is third.

Figure 2.21 Top Trading Partners with Central Coast Region
by Tonnage



Source: FAF3.

Figure 2.22 Top Trading Partners with Central Coast Region
by Value



Source: FAF3.

By 2040, California will still account for 82.3 percent of shipments by weight, but Eastern Asia, the Rest of Americas, and Mexico will all overtake Texas as top trading partners. Though there could be a variety of factors that can lead to this, rapid economic development in those emerging economies which increases demand for consumer goods is likely a key reason. Together, these three areas are projected to account for 4.4 percent of all trade by weight. By value, trade with California will continue to dominate, though it will drop to only 58 percent of all goods. This indicates the importance of interregional corridors in the region. Trade with East Asia and Mexico will both overtake Texas to become the second- and third-largest trading partners, accounting for nearly 8 percent of the total.

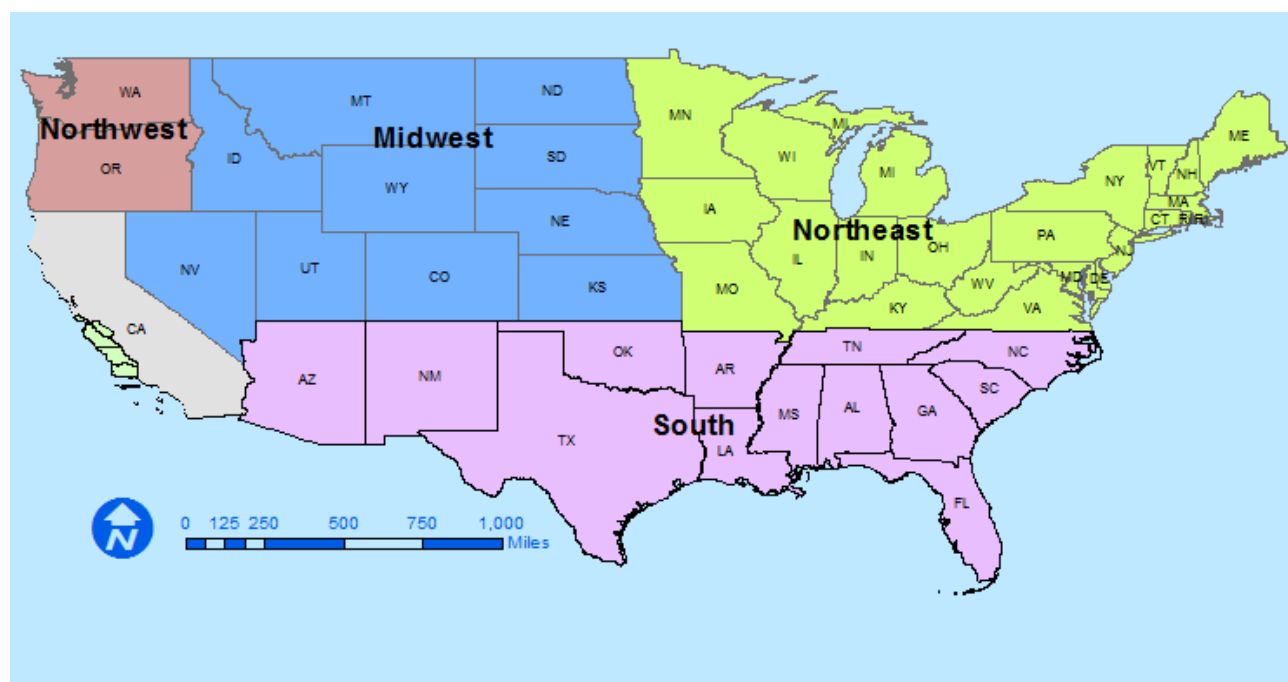
Breaking the United States into four sections as shown in Figure 2.23 below allows for an examination of freight flows to areas that might utilize the same routes.¹³ For outbound flows, Oregon and Washington attracted shipments weighing 686 thousand tons in 2012 and goods worth \$1,209 million. The southern region attracted 1,045 thousand tons and \$2,829 million in goods, and the central region attracted 784 thousand tons and \$1,520 million in goods. The Midwest/Northeast was the largest shipping destination by both weight (1,097 thousand tons) and value (\$2,936 million). This distribution is projected to continue through 2040.

For inbound shipments, the southern region originated the most goods by weight (2,857 thousand tons), with the Midwest/Northeast originating the most goods by value (\$6,631 million). The northwest was the smallest region by both measures, a fact partially explained by the limited geographic size of the region.

¹³ This map excludes Hawaii (which would require air or ocean shipments) and Alaska.

The key takeaway from this analysis is that connectivity to the Eastern United States is important to support future freight flow growth, followed by north-south connectivity to the Pacific Northwest and Mexico. Connectivity to I-5 from U.S. 101 is critical.

Figure 2.23 Trading Partners Map



2.3.2 County-Level Flows

Table 2.5 and Table 2.6 below show the inbound, outbound, intra, and total flows by county for the study region by weight (2012 and 2040) and value (2012 and 2040). Details for these flows are found in the county descriptions that follow.

Table 2.5 Freight Flows by County by Tonnage

County	Weight 2012 (Thousands of Tons)					Weight 2040 (Thousands of Tons)				
	MON	SBO	SLO	SB	SC	MON	SBO	SLO	SB	SC
Inbound	15,512	14,396	9,686	14,098	10,258	28,364	18,600	16,820	25,211	16,258
Outbound	11,038	14,622	6,530	17,816	15,424	20,092	21,553	11,471	27,762	23,134
Intra	471	823	158	728	438	810	1,041	260	1,100	636
Total	27,021	29,841	16,374	32,642	26,120	49,266	41,195	28,551	54,073	40,029

Source: FAF3.

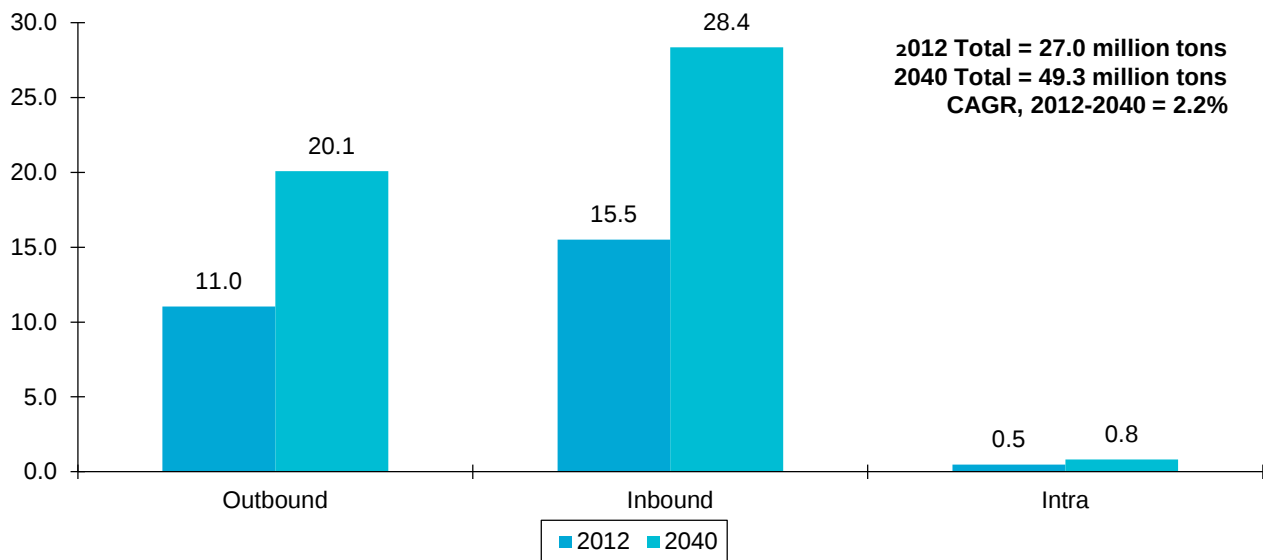
Table 2.6 Freight Flows by County by Value

County	Value 2012 (Millions of Dollars)				Value 2040 (Millions of Dollars)					
	MON	SBO	MON	SBO	MON	SBO	MON	SBO	MON	SBO
Inbound	\$13,245	\$8,514	\$10,919	\$16,785	\$10,129	\$36,125	\$14,082	\$28,923	\$47,800	\$26,777
Outbound	\$7,052	\$9,354	\$6,474	\$12,602	\$7,304	\$16,436	\$14,988	\$16,761	\$34,267	\$15,112
Intra	\$199	\$433	\$160	\$471	\$102	\$464	\$567	\$399	\$1,267	\$165
Total	\$20,497	\$18,301	\$17,554	\$29,858	\$17,535	\$53,025	\$29,637	\$46,084	\$83,333	\$42,055

Source: FAF3.

Monterey County

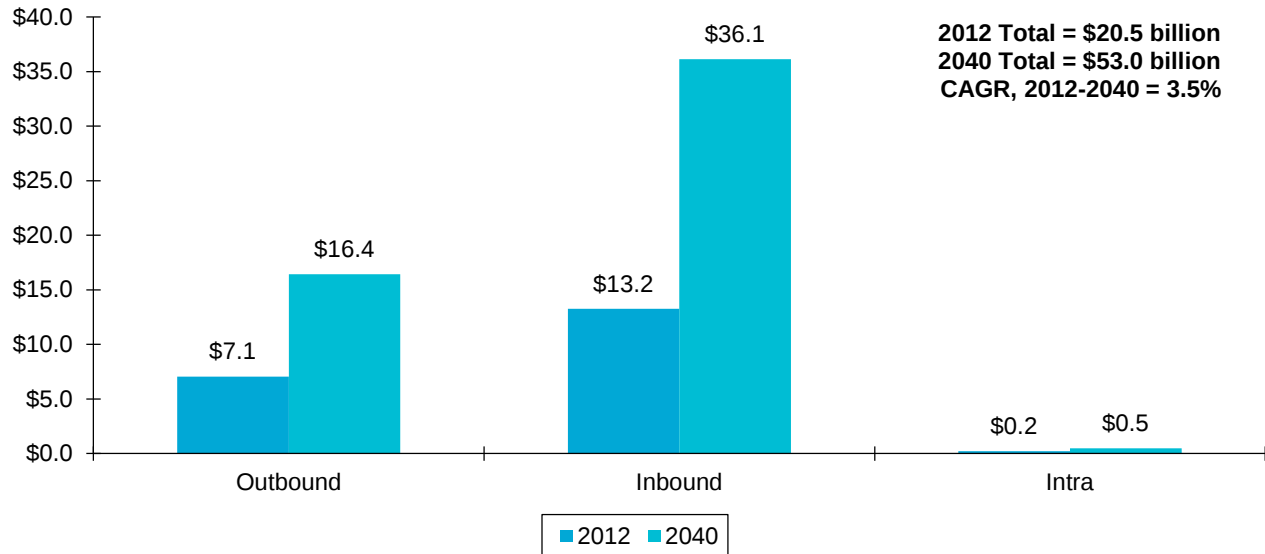
Figures 2.24 and 2.25 below show the total tons and value of goods moving into, out of, and within Monterey County. Unlike the region as a whole, Monterey County was dominated by inbound shipments in 2012 with 57 percent of all shipments by weight moving into the county. Sixty-four percent of goods by value also moved inbound in 2012, which more closely mirrored the region. Intracounty shipments made up a tiny fraction of all movements by both weight and value (less than 2 percent for both). Monterey County is projected to remain heavily tilted towards inbound movements in 2040, growing to 58 percent and 72 percent of all shipments by weight and value, respectively. The high percentages of inbound freight flows is demonstrative of a largely consumer driven economy with demands for various goods.

Figure 2.24 Monterey County Freight Flows by Direction of Movement
Millions of Tons

Source: FAF3.

Figure 2.25 Monterey County Freight Flows by Direction of Movement

Billions of Dollars

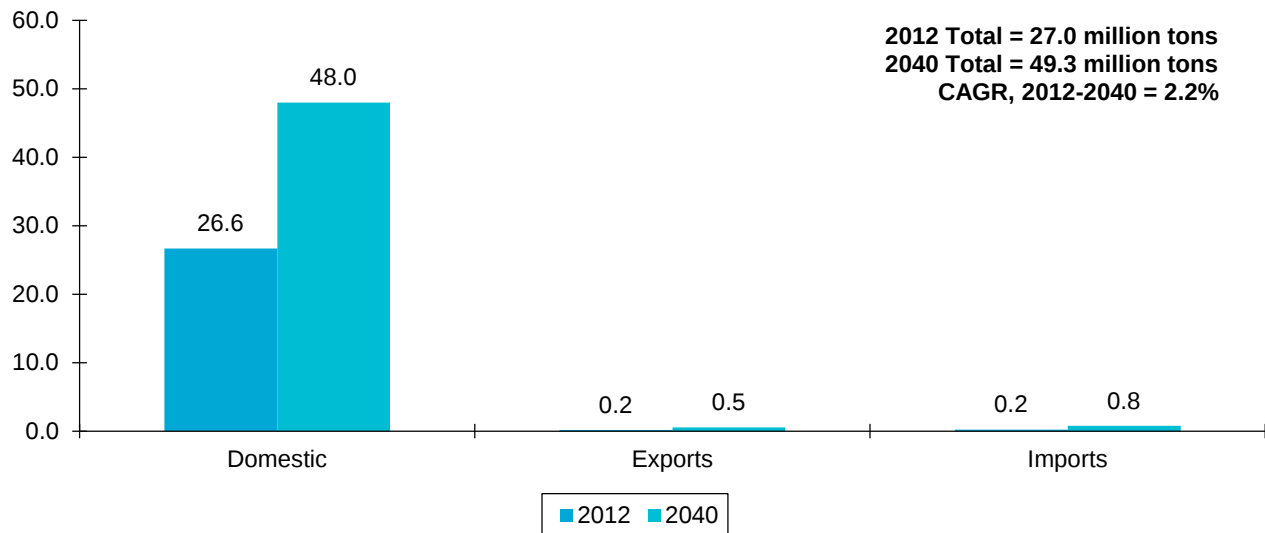


Source: FAF3.

Figures 2.26 and 2.27 below show the share of domestic, export, and import shipments from Monterey County in 2012 and 2040 by weight and value. By both measures, Monterey County trades almost entirely within the United States with domestic trade accounting for 99 percent of shipments by weight and 96 percent by value. This reliance on domestic trade is projected to continue through 2040 for goods measured by weight, but a quadrupling of the value of import shipments to 4.5 percent will bring more international goods to the county in the future.

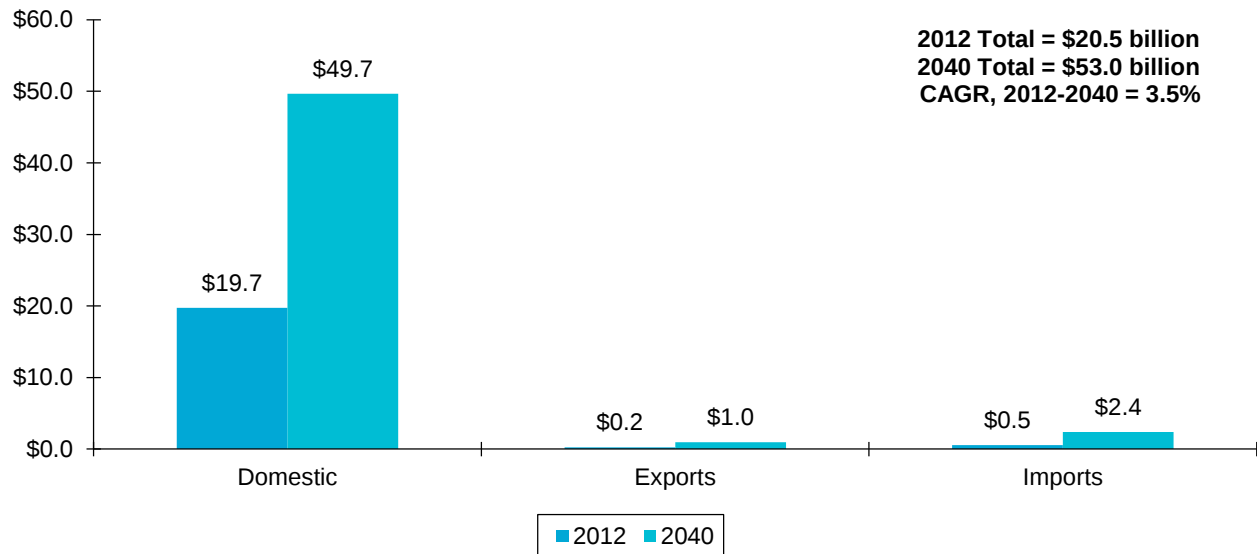
Figure 2.26 Monterey County Freight Flows by Trade Type

Millions of Tons



Source: FAF3.

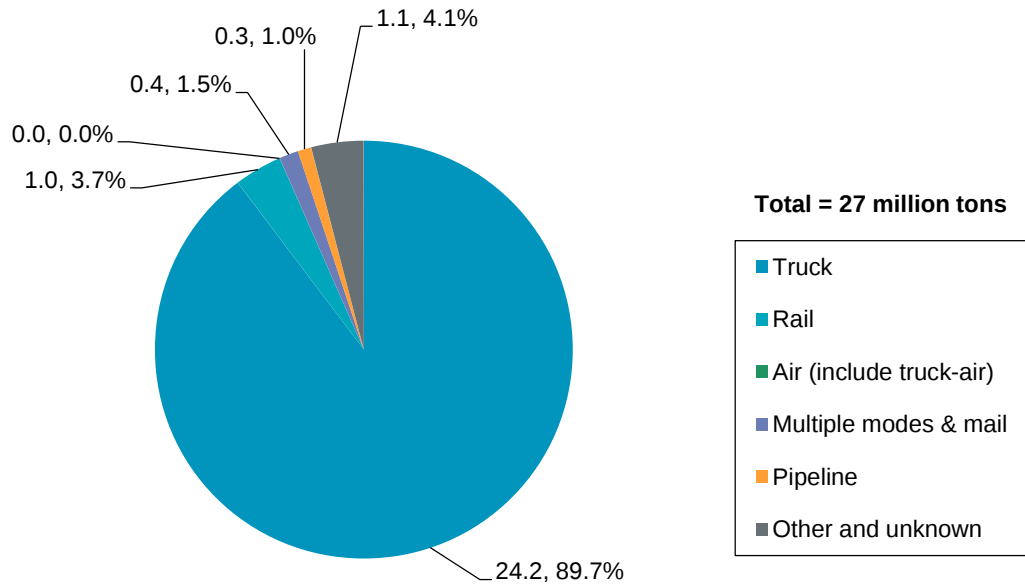
Figure 2.27 Monterey County Freight Flows by Trade Type
Billions of Dollars



Source: FAF3.

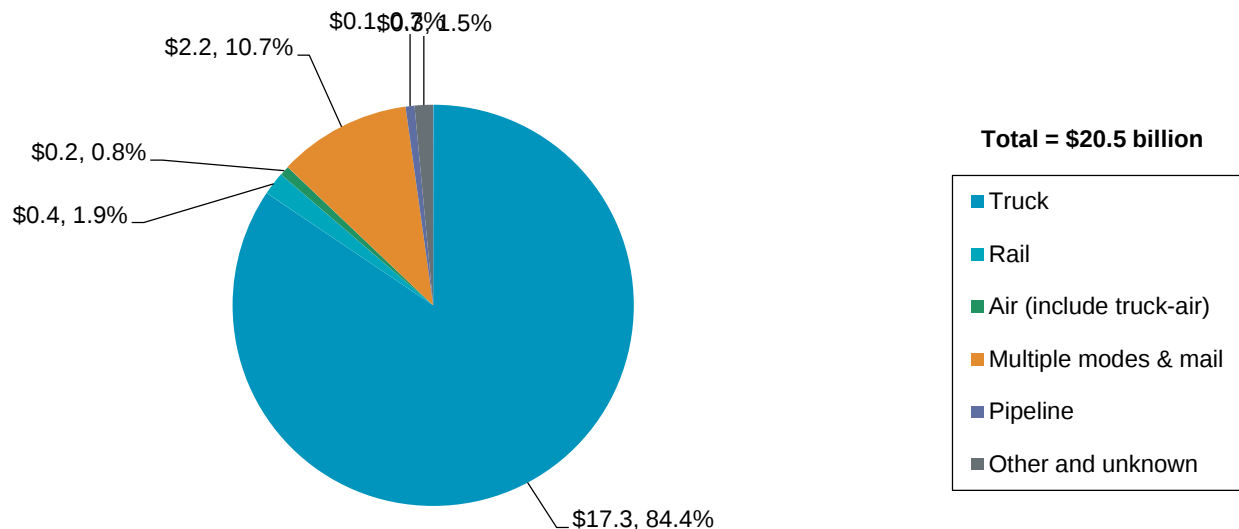
Figures 2.28 and 2.29 below show the modal split in 2012 by weight and value. Truck was the dominant mode of travel for goods moving into, out of, or within Monterey County, accounting for nearly 90 percent of shipments by weight and nearly 85 percent by value in 2012. Other/unknown and rail held the biggest shares after truck by weight, with multiple modes and mail representing more than 10 percent of shipments by value. Truck will remain the dominant mode in 2040 for shipments measured by weight – gains in the trucking mode will account for more than 90 percent of the total increase in goods shipped by 2040 (20.1 million tons out of a total increase of 22.3 million tons). By value, multiple modes and mail will gain in share by 2040, carrying 17 percent of all shipments by value.

Figure 2.28 Monterey County Freight Flows by Mode
Millions of Tons



Source: FAF3.

Figure 2.29 Monterey County Freight Flows by Mode
Billions of Dollars

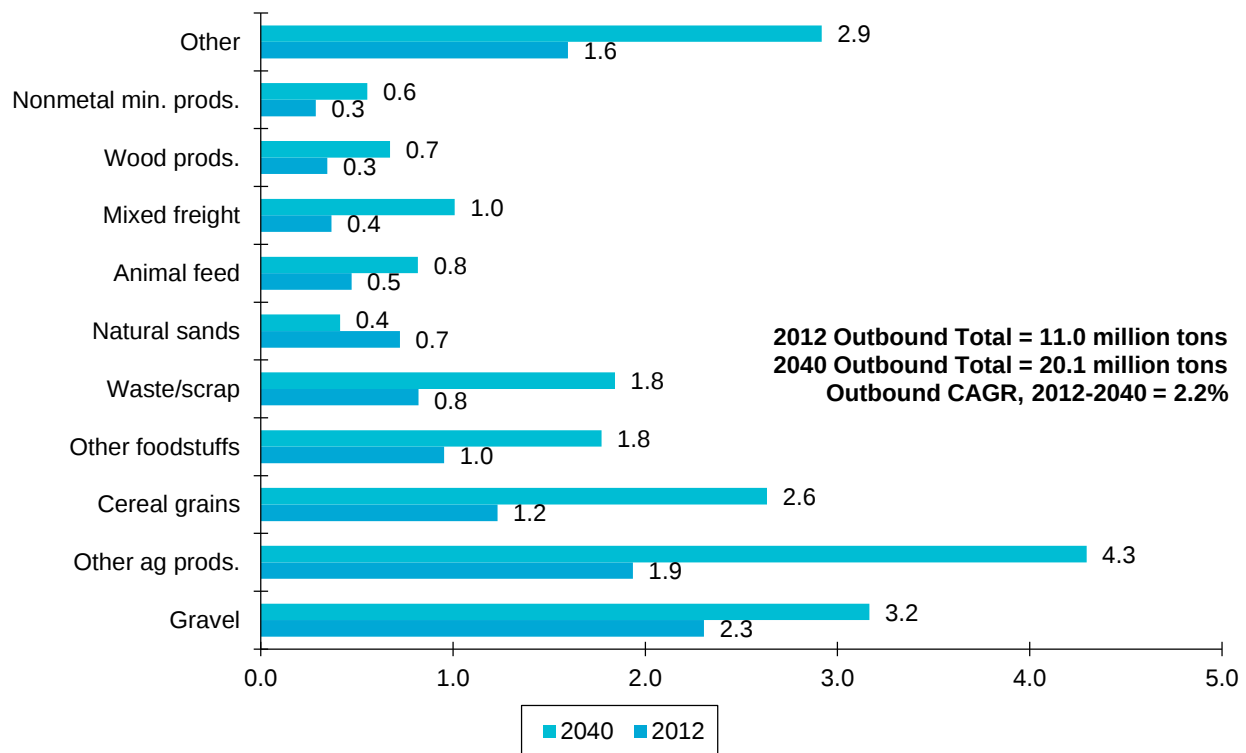


Source: FAF3.

Figure 2.30 below shows the top commodities by weight for all movements associated with Monterey County in 2012 and 2040. Gravel represents the top commodity moved, accounting for 17.9 percent of all shipments

in 2012, as it is usually one of the heaviest commodities moved. Agricultural products, including other agricultural products, cereal grains, and other foodstuffs accounted for more than 31 percent of all shipments. All three of these commodities are projected to grow significantly through 2040, with other agricultural products, a category which includes fresh or chilled vegetables and fruits, becoming the top commodity for the County. This is the only county in the study region with an agricultural good as the top commodity shipped by either measure in 2012 or 2040. This indicates that agricultural activity will continue to dominate in Monterey County in the future, maintaining its position as a key producer of agricultural products for the entire nation.

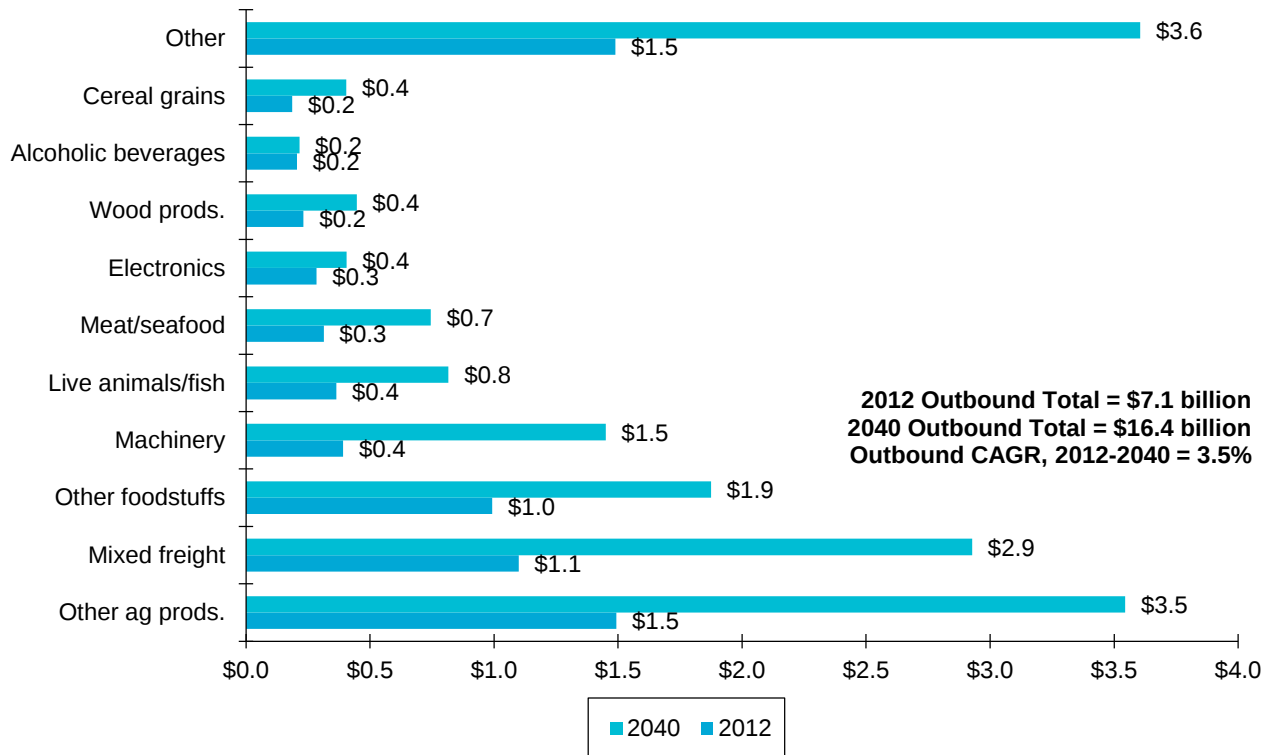
Figure 2.30 Monterey County Freight Flows by Top Commodities by Tonnage
Millions of Tons



Source: FAF3.

Figure 2.31 below shows the top commodities by value for all movements in Monterey County. Other agricultural products, mixed freight, and other foodstuffs were the top three commodities in 2012. Agricultural products in the top 10, including alcoholic beverages (wine) and meats/seafood, represented 29 percent of the County's shipments by value. By 2040, mixed freight is projected to overtake other agricultural products to become the largest single commodity by value. Machinery, electronics, and pharmaceuticals will all triple in total value shipped, and miscellaneous manufactured goods are projected to more than quadruple, representing a growing manufacturing and technology economic sector.

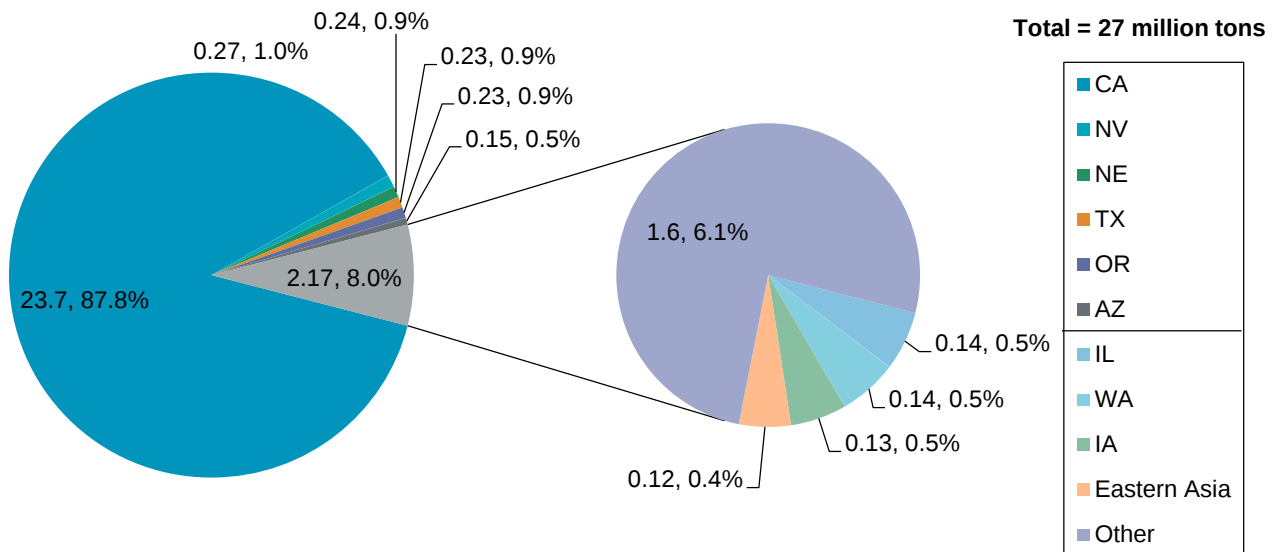
Figure 2.31 Monterey County Freight Flows by Top Commodities by Value
Billions of Dollars



Source: FAF3.

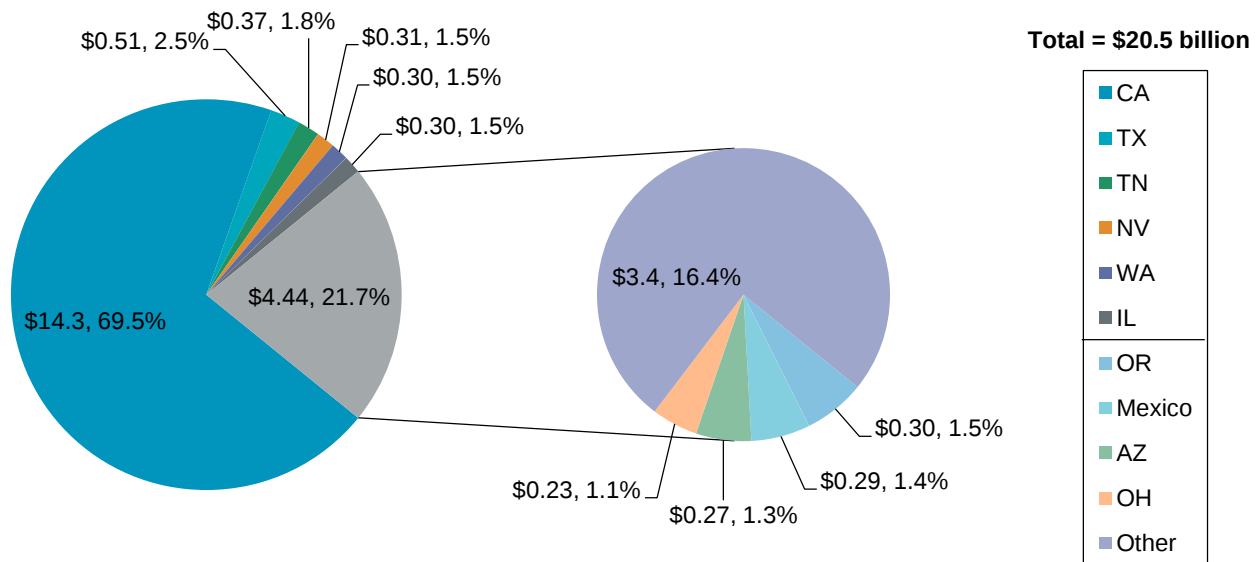
Figures 2.32 and 2.33 below detail Monterey County's top trading partners by weight and by value in 2012. The remainder of California dominates in both categories. East Asia was the largest foreign trading partner for the county by weight, with 0.12 million tons exchanged (0.4 percent). Mexico was the largest foreign trading partner by value, with \$0.29 billion exchanged (1.4 percent). In 2040, Arizona is projected to become the top trading partner by weight outside of California with 3.7 percent of trade while Texas will remain the top trading partner by value and will grow its share to 3.4 percent.

Figure 2.32 Monterey County Trading Partners
Millions of Tons (2012)



Source: FAF3.

Figure 2.33 Monterey County Trading Partners
Billions of Dollars (2012)



Source: FAF3.

Details for the State can be found in Table 2.7. By all measures, Monterey County trades the most significantly with Northern San Joaquin Valley, indicating that east-west connectivity to areas such as Fresno and Modesto via routes such as SR 156, SR 152, and SR 198 is critical.

Table 2.7 Monterey County Total Trade with California Regions

Region	Tons 2012 (Thousands)	Tons 2040 (Thousands)	Value 2012 (Millions of Dollars)	Value 2040 (Millions of Dollars)
Kern County, California	2,380	3,850	787	1,894
Northern San Joaquin Valley	8,276	15,392	4,785	11,322
Rest of California	3,093	5,162	1,556	3,580
Sacramento	2,240	4,920	1,406	3,148
San Diego	180	214	177	349
Southern California (SCAG)	2,630	4,269	2,747	6,905
San Francisco Bay Area	2,719	4,188	1,670	3,380

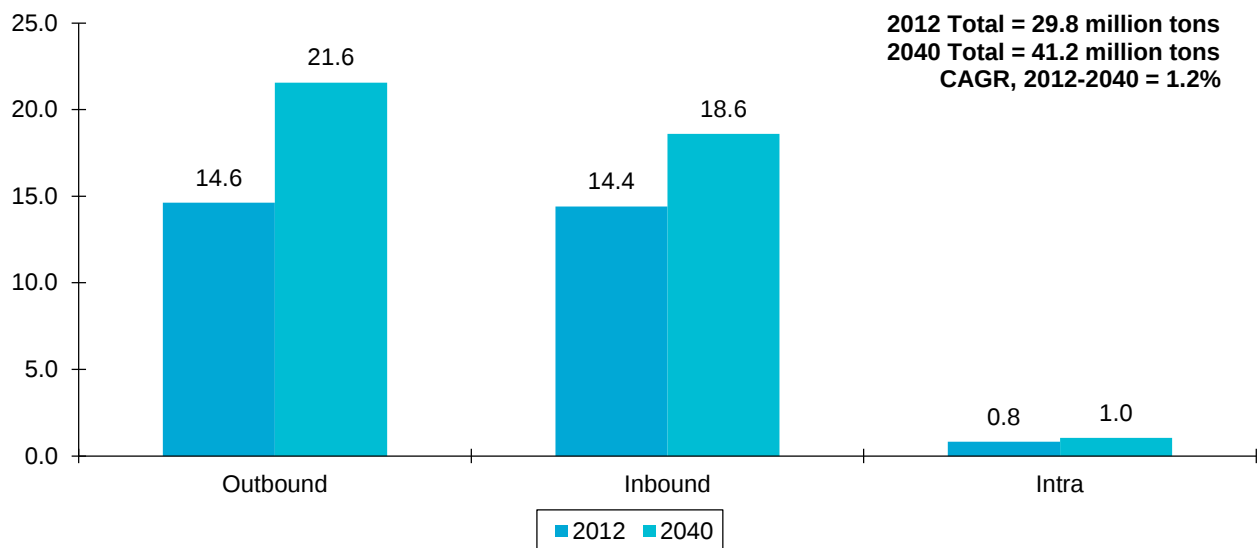
Source: FAF3.

San Benito County

Figures 2.34 and 2.35 below show the split of inbound, outbound, and intracounty traffic for San Benito County by weight and value in 2012 and 2040. Inbound and outbound movements are relatively evenly split in both categories, with slightly more outbound shipments. Intracounty shipments accounted for 2.8 percent of shipments by weight, and 2.4 percent by value.

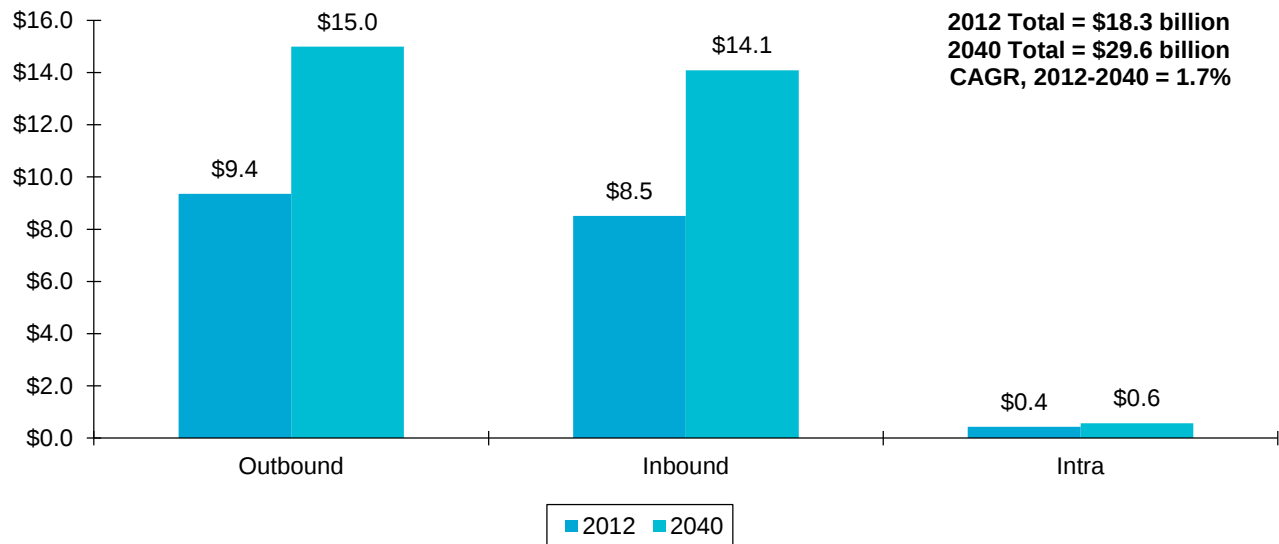
By weight in 2040, outbound shipments are projected to increase in share to 52.4 percent, with 45.1 percent in inbound shipments, and 2.4 percent in intracounty shipments. By value, outbound shipments will decrease slightly to 50.6 percent, with 47.6 percent of shipments inbound, and 2 percent intracounty.

Figure 2.34 San Benito County Freight Flows by Direction of Movement
Millions of Tons



Source: FAF3.

Figure 2.35 San Benito County Freight Flows by Direction of Movement
Billions of Dollars

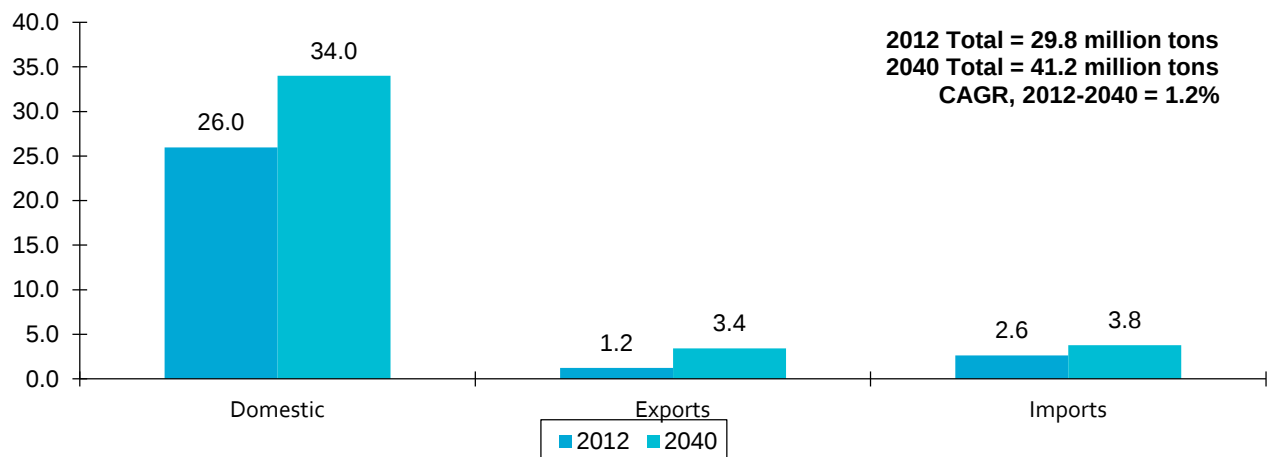


Source: FAF3.

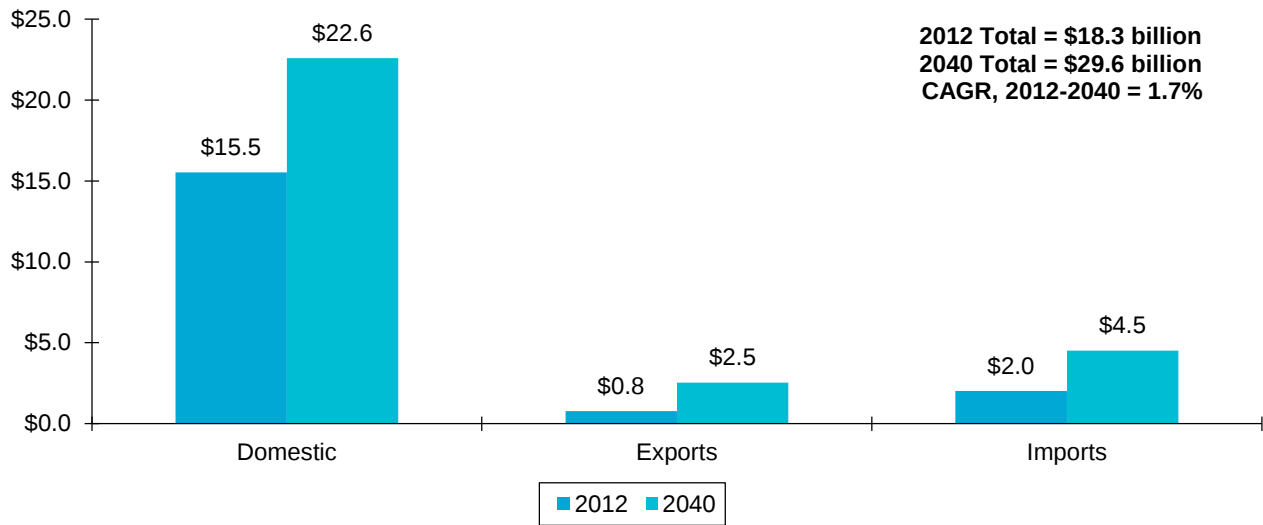
Figures 2.36 and 2.37 below show types of trade in 2012 and 2040 by weight and value. Domestic shipments dominated trade by both measures. 87.2 percent of shipments by weight were domestic, 4 percent were exports, and 8.7 percent were imports in 2012. In 2040, domestic shipments are projected to decrease to only 82.5 percent, with an increase in both exports (to 8.3 percent) and imports (to 9.2 percent).

By value, 84.7 percent of shipments were domestic, 4.4 percent were exports, and 10.9 percent were imports. In 2040, domestic shipments are projected to decrease to only 76.4 percent, with increases in both exports (to 8.4 percent) and imports (to 15.2 percent).

Figure 2.36 San Benito County Freight Flows by Trade Type
Millions of Tons



Source: FAF3.

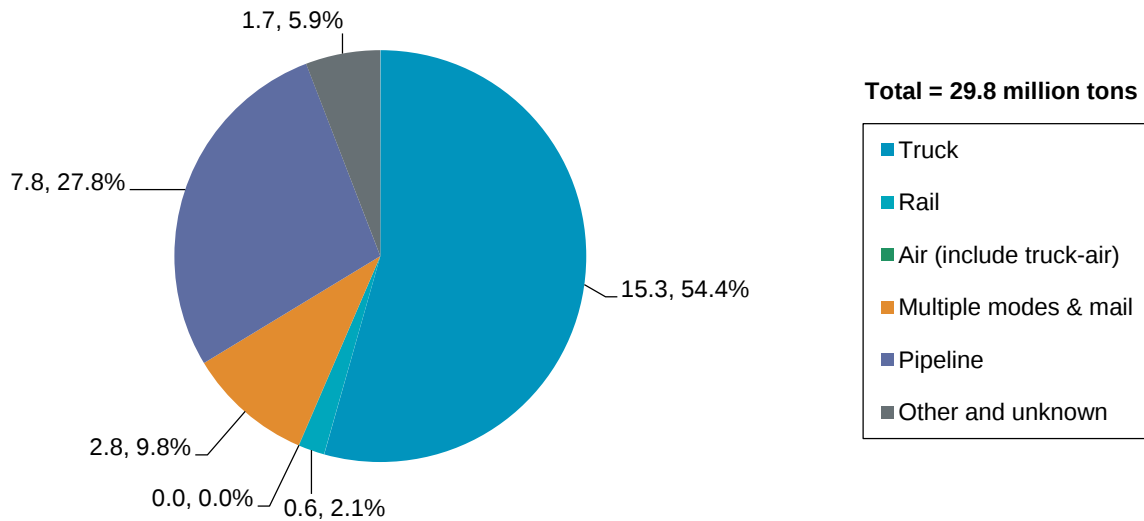
Figure 2.37 San Benito County Freight Flows by Trade Type*Billions of Dollars*

Source: FAF3.

Figures 2.38 and 2.39 below show the modal split for goods moving into, out of, and within San Benito County in 2012 by weight and value. Trucks moved a much lower percent of goods in San Benito County than in the region overall, accounting for only 54.4 percent of shipments by weight and 50.5 percent by value. Pipelines move the second greatest percent of goods by both weight (27.8 percent) and value (27 percent), followed by multiple modes and mail and rail. Air moved less than 0.1 percent of goods by weight, and 0.7 percent by value. Other/unknown accounted for 5.9 percent by weight and 3.9 percent by value. The high amount of pipeline movements is attributed to a high level of inbound and outbound gasoline movements. The inbound movements are almost entirely from other parts of California, which may have originated from overseas. There are a cluster of oil wells in the southern part of the County that are part of the San Joaquin Valley Basin.

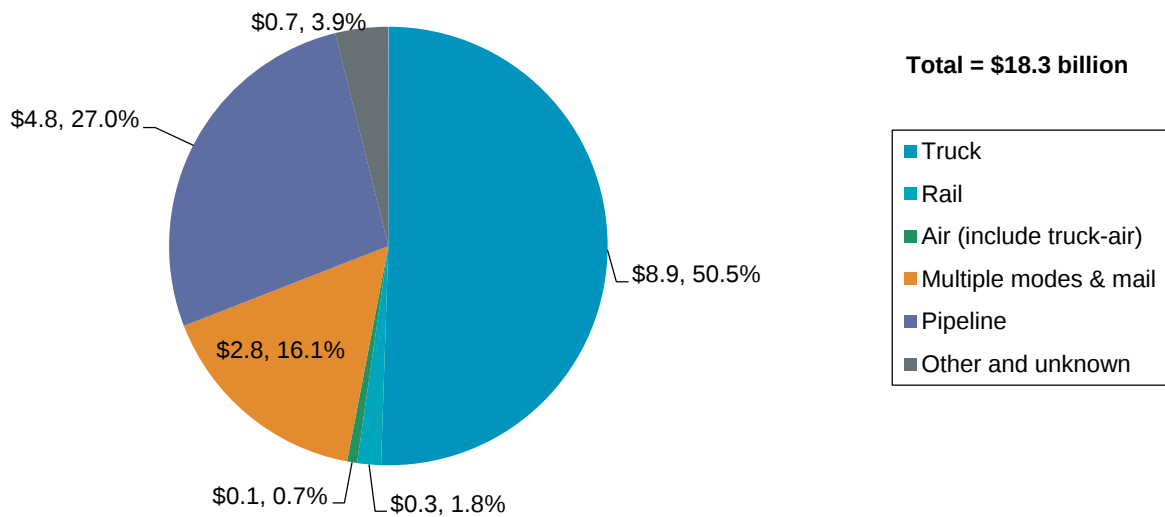
In 2040, the share of goods moved by truck measured by weight in San Benito County is projected to decrease to 53 percent. Pipeline shipments are projected to increase to 28 percent, 11 percent will move by multiple modes and mail, five by other/unknown, and two by rail. Truck share by value is projected to increase to 52 percent in 2040, with pipeline decreasing slightly to 25 percent, multiple modes and mail increasing to 17 percent, rail increasing slightly to two percent, air increasing slightly to one percent, and other/unknown decreasing slightly to 3 percent.

Figure 2.38 San Benito County Freight Flows by Mode
Millions of Tons



Source: FAF3.

Figure 2.39 San Benito County Freight Flows by Mode
Billions of Dollars

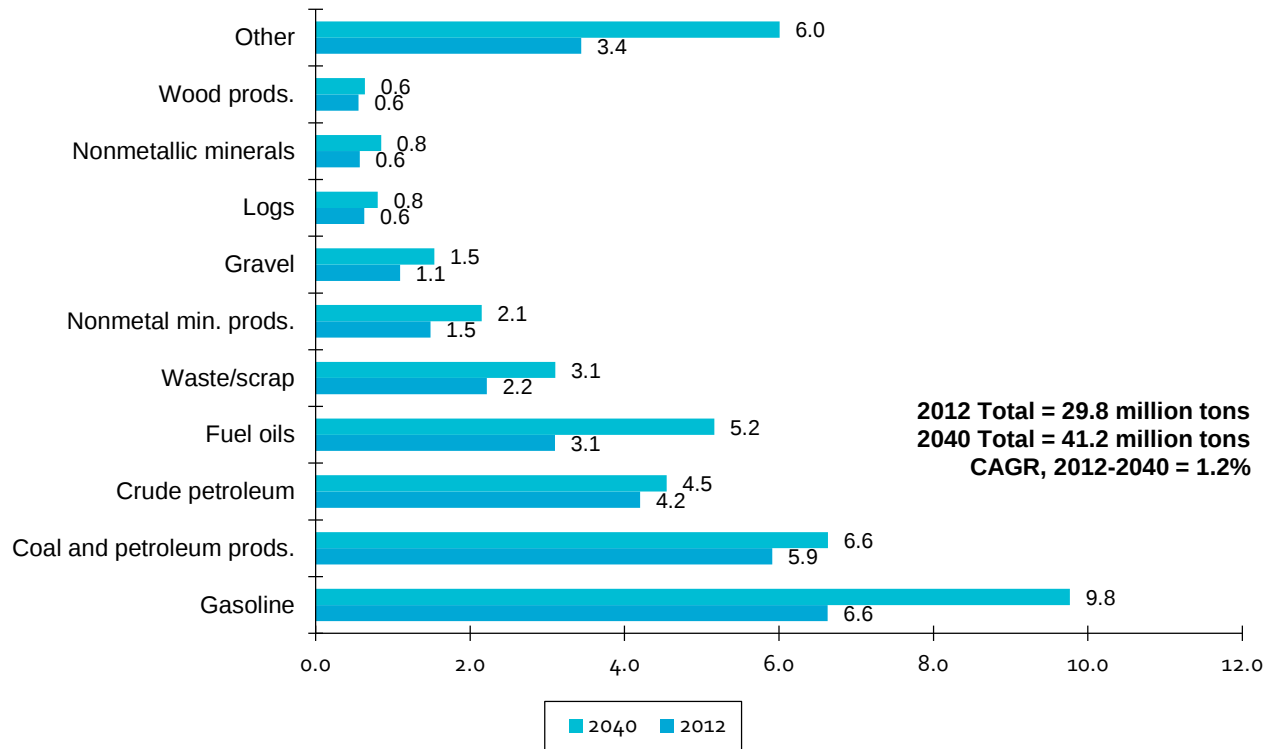


Source: FAF3.

Figure 2.40 below shows the top commodities for goods moving into, out of, and within San Benito County in 2012 and 2040 by weight. Gasoline, coal and petroleum products, and crude petroleum represented 57.8 percent of all shipments by weight in 2012 which explains the high modal share that pipeline had in the county. Agricultural products did not appear in the top 10 commodities by weight, the only county that this

occurred in. By 2040, the top three commodities are projected to decrease slightly to a total of 50.7 percent of total goods, with every commodity except for wood products increasing.

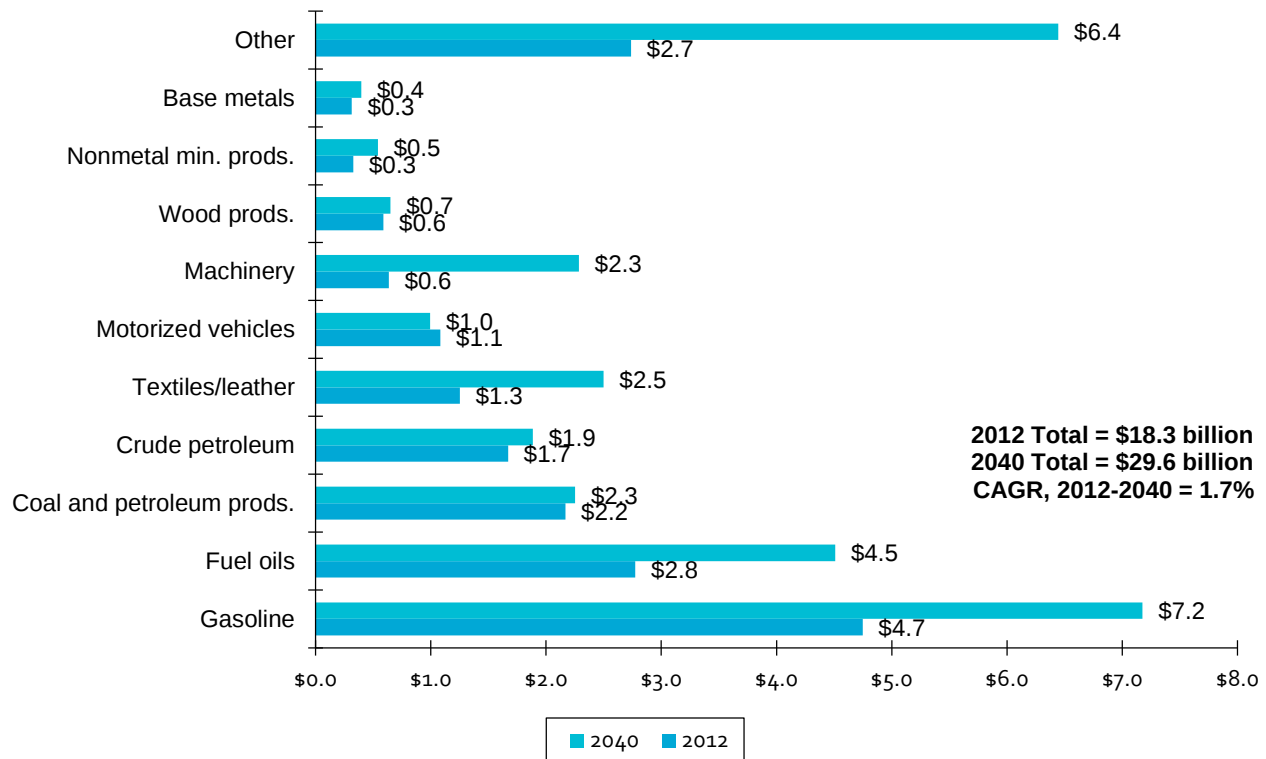
Figure 2.40 San Benito County Freight Flows by Top Commodities by Tonnage
Millions of Tons



Source: FAF3.

Figure 2.41 below shows the top commodities moving into, out of, and within San Benito County by value in 2012 and 2040. Gasoline and petroleum products again dominated, with gasoline, fuel oils, and coal and petroleum products representing 53 percent of shipments by value in 2012. Textiles/leather and machinery are projected to grow significantly by 2040, with textiles/leather replacing coal and petroleum products for third in value shipped. Agricultural products are again not represented in the top 10.

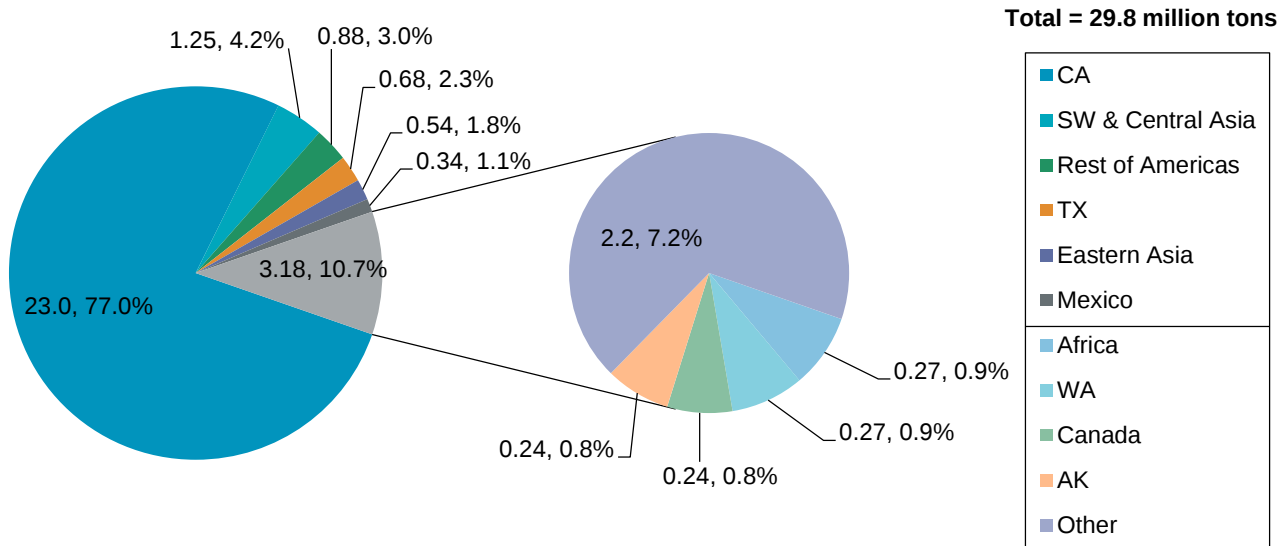
Figure 2.41 San Benito County Freight Flows by Top Commodities by Value
Billions of Dollars



Source: FAF3.

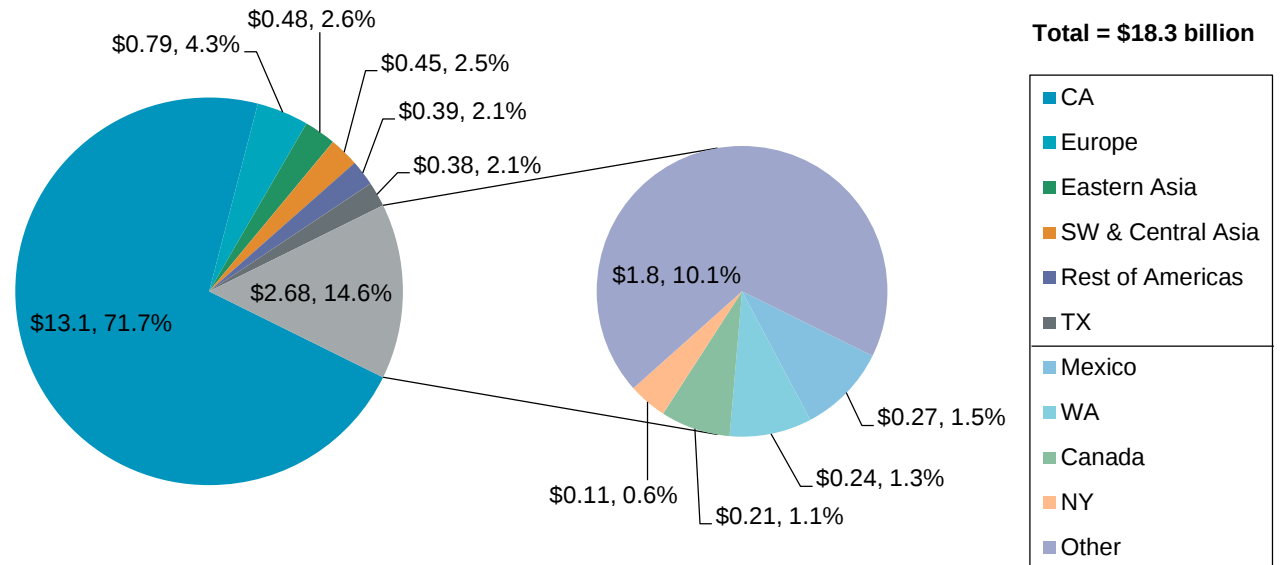
Figures 2.42 and 2.43 below detail San Benito County's top trading partners by weight and by value in 2012. Trade with the remaining counties of California dominates in both categories. Southwest and Central Asia was the largest foreign trading partner for the county by weight in 2012, with 1.26 million tons exchanged (4.2 percent). Europe was the largest foreign trading partner by value, with \$0.79 billion exchanged (4.3 percent). By 2040, the Rest of the Americas is projected to overtake Southwest and Central Asia as the county's largest trading partner outside California by weight. By value, Eastern Asia is projected to become the largest partner beyond California, responsible for \$2.08 billion and 7 percent of trade.

Figure 2.42 San Benito County Trading Partners
Millions of Tons



Source: FAF3.

Figure 2.43 San Benito County Trading Partners
Billions of Dollars



Source: FAF3.

Details for various regions in the State can be found in Table 2.8 below. By far, the largest trading partner of San Benito County is with the San Francisco Bay Area, indicating connectivity with U.S. 101, SR 156, and SR 152 as the most important routes for goods movement.

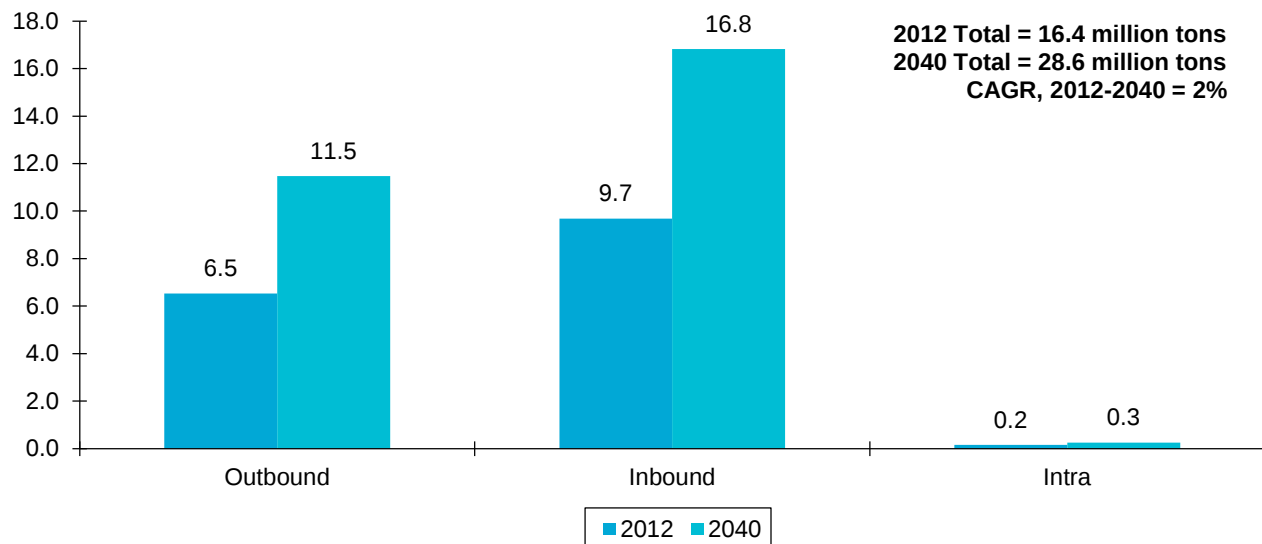
Table 2.8 San Benito County Total Trade with California Regions

Region	Tons 2012 (Thousands)	Tons 2040 (Thousands)	Value 2012 (Millions of Dollars)	Value 2040 (Millions of Dollars)
Kern County, California	376	573	194	324
Northern San Joaquin Valley	799	1,287	552	1,003
Rest of California	674	1,060	390	667
Sacramento	574	1,245	381	905
San Diego	32	25	35	52
Southern California (SCAG)	909	1,449	887	1,581
San Francisco Bay Area	18,073	23,082	9,950	13,277

Source: FAF3.

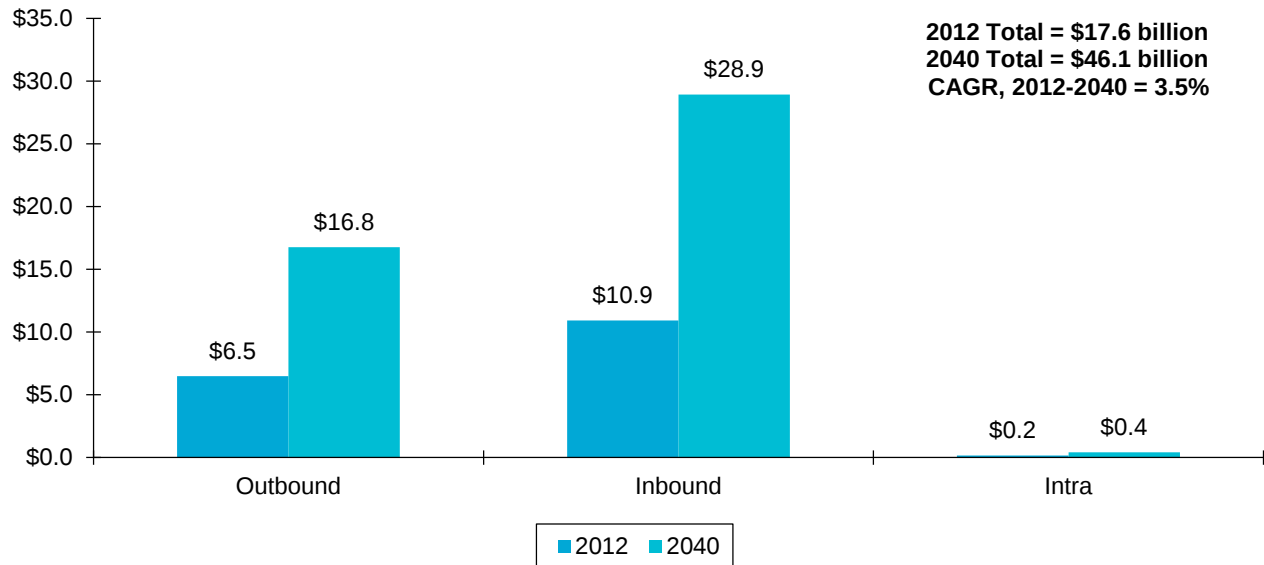
San Luis Obispo County

Figures 2.44 and 2.45 below show the total inbound, outbound, and intracounty freight flows for San Luis Obispo County for 2012 and 2040 by weight and value. By both measures, inbound flows are the dominant direction, accounting for 59.1 percent of shipments by weight and 61.9 percent of shipments by value. This is projected to decrease slightly to 58.7 percent by weight and increase slightly to 62.7 percent by value by 2040.

Figure 2.44 San Luis Obispo County Freight Flow by Direction of Movement
Millions of Tons

Source: FAF3.

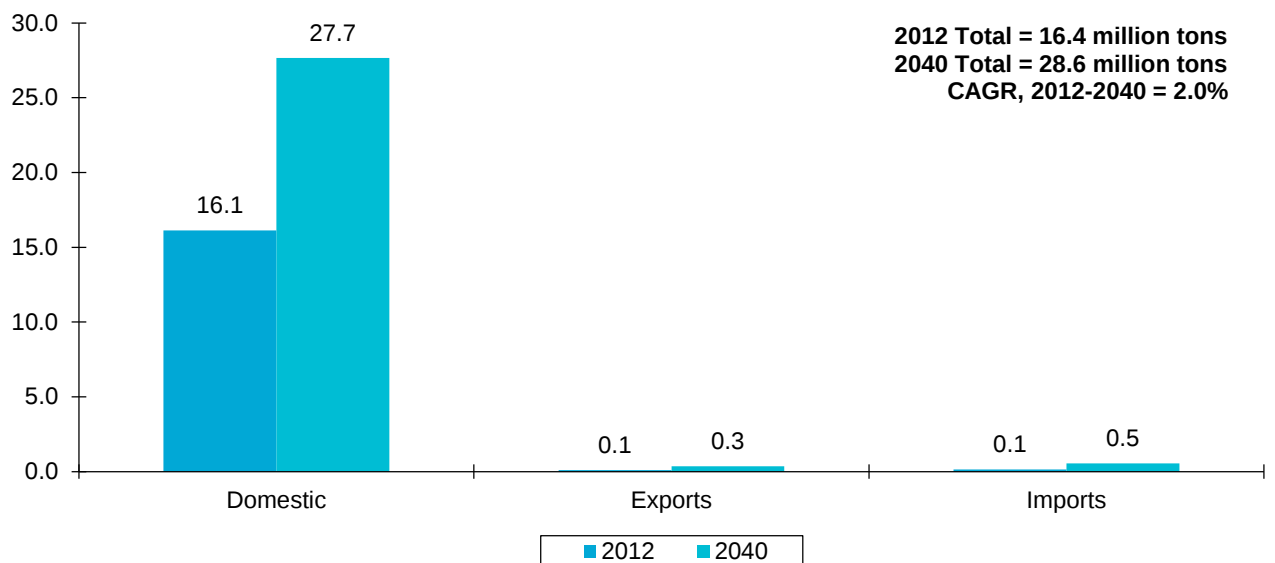
Figure 2.45 San Luis Obispo County Freight Flow by Direction of Movement
Billions of Dollars



Source: FAF3.

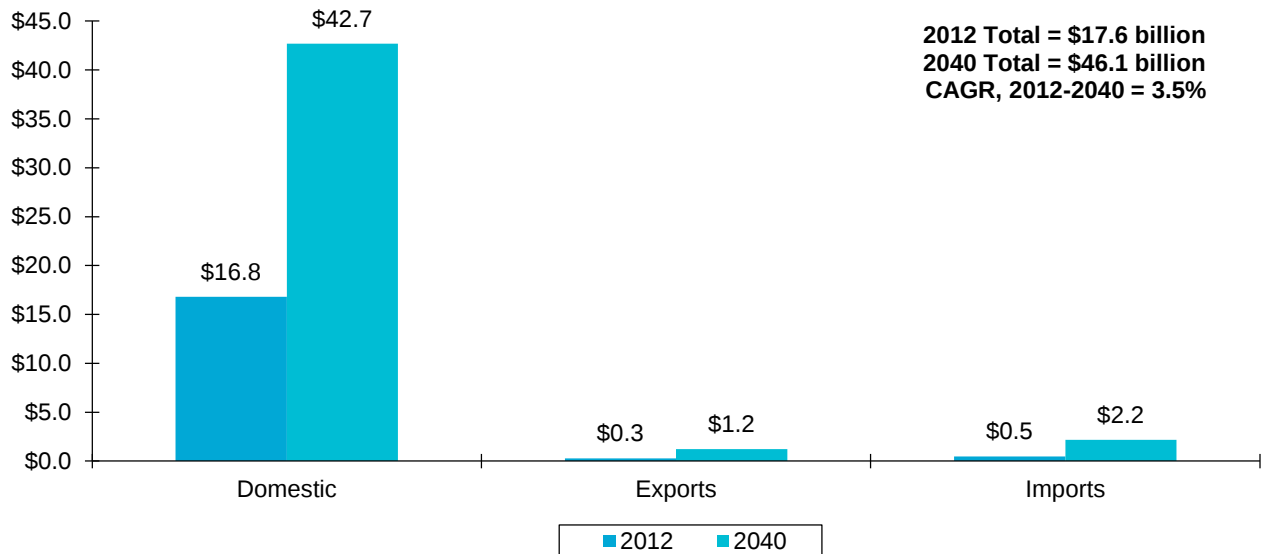
Figures 2.46 and 2.47 below show domestic, export, and import shipments for San Luis Obispo County for 2012 and 2040 by weight and value. Domestic shipments accounted for 98.2 percent of all movements in 2012 by weight and 95.5 percent by value. Imports and exports in 2012 by weight were roughly equivalent, while imports were slightly higher by value. Domestic shipments are projected to remain dominant through 2040, with imports accounting for the second highest directional totals by both weight and value.

Figure 2.46 San Luis Obispo County Freight Flows by Trade Type
Millions of Tons



Source: FAF3.

Figure 2.47 San Luis Obispo County Freight Flows by Trade Type
Billions of Dollars

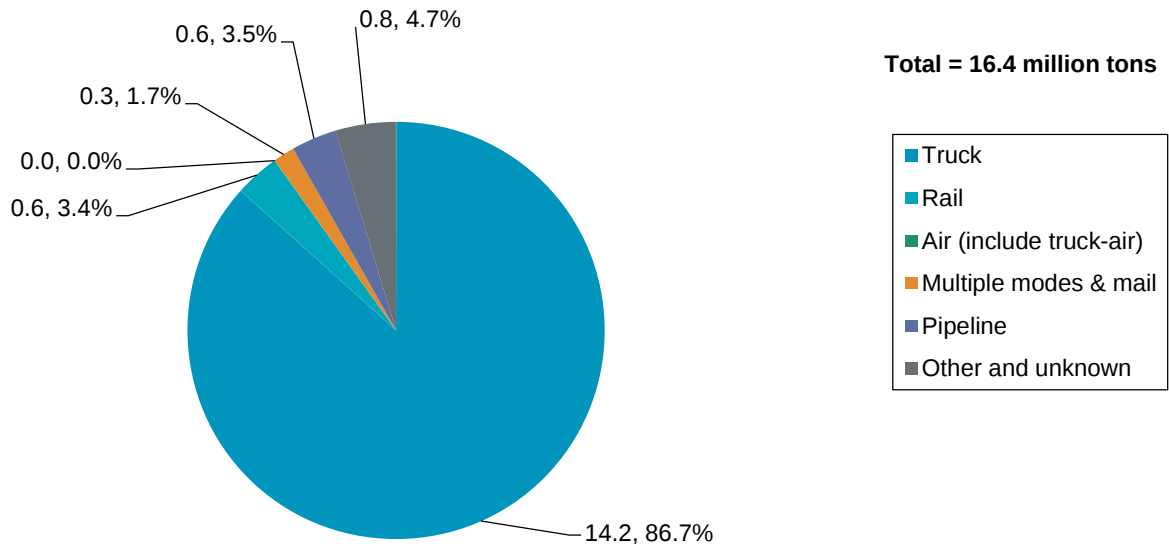


Source: FAF3.

Figures 2.48 and 2.49 below show the modal split for goods shipped into, out of, and within San Luis Obispo County in 2012 by weight and by value. Truck was the dominant mode, carrying 86.7 percent of goods by weight and 82.3 percent of goods by value in 2012. Other/unknown was the next largest mode by weight at 3.8 percent, followed by Pipeline (3.5 percent) and rail (3.4 percent). Multiple modes and mail carried 1.7 percent of goods by weight, rail 3.4 percent, pipeline 3.5 percent and other/unknown 4.7 percent. By value, multiple modes and mail was the second highest mode type responsible for 11.5 percent of shipments, followed by other/unknown (2.1 percent) and rail (1.6 percent).

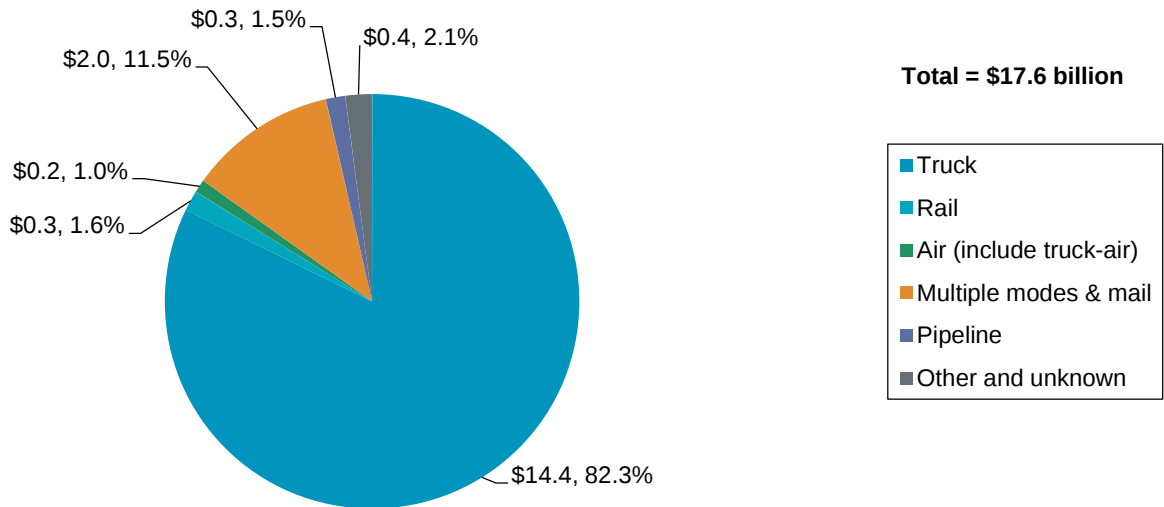
Trucks are projected to carry slightly more goods by weight in 2040 than in 2012, though their modal share by value is projected to decrease to 76.4 percent. Multiple modes and mail will see the largest growth in modal split, accounting for 17.4 percent by value in 2040, with air shipments also seeing an appreciable increase to 2.6 percent.

Figure 2.48 San Luis Obispo County Freight Flows by Mode
Millions of Tons



Source: FAF3.

Figure 2.49 San Luis Obispo County Freight Flows by Mode
Billions of Dollars

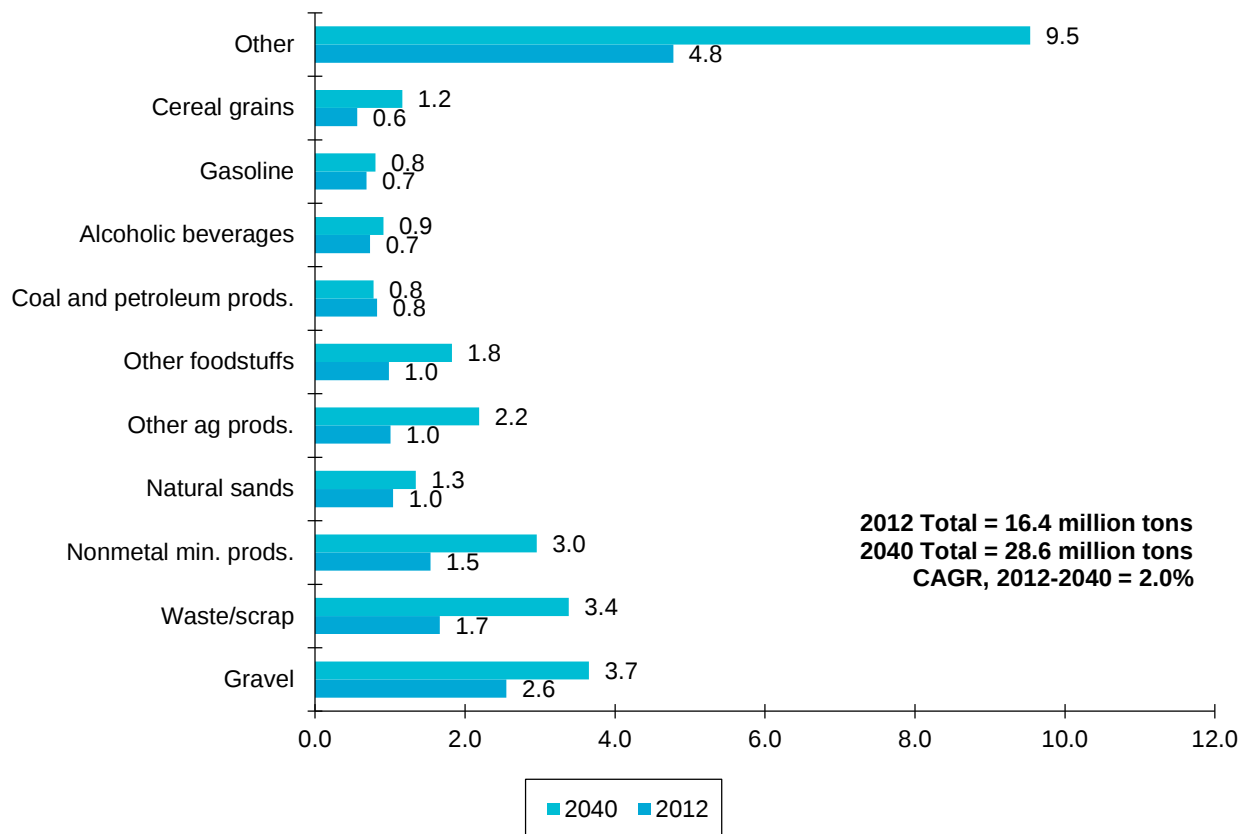


Source: FAF3.

Top commodities by weight in 2012 and 2040 for San Luis Obispo County are shown in Figure 2.50 below. Gravel, waste/scrap, and nonmetal mineral products represented 35.4 percent of shipments, with agricultural goods comprising 20.1 percent. Growth is projected for every commodity type shown other than coal and petroleum products which are projected to remain level, representing the diversity of the goods movement activities in San Luis Obispo County. The share of agricultural products is projected to rise to 21.3 percent by

2040 (from 20.1 percent) while the top three commodities of gravel, waste/scrap, and nonmetal mineral products will maintain their share of total commodities.

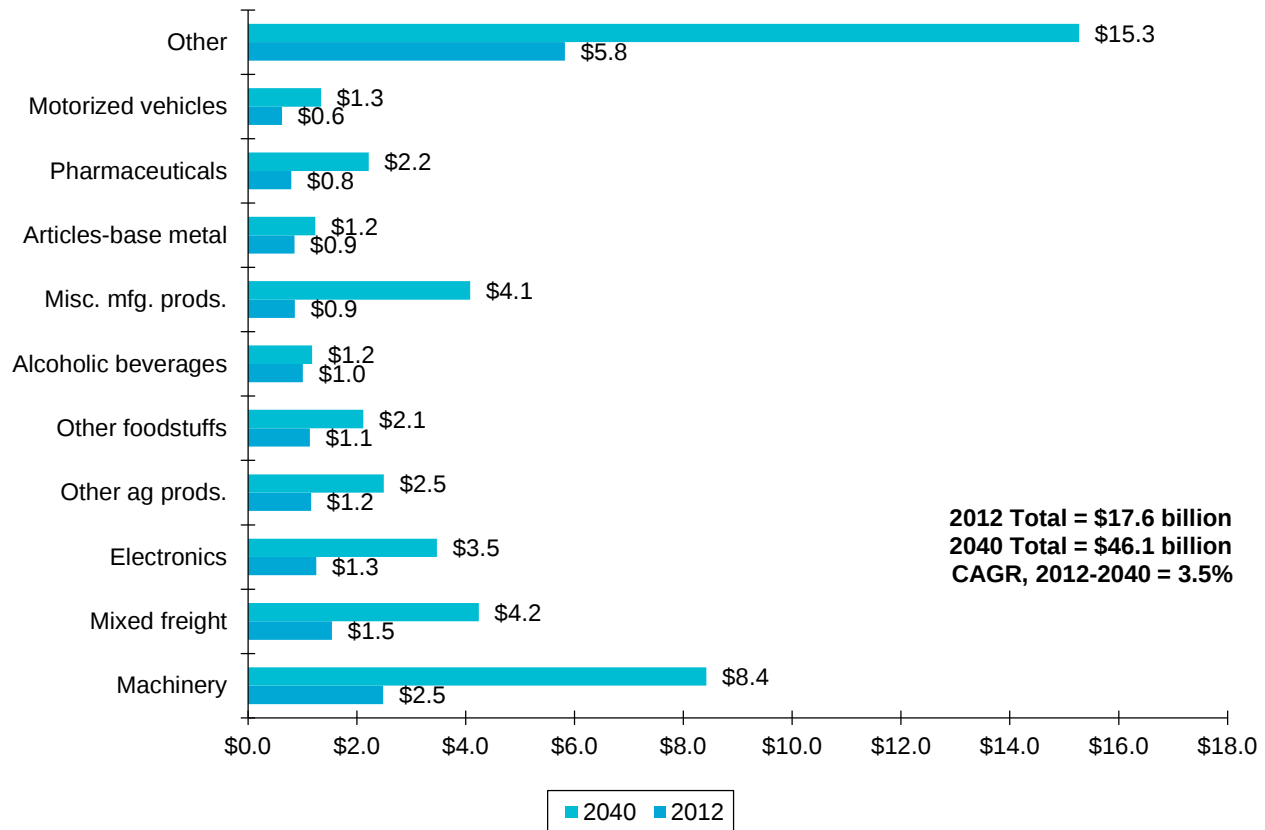
Figure 2.50 San Luis Obispo County Freight Flows by Top Commodities by Tonnage
Millions of Tons



Source: FAF3.

Figure 2.51 below shows the top commodities in 2012 and 2040 by value for San Luis Obispo County. Machinery, mixed freight, and electronics represented 30.1 percent of all commodities shipped in 2012. Machinery and miscellaneous manufactured products are projected to see the greatest increases by 2040 – these two commodities will represent more than 27 percent of shipments by value in 2040.

Figure 2.51 San Luis Obispo County Freight Flows by Top Commodities by Value
Billions of Dollars

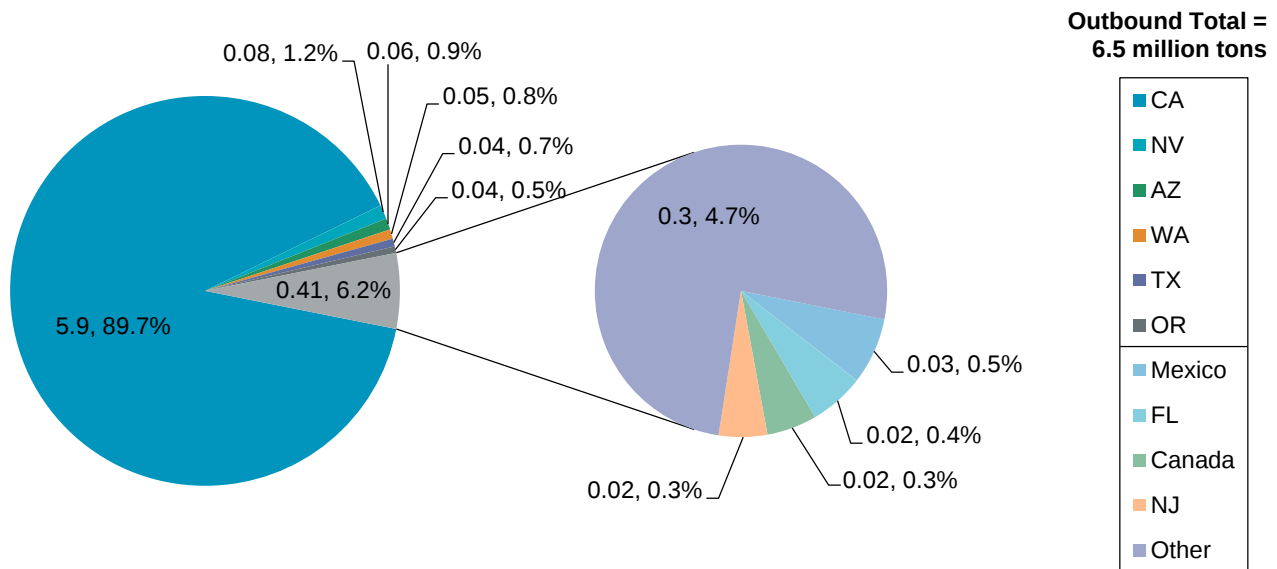


Source: FAF3.

Figures 2.52 and 2.53 below show the top trading partners for San Luis Obispo County in 2012 by weight and value. Trade with other regions of California dominates, though shipments outside the State were more common when measured by value than by weight. Texas is the largest single trading partner for goods by weight and value outside of California. By weight, no country other than the U.S. is a top-10 trading partner. By value, Mexico is the second-largest partner, accounting for \$0.42 billion (2.4 percent) of goods. The absence of an Asian trading partner in the top 10 is unusual for the region.

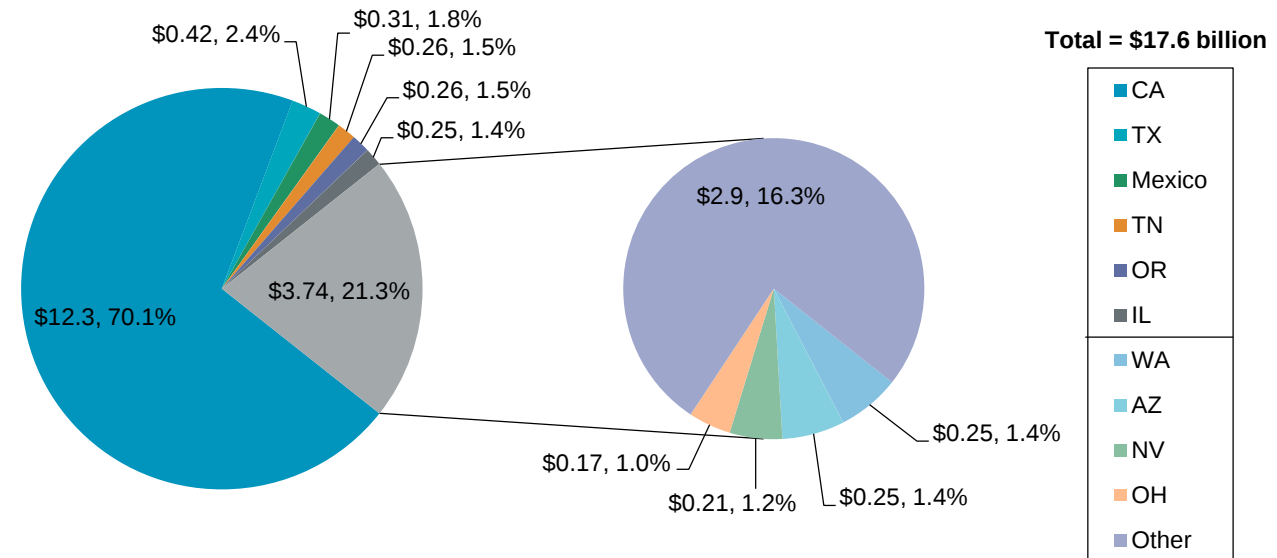
Projections for 2040 show Arizona growing to become the top trading partner by weight, accounting for 3.9 percent of shipments, followed by Texas (1.9 percent) and Nevada (1.6 percent). By value, Texas will remain the top trading partner (3 percent) followed by Mexico (2.9 percent) and Tennessee (2.8 percent).

Figure 2.52 San Luis Obispo County Trading Partners
Millions of Tons (2012)



Source: FAF3.

Figure 2.53 San Luis Obispo County Trading Partners
Billions of Dollars (2012)



Source: FAF3.

Table 2.9 below details trade with other regions of California. The most significant trading partner in California is with Northern San Joaquin County, which together with Kern County, dominates freight flows. Connections via U.S. 101, SR 41, SR 46, SR 58, SR 166, and SR 33 are thus the most important for truck travel.

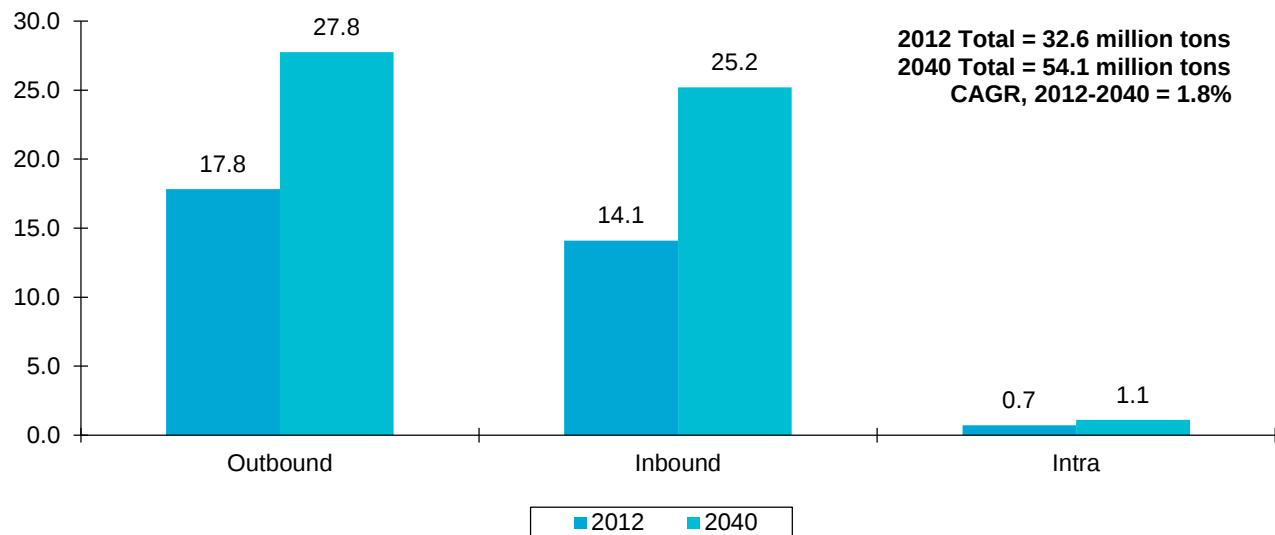
Table 2.9 San Benito County Total Trade with California Regions

Region	Tons 2012 (Thousands)	Tons 2040 (Thousands)	Value 2012 (Millions of Dollars)	Value 2040 (Millions of Dollars)
Kern County, CA	1,430	2,224	761	1,841
Northern San Joaquin Valley	4,268	7,703	4,055	9,870
Rest of California	2,133	3,373	1,501	3,369
Sacramento	1,201	2,484	1,054	2,455
San Diego	129	161	158	328
Southern California (SCAG)	1,972	1,972	2,340	5,602
San Francisco Bay Area	1,653	1,653	1,385	2,897

Source: FAF3.

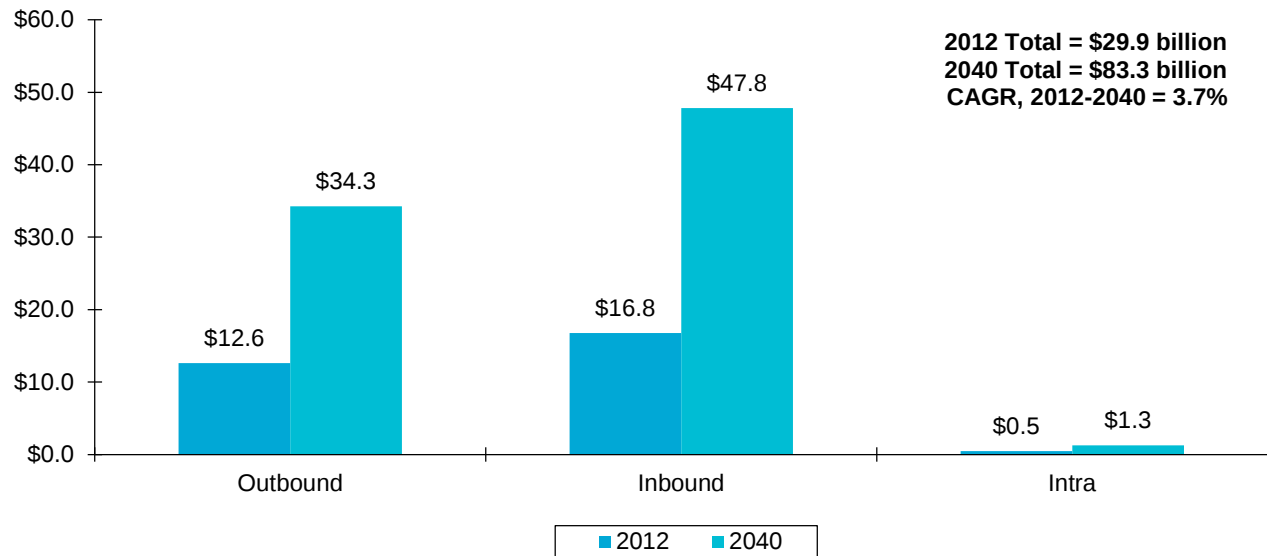
Santa Barbara County

Figures 2.54 and 2.55 below show the outbound, inbound, and intracounty shipments for goods moving in Santa Barbara County in 2012 and 2040 by weight and by value. Outbound shipments accounted for 54.6 percent of outbound shipments by weight, but only 42.1 percent by value. Intracounty shipments accounted for a larger percent by weight (2.1 percent) than by value (1.7 percent).

Figure 2.54 Santa Barbara County Freight Flows by Direction of Movement
Millions of Tons

Source: FAF3.

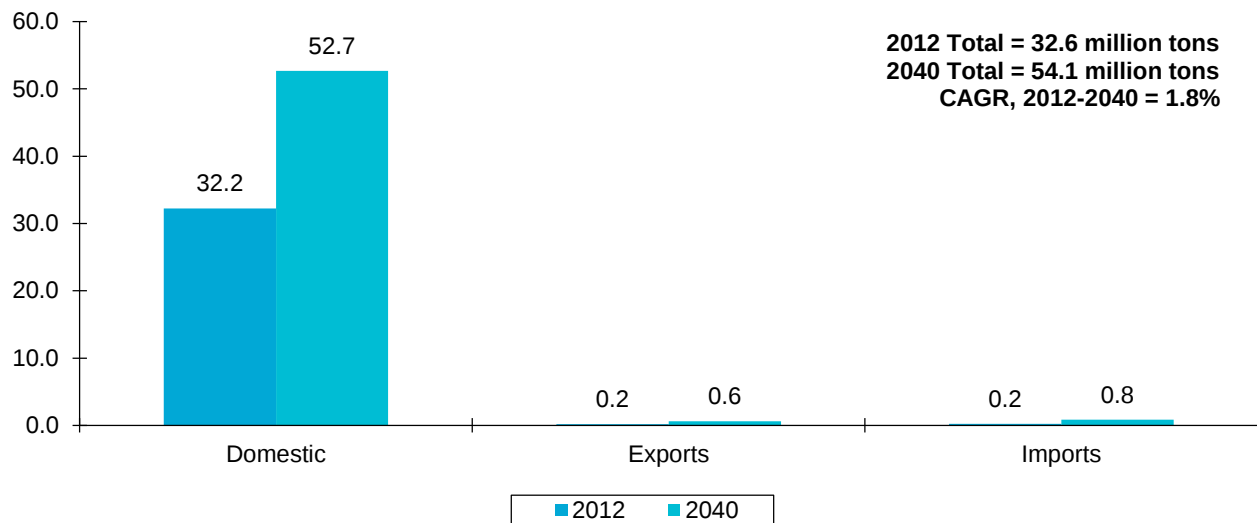
Figure 2.55 Santa Barbara County Freight Flows by Direction of Movement
Billions of Dollars



Source: FAF3.

Figures 2.56 and 2.57 below show the domestic, export, and import shipments in Santa Barbara County in 2012 and 2040 by weight and by value. Domestic shipments dominated by both measures in 2012 and are projected to account for 82.5 percent of shipments by weight and 76.4 percent of shipments by value in 2040. This represents a decrease from current shares of 87.2 percent by weight and 84.7 percent by value, as both export and import shipments grow.

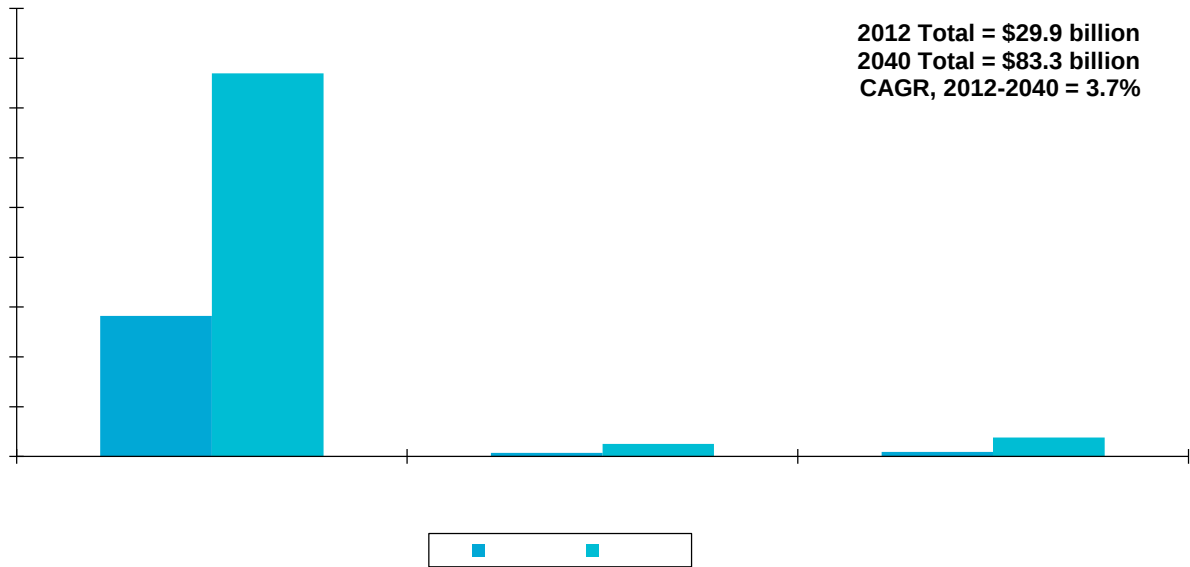
Figure 2.56 Santa Barbara County Freight Flows by Trade Type
Millions of Tons



Source: FAF3.

Figure 2.57 Santa Barbara County Freight Flows by Trade Type

Billions of Dollars

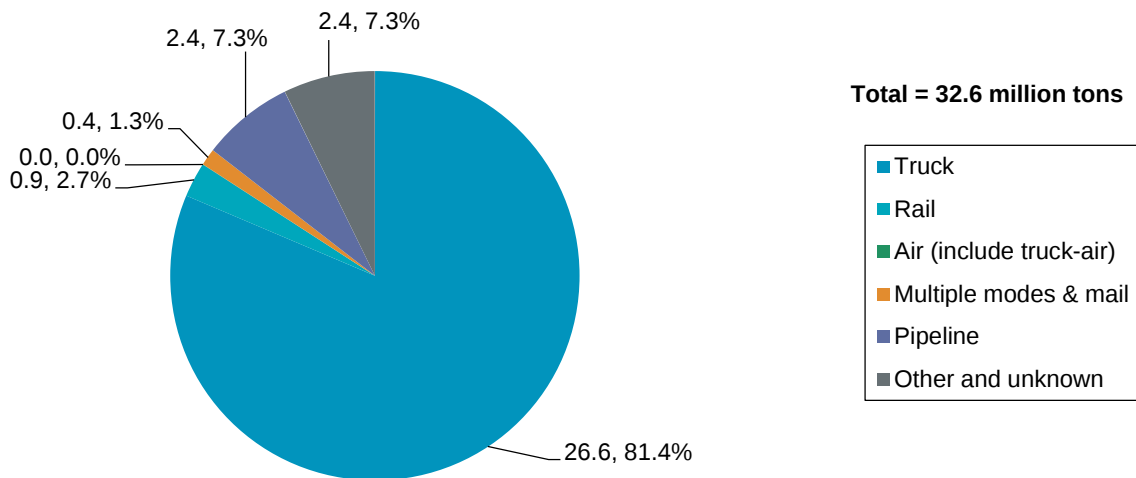


Source: FAF3.

Figures 2.58 and 2.59 below show the modal split for goods moving into, out of, and within Santa Barbara County in 2012 by weight and by value. Truck shipments accounted for 81.4 percent of shipments by weight and 76.4 percent of shipments by value in 2012. Trucking is projected to increase to 83.7 percent of the modal split by weight in 2040 but fall to 71.5 percent by value. Pipelines will decrease slightly and rail gain slightly for shipments by weight, with a large increase in multiple modes and mail to 20.3 percent and a smaller increase to 3.4 percent by air for shipments measured by value.

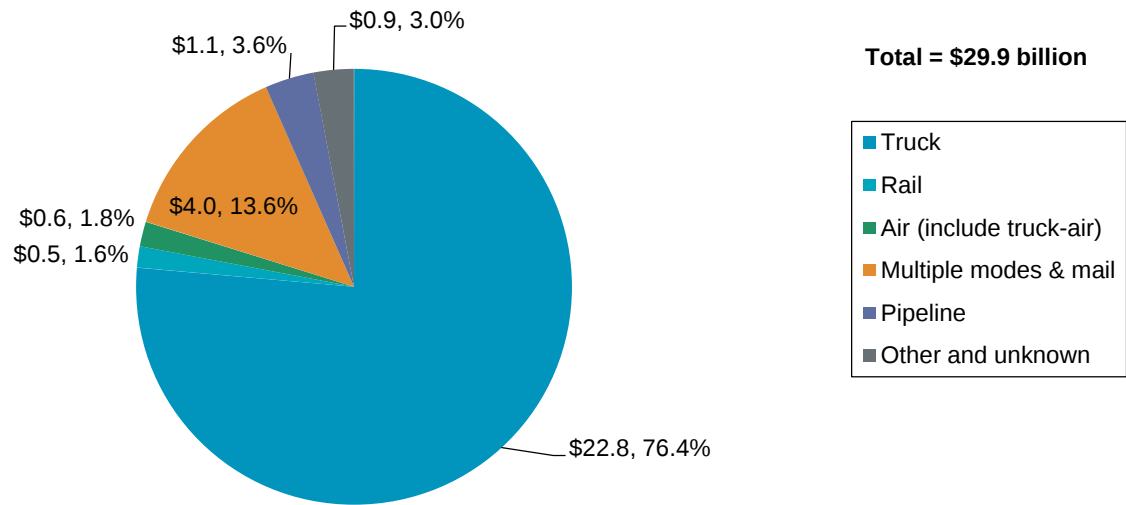
Figure 2.58 Santa Barbara County Freight Flows by Mode

Millions of Tons



Source: FAF3.

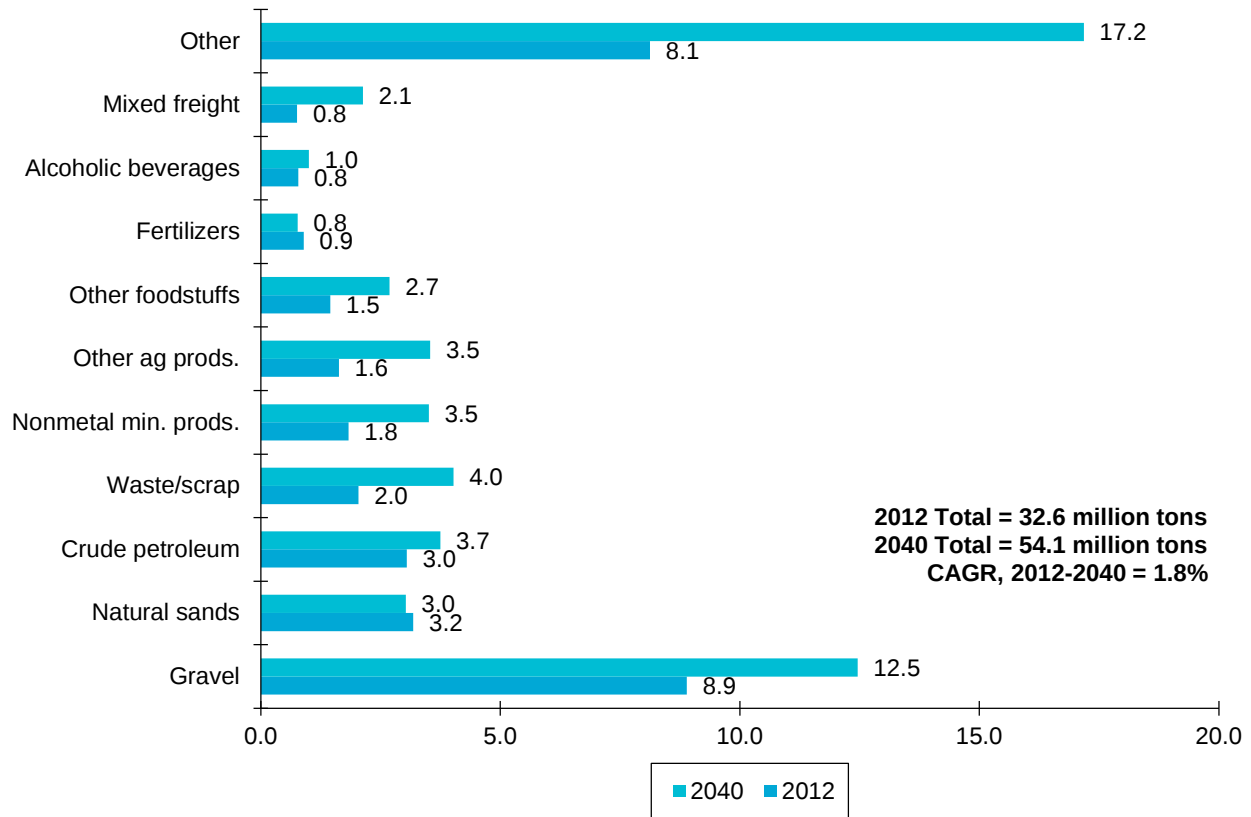
Figure 2.59 Santa Barbara County Freight Flows by Mode
Billions of Dollars



Source: FAF3.

Figure 2.60 below shows the top commodities in Santa Barbara County by weight for 2012 and 2040. Similar to overall trends in the region, gravel, sands, petroleum, and waste/scrap are the top commodities, with some significant shipments in agricultural goods. Natural sands and fertilizers are both projected to decrease in total tonnage moved in 2040, with growth in all other categories. Tons of mixed freight, other agricultural products, and waste/scrap are all projected to double or more by 2040.

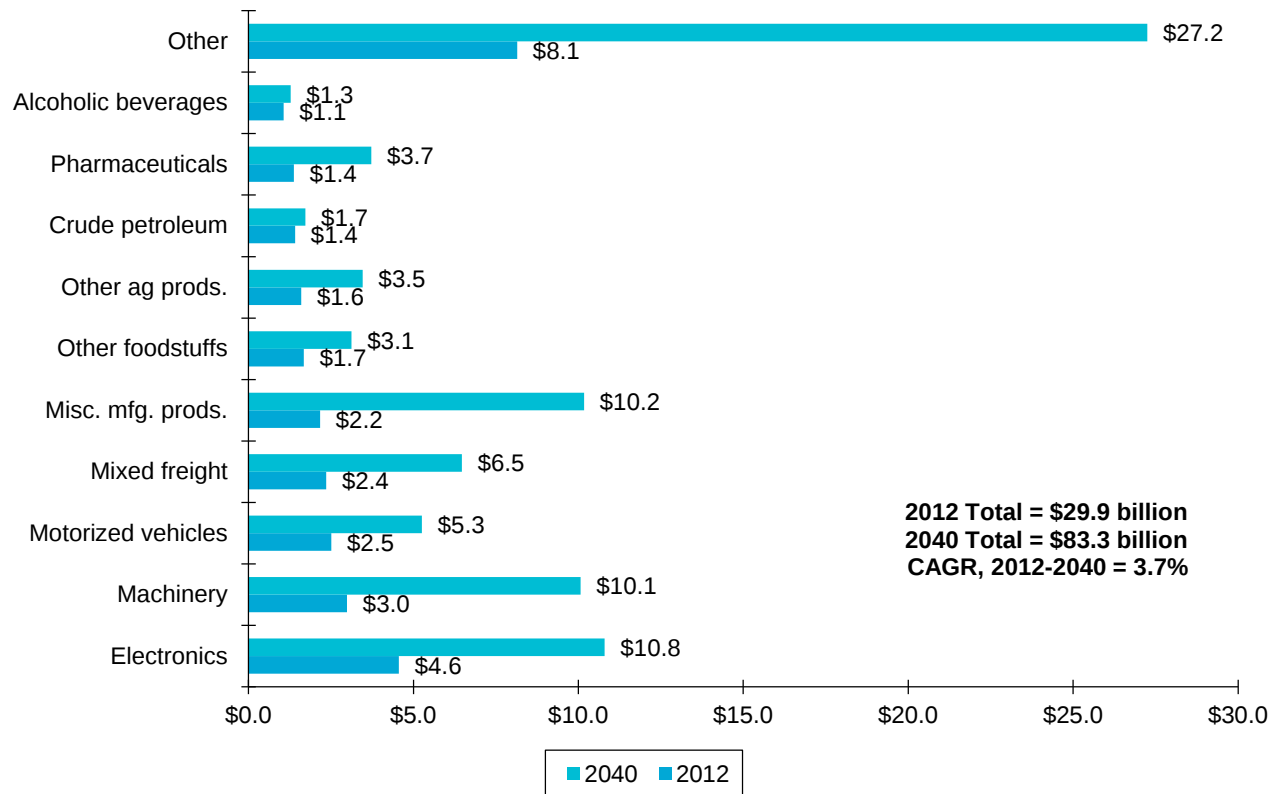
Figure 2.60 Santa Barbara County Freight Flows by Top Commodities by Tonnage
Millions of Tons



Source: FAF3.

Figure 2.61 below shows the top commodities by value in 2012 and 2040 for Santa Barbara County. Shipments of electronics, machinery, motorized vehicles, mixed freight, and miscellaneous manufactured products all topped \$2 billion in 2012. All five categories are projected to increase through 2040, with the fastest growth occurring for miscellaneous manufactured products. Agricultural products are projected to comprise 9.5 percent of shipments by value in 2040.

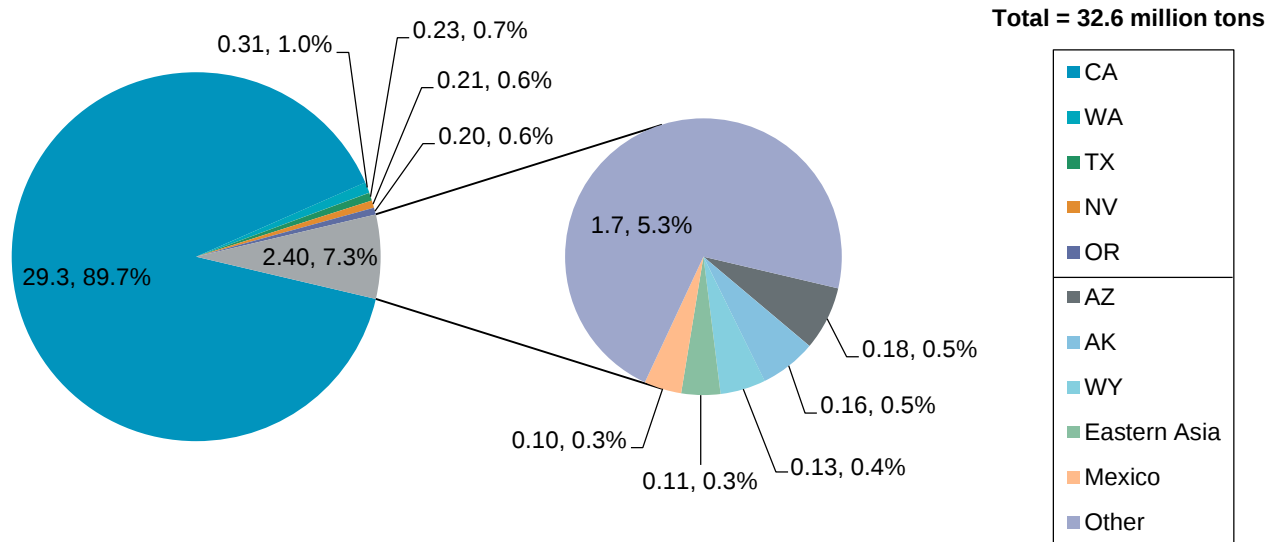
Figure 2.61 Santa Barbara County Freight Flows by Top Commodities by Value
Billions of Dollars



Source: FAF3.

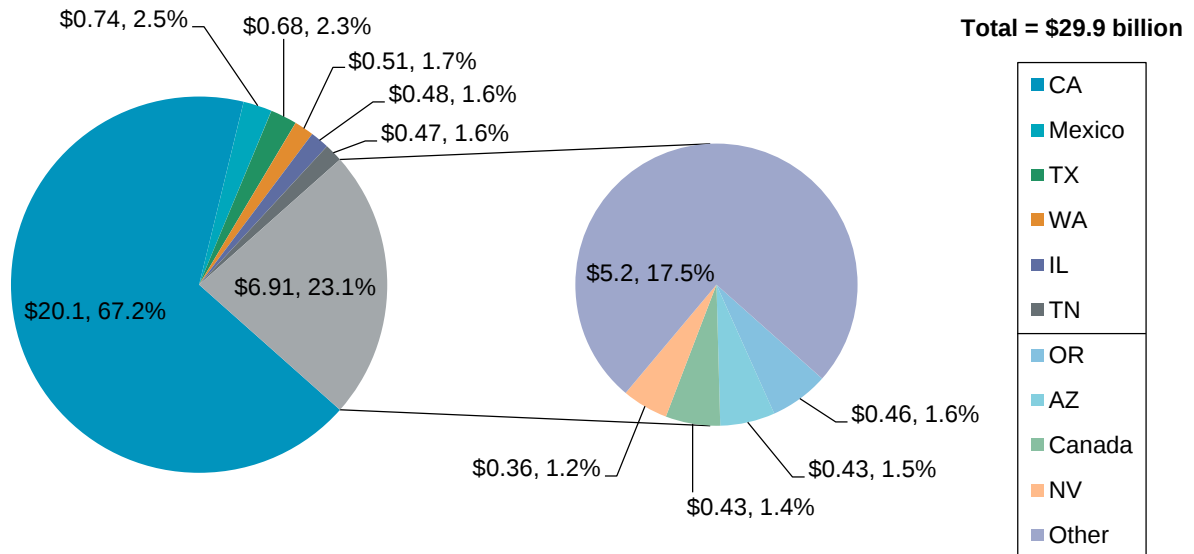
Figures 2.62 and 2.63 below show the trading partners for Santa Barbara County in 2012 by weight and by value. The remainder of California accounted for nearly 90 percent of trade by weight, and just over 87 percent by value. Beyond California, Washington was the second-highest trading partner for goods by weight, followed by Texas and Nevada with no single location accruing more than one percent of trade. Mexico was the second highest partner by value, accounting for 2.6 percent of trade, followed by Texas (2.3 percent) and Washington (1.7 percent). By 2040, trade with Arizona (2 percent) is projected to eclipse Washington (1.7 percent) by weight, while Tennessee (3.5 percent) is projected to overtake Mexico (3.3 percent) as the top trading partner by value with a growth in electric and electronic products.

Figure 2.62 Santa Barbara Trading Partners
Millions of Tons (2012)



Source: FAF3.

Figure 2.63 Santa Barbara Trading Partners
Billions of Dollars (2012)



Source: FAF3.

Table 2.10 below details Santa Barbara County's trade with the remainder of California by weight and value in 2012 and projected for 2040. It trades with Northern San Joaquin Valley the most by tonnage and value, with Southern California a close second. As a result, routes including U.S. 101 and SR 126 will be of most importance.

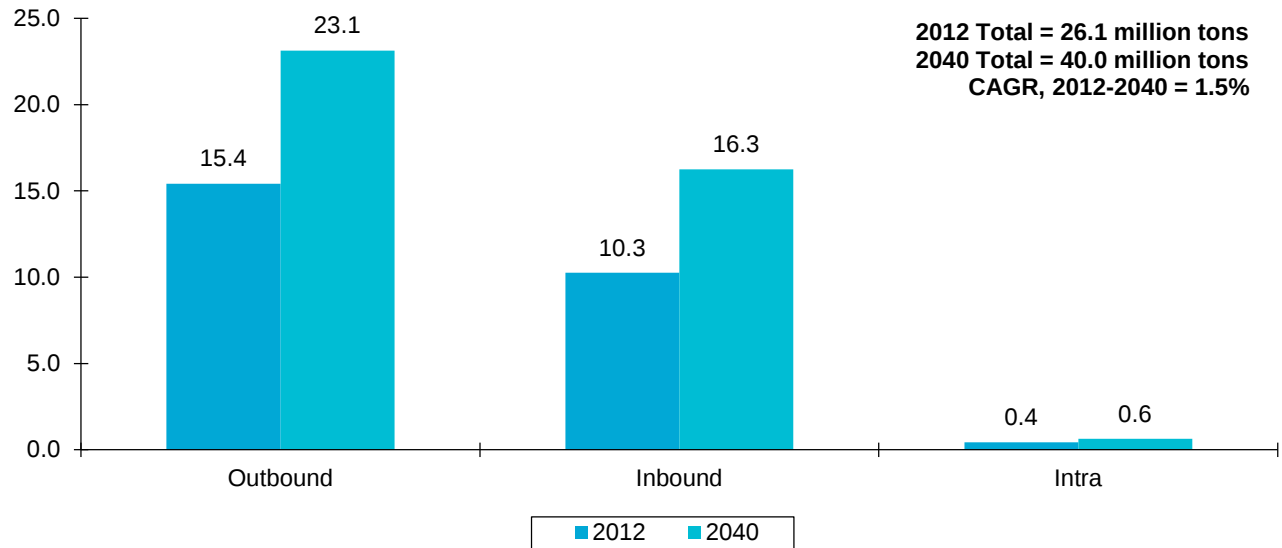
Table 2.10 Santa Barbara County Total Trade with California Regions

Region	Tons 2012 (Thousands)	Tons 2040 (Thousands)	Value 2012 (Millions of Dollars)	Value 2040 (Millions of Dollars)
Kern County, CA	2,882	4,382	1,192	3,020
Northern San Joaquin Valley	8,872	15,001	6,237	15,841
Rest of California	4,133	6,485	2,273	5,558
Sacramento	1,994	4,008	1,723	4,164
San Diego	179	220	290	635
Southern California (SCAG)	4,240	6,033	4,379	10,129
San Francisco Bay Area	4,208	5,786	2,363	5,411

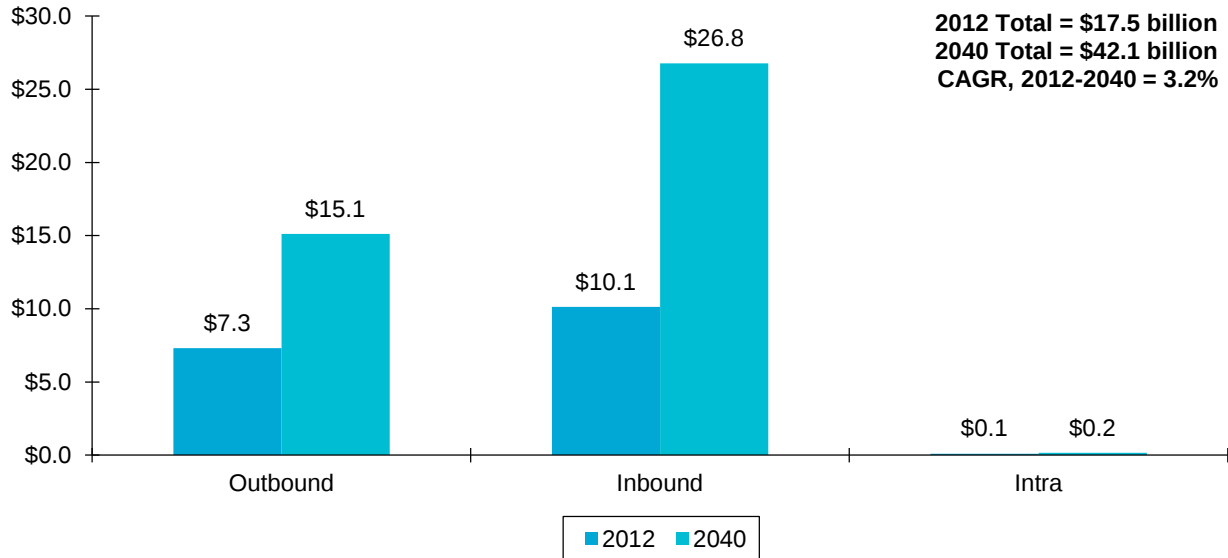
Source: FAF3.

Santa Cruz County

Figures 2.64 and 2.65 below show the total inbound, outbound, and intracounty freight flows for Santa Cruz County in 2012 and 2040. By weight, outbound shipments accounted for 59 percent of shipments in 2012, inbound for 39.5 percent, and intracounty for the remainder. By value, outbound shipments represented only 41.7 percent of the flow, with inbound accounting for 57.7 percent and intracounty representing less than 1 percent of shipments. Slight growth in inbound shipments is projected for 2040 by weight with outbound falling slightly. By value, inbound shipments will take over a larger share, growing to 63.7 percent of all movements. The rapid growth in shipments of machinery and electronics – both high-value goods that are becoming more critical in a high-tech world – is likely driving most of this increase, as most of these products are not made in the County (see commodity section for details).

Figure 2.64 Santa Cruz County Freight Flows by Direction of Movement*Millions of Tons*

Source: FAF3.

Figure 2.65 Santa Cruz County Freight Flows by Direction of Movement*Billions of Dollars*

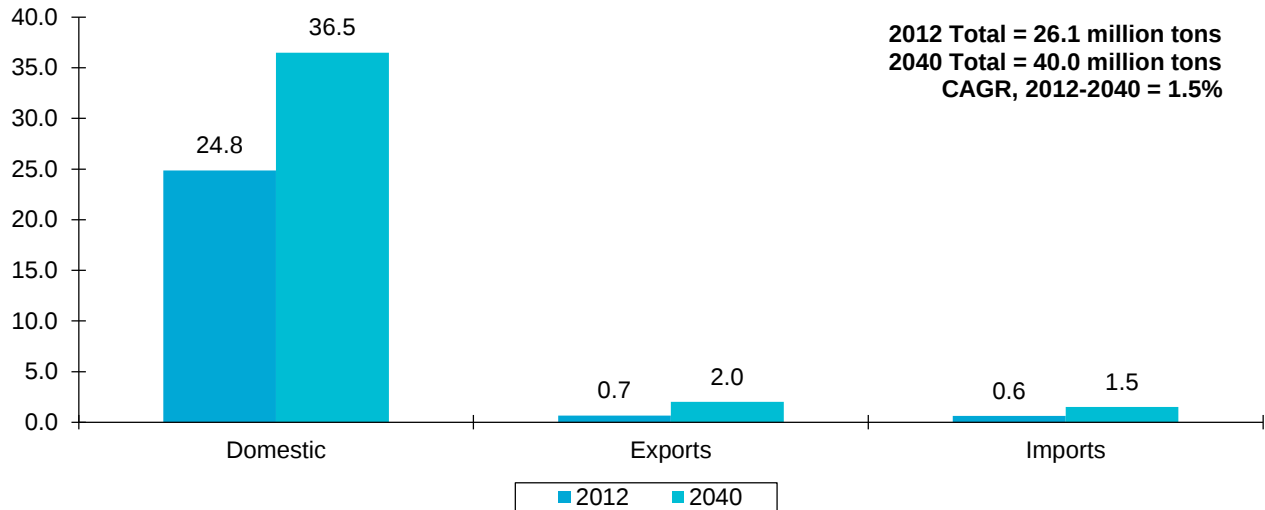
Source: FAF3.

Figures 2.66 and 2.67 below show the type of freight shipments in 2012 and 2040 by both weight and value. Domestic shipments dominated, accounting for 95 percent of shipments by weight in 2012 and 81.7 percent by value. Exports made up 2.7 percent by weight and imports 2.3 percent. By value, imports accounted for 11.4 percent and exports 6.9 percent. In 2040, domestic shipments are projected to decrease to 91.3 percent with exports growing to five percent of the total and imports growing to 3.8 percent. By value, imports are

projected to grow to 20.7 percent, exports are projected to grow to 11.2 percent, and domestic shipments are projected to decrease to 67.9 percent.

Figure 2.66 Santa Cruz County Freight Flows by Trade Type

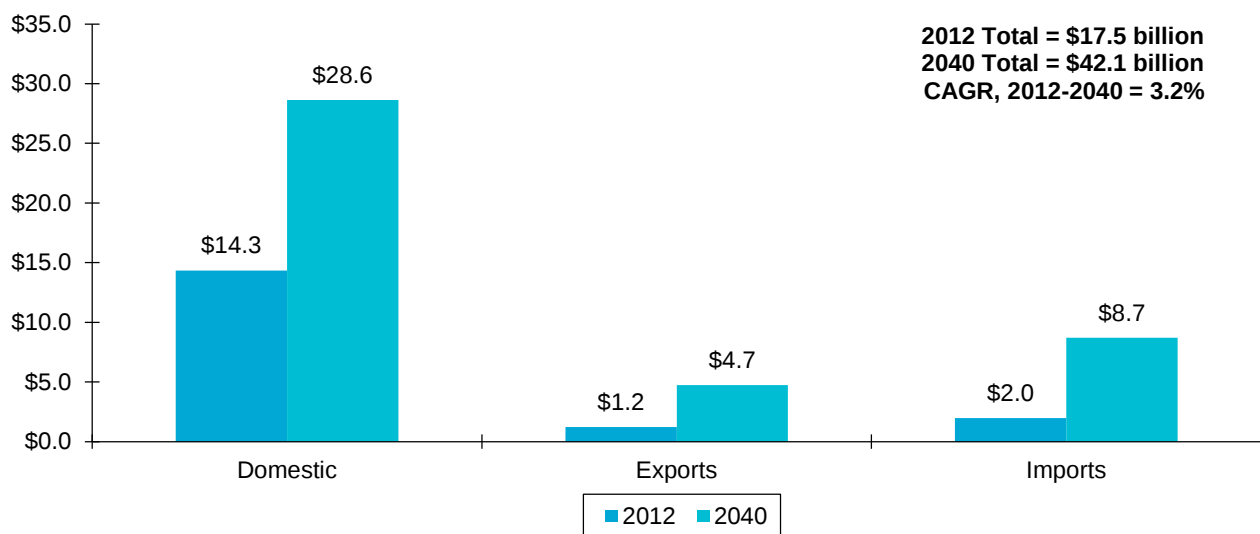
Millions of Tons



Source: FAF3.

Figure 2.67 Santa Cruz County Freight Flows by Trade Type

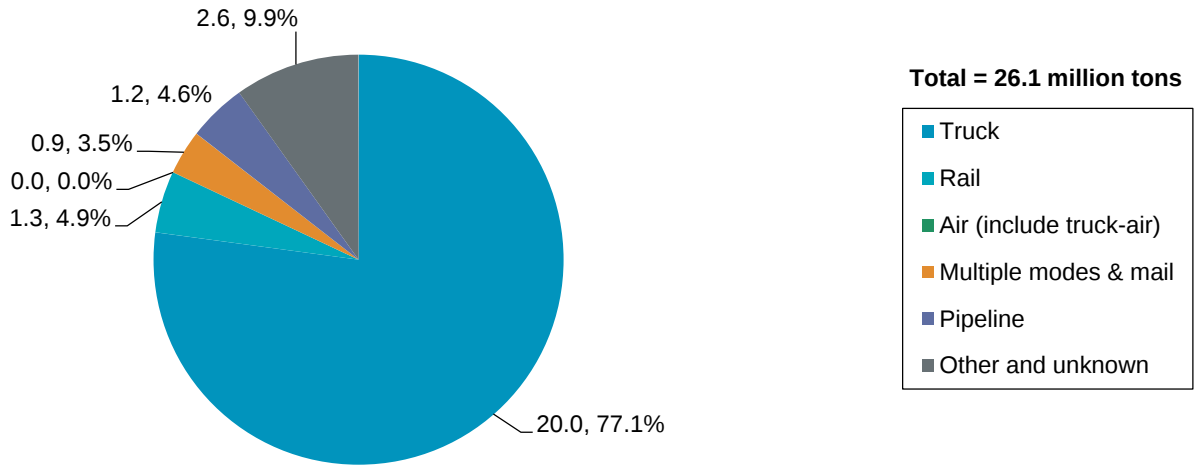
Billions of Dollars



Source: FAF3.

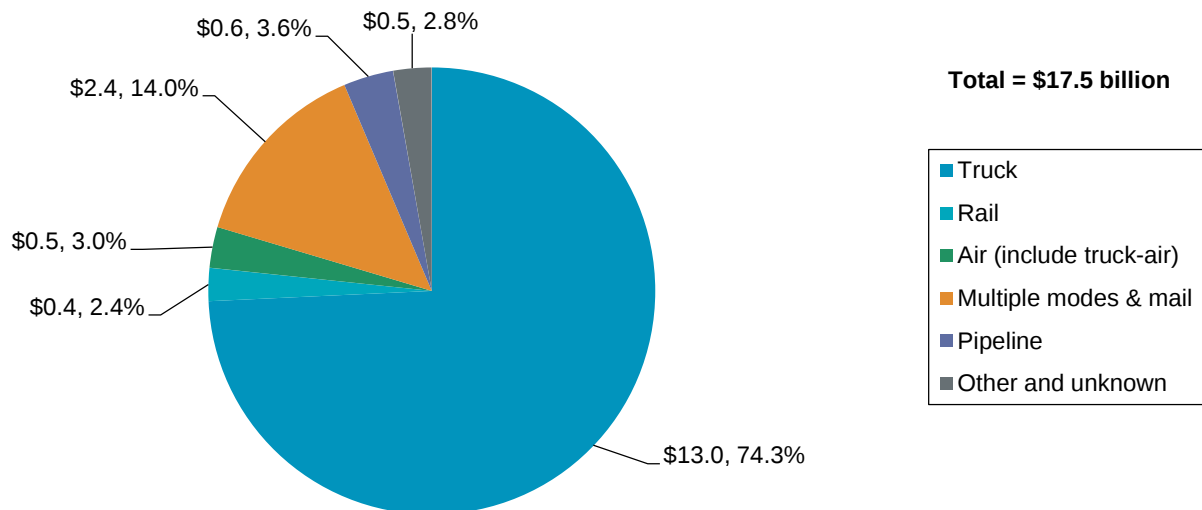
Figures 2.68 and 2.69 below show the modal split for shipments that moved into, out of, and within Santa Cruz County in 2012. Truck shipments accounted for approximately three-fourths of all movements by both weight and value. Other/unknown represented the second largest mode for weight, followed by rail. By value, multiple modes and rail was the second largest mode accounting for 14 percent of shipments. Trucking is projected to grow to 78.5 percent of shipments by weight in 2040 but decrease to 72.4 percent of shipments by value.

Figure 2.68 Santa Cruz County Freight Flows by Mode
Millions of Tons



Source: FAF3.

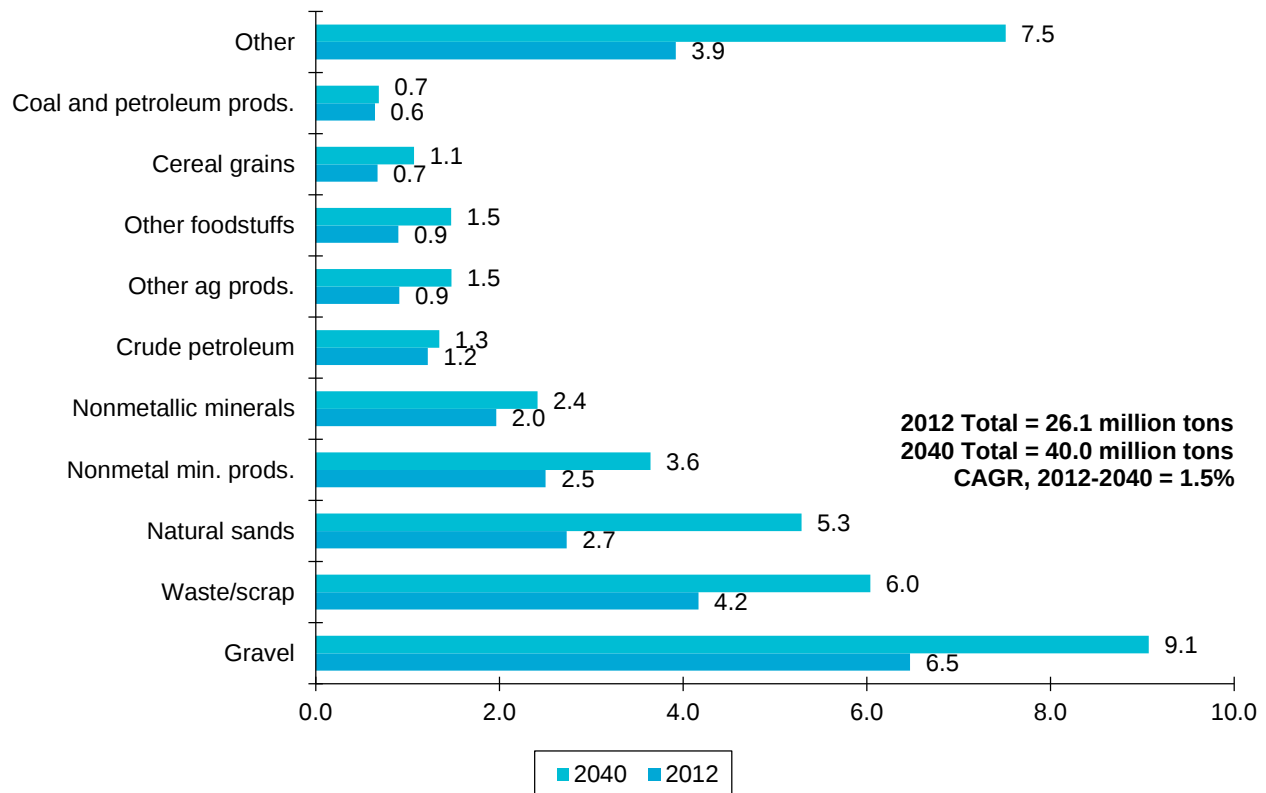
Figure 2.69 Santa Cruz County Freight Flows by Mode
Billions of Dollars



Source: FAF3.

Figure 2.70 below shows the top commodities by weight and value in 2012 and 2040 for shipments into, out of, and within Santa Cruz County. Gravel, waste/scrap, and natural sands were the top three commodities by weight, accounting for 51.3 percent of all shipments in 2012. These commodities are projected to remain in the top 10 in 2040, with growth occurring in every category. Agricultural products, including other agricultural products, other foodstuffs, and cereal grains represented 9.6 percent of all shipments in 2012, growing to 10.3 percent in 2040.

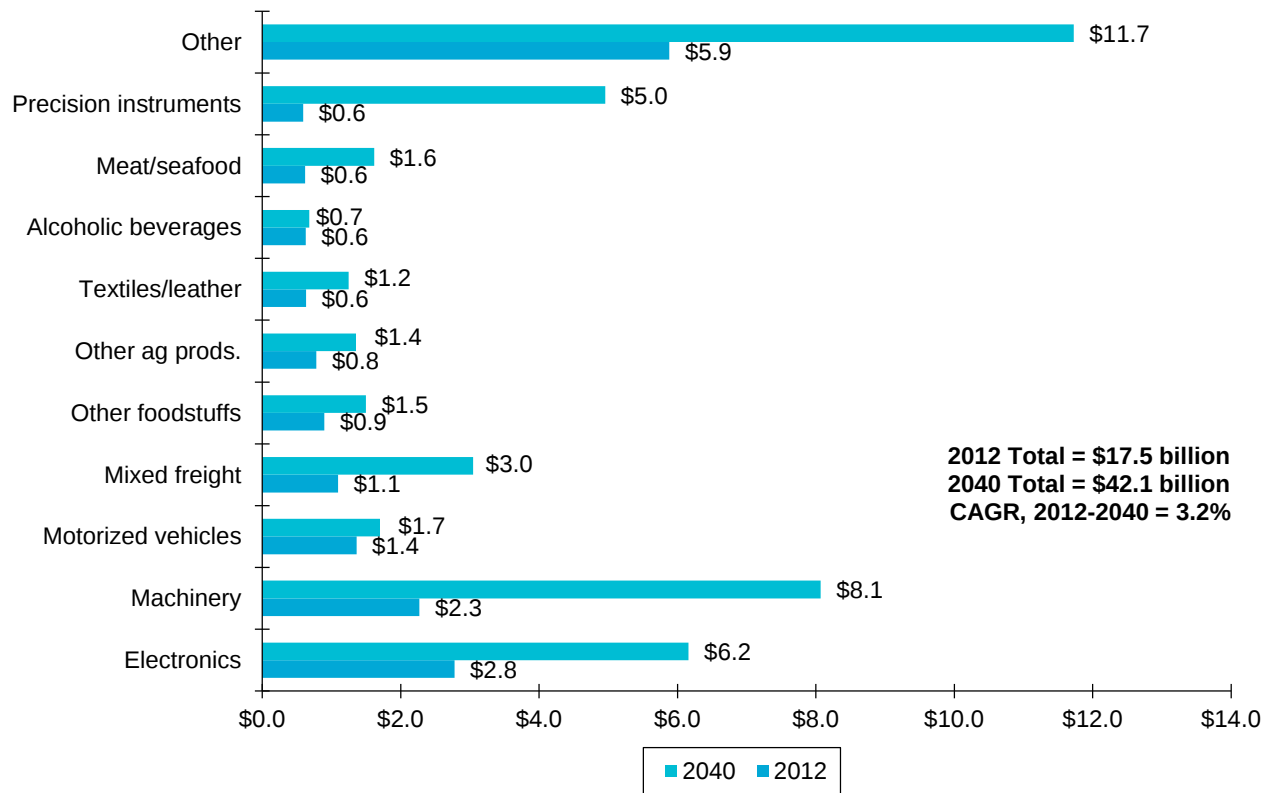
Figure 2.70 Santa Cruz County Freight Flows by Top Commodities by Tonnage
Millions of Tons



Source: FAF3.

Figure 2.71 below shows the top commodities by value in 2012 and 2040 for goods into, out of, and within Santa Cruz County. Electronics, machinery, and motorized vehicles represented 37.1 percent of all shipments in 2012. Agricultural goods totaled 16.6 percent of shipments. By 2040, precision instruments are projected to increase to \$5 billion in shipments and become the third-highest shipped commodity in the County. All commodity groups are projected to grow by 2040.

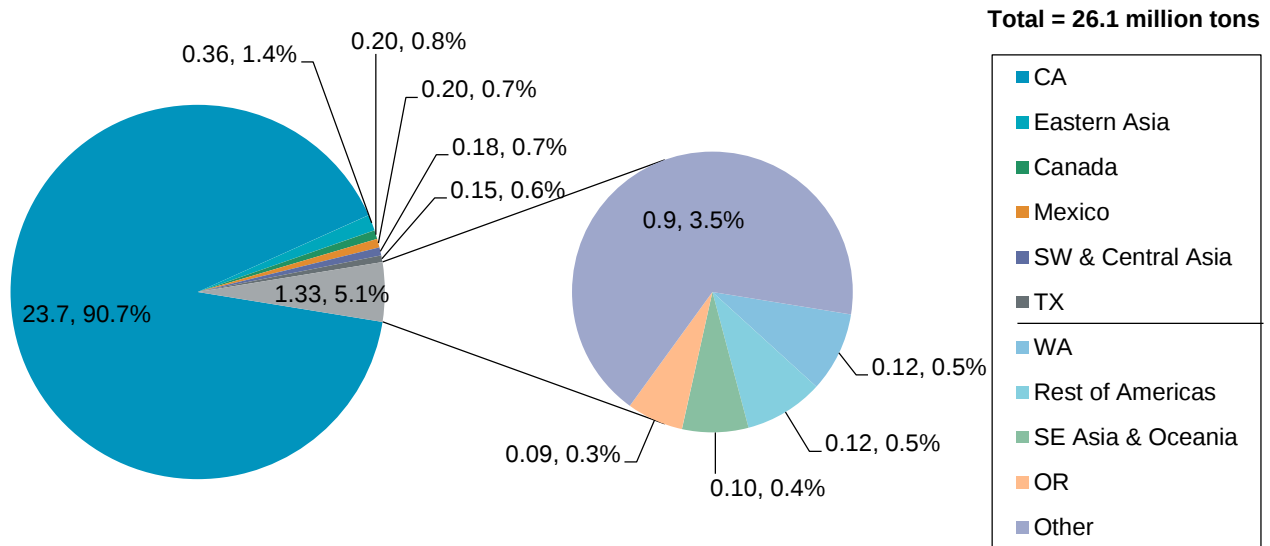
Figure 2.71 Santa Cruz County Freight Flows by Top Commodities by Value
Billions of Dollars



Source: FAF3.

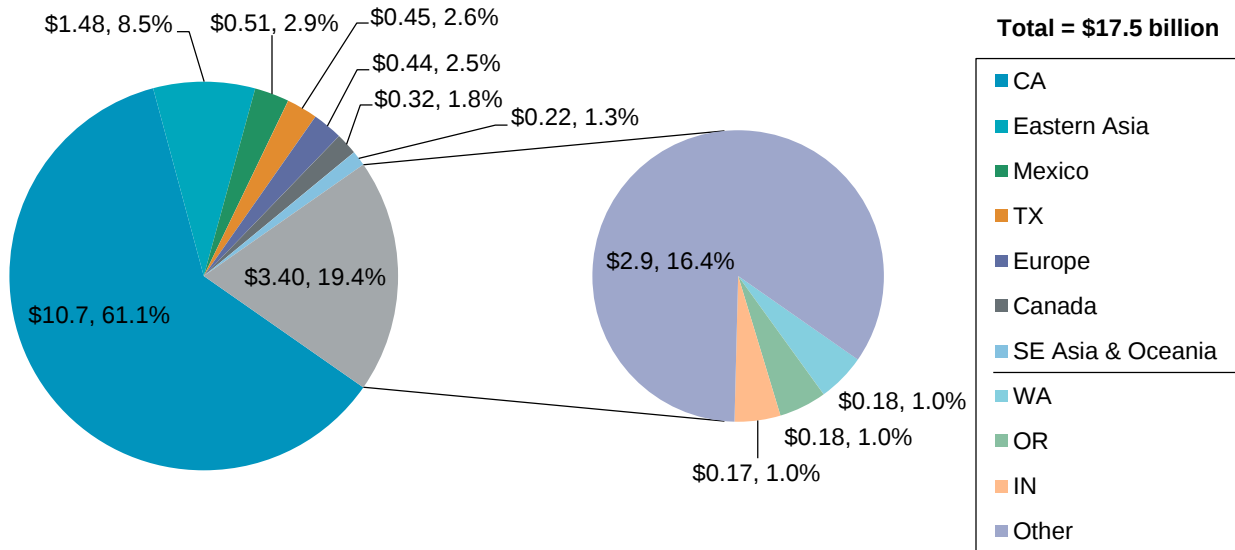
Figures 2.72 and 2.73 below show the top 10 trade partners for Santa Cruz County in 2012 by weight and value. The remainder of California was the dominant partner, especially when measuring shipments by weight. Eastern Asia was the only other partner above one percent in 2012 by weight. It also is the top trading partner by value, accounting for 8.5 percent of all trade, followed by Mexico (2.9 percent) and Texas (2.6 percent). Eastern Asia is projected to remain the top trading partner by weight and value in 2040 growing to 3.4 percent and 16.9 percent of the total, respectively.

Figure 2.72 Santa Cruz County Trading Partners
Millions of Tons (2012)



Source: FAF3.

Figure 2.73 Santa Cruz County Trading Partners
Billions of Dollars (2012)



Source: FAF3.

Table 2.11 below details goods moving in, out, and through Santa Cruz County to other regions of California in 2012 and 2040 by weight and value. The overwhelming majority of trade is with the San Francisco Bay Area, given its geographic proximity. Roads including SR 1, SR 17, SR 129, and U.S. 101 are the most important connections.

Table 2.11 Santa Cruz County Total Trade with California Regions

Region	Tons 2012 (Thousands)	Tons 2040 (Thousands)	Value 2012 (Millions of Dollars)	Value 2040 (Millions of Dollars)
Kern County, CA	355	540	129	252
Northern San Joaquin Valley	1,237	2,132	702	1,412
Rest of California	551	838	261	511
Sacramento	790	1,723	523	1,036
San Diego	60	68	93	188
Southern California (SCAG)	776	1,038	1,083	2,069
San Francisco Bay Area	18,665	6,635	7,493	12,784

Source: FAF3.

2.4 Freight System Infrastructure

The commodities that flow into, out of, within and through the U.S. 101 Central Coast region use a collection of multimodal freight systems infrastructure such as rail and ports. Beyond U.S. 101, the study region contains other freight infrastructure. Table 2.13 below shows key highways by County that intersect with U.S. 101 in the study area. Many of these are critical freight corridors that move goods to and from local communities. They also form a vital link to Interstate 5 and the Central Valley of California to the east. Interstate 5 is the main North/South corridor on the West Coast of the United States connecting Central California with Los Angeles, San Diego, and Mexico to the south and Portland, Seattle, and Canada to the north as well as numerous East/West Interstates.

In addition to highways, the U.S. 101 Central Coast region also is served by the Union Pacific Railroad (UP) as well as the Santa Maria Valley Railroad, providing additional modal alternatives to shippers. While there are no cargo airports in the area, the study region is served by cargo airports in nearby regions such as the Fresno Yosemite International Airport and the Norman Mineta San Jose international Airport. The study area also is connected to the rest of the U.S. and the world through several intermodal gateways in the Bay Area, Southern California, and Central Valley. Figures 2.74 and 2.75 shows the multimodal freight systems infrastructure in the study region.

Table 2.12 Key Intersecting Highways with U.S. 101, by County

County	San Benito	Monterey	San Luis Obispo	Santa Barbara
Key Intersecting Highways	SR 152	SR 156	SR 46	SR 135
	SR 129	SR 198	SR 41	SR 154
	SR 156		SR 58	SR 246
			SR 1	SR 1
			SR 166	

Figure 2.74 Multimodal Freight Systems Infrastructure in the Study Area
Santa Cruz, San Benito, and Monterey Counties



Source: Data obtained from various sources, including Caltrans, National Transportation Atlas Data Base. Cambridge Systematics, Inc. analysis.

Figure 2.75 Multimodal Freight Systems Infrastructure in the Study Area
San Luis Obispo and Santa Barbara Counties



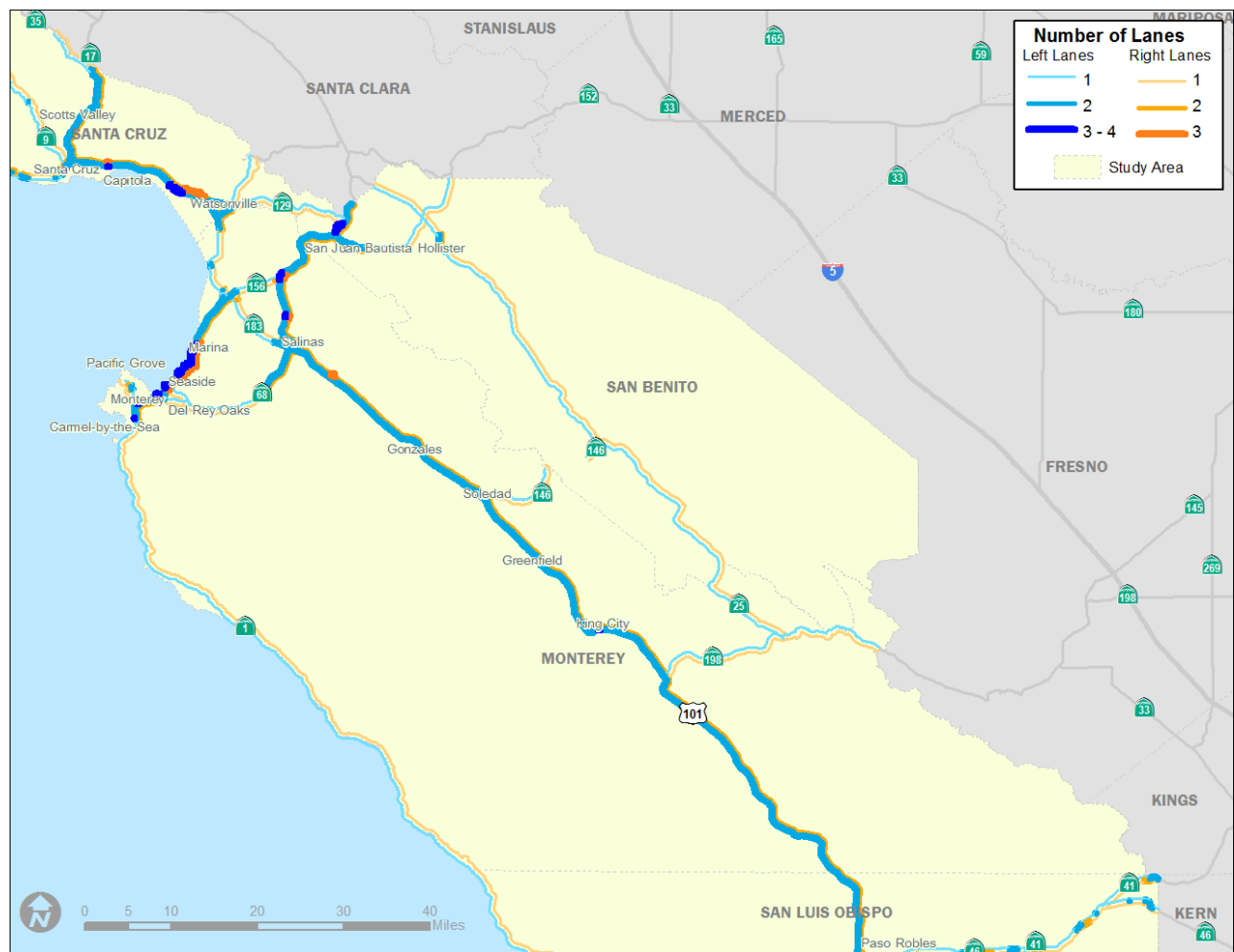
Source: Data obtained from various sources, including Caltrans, National Transportation Atlas Data Base. Cambridge Systematics, Inc. analysis.

2.4.1 Highways and Connecting Roads

The U.S. 101 corridor provides critical connectivity that links business in the study region to the rest of California, the nation and beyond. In addition, a variety of east-west highways, including SR 152/SR 156, SR 41/SR 46, SR 1, SR 129, SR 58, and SR 166 provide secondary and last-mile connectivity that links them to U.S. 101 and other regions, such as San Joaquin Valley. The best source of information on the physical makeup of U.S. 101 is from the Caltrans Transportation Concept Report for U.S. 101 released in December 2014.¹⁴ Figures 2.76 and 2.77 shows the number of lanes on U.S. 101 in the study region and the east-west highways. The majority of U.S. 101 has two lanes in each direction.

¹⁴ California Department of Transportation. Transportation Concept Report: U.S. 101 District 5. December 2014. Table 3.1 and 4.3.

Figure 2.76 Number of Lanes along U.S. 101
Santa Cruz, San Benito, and Monterey Counties



Source: Caltrans Transportation Concept Report U.S. 101.

Figure 2.77 Number of Lanes along U.S. 101
San Luis Obispo and Santa Barbara Counties



Source: Caltrans Transportation Concept Report U.S. 101.

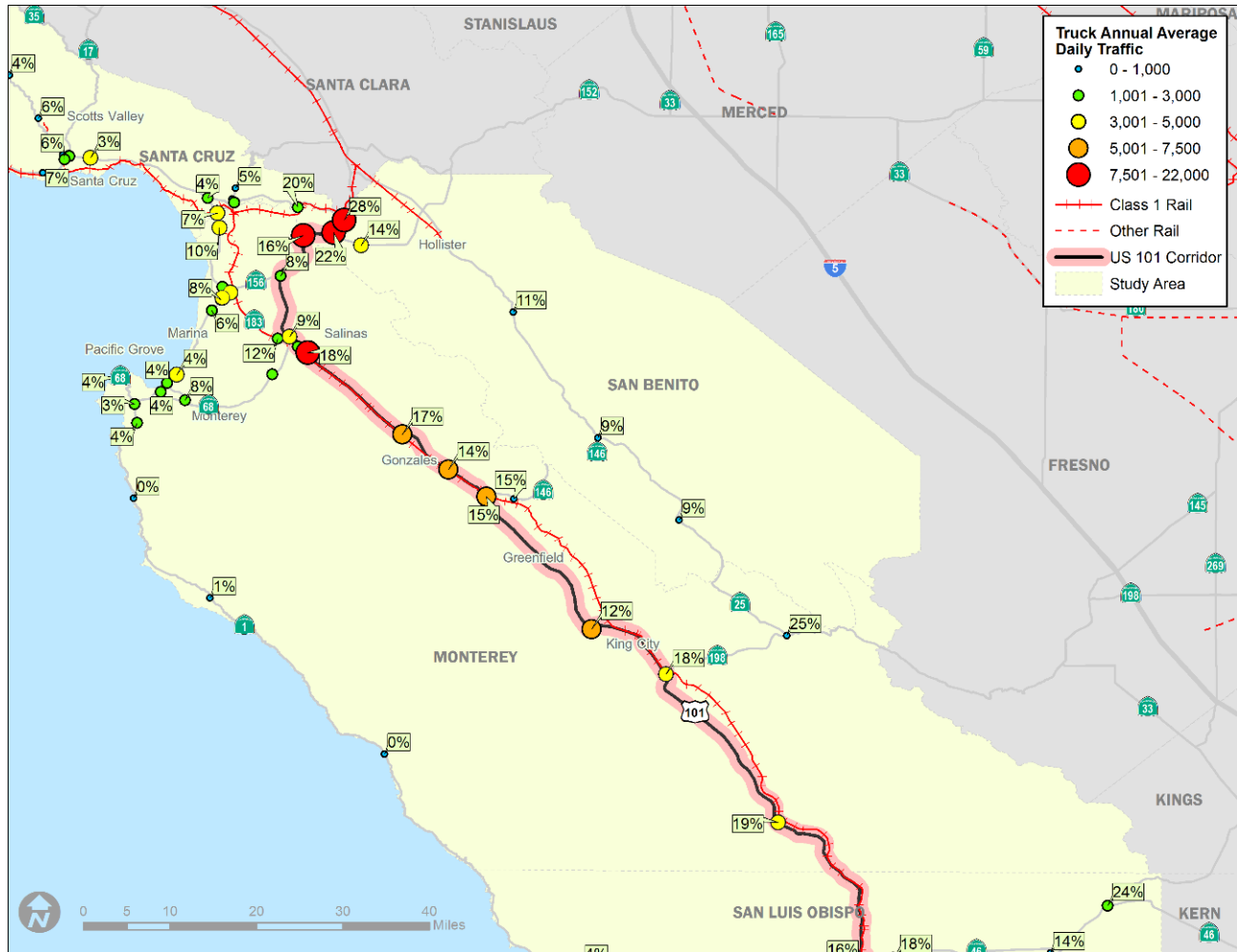
Truck Traffic Volumes

The U.S. 101 is the most critical freight corridor in the study area and thus carries the highest truck volume, as shown in Figures 2.78 and 2.79. In 2013, the location with the highest absolute number of trucks was in San Benito County at the junction with Route 156 East, with 22,000 average daily trucks. This location also was the highest when measured by percent of total vehicle Average Annual Daily Trucks (AADT), at 22 percent. The high truck volumes in these locations are clearly due to a combination of agriculture activities in Monterey County, including transportation between coolers and shippers, as well as proximity to the Bay Area for trade. Five-axle trucks represented the majority of trucks in all but 12 count locations where two-axle trucks represented more than 50 percent of truck traffic. Of those 12 locations, two were in Monterey County, two in San Luis Obispo County, three in San Benito County, and five in Santa Barbara County.

Figure 2.78 and Figure 2.79 also show truck counts on major routes that intersect or run parallel to U.S. 101. The heaviest truck volume on routes other than U.S. 101 in 2013 was located at the intersection of SR 183

and SR 156 in Monterey County with 3,875 trucks accounting for 15.5 percent of all annual daily traffic. This again is likely due to agriculture activity in those regions around Salinas. In fact, the top 10 highest truck count locations are almost exclusively located in the Northern 101 Corridor along SR 1. The highest percent of trucks was at the junction of U.S. 101 and Route 129 in San Benito County where 27.8 percent of all traffic was a truck.

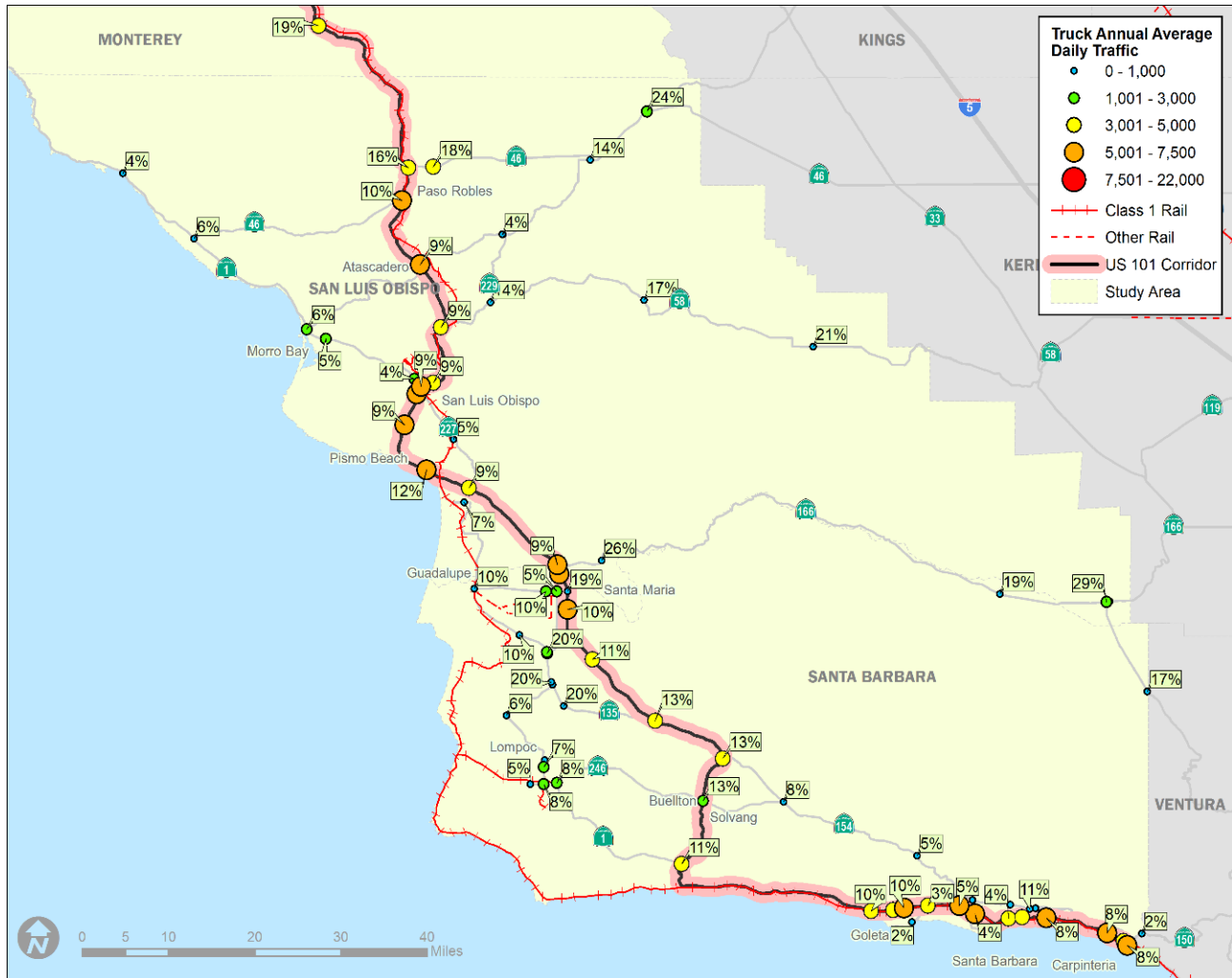
Figure 2.78 Truck Volumes and Percent Traffic that is Trucks on U.S. 101 and Adjacent Highways
Santa Cruz, San Benito, and Monterey Counties



Source: Caltrans data.

Note: AADT stands for Average Annual Daily Traffic.

Figure 2.79 Truck Volumes and Percent Traffic that is Trucks on U.S. 101 and Adjacent Highways
San Luis Obispo and Santa Barbara Counties



Source: Caltrans data.

Note: AADT stands for Average Annual Daily Traffic.

Seasonality and Time-of-Day Truck Trip Variations

One of the unique traffic patterns of the Central Coast region is the seasonal variability of traffic generated from peak harvest seasons from March to October, and the summer tourist traffic near SR 156, which may impact freight operations. When trucks are moving all at the same time during peak harvest season, there can be more serious congestions issues. To further understand truck trip variations, we looked at Caltrans' Performance Measurement System (PeMS) data.¹⁵ Data from four detector locations that are within or near our study area on U.S. 101 are used, include counts near Gilroy, King City, Templeton, and Santa Barbara

¹⁵ Caltrans PeMS data is a useful data source to show variations of truck traffic at a certain location throughout the year and time period. However, it is not a good data source to show absolute volumes of truck traffic. The truck traffic shown using PeMS is higher overall than that reported from Caltrans.

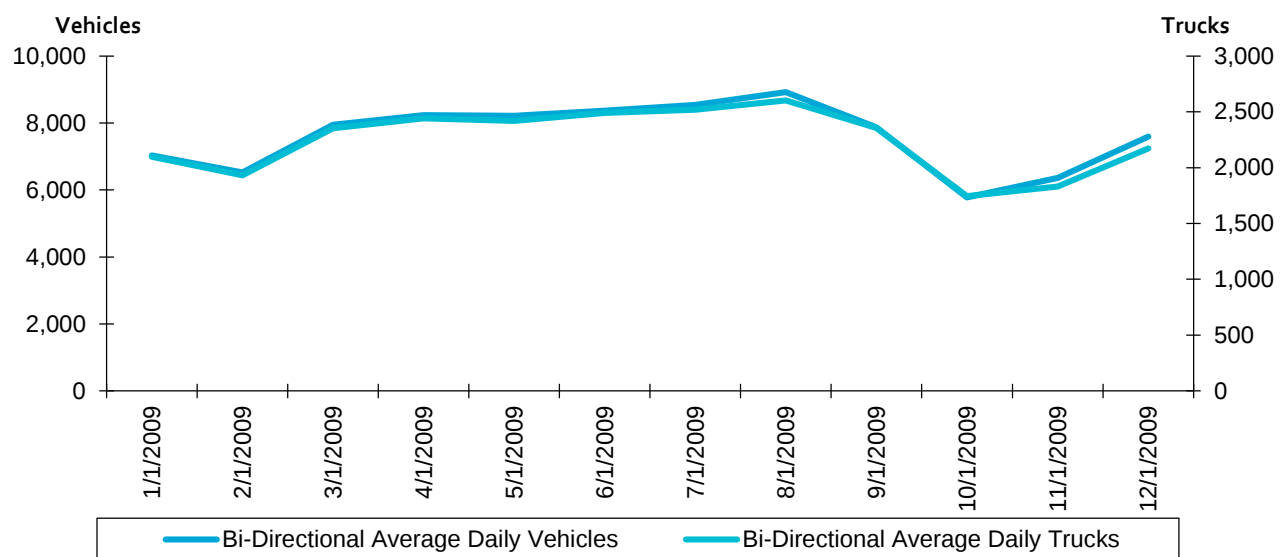
(from North to South). For each of these locations, we analyzed variations in monthly traffic as well as variations in daily traffic by time period. Because of data limitations, different years of data may be used for particular stations.

Overall trends indicate a peak in all vehicle traffic between May and August with the lowest levels of traffic occurring in February and March. Santa Barbara is an exception, with a low in truck traffic in September. Truck traffic followed a similar pattern, with the highest annual daily truck counts occurring in July or August. February, March, November, and December were the months with the lowest number of trucks. In terms of time-of-day variations, all four locations showed distinctive peaks during the p.m. periods, with a lull during the midday for both trucks and all vehicles. Two of the locations had a significant AM peak, two did not. Weekend and holiday traffic flows were more mixed, but there was a general increase in traffic at most locations from the a.m. period through about 2:00 or 3:00 p.m., with a gradual decline after that time.

U.S. 101 near Gilroy

Though not in the study area, it is useful to look at traffic patterns near Gilroy, since there are significant trade flows between the Central Coast and the Bay Area. Average daily traffic on U.S. 101 near Gilroy in 2009 peaked in August, at just over 8,900 vehicles (Figure 2.80). October saw the lowest traffic, with flows averaging less than 6,000 vehicles per day. Trucks followed this pattern, with a high of 2,602 in August and a low of 1,746 in October. Truck volumes here are high because Gilroy is a key route for freight going between the Bay Area/Central Coast and I-5, the primary route serving the Central Valley. In addition, where there are noticeable variations in truck traffic, the variations are not high enough to be correlated solely with agriculture seasonality. Indeed, since overall traffic and truck traffic are highly correlated based on Figure 2.80, it is safe to reach this conclusion. Truck traffic is likely in response to consumer demand.

Figure 2.80 Traffic Volumes by Month on U.S. 101 near Gilroy

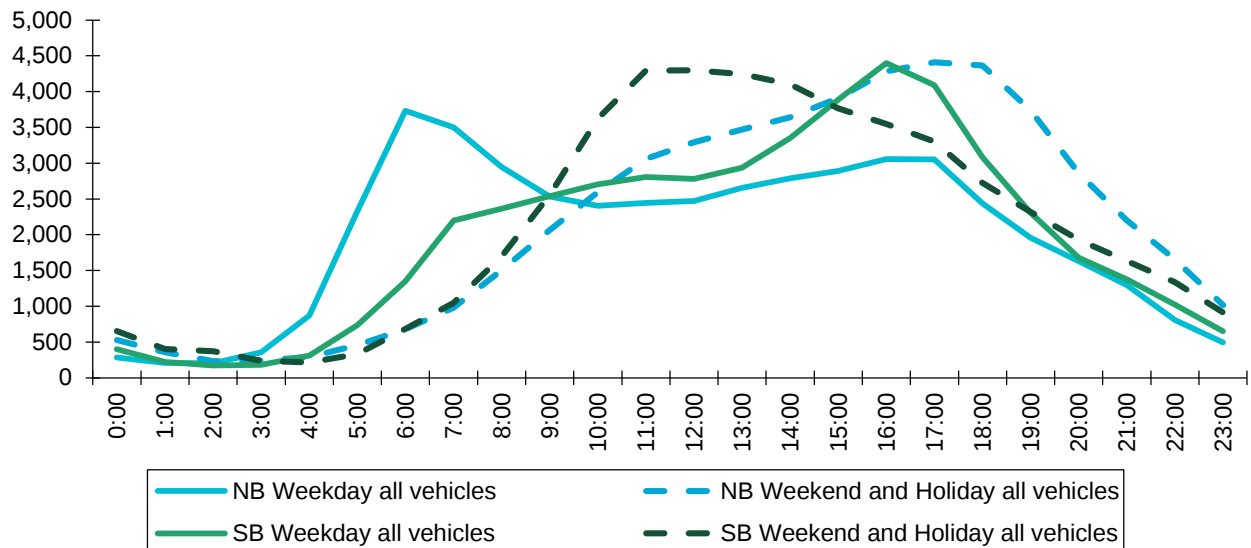


Source: Caltrans PeMS.

Traffic volumes on U.S. 101 near Gilroy in April 2009 showed a distinct weekday AM peak in the northbound direction and a significant weekday PM peak in the southbound direction for all vehicles (Figure 2.81). There was no AM peak for weekday southbound traffic, and only a 24 percent increase in traffic volume for

northbound vehicles at 4:00 p.m. compared to noon. This traffic pattern corresponds to commuter traffic to Silicon Valley where commuters travel northbound from residential areas in the Monterey Bay area to job centers in Silicon Valley in the AM, and return in the southbound direction in the p.m. During the weekend and holidays, southbound traffic peaked at noon and northbound traffic peaked at 5:00 p.m., indicating tourist traffic to Santa Cruz, Monterey, and other coastal attractions. The 4,411 average vehicles traveling northbound during weekends and holidays at 5:00 p.m. was the highest hourly total at this site.

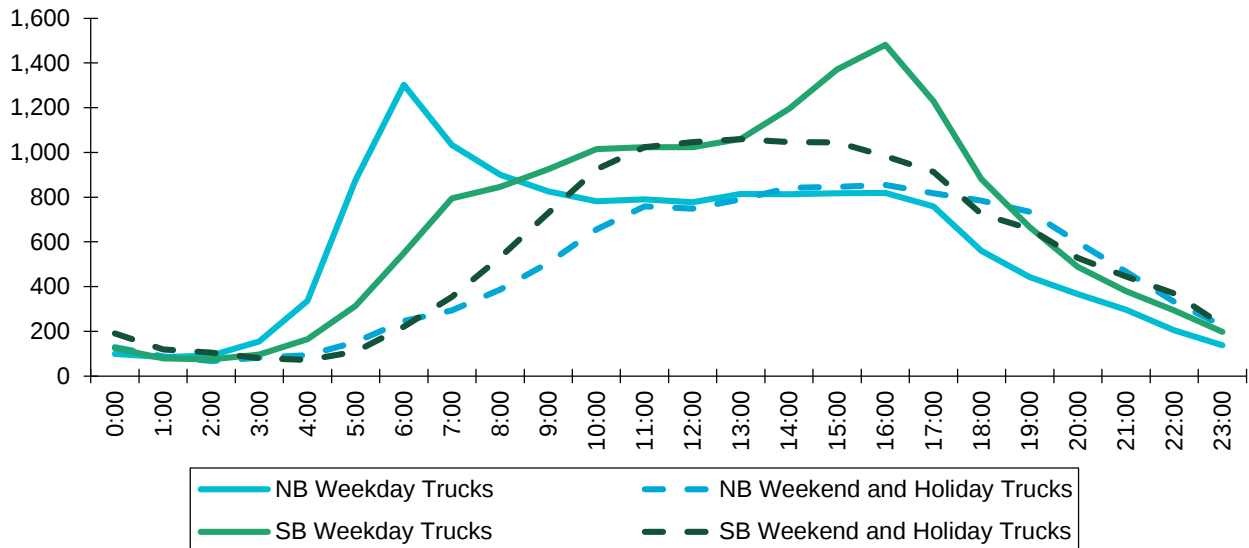
Figure 2.81 Total Traffic by Time Period on U.S. 101 near Gilroy



Source: Caltrans PeMS.

Truck traffic showed a very similar pattern to that of all traffic during weekdays (Figure 2.82). During weekdays, southbound traffic peaked in the afternoon and northbound traffic peaked in the morning, indicating goods movement to Silicon Valley and beyond. Weekend and holiday truck volumes were smoother, with a gradual increase in both directions during the morning, a steady high in the midday, and a gradual decrease in the evening. Overall, southbound truck traffic volumes were higher than northbound volumes except during the AM peak. We speculate that during the AM peak outbound traffic is likely headed for deliveries in the Bay Area, such as delivery of food stuffs, flowers and so on.

Figure 2.82 Truck Traffic by Time Period on U.S. 101 near Gilroy

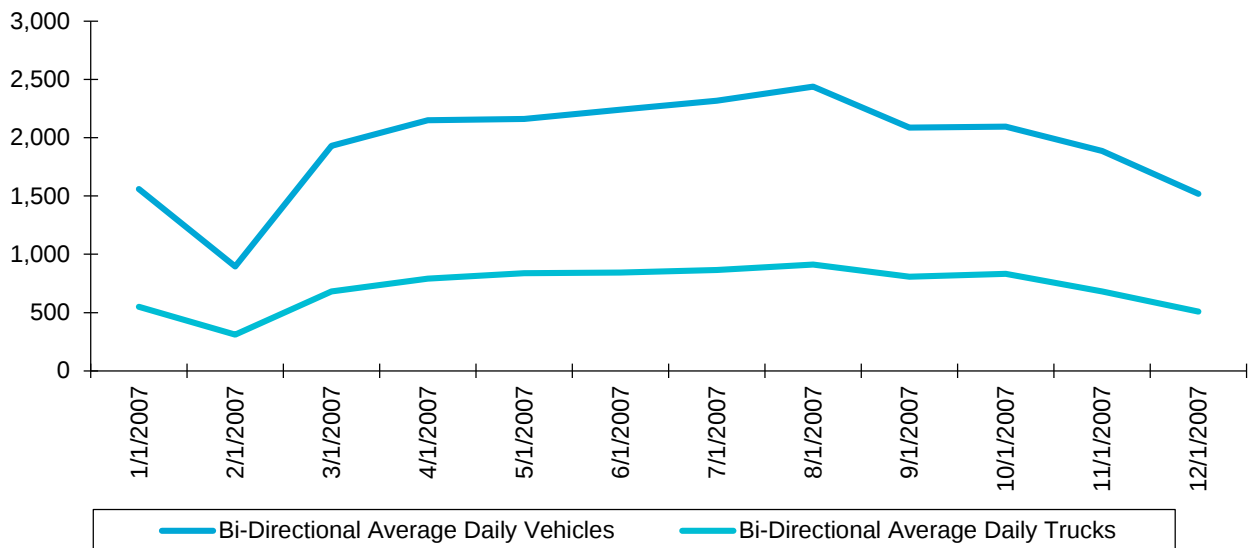


Source: Caltrans PeMS.

U.S. 101 near King City

Average daily traffic in 2007 on U.S. 101 near King City was the lowest of the four stations, as shown in Figure 2.83. The highest month was August with over 2,400 average vehicles per day. February was the lowest month, with only 896 vehicles per day. The rest of the year shows a steady rise in traffic between February and August, and a steady decline in traffic between August and February. Truck traffic at this location mirrored all traffic, with a low of 309 trucks per day in February and a high of 912 in August. Trucks accounted for between 33 percent (December) and 40 percent (October) of the total traffic at this location.

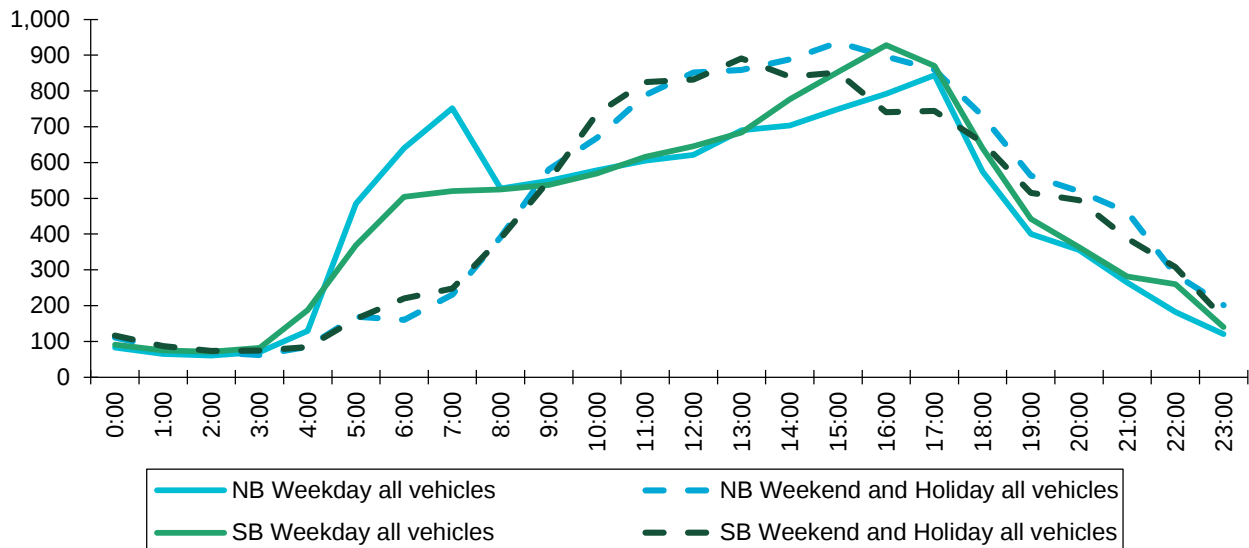
Figure 2.83 Traffic Volumes by Month on U.S. 101 near King City



Source: Caltrans PeMS.

As shown in Figure 2.84, U.S. 101 near King City showed an expected peak in the northbound direction during both the morning and afternoon for all vehicles, but the southbound directions only peaked during the afternoon. Northbound weekend and holiday traffic at 3:00 p.m. was the maximum volume at this location with an average of 936 vehicles per hour. Midday weekend and holiday volume was higher than weekday volume between 9:00 a.m. and 4:00 p.m., measuring 32 percent higher at 11:00 a.m.

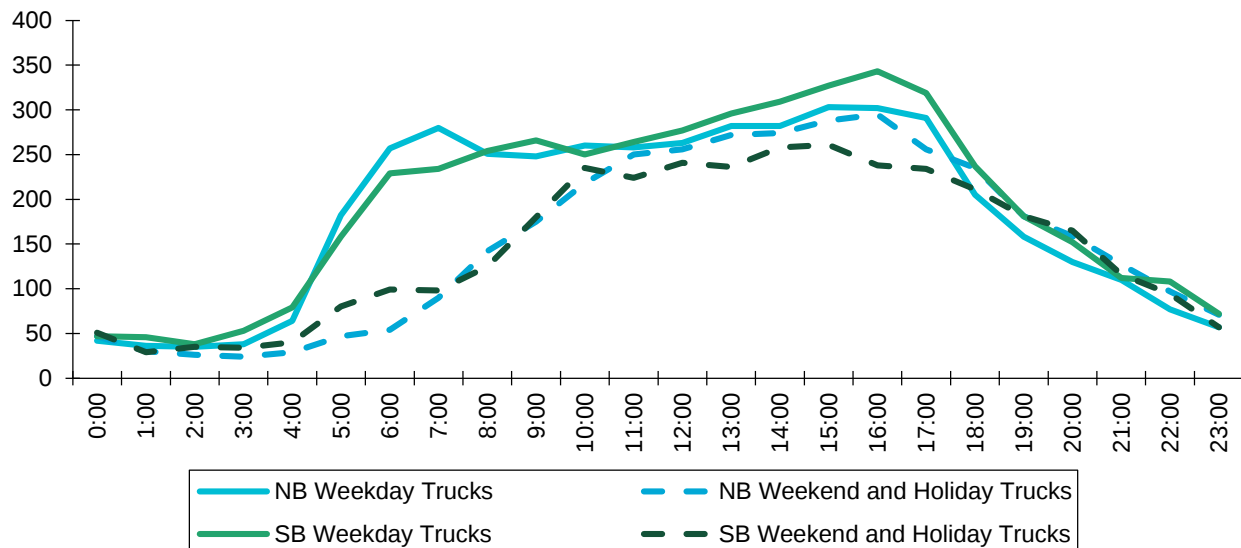
Figure 2.84 Total Traffic by Time Period on U.S. 101 near King City
April 2008



Source: Caltrans PeMS.

According to Figure 2.85, truck volume patterns on U.S. 101 near King City are similar to that of all vehicles, including the lack of an AM peak for southbound trucks. Weekday truck volumes generally remain higher than weekend and holiday levels except in the late night and early mornings. Without additional data the reasons behind this pattern cannot be easily speculated, though the need to service customers during business hours, especially getting shipments in or out as businesses open or close, likely drives much of the activity. Trucks account for between 26 percent (SB Weekend and Holiday, 1:00 p.m.) and 65 percent (SB Weekday, 3:00 a.m.) of the total volume.

Figure 2.85 Truck Traffic by Time Period on U.S. 101 near King City
April 2008

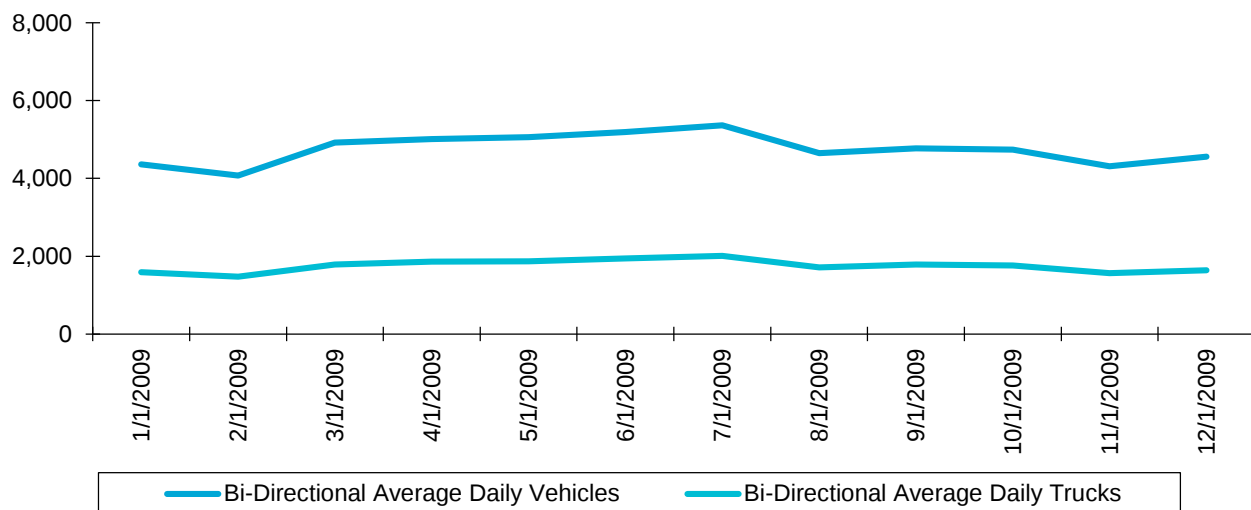


Source: Caltrans PeMS.

U.S. 101 near Templeton

As shown in Figure 2.86, average daily vehicle traffic on U.S. 101 near Templeton in 2009 varied between a low of 4,072 in February and a high of 5,365 in July. Truck totals ranged between 1,471 in February and 2010 in July, mirroring the total vehicle count pattern. Trucks accounted for between 36 and 38 percent of daily traffic at this location throughout 2009.

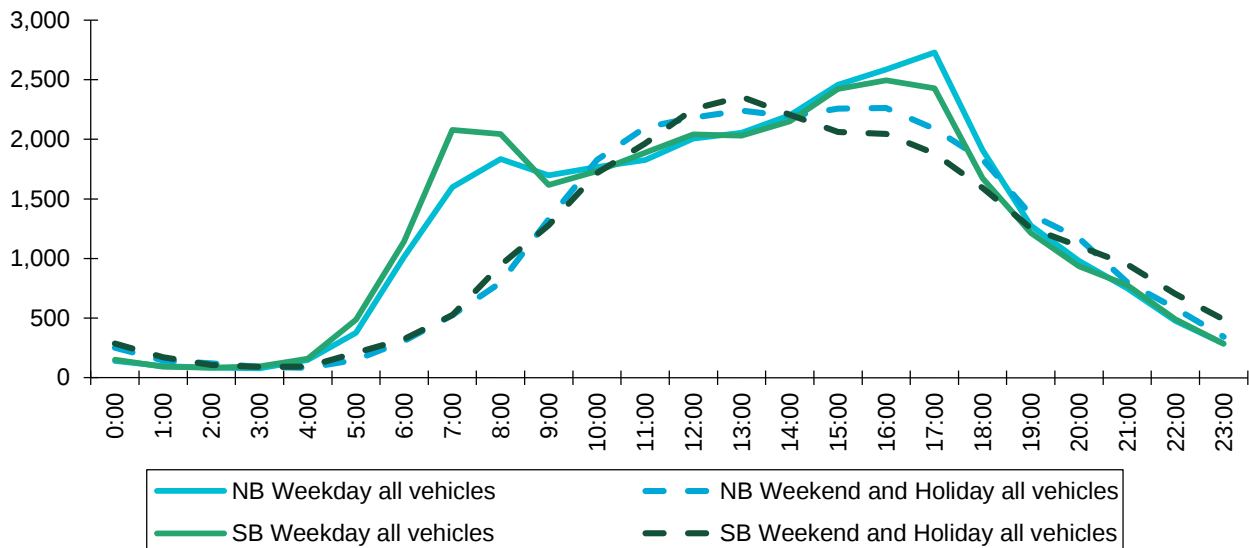
Figure 2.86 Traffic Volumes by Month on U.S. 101 near Templeton



Source: Caltrans PeMS.

As Figure 2.87 shows, U.S. 101 near Templeton in 2009 saw the highest volume of vehicles in both directions during the PM peak, with a maximum northbound flow of 2,728 at 5:00 p.m. and a maximum southbound flow of 2,261 at 4:00 p.m. AM peak flows were significantly lower in both directions, and were actually surpassed by the maximum weekend and holiday traffic. Southbound weekend and holiday traffic peaked at 2,355 vehicles at 1:00 p.m. and northbound weekend and holiday traffic peaked at 2,261 at 4:00 p.m. Between 10:00 a.m. and 2:00 p.m., there was more volume on weekends and holidays than there was during the week.

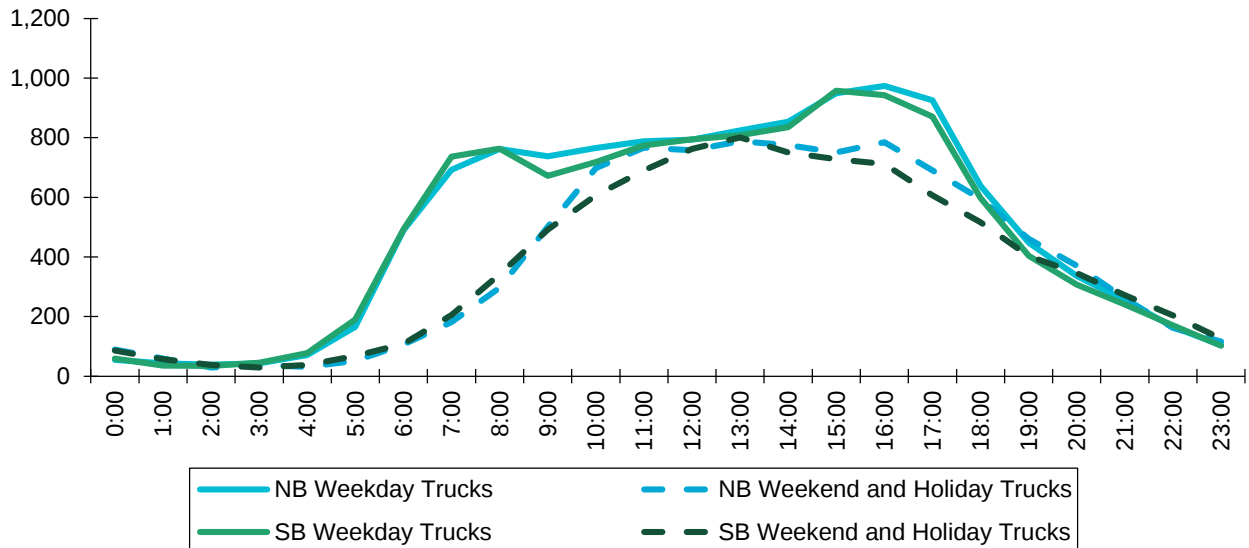
Figure 2.87 Total Traffic by Time Period on U.S. 101 near Templeton
April 2009



Source: Caltrans PeMS.

Figure 2.88 shows that truck volumes followed a similar pattern as total traffic, with the PM peak being larger than the AM peak in both directions and maximum weekend and holiday volumes surpassing the AM peak. Trucks accounted for between 24 percent of traffic (NB Weekend and Holiday, 2:00 a.m.) to 54 percent of traffic (NB Weekday 3:00 a.m.). Midday truck volumes were nearly identical between weekdays and weekends and holidays.

Figure 2.88 Truck Traffic by Time Period on U.S. 101 near Templeton
April 2009

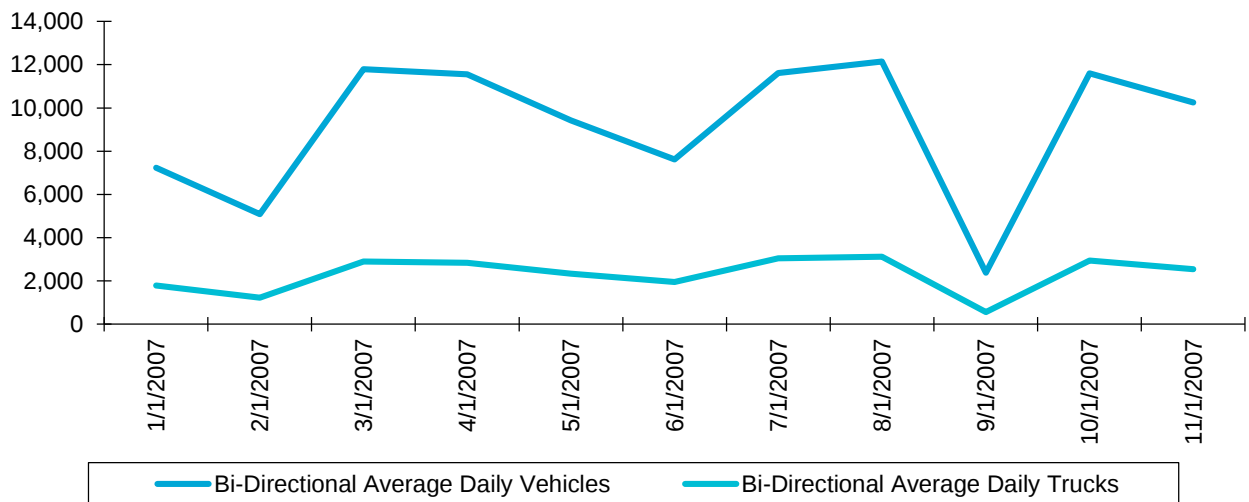


Source: Caltrans PeMS.

U.S. 101 near Santa Barbara

Figure 2.89 shows that total average daily traffic on U.S. 101 near Santa Barbara varied widely in 2008. Average daily traffic ranged between a low of 2,385 in September and a high of 12,146 in August. Average daily truck patterns followed this overall trend. September saw a low of 567 trucks and August saw the heaviest flows with over 3,100 daily trucks. Since there is no obvious explanation for the sudden drop of traffic levels in September, it is likely a major disruption happened, or there was a reporting error. Trucks accounted for approximately 25 percent of the total average daily traffic in each month.

Figure 2.89 Traffic Volumes by Month on U.S. 101 near Santa Barbara

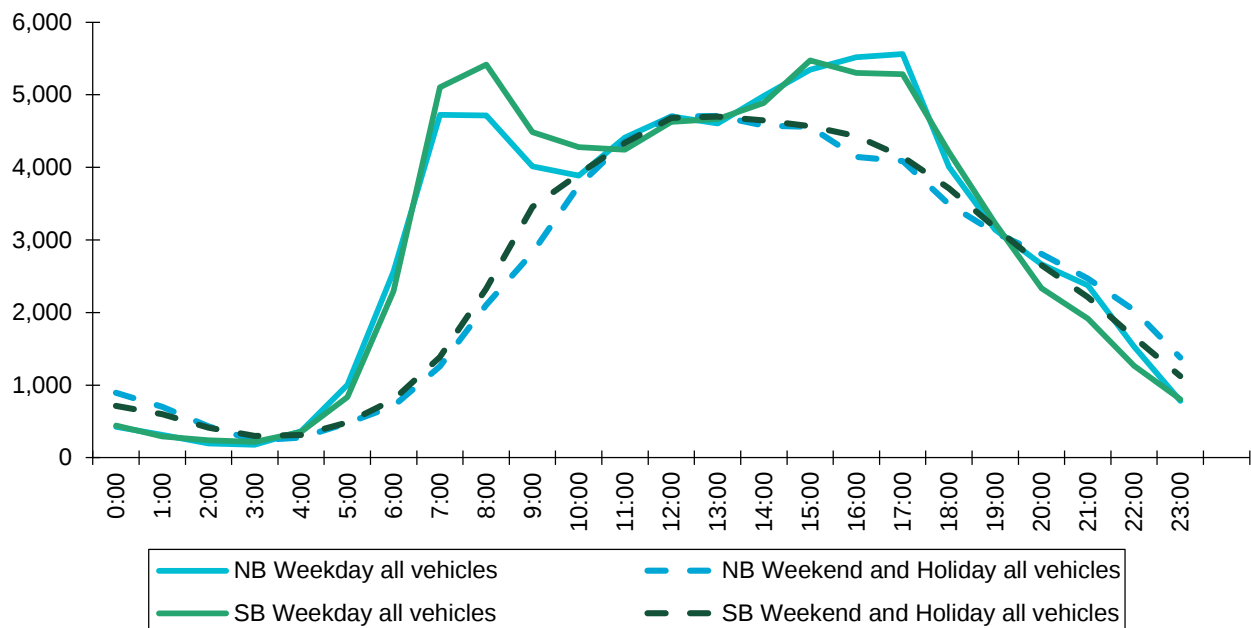


Source: Caltrans PeMS.

Figure 2.90 shows that average traffic during April 2009 on U.S. 101 near Santa Barbara shows an AM and PM peak associated with rush hour traffic in both directions. The northbound direction saw a higher peak in the afternoon, with southbound volumes almost identical between AM and PM. Weekend and holiday traffic volumes reach their maximum at 1:00 p.m., with a total combined volume approximately 85 percent that of the maximum weekday volume. The average northbound volume of 5,562 during weekdays at 5:00 p.m. was the highest volume measured for any of the four stations at any time.

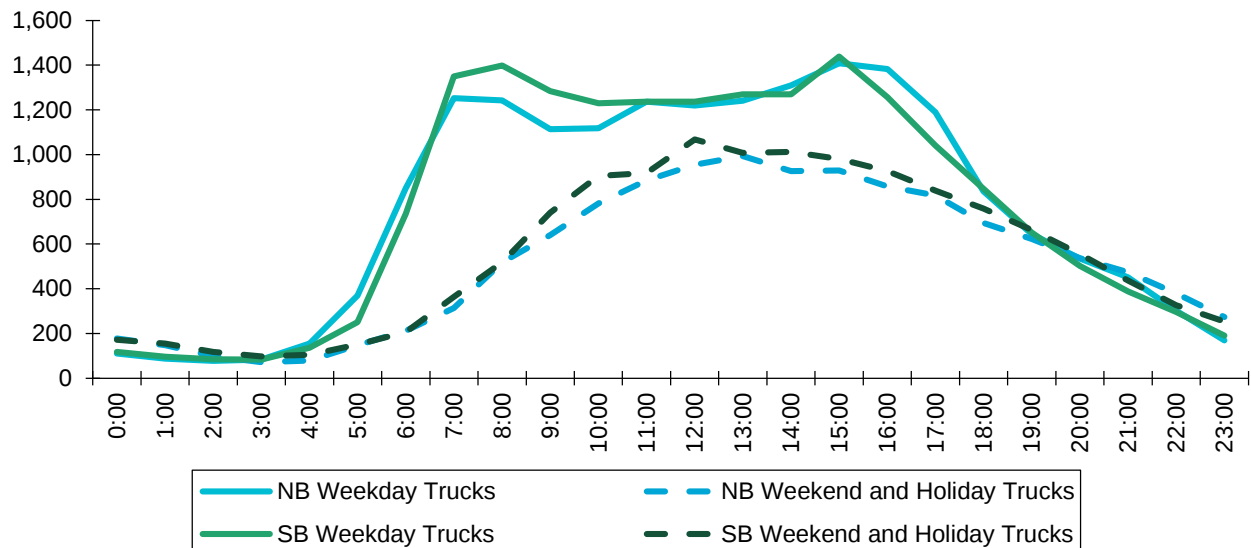
Figure 2.91 shows that truck volumes followed a very similar pattern, with AM and PM peaks during the weekdays and a gradual increase during the morning until approximately noon or 1:00 p.m. and then a gradual decrease during the weekend and holidays. Trucks accounted for between 19 percent (NB Weekend and Holiday, 10:00 p.m.) and 46 percent (NB Weekday, 3:00 a.m.) of total traffic volume. Midday weekend and holiday truck traffic was approximately 80 percent of midday weekday truck volume.

Figure 2.90 Total Traffic by Time Period on U.S. 101 near Santa Barbara
April 2009



Source: Caltrans PeMS.

Figure 2.91 Truck Traffic by Time Period on U.S. 101 near Santa Barbara
April 2009



Source: Caltrans PeMS.

2.4.2 Rail Network

The study region is served by one Class I railroad, Union Pacific (UP), and by the Santa Maria Valley Railroad (SMVRR). Amtrak shares the UP tracks for its Coast Starlight service. Union Pacific's tracks run parallel to U.S. 101 through much of the region and carry lumber, coal, frozen foods, construction material, fertilizer, and steel, along with a variety of other goods. There is also the Santa Cruz Branch Line, a section of track that breaks off from UP's mainline near Watsonville and runs northwest into Santa Cruz County. The Santa Cruz County Regional Transportation Commission purchased this line in 2012 and is studying the feasibility of improving the line for passenger and/or expanded freight service. SCCRTC currently contracts with Iowa Pacific to operate a small amount of freight on the line.

The Santa Maria Valley Railroad (SMVRR) is a 14-mile-long shortline operating in the Santa Maria Valley and interchanging with UP in Guadalupe. Outbound goods have historically been frozen vegetables and strawberries, with major inbound commodities, including construction material, lumber, steel, machinery, and liquid fertilizer. The Betteravia Industrial Park is a major transload location for the line.¹⁶ According to stakeholders, business for the line has quadrupled over the last three years from a combination of new customers and mode shifts among existing clients.

The study region does not have any intermodal connection in the Central Coast and shippers need to connect to San Joaquin Valley to have access to intermodal service.

¹⁶ CCCCFS, 74-76.

2.5 Summary of Economic, Industrial and Freight Flow Profile

Table 2.13 below provides a summary of key economic facts that affect freight movement in the five-county study region.

Table 2.13 Summary of Economic Profile by County

	Monterey	San Benito	Santa Cruz	San Luis Obispo	Santa Barbara
Population (2010)	308,400	16,201	110,201	95,900	197,400
Freight-Intensive Industry Employment (2013)	96,170	8,978 ^a	40,410 ^b	46,242 ^c	80,194
Total GRP (2009)	\$16,016	No Data	\$9,122	\$9,577	\$17,732
Key Industries	Agriculture (salad, wine), retail, manufacturing	Retail, manufacturing, agriculture	Retail, construction, manufacturing, agriculture	Retail, construction, manufacturing	Retail, manufacturing, agriculture
Key Trading Partners	San Joaquin Valley, Southern California, San Francisco Bay Area	San Francisco Bay Area	San Francisco Bay Area	San Joaquin Valley, Southern California, San Francisco Bay Area	San Joaquin Valley, San Francisco Bay Area
Major Connecting Roads to U.S. 101	SR 156 SR 198	SR 152 (some truck restrictions) SR 129 SR 156	SR 17/I-880 SR 1/SR 129	SR 46 SR 41 SR 58 SR 1 SR 166	SR 135 SR 154 SR 246 SR 1

Source: Bureau of Economic Analysis, RTP-MTP/SCS for each MPO, Central Coast California Commodity Flow Study.

^a Forestry, fishing, and related activities; Mining; Utilities; Wholesale trade not included to protect confidential information.

^b Forestry, fishing, and related activities; Mining; Utilities; Transportation and Warehousing not included to protect confidential information.

^c Utilities; Transportation and Warehousing not included protecting confidential information.

3.0 Performance-Based Needs Assessment

Prior studies such as the CCCCFs and the various regional- and county-level long-range plans, revealed the needs and issues along the U.S. 101 corridor. Overall, there was significant consistency across the different plans on the major needs and issues along the corridor, including lack of truck parking, congestion along segments of U.S. 101, lack of east-west connectivity and a truck driver shortage. To better understand these issues, this section evaluates the performance of the U.S. 101 study area using a performance measurement framework. For each of the metrics shown in Table 4.1, data-driven analysis was performed to identify key performance challenges. The results of the analysis were then combined with stakeholder comments and findings from previous studies to come up with a condition rating for each particular metric. This allows us to identify the key goods movement challenges throughout the Central California Coast.

Table 3.1 Summary of Needs Evaluation

Goals	Measure(s)	Metric(s)	Current Condition Rating	Ratings Explanation
Support economic development	Access and Multimodal Connectivity	Freight routes access from/to locations with significant freight activities; east-west connection to parallel roadways; roadway/rail connectivity		Limited east-west connectivity to parallel routes cited in several studies and mentioned by stakeholders with poor conditions along SR 156, SR 41, SR 46. Rail connection facing several challenges for future growth.
Provide an efficient, reliable, well-maintained and safe goods movement facility	Travel-time delay on truck routes – Recurrent and Seasonal	Truck delay		Truck delay is a moderate problem in the area, and is most significant in East Santa Barbara County to Ventura County line, North of Salinas, and between San Luis Obispo and Santa Maria. Given seasonal variations, during summer the delays can be worse due to peak harvest season. Weekend delays during peak tourist seasons can also be on par with weekday delay.
	Travel-Time Reliability	Planning time index		Reliability is a moderate problem in the region, with the highest Planning Time Index of 1.30. During the AM and PM peak, reliability is poorest along North U.S. 101 from the Santa Clara County Boundary to Salinas, from San Luis Obispo to Santa Maria, and in Eastern Santa Barbara up to the Ventura County line.
	Freight-Related Crashes	Truck-involved crashes and crash rate		Intersection crashes are more severe than other types of crashes, and occur at uncontrolled intersections. Highway at-grade crossings is a safety concern along the corridor. Top crash areas include

Goals	Measure(s)	Metric(s)	Current Condition Rating	Ratings Explanation
				U.S. 101 at 156, U.S. 101 between SR 41, and just south of the SR 227: U.S. 101 between SR 1 and SR 154. Crashes on other intersecting highways are highest on SR 46 and SR 156.
	Freight Infrastructure Conditions	Rail Vehicle crashes at at-grade rail crossings		Safety at at-grade rail crossing is not a major issue in the study area.
		Bridge conditions rating		Bridge conditions along U.S. 101 are generally sufficient. However bridge conditions on intersecting and parallel routes, including SR 1, show a large number of structurally deficient and functionally obsolete structures with the worst rated bridges in Monterey and Santa Cruz County.
		Pavement condition rating		Segments identified for major or minor rehabilitation are concentrated in Monterey County between the merger with SR 156 West and the Monterey/San Luis Obispo County border. There is also a concentration of high-priority segments from Santa Barbara to the Santa Barbara/Ventura County line. Thirty-four percent other state highways have high-priority for major and minor rehabilitations.
	Trucking Parking	Number of parking spaces needed along corridor		Lack of long-haul truck parking has been an issue on the corridor for decades. In addition, parking for deliveries and pickup is also inadequate.
	Truck Routes	Extent of Truck Routes Network		While U.S. 101 is well-signed and a designated truck route throughout the study area, the “first- and last-mile” routes that connect U.S. 101 to origins and destinations are often not designated as truck routes.
	Adoption of Advanced technologies	Degree of Implementation of ITS technologies		There is no single coordinated ITS system on U.S. 101, though there is some limited ITS technologies such as ramp metering.
Reduce and mitigate impacts from goods movement operations	Emissions and Air Quality	Tons of PM _{2.5} , PM ₁₀ , and CO ₂ /N ₂ O emissions from trucks.		Air quality in the region is generally good. Trucks produces less than 5 percent of PM _{2.5} pollution, and about 2.4 percent of PM ₁₀ pollution.

Goals	Measure(s)	Metric(s)	Current Condition Rating	Ratings Explanation
	Use of Clean Fuel Technologies	Use of Clean Fuel Technologies		Clean fuel technologies which are more appropriate for goods movement such as LNG are not currently being championed by the state. Lack of infrastructure also hinders clean fuel technology use.

3.1 Economic Development Needs

3.1.1 Accessibility and Connectivity

Providing access and connectivity to freight shippers and receivers is essential to ensuring the economic competitiveness of a region. Poor access and connectivity can lead to higher transportation costs, and thus reduced competitiveness. In addition, lack of parallel connections can lead to more significant traffic disruptions during disasters and incidents, thus further impacting competitiveness. This sections looks at the highway and railway connectivity of the study region to assess existing performance.

Highway Connectivity

The issue of parallel highway connectivity has been brought up in the SBCAG 101 in Motion plan, as well as the Caltrans 101 Transportation Concept Report (2014). Limited number of viable parallel routes to U.S. 101 besides I-5 limits the ability to mediate growing congestion. Though SR 1 and SR 25 can provide limited parallel connectivity, their roadway characteristics, including terrain, speed limit, capacity, and truck advisories are not optimal for freight movements. As shown in Section 3.2.4, pavement conditions on SR 1 and SR 25 also are below average in most places.

In addition, east-west connectivity was brought up as a major issue in the CCCCFS. SR 156/SR 152, SR 46, and SR 41 were determined to be the key freight corridors that connect the Central Coast with I-5. This finding is consistent with our analysis, which shows key clusters of goods movement businesses use these routes, and that these are the major connecting highways that are most heavily utilized for goods movement. Currently, truck volumes are highest on SR 156 and SR 46. Pavement condition data indicated several locations of pavement in poor condition on these major freight corridors, with concentrations of poor pavement conditions on SR 41 between Atascadero and Shandon and SR 46 east of Shandon and a short stretch of SR 156 west of Hollister. In addition, safety is a concern on some routes, with SR 156 having 21 incidents and 34 injuries, the second highest in the study area. SR 46/46E, 166, and 129 all had 12 incidents between 2010 and 2012. Other routes do not have sufficient conditions information, or have average conditions.

Rail Connectivity

In addition to highway connectivity, as shown in Section 2.3 a small percent of freight traffic also is moved on rail. Since rail transportation is often more fuel efficient and cost effective than trucking in certain long-haul shipping scenarios, it can be an attractive alternative to truck movement. One of the major challenges with rail is the lack of an intermodal terminal in the California Central Coast and the need to connect with the

Central Valley to meet this need. While a detailed study needs to be done to understand the demand for such a potential terminal, there is potential for increased rail service that does not involve intermodal connectivity. The Santa Maria Valley Railroad (SMVRR) interchanges with Union Pacific (UP) in Guadalupe and helps move commodities to market. The Betteravia Industrial Park west of Santa Maria is a major transload location for this short-line operator.¹⁷

According to stakeholders, business for the SMVRR has quadrupled over the last three years from a combination of new customers and mode shifts among existing clients. However, while there are growth potentials, several challenges exist for rail transportation along this line:

- Conflicts with passenger rail: Metrolink has passenger service which has been conflicting with SMVRR trains since they quadrupled their business and are sending out more trains per week. Single track issues are contributing to this conflict in the Metrolink area, but funding additional tracks is expensive and is typically paid for by short-line rail operators or other freight rail clients.
- Coordination with UP lines: UP is running two trains per week on a regular basis, and that predictability has been more important than daily service at unpredictable times. The only difficulty now is that as SMVRR increases the number of loads they're running per week, they will need more UP trains to haul their loads. Sometimes trains to/from the area have to use indirect routes to get product from one point to another due to limited intermodal stations and limited numbers of trains serving SMVRR.
- Limitations with gate cutoff times: For a specific container to make it on the specific train out that day it must get the container to that ramp before the gate cutoff time otherwise it may not make it onto that train and would be pushed to the next departure. Cutoff times can be up to four hours before train departure to allow ramp personnel time to still load the containers onto the train. Fresh Express ships some product to Chicago and Pittsburgh and about 5 to 10 percent of their shipments are by rail. The rail time cutoff can impact when loads go out which can impact short spoilage times for sensitive agricultural products, so some shippers continue to use trucks over rail.

3.2 Mobility Needs

3.2.1 Travel-Time Delay

Congestion on U.S. 101 remains an issue in the Central Coast region during some time periods, and congestion delay leads to a host of impacts for communities, including pollution, lost time/productivity and other quality of life concerns. For the private sector, congestion drives up logistics costs and ultimately cuts into customer satisfaction and profits.

In order to determine system mobility and congestion, U.S. 101 was divided into segments roughly corresponding with the Caltrans segments identified in the U.S. 101 TCR. Modifications were made to begin and end each segment at an existing truck count location as these locations provided AADT and truck percentages. Segments used to analyze travel-time delay and commercial hours of delay are detailed in Table 3.2 below.

¹⁷ CCCCFS, 74-76.

Table 3.2 U.S. 101 Segments for Travel-Time Delay

Segment	Start Point Truck Count Station	End Point Truck Count Station	Approximate Length (Miles)	Approximate Free-Flow Travel-Time (Minutes)
1	Ventura/Santa Barbara Line	Hollister Avenue	27	25
2	Hollister Avenue	Las Flores Bridge	53	45
3	Las Flores Bridge	166 East Interchange	12	10
4	166 East Interchange	Santa Fe	23	20
5	Santa Fe	Rt. 58 Junction	14	12
6	Rt. 58 Junction	Paso Robles Junction Rt. 46 East	20	17
7	Paso Robles Junction Rt. 46 East	San Lucas Junction Rt. 198 East	42	33
8	San Lucas Junction Rt. 198 East	Airport Boulevard – Salinas	54	44
9	Airport Boulevard-Salinas	Monterey-San Benito County Line	15	14
10	Monterey-San Benito County Line	Junction Rt. 129 West	5	4

Source: Caltrans U.S. 101 TCR.

Note: Free-Flow travel-time based on Google Maps “without traffic.”

To measure these delays, we used a Reliability Module¹⁸ that produces outputs include travel-time reliability and recurrent and incident truck hours of delay based on traffic volume, roadway capacity, ADT, percent trucks, and number of lanes.

Figures 3.1 through 3.4 displays these recurring commercial delays for weekdays measured in vehicle-hours of delay per day for the AM and PM peaks. Recurring delay is a measure of normal congestion, versus incident delay which is delay attributed to random events such as an incident or weather. Congestion and delay are well established metrics in transportation modeling and analysis. The reduction of travel time is the most significant component in benefit-cost analysis for transportation projects because reductions in travel time provide the biggest benefit to travelers and businesses.¹⁹

Santa Barbara County: U.S. 101 between Ventura County and Hollister Avenue in Goleta is one of the most congested locations in the study area. Between 6:00 a.m. and 7:00 p.m., delay averages 65 vehicle-hours per day – the highest in the region. The PM peak between 3:00 p.m. and 7:00 p.m. had the highest p.m. delay in the region with 35 vehicle-hours per day. During the AM Peak between 6:00 a.m. and 9:00

¹⁸ Work developed as part of Transportation Research Board Project State Highway Research Project (SHRP) 2 C11 “Development of Improved Economic Analysis Tools Based on Recommendations from Project C03 (2).” July 31, 2013.

¹⁹ Vovsha, P., M. Bradley, and H. Mahmassani. 2011. *Value of Travel Time Reliability: Synthesis of Estimation Approaches & Incorporation in Transportation Models*. Presentation for the Transportation Research Board Annual Meeting.

a.m., this section registered 26.5 vehicle-hours per day delay. U.S. 101 between Hollister Avenue and SR 166 saw no recurring delay.

San Luis Obispo County. Between 6:00 a.m. and 7:00 p.m., U.S. 101 between SR 166 East and Santa Fe had delays of 30.1 vehicle-hours per day. This same stretch had delays of 12.3 vehicle-hours per day during the AM peak, and 17.6 vehicle-hours of delay during the PM peak. From Santa Fe to SR 58 experienced 14.7 vehicle-hours of delay between 6:00 a.m. and 7:00 p.m., 9.6 vehicle-hours of delay during the PM peak, and 4.7 vehicle-hours of delay during the AM peak. Between Route 58 and Route 46 East in Paso Robles, trucks encountered 7 vehicle-hours of delay over the entire day, with both the AM and PM peaks remaining below 5 vehicle-hours of delay.

Monterey County. From Airport Boulevard in Salinas to the San Benito County line is the only section of U.S. 101 in Monterey County with significant delays. This stretch saw 30.1 vehicle-hours of delay during the entire day and 13.4 vehicle-hours of delay in the AM peak. There was minimal delay during the middle of the day, and no appreciable delay during the PM peak.

San Benito County. From the San Benito/Monterey County line to Route 129 West experienced delays of 11.1 vehicle-hours of delay during the entire day, 6.4 vehicle-hours of delay during the PM peak, and less than 5 vehicle-hours of delay during the AM peak and midday.

These segments have large amounts of commuter traffic, and therefore have the highest truck delay as well. The data indicates that commercial delays are concentrated on U.S. 101 to stretches near Santa Barbara and south of San Luis Obispo throughout the day. There also is significant delay north of San Luis Obispo in the PM peak, and on U.S. 101 where it runs concurrent with SR 156 in the AM peak. According to stakeholders, the stretches of 101 from Salinas to Gilroy, as well as the interchanges with the SR 68 West, SR 156 West, SR 129, and SR 156 East are the most congested locations. These locations correspond with our analysis.

Based on seasonality patterns discussed in Section 2.4.1, the delay intensities at the worst delay locations are expected to be worse in the summer months. In addition, based on the daily variations we observed, we can assume that weekend delay in the worst hours will be on par with the peak AM and PM period delays. Thus, solutions that aim at reducing weekday delay should also benefit weekend traffic.

Figure 3.1 Weekday Recurrent Commercial Delay AM Peak
Santa Cruz, San Benito, and Monterey Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

Figure 3.2 Weekday Recurrent Commercial Delay AM Peak
San Luis Obispo and Santa Barbara Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

Figure 3.3 Weekday Recurrent Truck Delay PM Peak
Santa Cruz, San Benito, and Monterey Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

Figure 3.4 Weekday Recurrent Truck Delay PM Peak
San Luis Obispo and Santa Barbara Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

3.2.2 Reliability

In addition to predictable recurring delay, a more recent concept in transportation modeling and planning is travel reliability. Travel reliability, which can be affected by unexpected events, such as incidents or weather, can have an even larger impact on goods movement. Motor carriers are held to very strict standards for on-time delivery by their customers. Being late can mean missing times when businesses are open or missing cutoff times for intermodal connections at ports, airports, and rail terminals. In order to avoid poor on-time performance, motor carriers often build in “buffers” or extra travel time to account for potential, unpredictable delays. This can translate into wasted time when conditions are not as bad as the worst case scenario. Motor carriers are reducing this wasted time by using real-time traffic information and sophisticated dispatching programs, but it is impossible to adapt in real-time to all instances of unreliable travel times.

One way to measure travel-time reliability is through the planning time index (PTI). PTI represents how much total time a traveler should allow to ensure on-time arrival 95 percent of the time. For example, if a trip on a

segment should take 20 minutes in free-flow conditions, a planning time index of 1.5 indicates that a traveler should allow for 30 minutes of travel to arrive on time 95 percent of the time (20 minutes $\times$ 1.5 = 30).

The PTI was calculated for each of the 10 segments identified previously using the Reliability Module detailed previously. Figures 3.5 through 3.8 below illustrates the Planning Time Index for each of the segments.

The highway segment between Ventura County and Hollister Ave in Goleta had the highest PTI of any of the U.S. 101 segments, averaging 1.18 between 6:00 a.m. and 7:00 p.m. Segments from Airport Boulevard in Salinas to the northern boundary of the study area had the second and third-highest PTIs at 1.09 and 1.10 respectively. Another segment, south of San Luis Obispo, was next with an overall PTI of 1.08. All other segments had PTIs less than 1.05, with Las Flores Bridge to SR 166 East and SR 58 to SR 46 East having a PTI of 1.0.

During the AM peak between 6:00 a.m. and 9:00 a.m., U.S. 101 from the Ventura County line to Hollister Avenue had a PTI of 1.23, with U.S. 101 south of San Luis Obispo and from Airport Boulevard to SR 129 all having a PTI of 1.12. This indicates increased levels of congestion during the morning peak period compared to the daily average. The segment between Las Flores Bridge and SR 166 East and another segment between SR 46 East and SR 198 had a PTI of 1.0, indicating free-flow traffic conditions during the peak hours.

The highest PTI in the corridor occurred during the PM peak (3:00 p.m. to 7:00 p.m.) in Southern Santa Barbara County at 1.26. The segments south of San Luis Obispo and Segment 10 from the Monterey/San Benito line to SR 129 followed with PTIs of 1.15 each. Between Santa Fe and SR 58 and Airport Boulevard in Salinas to San Benito County had PTIs of 1.13, with the other segments below 1.1 and Hollister Avenue to Las Flores Bridge and SR 46 to SR 198 East at free-flow conditions. The p.m. had the highest average PTI at 1.09, followed by the AM peak at 1.07, the full day at 1.05, and the midday (9:00 a.m. to 3:00 p.m.) at 1.03.

All of the worst reliability sections correspond with locations with the highest overall traffic generated by commuters moving to/from job centers.

Figure 3.5 Weekday Planning Time Index along U.S. 101, AM Peak
San Luis Obispo and Santa Barbara Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

Figure 3.6 Weekday Planning Time Index along U.S. 101, AM Peak
Santa Cruz, San Benito, and Monterey Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

Figure 3.8 Weekday Planning Time Index along U.S. 101, PM Peak
San Luis Obispo and Santa Barbara Counties



Source: SHRP Calculator, Caltrans AADT and Truck Data.

3.2.3 Safety

Highway

On U.S. 101, trucks and passenger vehicles face unique safety challenges due to congestion, mainly due to uncontrolled access to a high-speed facility. Figure 3.9 below shows the location of crashes with injuries involving trucks along U.S. 101 between 2010 and 2012. There were 156 incidents which injured 202 persons and resulted in 11 fatalities.

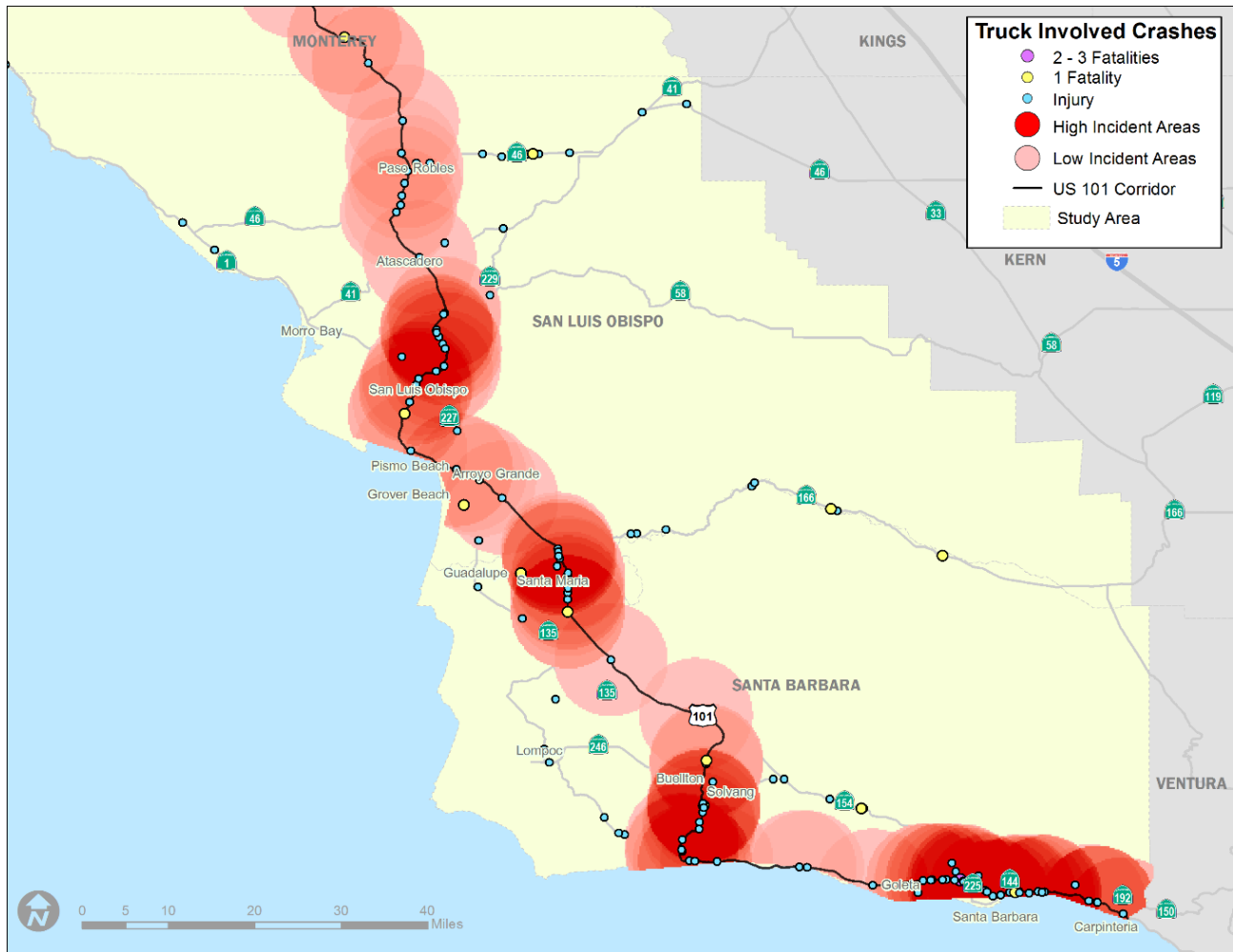
Ten of the crashes, representing 6.4 percent of the total, occurred at intersections. These crashes accounted for 16 injuries (7.9 percent) and one fatality. Seven of the incidents are listed as “broadside” collisions, with one each of “head-on,” “sideswipe,” and “rear end.” Half occurred in July, August, and September and seven took place on Thursdays. Six of these locations are at locations where traffic enters or exists from U.S. 101 without a ramp – uncontrolled intersections. Two more occurred at locations that were, but are no longer, uncontrolled intersections due to improvements made by Caltrans through the Prunedale Improvement

Project. The fatality occurred at U.S. 101 and Santa Maria Way in San Luis Obispo County. This location is access controlled via a ramp. Interviews with stakeholders identified highway at-grade crossings as one of the largest safety concerns in the corridor. While the percent of total incidents at these locations during the examined period was low, they represent a significant percent of the injuries caused by truck-related incidents.

Specific areas with a high number of incidents are detailed below.

- **Where U.S. 101 and SR 156 overlap (Monterey and San Benito Counties).** 20 incidents involving trucks occurred on this approximately 10-mile stretch of U.S. 101. These incidents claimed two lives and caused 30 injuries from 2010 to 2012. The incidents were not clustered by month or year, though more than half occurred on a Friday or Saturday. One incident took place at an intersection (Crazy Horse Canyon Road) causing one injury. The intersection at this location was replaced with a ramp in late 2014 as part of Caltrans' Prunedale Improvement Project.
- **U.S. 101 between SR 41 in Atascadero and just south of the junction with SR 227 south of San Luis Obispo City.** 17 incidents occurred on this approximately 19-mile stretch of U.S. 101 between 2010 and 2012 causing 19 injuries and one death. Seven of the incidents occurred on a Friday, all between noon and 9:00 p.m. None occurred at an intersection.
- **U.S. 101 between SR 1 and SR 154 in Santa Barbara County.** Nine incidents on this 14-mile stretch of U.S. 101 claimed two lives and injured 10. Tuesdays and Thursdays accounted for three crashes each. None took place at an intersection.

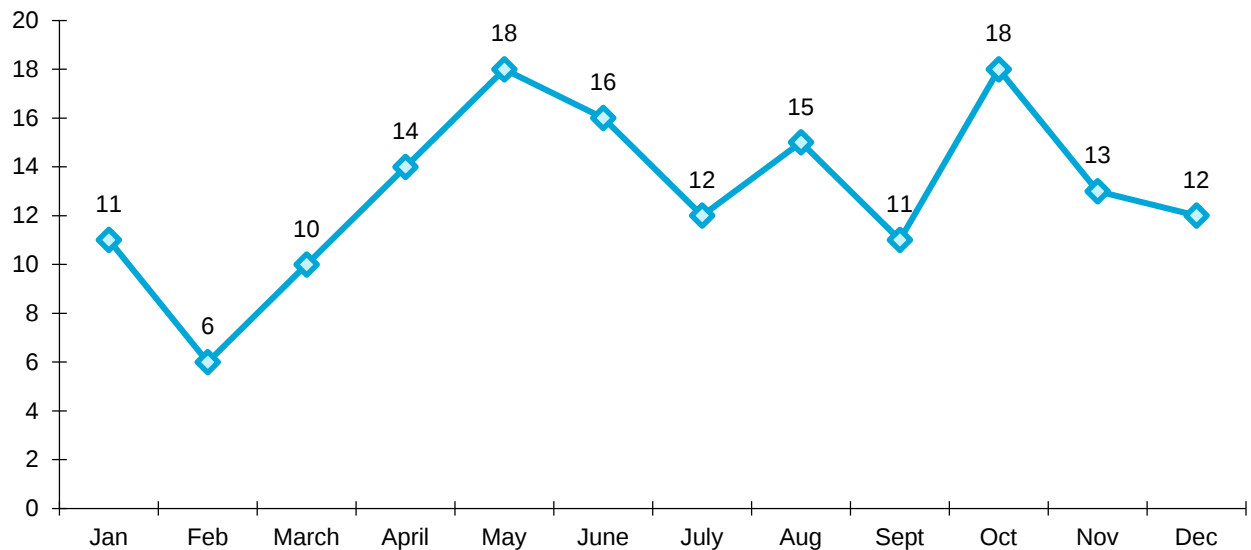
Figure 3.9 Truck-Involved Injury Crashes on U.S. 101
2010 to 2012



Source: Caltrans SWITRS data. Deaths are weighted twice as heavily as injuries.

In terms of seasonality, the number of crashes correlate with seasonality patterns, as April through October have higher number of crashes than from the low season of November through January, as shown in Figure 3.10. February had the least number of crashes with six. Strategies to reduce traffic, or peak-period traffic can reduce the likelihood of these crashes.

Figure 3.10 Truck Involved Injury Incidents by Month on U.S. 101
2012 to 2010

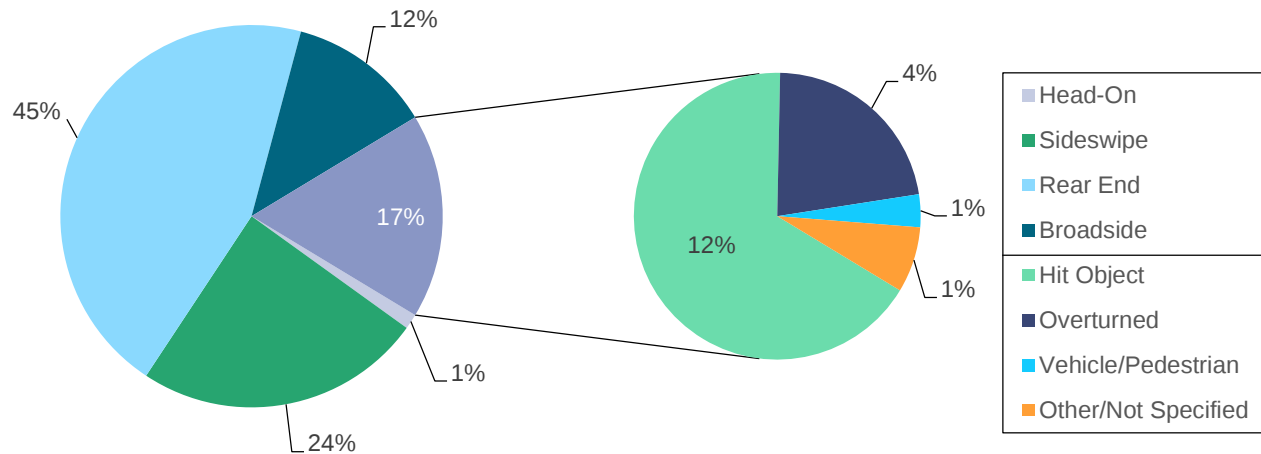


Source: SWITRS.

Figure 3.11 below provides details on the type of truck-involved incidents that caused injuries on U.S. 101 in the study area. By far, rear end collisions are the dominant type of incident, accounting for 70 of the 156 total collisions. A 2003 report by Thomas Golob and Wilfred Recker examined 1,000 crash reports on major freeways in Southern California. Though the results were preliminary, they do suggested a link between rear-end crashes and higher levels of congestion.²⁰

²⁰ Thomas F. Golob and Wilfred W. Recker. A method for relating type of crash to traffic flow characteristics on urban freeways. August 2003.

Figure 3.11 Collision Type for Truck Involved Incidents
2012 to 2010



Source: SWITRS.

Note Crash data includes incidents where the above routes are listed as “Secondary” in order to include as many incidents at or near intersections as possible.

Beyond U.S. 101, a number of additional intersecting or adjacent routes also had truck-involved collisions that resulted in injuries or fatalities. Between 2010 and 2012, there were 142 collisions which injured 208 and killed 21 on State Routes in the study area. Four deaths occurred on SR 129, four on SR 154, seven on SR 156, four on SR 166, and one each on SR 1 and SR 46. The deadliest incident occurred at the intersection of SR 154 and State Street in Santa Barbara in 2010 which killed three people. Two other incidents with fatalities are listed at intersections. Two people were killed in 2011 at the intersection of SR 129 and Lakeview Road in Santa Cruz County. Two other people were killed in 2012 at SR 156 and San Felipe Road in San Benito County. The Lakeview Road intersection currently has a stop sign on Lakeview Road. The San Felipe Road intersection currently is controlled by a traffic light.²¹ In total, 26 (18 percent) of the 142 collisions on State Routes in the study region occurred at intersections.

SR 1 had 40 incidents and 64 injuries, the most of any route other than U.S. 101. SR 156 had 21 incidents and 34 injuries, the second highest of routes other than U.S. 101. State Routes 46/46E, 166, and 129 combined had 12 incidents between 2010 and 2012.

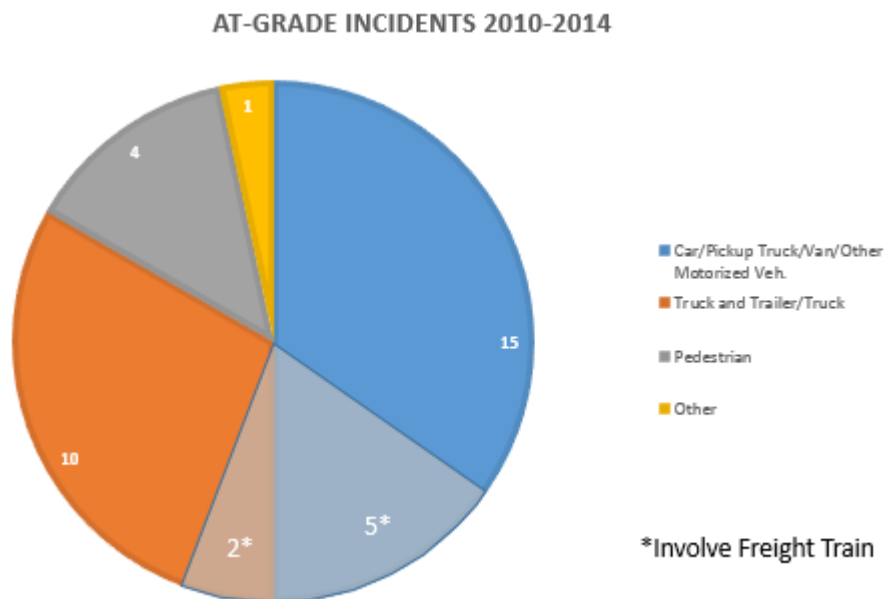
Rail Crossings

Between 2010 and 2014, 30 incidents at at-grade rail crossings have occurred within the study region, only one of which was on U.S. 101. In April of 2012, a car in Monterey County was hit by an Amtrak passenger train at an at-grade crossing just north of Chualar. Two people were injured with no fatalities. As Figure 3.12 shows, of the 30 incidents in the study area, 10 involved a truck or truck-trailer, 15 involved a motor vehicle

²¹ Intersection conditions according to Google Maps – 5/13/15.

other than a truck, four involved pedestrians, and one was classified as “other.”²² Seven of the 30 incidents involved a freight train and these are indicated with a * on Figure 3.12. The data shows that rail crossings with U.S. 101 are not a major issue in the study region.

Figure 3.12 At-Grade Rail Incidents
2010 to 2014



Source: Federal Railroad Administration, Office of Safety Analysis.

Note: Two of the Truck and Trailer/Truck at-grade incidents involved a freight train.
Five of the Car/Pickup Truck/Van/Other Motorized Vehicle at-grade incidents involved a freight train.

3.2.4 Bridge and Pavement Condition

Pavement and bridge surface quality are issues of concern to both the public and private sectors. Poor conditions can cause delays, damage vehicles, and damage goods in transit. In order to determine the condition of bridges, the study utilized the National Bridge Inventory Data. This data provides a Sufficiency Rating (SR) of the bridge, which is a composite score of structural adequacy and safety, serviceability and functional obsolesces. A score of 100 percent would indicate an entirely sufficient bridge and a zero percent score would represent an entirely insufficient or deficient bridge.

The SR is also used to determine eligibility for funding under the FHWA's Highway Bridge Program (HBP). To be eligible for rehabilitation, a bridge must have an SR of 80 or less; to be eligible for replacement, the bridge must have an SR of less than 50. Figures 3.13 and 3.14 below show the 233 bridges on U.S. 101 in the study region as well as bridges on other key freight routes in the study region. Three of the 233 have sufficiency ratings of 50 or below, two in Santa Barbara County and one in San Luis Obispo County.

²² Federal Railroad Administration Office of Safety. Crossing Inventory and Accident Reports. On-line at: <http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/crossing/crossing.aspx>.

There are 14 other bridges on State Routes in the study region with sufficiency ratings under 50. Seven are found on SR 1, three in Monterey County, three in Santa Cruz County, and one in Santa Barbara County. Three are found on SR 236 and two on Route 9 in Santa Cruz County. The remaining two are found on SR 58 in San Luis Obispo County and State Route 150 in Santa Barbara County.

Figure 3.13 Bridge Conditions in Study Area
Santa Cruz, San Benito, and Monterey Counties



Source: Caltrans NBI Data.

Figure 3.14 Bridge Conditions in Study Area
Santa Cruz, San Benito, and Monterey Counties



Source: Caltrans NBI Data.

In addition to a low sufficiency rating, a bridge must be classified as either structurally deficient or functionally obsolete in order to qualify for HBP funding. A bridge is listed as structurally deficient when its deck, superstructure, or substructure are rated a “4” or lower on a scale from 0 to 9. These bridges are still safe, but they are identified for rehabilitation or replacement. Functionally obsolete bridges are described by the U.S. DOT as lacking sufficient carrying capacity, having height restrictions, or being prone to flooding – it is **not** related to the condition of the bridge.²³ Of the 233 bridges on U.S. 101 in the study region, 13.7 percent are structurally deficient, 21 percent are functionally obsolete, and 65.2 percent had no identified issues.

On other State Routes, 24 structures in the study region are listed as “Structurally Deficient,” including four of the seven bridges with sufficiency ratings under 50. Seventy-five are classified as “Functionally Obsolete,” including the remaining 10 bridges with sufficiency ratings under 50.

²³ Maryland DOT Bridge Inspection Fact Sheet. August 2007.

To better understand how much traffic volumes or other factors may be affecting bridge conditions, a simple linear regression analysis was run for several variables. It was determined that traffic levels were not correlated with bridge conditions at all, while the age of the bridges had about 20 percent correlation with bridge conditions. The average age of the bridges was 45 years old.

Pavement Conditions

In addition to bridge conditions, pavement ratings are an important factor in determining the overall condition of U.S. 101's infrastructure. Figures 3.15 and 3.16 below illustrate pavement conditions on U.S. 101 and other key State Routes in the study region developed in a 2011 survey. Road segments were given a score based on ride quality, structural distress, and the Maintenance Service Level (MSL) of the roadway which varies depending on the classification of the route. U.S. 101 is classified as MSL 1, highest priority.²⁴

Segments with a priority number between 1 and 14 are shown in red in the figure below, indicating the need for major or minor rehabilitation. Yellow indicates segments with a Priority Number between 15-33, and green indicates segments with a Priority Number between 34 and 99. Segments identified for major or minor rehabilitation are concentrated in Monterey County between the merger with SR 156 West and the Monterey/San Luis Obispo County border, with a notable exception adjacent to King City. There also is a concentration of high-priority segments from Santa Barbara to the Santa Barbara/Ventura County line. This is roughly correlated with the truck traffic levels along U.S. 101. The lowest Priority Number of "1" was found in three locations: 1) just east of Santa Barbara, 2) an approximately three-mile stretch just north of San Miguel, and 3) sections in Monterey County south of SR 198 and within the City of Salinas.

The remaining state highways in the study region account for approximately 1,064 center-lane miles, of which 32 percent are listed with Priority Numbers between 1 and 14. A further 32 percent have Priority Numbers between 15 and 33, and the remaining miles have Priority Numbers of 34 or more. SR 41 and 58 in San Luis Obispo County, SR 146 and 25 in Monterey County, SR 156 in San Benito County, SR 9 in Santa Cruz County, and SR 135 and 192 in Santa Barbara County contain a large number of segments with Priority Numbers lower than 14.

Note that bridges are excluded from this scoring and are rated using the bridge sufficiency rating discussed previously.

²⁴ An MSL-1 rating makes it more likely that a road's Priority Number will be closer to 1, indicating it is more in need of rehabilitation. This means major roads with a lower MSL rating will be more likely to be repaired.



Figure 3.16 2011 Pavement Conditions
San Luis Obispo and Santa Barbara Counties



Source. AMBAG.

3.2.5 Parking and Truck Routes

Truck drivers have four basic reasons for parking their trucks, which creates the need for temporary and long-term (more than 10 hour) parking:

1. To serve customers at the customer's site;
2. To stop temporarily for personal needs and/or to await instructions as to what to do next for loading and unloading;
3. For the driver to rest during the mandated rest period; and
4. At the end of the day when the truck returns to its home base.

While truck drivers strive to park in designated areas in each of these situations, lack of truck parking can cause inappropriate parking, lead to additional costs and delays. The following narrative describes several of

the situations that create the need for additional truck parking, as well as other goods movement system considerations, in Alameda County.

Parking Shortage

California operates three Statewide Roadside Rest Areas (SRRA) within the study area, two of which – Gaviota NB/SB and Camp Roberts NB/SB – are on U.S. 101. The third – Shandon – is located on SR 46 in San Luis Obispo County, east of U.S. 101. These locations mainly serve long-haul trucking needs. A 2011 report²⁵ found that the Gaviota and Camp Roberts locations were not facing current capacity issues for truck parking, and were projected to face only minor capacity constraints of between two and seven truck parking spots in the future. Total truck/bus traffic at Gaviota is approximately half of the statewide average of 26 percent. In addition, four miles north of Gaviota, an additional five to seven truck spaces are available at a Caltrans Truck Parking Area. Camp Roberts, located in southern Monterey County, also is forecasted to face minor capacity constraints in the future, though truck/bus traffic in both directions (23 percent northbound, 32 percent southbound) are significantly higher than at Gaviota. Shandon SRRA, located in rural San Luis Obispo County, does not have any current capacity constraints for truck parking, nor was there a projected constraint in the future. The study did raise the possible need for a new SRRA in the Soledad/Salinas region that would serve southbound traffic between Moss Cove – 311 miles north of Camp Roberts – and Camp Roberts SB. There also are a number of alternative stopping opportunities along the corridor at private facilities.

Unauthorized parking along U.S. 101 is another issue that has been raised consistently in the study region since the early 1990s. Interviews with the California Highway Patrol in addition to searches utilizing Google Earth identified 10 locations on or near U.S. 101 in the study region that experience unauthorized parking throughout the year. This poses a safety risk, as trucks parked on the shoulder of U.S. 101 or on ramps can limit a driver's view. These locations are spread along the corridor, with one prominent cluster just south of King City. Interviews with stakeholders also identified seasonal parking issues near shipping hubs, delivery points, and harvest areas such as agricultural coolers, warehouses, manufacturing facilities, or other freight-producing industries. Drivers lack access to amenities such as food, showers, and services at these major freight generating locations. The Salinas area was specifically cited as lacking amenities for truck drivers.

Figures 3.17 and 3.18 below identify the Statewide Roadside Rest Areas, alternative stopping opportunities, and unauthorized parking locations in the U.S. 101 corridor.

²⁵ Dornbusch Associates. Final Task 5 Report, Strategic Recommendations, Safety Roadside Rest Area Master Plan. April 2011. http://www.dot.ca.gov/hq/LandArch/srra/docs/11_Final_SRRA_Master_Plan_Report.pdf.

Figure 3.17 Rest Areas, Alternative Stopping Locations, and Unauthorized Parking
Santa Cruz, San Benito, and Monterey Counties



Source: AMBAG and Caltrans.

Figure 3.18 Rest Areas, Alternative Stopping Locations, and Unauthorized Parking
San Luis Obispo and Santa Barbara Counties



Source: AMBAG and Caltrans.

Hour of Service

Hour of Service (HOS) rules contain a number of requirements related to the amount of time operating a truck, the working day length, rest periods, and time off. The current Federal HOS rule stipulates an 11-hour daily driving limit and 14-hour work day limit. In addition, the maximum average work week for truck drivers is 70 hours (which is a decrease from the previous maximum of 82 hours). Drivers who reach the maximum 70 hours of driving within a week may resume driving if they rest for 34 consecutive hours, including at least two nights when their body clock demands sleep the most – from 1:00 to 5:00 a.m. Also, truck drivers must take a 30-minute break during the first eight hours of their shift. On December 16, 2014, an updated HOS rule was passed by congress that included more stringent regulations regarding the restart. However, this rule was suspended immediately, and thus currently has no effect.²⁶

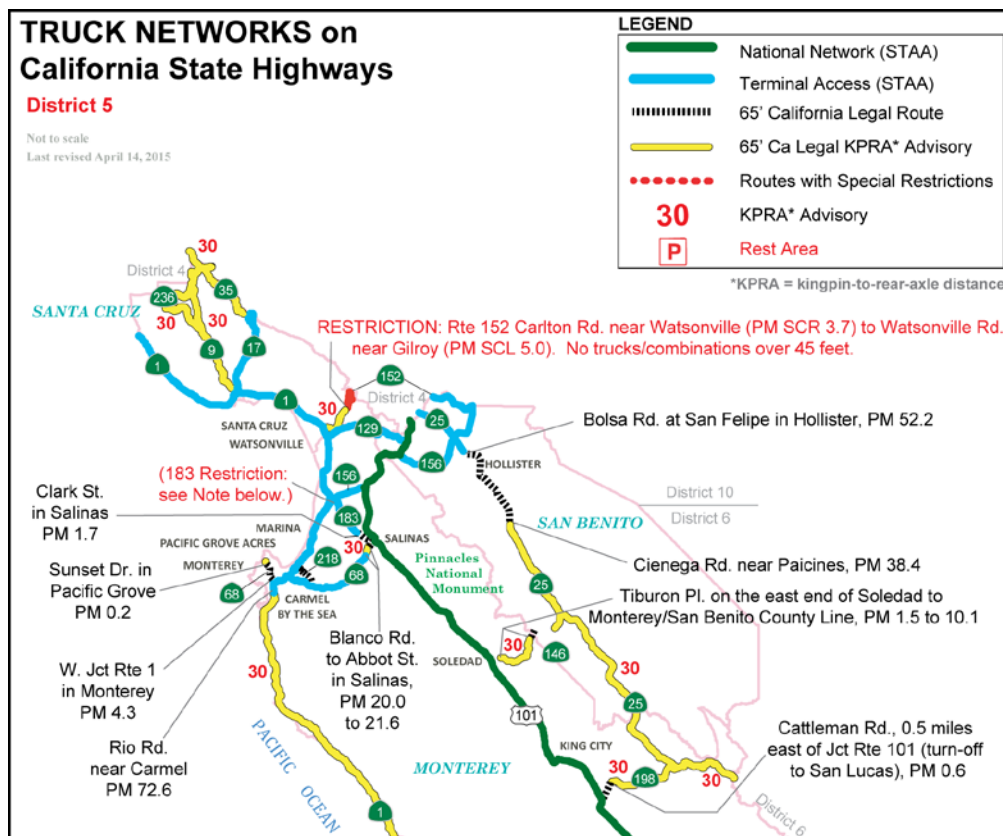
²⁶ <http://www.fmcsa.dot.gov/regulations/hours-service/hours-service-drivers>.

Based off of the current HOS rules, each of these stipulations is important to ensure the goods movement system is as safe as possible, but they also create several unintended consequences. By reducing the truck drivers' work week by 12 hours, the productivity of each truck is reduced. For companies to maintain the same level of productivity after the rule change, they will need to put more trucks with more drivers on the road. In addition, they may force the truck to stop wherever they are when the time is up, sometimes illegally. On top of that, many freight businesses are moving truck tracking to e-logs. An e-log is a small, computerized device similar to a GPS unit for a personal vehicle, that when installed in the dashboard of a transport truck, records when and where the truck goes, its speed, idle time, and even miles per gallon. E-logs track trucker hours more accurately, preventing drivers from flexing hours by falsifying logs. However, this loss of flexibility can make hours of service restrictions more onerous for drivers, requiring drivers to leave larger time and distance buffers between their final destinations due to trucking service centers which can accommodate large truck parking and hotels often being over 100 miles apart.

3.2.6 Truck Routes

Truck route maps and signage are key tools that allow drivers to adapt to congestion or incidents along their routes. It also is an important way for municipalities to direct trucks to routes that are able to accommodate them. Caltrans Traffic Operations produces a truck network map with major state routes and U.S. highways for each Caltrans District. This provides an overview for most of the major routes truckers utilize while moving through the region. Figure 3.19 below shows a small portion of that map.

Figure 3.19 California DOT District 5 Truck Networks



Source: Caltrans and Cambridge Systematics. <http://www.dot.ca.gov/hq/traffops/trucks/truckmap/truckmap-d05.pdf>.

While U.S. 101 is well-signed and a designated truck route throughout the study area, the “first- and last-mile” routes that connect U.S. 101 to origins and destinations are cause for concern. Many businesses that utilize U.S. 101 are located on local streets. Routing trucks from U.S. 101 to and from these locations in the most efficient and safest manner is critical for safety, to reduce wear on local roads, and to save time and money for carriers.

The California DOT maintains a list of municipalities by county with established truck routes. Most of the restrictions on truck operations are found in municipal codes. Table 3.2 lists these information for the counties. Communities should be encouraged to develop maps of route restrictions and utilize signage in order to make the routing more clear to drivers who may not be from the area. Communities without any regulations should work with local businesses and other stakeholders to develop similar plans.

Table 3.3 Extend of Truck Route Guidance by County

County	Monterey	San Benito	Santa Cruz	San Luis Obispo	Santa Barbara
Municipality with Truck Route Map*	None	None	None	Grover Beach	None
Municipality with Truck Routes in Municipal Codes*	Gonzales Greenfield King City Monterey		Santa Cruz County Scotts Valley	Pismo Beach San Luis Obispo	Santa Barbara County Carpinteria Guadalupe Lompoc Santa Barbara Santa Maria

Source: Local Truck Routes. California Department of Transportation. Accessed 23 March 2015. On-line at: <http://www.dot.ca.gov/hq/traffops/engineering/trucks/truckmap/local-truck-routes.htm>.

Note: 65' California Legal Only – No STAA Routes.

3.2.7 Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) can reduce congestion and increase system performance. Examples of ITS systems include closed circuit televisions, changeable message signs, ramp metering, weigh-in-motion systems, transportation management centers, and 511 information which are described in further detail below. Many of these systems were identified and described in the 2010 Central Coast ITS Implementation Plan.²⁷ However, there is still a lack of coordination between the various ITS systems, and between the municipalities and agencies that control their installation and use.

- **Closed Circuit Television Camera.** Camera's that monitor a highway's conditions are a valuable tool for improving operations. They allow responders to quickly find an incident location, and allow operations personnel to monitor weather, congestion, or other conditions of the roadway. There were 77 closed circuit television cameras along U.S. 101 in the study area in 2010 in operation, under construction, or in the design phase.

²⁷ California Department of Transportation. Central Coast ITS Implementation Plan. September 16, 2010.

- Changeable Message Signs.** These are electronic signs that are placed either permanently above the roadway, or are mobile units placed along the side of the road that can display information that can change depending on conditions. Travel times or warnings about upcoming conditions or detours are common messages. As of 2010, U.S. 101 had 10 changeable message signs (CMS) in the study area. Six were in operation, three in design, and one under construction. Figure 3.20 shows an example of such as a sign.

Figure 3.19 CMS – SBCAG U.S. 101 in Motion



- Ramp metering.** This ITS feature is essentially a stop light on a highway entrance ramp. Access to the highway is controlled, preventing large numbers of vehicles from entering and merging at the same time. This increases safety, reduces more consistent and reliable travel times, and helps smooth traffic flow on the main road. Ramp metering is already in place on sections of U.S. 101 outside of the study area. U.S. 101 in Sonoma between Petaluma and Windsor saw a 9 percent reduction in travel time after ramp metering was installed.²⁸ Metering on U.S. 101 southbound in San Mateo, California improved the average time saved over a stretch of highway by 5 minutes or 18 percent during the AM peak and 4 minutes or 13 percent during the PM peak.²⁹ This technology can improve safety and system performance on the corridor for both freight and passenger vehicles. Caltrans' Transportation Concept Report for U.S. 101 does note four locations as of August 2013 with ramp metering, as well as requirements for future ramp metering in connection with the Unikool agricultural processing facility near Salinas, but updated data from Caltrans is not available.³⁰ Figure 3.21 shows an illustration of ramp metering.
- Weigh-in-motion:** Weigh-in-motion (WIM) is a system that measures the weight of vehicles while they pass over the system at highway speeds. Information can be broken out by vehicle type (number of axles), weight, time of day, or other metrics. They also are commonly used to monitor for overweight commercial vehicles. Although present systems in use in the United States are not accurate enough to generate tickets on their own, the system is used as a screening tool. Trucks pass over the WIM station at highway speed and if they are close or over the weight limit, they can be directed to a more accurate static scale. If they are below the threshold, they can bypass the static scale, saving time and money for the drivers and reducing congestion and safety issues at the static site.³¹ In addition, collected data can be extremely useful for planning purposes even if the system is not used for enforcement. As of 2010, there were four operating WIM sites on U.S. 101 in the study region. Figure 3.22 provides an example of WIM site.

²⁸ <http://www.tam.ca.gov/Modules/ShowDocument.aspx?documentid=7955>.

²⁹ <http://www.sta.ca.gov/docManager/1000000744/%286%29%20Implementing%20Ramp%20Metering%20in%20Solano%2003-30-2011.pdf>.

³⁰ California Department of Transportation. Transportation Concept Report: U.S. 101, pages 26, 33.

³¹ Two of these sites utilize Bending Plate technology, and two utilize Piezoelectric sensor technology. For a full discussion of technology types and costs, see: David Pines and Clara Fang. *A Study of Weigh Station Technologies and Practices*. Connecticut Academy of Science and Engineering. November, 2008.

Figure 3.20 Example of Ramp Metering from FHWA

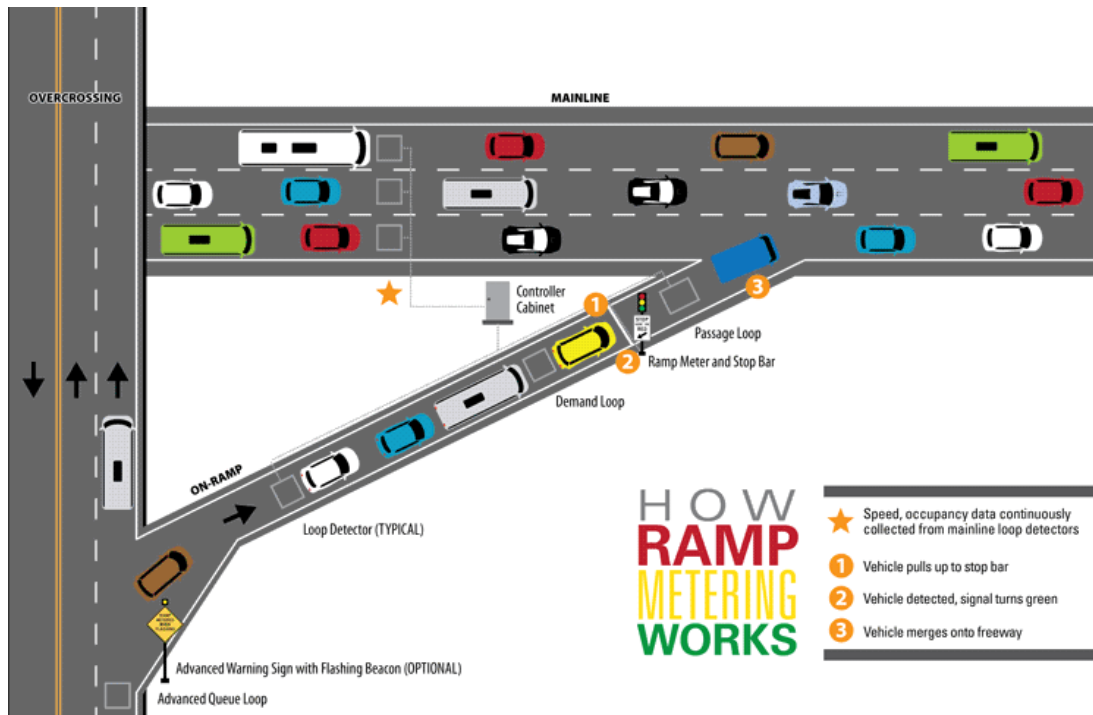
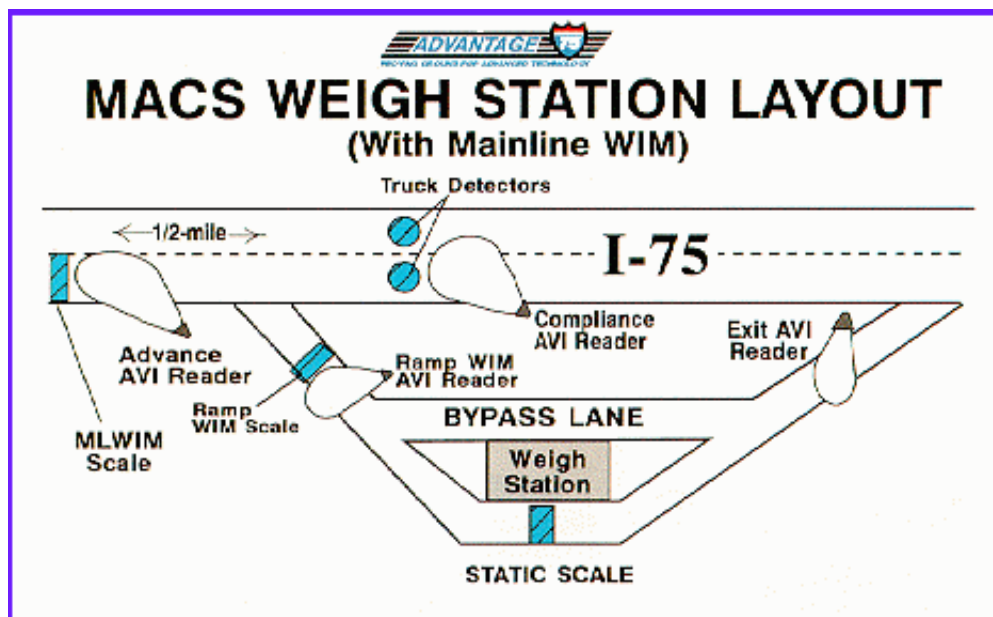


Figure 3.21 FHWA Advantage I-75 Corridor Weigh Station Layout



Source: Federal Highway Administration. <http://www.fhwa.dot.gov/publications/publicroads/95fall/p95au16.cfm>.

- **Transportation Management Centers.** Transportation management centers are physical buildings that coordinate transportation-related data collection, processing, control, and information dissemination. They monitor and coordinate the functions of ITS devices such as closed circuit televisions, traffic control devices, changeable message signs, and ramp meters. They also are the main center for directing incident management, increasing response time and decreasing resulting congestion. Caltrans District 5 in cooperation with the California Highway Patrol operates a Transportation Management Center in San Luis Obispo.
- **511.** The 511 system is a uniform way to provide travel conditions to the public. It has been implemented to some degree in most of the United States. Full 511 systems include: 1) traffic speeds, 2) travel times, 3) incident and construction delays, 4) transit schedules, routes, fares, and delays, 5) assistance finding carpool or vanpool, 6) bicycle routes and safety, and 7) telecommuting. Detailed travel, transit, and commuter information is instantly available to people calling from any area. The Central Coast lacks a complete, integrated 511 system that covers the entire U.S. 101 Corridor through the study region.³² Limited information is available through the Western States Rural Transportation Consortium's "One-Stop Shop" web site which lists travel conditions, construction and incidents, road conditions, and pictures from closed circuit television cameras.³³ An integrated, coordinated system for the entire corridor would improve transportation options and information for travelers on U.S. 101.

Figures 3.23 and 3.24 below show the locations of operating or planned changeable message signs, ramp metering, weigh-in-motion, and the Caltrans District 5 Transportation Management Center.

³² A potential model for such a 511 system is in operation in the Los Angeles, San Diego, and Inland Empire region of California. See: <http://www.ie511.org/traffic>.

³³ One Stop Shop for Travelers. Western States Rural Transportation Consortium. Accessed March 10, 2015. On-line at: <http://oss.weathershare.org/>.

Figure 3.22 Locations of ITS Technologies along U.S. 101
Santa Cruz, San Benito, and Monterey Counties



Source: Caltrans.

Figure 3.23 Locations of ITS Technologies along U.S. 101
San Luis Obispo and Santa Barbara Counties



Source: Caltrans.

3.3 Environmental/Quality of Life Concerns

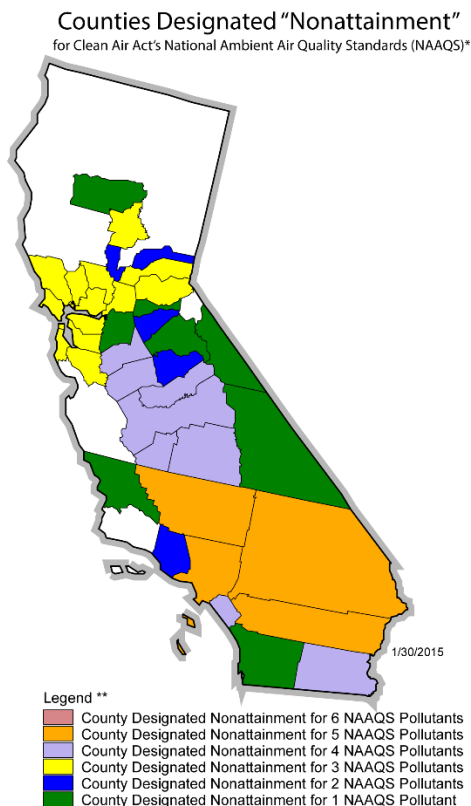
While residents and businesses rely on goods movement to provide their day-to-day needs, this freight activity sometimes leads to unintended impacts that should be mitigated. California's air quality standards are the most stringent and health-protective in the nation, and are designed to provide additional protection for those segments of the population who are most sensitive to the effects of air pollution.

The study region is comprised of three California Air Quality Management Districts (AQMD), also called air districts. Monterey Bay Air Resources District consists of Monterey County, San Benito County, and Santa Cruz County. San Luis Obispo and Santa Barbara are their own separate air districts. The California

Environmental Protection Agency Air Resources Board has primary responsibility for controlling air pollution from stationary sources, but also collect data from mobile sources, including trucks.³⁴

In terms of overall air contamination levels, as Figure 3.25 below indicates, the study region's air quality is generally very good. Only San Luis Obispo County is designated as a nonattainment area for 8-Hour Ozone.³⁵

Figure 3.24 Counties Designated “Nonattainment”



Guam - Piti and Tanguisson Counties are designated nonattainment for the SO₂ NAAQS

* The National Ambient Air Quality Standards (NAAQS) are health standards for Carbon Monoxide, Lead (1978 and 2008), Nitrogen Dioxide, 8-hour Ozone (1997 and 2008), Particulate Matter (PM-10 and PM-2.5 (1997 and 2006)), and Sulfur Dioxide (1971 and 2010)

** Included in the counts are counties designated for NAAQS and revised NAAQS pollutants. 1-hour Ozone is excluded. Partial counties, those with part of the county designated nonattainment and part attainment, are shown as full counties on the map.

Source: U.S. EPA. <http://www.epa.gov/oaqps001/greenbk/map/mapnpoll.pdf>.

3.3.1 Particulate Matter <2.5 Emissions

However, we should look at particulate matter (PM) pollution more closely, as a significant portion of PM_{2.5} pollution³⁶ comes from freight. Table 3.3 below illustrates the tons of Particulate Matter (less than 2.5

³⁴ Totals below exclude trucks explicitly listed as “passenger.”

³⁵ County is “Marginal.” *Current Nonattainment Counties for All Criteria Pollutants*. U.S. EPA. On-line at: <http://www.epa.gov/airquality/greenbook/ancl.html> Current as of January 31, 2015.

³⁶ PM_{2.5} is fine particulate matter and is believed to cause more significant health risk than PM₁₀ (larger).

microns) produced per day by trucks in the three AQMDs and compares it to all mobile sources and all sources in each air district.

Trucks produce less than five percent of all PM <2.5 in the study region and account for 15 percent of emissions from mobile sources. Of the three air district, truck traffic in the Monterey Bay Air Resources District accounts for the highest percent of emissions from mobile sources (9.3 percent) and from all sources (5.2 percent). Just under a ton of Particulate Matter <2.5 is produced per day throughout the five county study area.

Table 3.4 Particulate Matter < 2.5 Microns Emissions (2012)

Air Quality Management District	Tons	Percent Emissions by Trucks	Percent All Sources
Monterey Bay Air Resources District	.6096	9.3%	5.2%
San Luis Obispo	.1465	2.2%	3.1%
Santa Barbara	.2296	3.5%	3.9%
Total	.9857	15.0%	4.4%

Source: California Environmental Protection Agency Air Quality Board. Emissions by California Air District. Retrieved March 27, 2015.

3.3.2 Particulate Matter <10 Emissions

Table 3.4 below illustrates the tons of Particulate Matter (PM) <10 (less than 10 microns) produced per day by trucks in the three AQMDs and compares it to all mobile sources and all sources in each air district. Trucks are responsible for 2.4 percent of the PM <10 produced in the five-county region but produce more than 21 percent of the emissions from mobile sources. Trucks in the Monterey Bay Unified APCD produce the most absolute tons and highest percent of PM <10 from mobile sources, but trucks in Santa Barbara AMQD produce 2.9 percent of all PM <10 in the County – the highest of any air district.

Table 3.5 Particulate Matter <10 Microns Emissions (2012)

Air Quality Management District	Tons	Percent Emissions by Trucks	Percent All Sources
Monterey Bay Air Resources District	1.0293	12.5%	2.3%
San Luis Obispo	.2815	3.4%	1.9%
Santa Barbara	.445	5.4%	2.9%
Total	1.7558	21.3%	2.4%

Source: California Environmental Protection Agency Air Quality Board. Emissions by California Air District. Retrieved March 27, 2015.

3.3.3 Greenhouse Gas (CO₂ and N₂O) Emissions

Table 3.5 below illustrates the combined tons of Carbon Dioxide and Nitrous Oxide produced per day by trucks in the three AQMDs. Trucks produce a total of 160 tons of CO₂ and N₂O daily in the five counties and

account for 27.6 percent of all greenhouse gas produced in the study area. Trucks in the Monterey Bay Air Resources District produced 18.2 percent of the emissions from all mobile sources, and 32.7 percent of all emissions in the air district – the most from the three Air Pollution Control Districts.

Table 3.6 CO₂ and N₂O Emissions (2012)

Air Quality Management District	Combined Tons	Percent Emissions by Trucks	Percent All Sources
Monterey Bay Air Resources	89.0208	18.2%	32.7%
San Luis Obispo	26.8364	5.5%	27.3%
Santa Barbara	44.0236	9.0%	21.1%
Total	159.8808	32.7%	27.6%

Source: California Environmental Protection Agency Air Quality Board. Emissions by California Air District. Retrieved March 27, 2015.

Total emissions from the Monterey Bay Air Resources District are significantly higher than the other two APCD when measured by both absolute amounts and by percent of all emitting sources, with the exception of PM <10 when measured versus all sources where Santa Barbara APCD is the highest. The fact that the APCD includes three counties explains the higher absolute values, but does not provide an explanation of why the percentages are higher.

3.3.4 Clean Fuel Technology

California is a leader in the adoption of clean fuel technology, including electric and natural gas fueled vehicles. California is home to nearly half of the nation's plug-in electric vehicles (PEV).³⁷ An additional 33,000 vehicles are fueled with compressed natural gas or liquefied natural gas (LNG).³⁸ The number of vehicles utilizing alternative fuels helps drive and is driven by the availability of charging and fueling infrastructure. One of the main constraints stopping commercial truck fleets from changing to alternative fuel sources is the lack of infrastructure. Trucks that do not move on a set route and do not return to a home base every night are more affected by this.³⁹ More reliable sources of fuel will help reduce one of the concerns about switching to alternate vehicles. The U.S. Department of Energy's Alternative Fuels Data Center lists 78 alternative fuel stations on or within five miles of U.S. 101 between the San Benito/Santa Clara County line and the Santa Barbara/Ventura County border.⁴⁰ Of these, 71 are electric charging stations, four are compressed natural gas, two are biodiesel, and one is liquefied natural gas. Electric powered freight trucks have not become a viable technology yet due to limited range and rapid battery depletion when transporting heavy loads. Meanwhile, more viable freight fuel sources such as LNG are no longer being championed by the State or Federal government, so fueling station growth for these alternatives has stalled. Ownership is

³⁷ "California a Leader in Electric Vehicle Adoption." *Pure Green Cars*. December 11, 2014. Online at: <http://puregreencars.com/Green-Cars-News/markets-finance/california-a-leader-in-electric-vehicle-adoption.html>.

³⁸ California Energy Commission. "Natural Gas and Liquefied Natural Gas for Transportation in California. 2015. Accessed 21 March 2015. Online at: <http://energyalmanac.ca.gov/transportation/cng-lng.html>.

³⁹ Stakeholder Interviews, FAST Meeting 3/10/15.

⁴⁰ This total does not include propane stations.

mixed between public entities such as Santa Barbara County and Hartnell College and private entities such as hotels or banks. These locations are shown in Figures 3.26 and 3.27 below.⁴¹

Figure 3.25 Alternative Fuel Locations along U.S. 101
Santa Cruz, San Benito, and Monterey Counties



Source: U.S. Department of Energy Alternative Fuels Data Center.

⁴¹ http://www.afdc.energy.gov/locator/stations/route/results?utf8=%E2%9C%93&start=san+juan+bautista&end=carpinteria&fuel=all&private=false&planned=false&owner=all&payment=all&radius_miles=5. Map does not show route along U.S. 101 near Buelton, CA which was calculated separately and added.

Figure 3.26 Alternative Fuel Locations along U.S. 101
San Luis Obispo and Santa Barbara Counties



Source: U.S. Department of Energy Alternative Fuels Data Center.

While the above information is a valuable measure of alternative fuels infrastructure, it does not provide details about system use. The number of trucks utilizing alternative fuel currently is unavailable, as are counts of electric or natural gas commercial vehicles registered in the study area.

3.4 Additional Needs

There are a number of issues that are not specifically addressed in the performance measures matrix. These issues cut across a number of topic areas, and so are difficult to measure with a single performance measure. However, they are crucial components to evaluating and improving the flow of traffic along U.S. 101 both currently and in the future.

3.4.1 Truck Driver Shortage

The shifting labor market also has a direct impact on logistics. The American Trucking Association (ATA) estimates that in 2014, there was a shortfall of 35,000 drivers in the industry. That number is projected to rise

to 240,000 by 2020 if conditions remain the same.⁴² The lack of qualified drivers constrains total truck fleet capacity even as market conditions have rebounded. It also is a contributing factor to higher transportation prices. Without surplus capacity at a trucking company, any increase in shipment volume must be met by hiring through the trucking spot market. Hiring a carrier for a single load can increase rates by up to 30 percent than if the delivery was handled by a regular, contracted driver.

Government regulation, in the form of tighter Hours-of-Service (HOS) regulations also decreases the capacity of the truck fleet. Stricter reporting requirements, including the introduction of electronic logs, combined with rest mandates and reduced total hours may cause some drivers to leave the profession, while limiting the productivity of those that remain.⁴³ Reporting commercial vehicle operator employment or licenses in the study region is one way to track this issue.

3.4.2 Improved Data Collection on Freight Movement

An important observation gleaned from this study is the need for more specific truck data. Caltrans' Truck Counts are the only reliable source of information for truck movements in the study region, and they do not contain the detail needed to fully understand the movements of goods. Two areas of need stand out:

- Regular surveys of freight movement on intersecting truck routes that go to/from Interstate 5; and
- Data collection on seasonality trends. Qualitative observations and assumptions that there is a heavy seasonal shift in driver pattern and quantity.

Efforts was made in this report to better understand origin/destination patterns as well as seasonality trends and should provide a beginning point to start understanding these two needs.

⁴² Reuters. "Driver shortage makes capitalizing on low oil hard for truckers." February 6, 2015.
<http://www.reuters.com/article/2015/02/06/usa-truckers-railways-idUSL1N0VF1ZY20150206>.

⁴³ Fleetowner. "HOS rules kick in, driving up fears of capacity crunch." July 1, 2013.
<http://fleetowner.com/regulations/hos-rules-kick-driving-fears-capacity-crunch>.



STRATEGIES WORKING PAPER

U.S. 101 Central Coast California Freight Strategy

Appendix F. Strategies Recommendation

working paper

prepared for

AMBAG

prepared by

Cambridge Systematics, Inc.

working paper

U.S. 101 Central Coast California Freight Strategy

Appendix F. Strategies Recommendation

prepared for

AMBAG

prepared by

Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

date

December 2015

Table of Contents

1.0	Introduction	1
2.0	Summary of Needs.....	1
3.0	Methodology for Project Prioritization.....	5
4.0	Priority Projects.....	6
5.0	Programs and Other Recommendations	10
5.1	Intelligent Transportation System Program	10
	Changeable Electronic Message Sign (CMS)	10
	Closed-Circuit Television Cameras	10
	Ramp Metering Program.....	10
5.2	Grade Crossing Improvement Program	11
	Freight Parking Program.....	11
5.3	Truck Route Signage Improvement Program	12
5.4	Early Environmental Impact Report for Freight Industrial Zones.....	13
Appendix A.....		14

List of Tables

Table 2.1 Current Conditions for the U.S. 101 Corridor2

Table 4.1 U.S. 101 Priority Projects by County7

Table 5.1 ITS Technology Costs (2007 Estimate).....11

1.0 Introduction

This memorandum recommends strategies that can be used to address the needs along the U.S. 101 corridor in the Central Coast. Strategies can include both projects and programs. More than 100 strategies were initially identified as possibly benefitting freight movement on U.S. 101. Through a process of ranking, the final list reflects 20 high priority projects and several high priority programs for the five counties along the California Central Coast. The remainder of this memorandum is broken into four sections:

- Section 2.0 is a summary of needs identified in a prior task;
- Section 3.0 is a description of input received from stakeholders during public outreach;
- Section 4.0 highlights the methodology used to screen and rank strategies;
- Section 5.0 introduces the priority projects for the U.S. 101 study area; and
- Section 6.0 discusses the programs for the U.S. 101 study area.

2.0 Summary of Needs

The analysis conducted in the Existing Conditions memorandum helped identify initial needs and issues in the corridor. That quantitative analysis examined current conditions using twelve metrics to determine the corridor's performance in terms of three broad goals:

- Support economic development;
- Provide an efficient, reliable, well-maintained and safe goods movement facility; and
- Reduce and mitigate impacts from goods movement operations.

Table 2.1 below shows the goals, measures and performance metrics used to determine the corridor's condition, the current rating, and an explanation of that rating. Two metrics, tons of PM_{2.5}, PM₁₀, CO₂/N₂O and rail vehicle crashes at at-grade rail crossings, were determined to not be major issues in the study area. Two metrics, freight access/east-west connectivity and parking availability, were determined to be serious issues with poor current conditions. The other eight metrics were all rated as moderate needs.

Table 2.1 Current Conditions for the U.S. 101 Corridor

Goals	Measure(s)	Metric(s)	Current Condition Rating	Ratings Explanation
Support economic development	Access and Multimodal Connectivity	Freight routes access from/to locations with significant freight activities; east-west connection to parallel roadways; roadway/rail connectivity		Limited east-west connectivity to parallel routes leading to key freight markets was mentioned by several studies and stakeholders. Poor road infrastructure and travel conditions exist along East-West routes SR 156, SR 41, SR 46 and SR 166. Rail freight faces several challenges including a lack of truck to rail facilities, limited use, and limited capacity.
Provide an efficient, reliable, well-maintained and safe goods movement facility	Travel-time delay on truck routes – Recurrent and Seasonal	Truck delay/Travel Time Delay (TTD)		Truck delay is a moderate problem in the area, and is most significant in East Santa Barbara County to Ventura County line, North of Salinas, and between San Luis Obispo and Santa Maria. Given seasonal variations, during summer the delays can be worse due to peak harvest and tourist season. Weekend delays during peak tourist seasons can be as bad as weekday delay.
	Travel-Time Reliability	Planning time index/Travel Time Reliability (TTR)		Reliability is a moderate problem in the region. During the AM and PM peak, reliability is poorest along northbound U.S. 101 from Salinas to the Santa Clara County boundary, from the City of San Luis Obispo to Santa Maria, and in Eastern Santa Barbara to the Ventura County line.
	Freight-Related Crashes	Truck-involved crashes and crash rate		Intersection collisions are more severe than other types of collisions, and occur at uncontrolled intersections. Highway at-grade crossings are a safety concern along the corridor. Top crash areas include U.S. 101 at 156, U.S. 101 between SR 41, and SR 227, and U.S. 101 between SR 1 and SR 154.
		Rail Vehicle crashes at at-grade rail crossings		Safety at at-grade rail crossing is not a major issue in the study area.
	Freight Infrastructure Conditions	Bridge conditions rating		Bridge conditions along U.S. 101 are generally sufficient. However bridge conditions on intersecting and parallel routes, including SR 1,

Goals	Measure(s)	Metric(s)	Current Condition Rating	Ratings Explanation
Reduce and mitigate impacts from goods movement operations	Trucking Parking	Pavement condition rating		show a large number of structurally deficient and functionally obsolete structures with the worst rated bridges in Monterey and Santa Cruz County. Segments identified for major or minor rehabilitation are concentrated in Monterey County between the Monterey/San Luis Obispo County border and the SR 156 interchange in Prunedale. There is also a concentration of high-priority segments from Santa Barbara to the Santa Barbara/Ventura County line.
		Number of parking spaces needed along corridor		Lack of truck parking has been an issue on the corridor for decades, especially for long-haul truckers who are subject to challenging Federal hours of service restrictions which require frequent rest periods. In addition, parking for deliveries and pickup is also inadequate.
		Extent of Truck Routes Network		While U.S. 101 is well-signed and a designated truck route throughout the study area, the “first- and last-mile” routes that connect U.S. 101 to origins and destinations are often not designated as truck routes.
		Degree of Implementation of ITS technologies		There is no single coordinated ITS system on U.S. 101, though there is some limited ITS technologies such as ramp metering.
	Emissions and Air Quality	Tons of PM _{2.5} , PM ₁₀ , and CO ₂ /N ₂ O emissions from trucks.		Air quality in the region is generally good. Trucks produces less than 5 percent of PM _{2.5} pollution, and about 2.4 percent of PM ₁₀ pollution.
	Use of Clean Fuel Technologies	Use of Clean Fuel Technologies		Clean fuel technologies which are more appropriate for goods movement such as LNG are not currently being championed by the state. Lack of infrastructure also hinders clean fuel technology use.

 Good Conditions  Fair Conditions  Poor Conditions.

Extensive stakeholder outreach was used to validate the analysis in this report and determine if there were any topics unaccounted for. Overall, comments mirrored the needs identified during the quantitative analysis and gave the project team additional locally-based information on each issue. Specific comments included:

- The majority of north-south truck movement utilizing U.S. 101 in San Luis Obispo is heading to/from east-west routes to I-5 which connects to major ports, and the larger state and national highway system. The U.S. 101 corridor has few origin/final destination pairs that are both on the route.
- SR 46E should be the primary freight east-west freight corridor from San Luis Obispo County to I-5 and other major markets to the East. SR 41 is not suitable for heavy truck use due to poor terrain. Lack of passing lanes is a concern on most east-west routes.
- The interchange at U.S. 101 and SR 46E is a heavily congested area.
- There is a need for improved wayfinding signage and truck route identification along the U.S. 101 corridor.
- U.S. 101 is a critical alternative to I-5 during closures due to seasonal fires, mud slides, accidents, or more significant events such as earthquakes. It is also a strategic defense route for vehicles going to/from Vandenberg AFB. For these reasons, U.S. 101 needs to be a priority route for the state.
- At-grade intersections and other non-controlled access are a safety issue along the route because traffic entering and existing the highway may have to cross oncoming traffic.
- There are safety concerns about oil transportation by rail lines parallel to U.S. 101. This is a particular concern in southern Monterey and northern San Luis Obispo Counties where there are high-hazard areas with limited coverage from certified Hazardous Materials Teams.¹
- SR 156 near Alameda Road needs to be widened and access control implemented to address congestion, mobility, and quality of life issues.
- There are a high number of truck crashes on U.S. 101 between King City and Soledad. Between 2010 and 2012 there were 10 truck related incidents on this stretch of U.S. 101 resulting in two fatalities and thirteen injuries.
- There is a lack of alternative fueling stations on the southbound side of U.S. 101. Opportunities to expand the pipeline system in the areas should be explored to promote biodiesel and other alternative energy options in the corridor.
- There is a need for additional communication through ITS to better inform the public and truck drivers about periodic closures of U.S. 101, SR 129, SR 156 and SR 68.
- SR 129 from Watsonville to U.S. 101 is congested, especially at Watsonville.
- There is a lack of center dividers in medians along highway portions of U.S. 101 in San Luis Obispo County.

¹ California Office of Emergency Services. *Updated Gap Analysis for Rail in California*. March 13, 2015.

- Safety issues on SR 198. This route is generally seen as dangerous by stakeholders, though there was only a single incident involving a commercial vehicle on the route between 2010 and 2012.
- As a short-term issue in 2016-18, construction work on the California Flats Solar Project near SR 41 and 46 junctions in Cholame is expected to last two years and employ around 800 people, greatly increasing truck and construction vehicle traffic on these routes.
- There is a need for better incident management on I-5. In cases of incidents, trucks are diverting to U.S. 101, increasing congestion and truck VMT.

These comments were addressed with projects and program recommendations in this report as feasible.

3.0 Methodology for Project Prioritization

Over 100 projects were initially recommended along the Central California Coast that addressed multiple modes, routes, and needs and concerns. That list has been refined to a final set of 20 that represents the highest priority freight projects along the Central California Coast that can meet the project goals of supporting economic development, providing efficient, reliable, safe and well-maintained transportation assets, and reducing and mitigating impacts from goods movement.

Project prioritization started with an initial list of all potential projects that addressed goods movement needs. The project team collected the initial list of projects from the MPOs and RTPAs in the study area, the California Freight and Mobility Plan, freight industry representatives, the public, and other stakeholders. This initial list included over 100 major and minor projects impacting a number of different freight routes and modes in the study region.

This list was then edited to remove projects that would not accomplish the project goals. For example, landscaping projects that would not impact goods movement or projects on routes that have limited connectivity to U.S. 101 (SR 1 for example) were removed. Other projects, such as railroad siding projects which were identified at the county level and projects on consecutive road segments were combined whenever possible.

This process produced a refined list of 57 projects that could improve current conditions and help meet the goals of the plan (Appendix A). In order to provide a comparison between the projects, a numerical score was given based on four key criteria.

- A. The first score is based on the overall importance of the need, as determined by the *current condition* identified in the existing conditions section of this plan. To better prioritize conditions that need immediate attention, projects that address a corridor condition rated as poor received a higher score, while projects that address a corridor condition rated as good received a lower score. Projects that address a condition rated as poor (red) received an “H” high rating, those that address moderate needs (yellow) received a “M” medium rating, and those addressing low priority needs and issues (green) received a “L” low rating.
- B. The degree to which a project meets the goal of *supporting economic development*. For example, projects on east-west connecting routes from U.S. 101 to I-5, or which improve access to industry origins and destinations scored well in this category. Projects which promote multimodal freight shipping or

improve rail-road connectivity also score highly. These types of projects promote the economy by providing access and connectivity in the freight system.

- C. The degree to which a project meets the goal of *providing an efficient, reliable, well-maintained and safe goods movement facility*. For example, projects that can reduce travel-time delay and improve travel-time reliability on segments of U.S. 101 with poor ratings received high scores in this category. Projects that address truck parking also scored well here, as legal and safe parking is a key need.
- D. The degree to which the project meets the project goal of *reducing and mitigating impacts from goods movement operations*. For example, projects that promote the use of clean fuel technology or reduce truck emissions scored well.

Rankings for the above goals are based on project descriptions and the specific needs identified in the previous memoranda. For example, a freeway conversion in an area with high truck travel time delay (TTD) and a high planning time index which indicates a low travel time reliability (TTR) would get an “H” under the mobility goal. If there is no serious delay in that segment, it would get an “M” rating. Letter grades from these three goal areas were then converted to numeric scores (H=3, M=2, L=1) to calculate an overall score.

The top twenty projects in the region were compiled in the priority list of projects in the next section. In cases of a tie in composite score, projects that best emphasize freight issues were selected for inclusion in this list. For example, a project to expand truck parking facilities throughout the corridor would be included over a project that improved a single interchange since the interchange project is beneficial to freight traffic in one specific location, while the truck parking project would be specific to freight movement and would result in system-wide benefits for freight.

4.0 Priority Projects

Table 4.1 lists the top projects in each county based on a composite score.

Table 4.1 U.S. 101 Priority Projects by County

No.	County	Route or Facility	Project Description	Explicitly Freight?	Composite Score	Measure Addressed	Ratings Explanation
1	Monterey	SR 156	Add capacity and control access from Castroville Boulevard to U.S. 101. Convert to freeway and widen to four lanes. Two phases.	N	10	Access/Mobility, TTD, TTR, Potential Safety Improvement	Connecting route between 101 and SR 1. Congestion issues as described by stakeholders, intersection with 101 rated as one of the worst in the region.
2	Monterey	Hwy 101	U.S. 101 at Sanborn Rd (Salinas) Operational Improvements: modify southbound off-ramps to address truck congestion	N	8	TTD, TTR	Reliability and delay issues in segment. Stakeholders note congestion issues in Salinas.
3	Monterey	Hwy 101	U.S. 101 from Harris Rd to Russell Rd/ Espinosa Rd (north Salinas). Operational Improvements: modify interchanges; ramp metering	N	8	TTD, TTR,	Reliability and delay issues in segment. Stakeholders note congestion issues in Salinas.
4	San Benito	SR 152	New alignment of SR 152 between 101 and the Merced County line, including changes in Santa Clara County, and adding an eastbound truck climbing lane over Pacheco Pass	N	10	Access/Mobility, TTD, TTR, Potential Safety Improvement	Main east-west connection U.S. 101 to I-5. E-W connectivity mentioned by stakeholders to be very important.
5	San Benito	SR 25	New four-lane highway from San Felipe Road in Hollister to Hudner Lane North of SR 156, 3.8 miles total	N	10	Access/Mobility, TTD, TTR	Connection between U.S. 101 and SR 156.
6	San Benito	SR 156	Add capacity and control access from Alameda St to San Benito River Bridge. Widen to 4 lanes.	N	8	Access/Mobility, TTD, TTR	Project is currently fully funded, and will help ease congestion.
7	San Luis Obispo	Santa Maria Valley Railroad	Reactivate train yard in San Luis Obispo	Y	11	Access and Multimodal Connectivity	Shifting a portion of goods movement from truck to rail improves traffic conditions for freight and regular traffic on the highway system.

No.	County	Route or Facility	Project Description	Explicitly Freight?	Composite Score	Measure Addressed	Ratings Explanation
8	San Luis Obispo/Santa Barbara	SR 166	Operational improvements: new passing lanes	Y	10	Access/Mobility, TTD, TTR, Potential Safety Improvement	Improves east-west connections between U.S. 101 and I-5, improving freight access to and from Santa Maria Valley and surrounding agricultural areas, and facilitating improved freight access to major markets.
9	San Luis Obispo	SR 46	Fix low clearance issue for large freight trucks at overpasses	Y	10	Access and Multimodal Connectivity	Some railroad and highway overpasses create low clearance hazards for wide/heavy loads.
10	San Luis Obispo	Hwy 101	SR 46 East interchange Northbound off-ramp	N	9	Access/Mobility, TTD, TTR	Moderate travel time volatility in this section due to congestion. Stakeholders note high congestion and safety issues at interchange.
11	San Luis Obispo	SR 46	SR 46 Shandon to Kern County. Add Capacity: widen to 4 Lanes; expressway conversion; modify intersection to address congestion and truck mobility	N	9	Access/Mobility, TTD, TTR	Improves main east-west connection U.S. 101 to I-5.
12	San Luis Obispo	SR 46	SR 46 from Shandon Rest Area to 41/46 Wye. Operational Improvements: new interchange to improve corridor and truck mobility	N	9	Access/Mobility, TTD, TTR	Improves main east-west connection U.S. 101 to I-5.
13	San Luis Obispo	Hwy 101	Interchange Improvements on Southbound/Northbound ramps at SR 166 and Thompson Ave intersection	N	8	Access/Mobility, TTD, TTR	Improve poor reliability in section north of interchange.
14	San Luis Obispo	Hwy 101	Operational Improvements: new SB climbing lane on U.S. 101 from Brisco Rd/Halcyon Rd to Oak Park Blvd	Y	8	TTD, TTR	Improves poor reliability and delay in both AM and PM Peak along this segment (south of Pismo Beach).
15	Santa Barbara	Union Pacific	Construct new rail sidings throughout the rail line in Santa Barbara County. Ortega siding six miles south of Santa Barbara Train Station and other sidings	Y	9	Access and Multimodal Connectivity	Providing additional rail sidings to allow for additional capacity and reduced delays for rail freight.

No.	County	Route or Facility	Project Description	Explicitly Freight?	Composite Score	Measure Addressed	Ratings Explanation
16	Santa Barbara	U.S. 101	Relocate and expand Gaviota roadside rest areas Northbound and Southbound to better accommodate freight truck parking	Y	8	Truck Parking	Need for additional truck parking for long-haul truckers.
17	Santa Barbara	U.S. 101	U.S. 101 from Carpinteria to Santa Barbara: add high-occupancy vehicle lanes to reduce commuter and truck congestion; modify interchange at Hot Springs Road/Cabrillo Boulevard and North Jameson Lane and U.S. 101	N	8	TTD, TTR, Potential Safety Improvement	Addresses poor reliability, delay, and high crash rates along this segment.
18	Santa Barbara	SR 166	Add Capacity & Access Control on SR 166 from Guadalupe to Santa Maria: Widen to four lanes to reduce congestion and improve truck mobility	N	8	Access/Mobility, TTD, TTR, Adoption of Advanced Technology, Potential Safety Improvement	This is a top priority connection mentioned by stakeholders as this area is a key origin, destination, and staging area for truck freight in the San Luis Obispo/Santa Barbara Counties area.
19	Santa Cruz	Iowa Pacific	Construct transload facility at Watsonville to facilitate truck loading onto rail, increase rail shipping, and reduce truck traffic on roadways	Y	10	Access and Multimodal Connectivity	Accessibility to rail was mentioned as important by stakeholders
20	Santa Cruz	Union Pacific	Upgrade rail to Federal Rail Administration Class 2 rail, allowing freight train speeds of up to 25 MPH on sections of rail throughout Santa Cruz County	Y	8	Access and Multimodal Connectivity	Rail mobility is mentioned as important for stakeholders

Source: Individual sources for projects are identified in the Table in the Appendix (Section 5). TTD = Travel Time Delay; TTR = Travel Time Reliability.

5.0 Programs and Other Recommendations

While it is important for the plan to identify specific projects to fund, many other needs cannot be addressed with a specific project but is still worthy to prioritize. In those instances, a program is needed to address the particular issue. This plan prioritizes the development of these programs to facilitate seeking funding as appropriate.

5.1 Intelligent Transportation System Program

This program would implement projects developed in the Central Coast ITS System Plan as identified and discussed below. Cost estimates for each system are taken from the *Central Coast ITS Implementation Plan* which was finalized in 2007.²

Changeable Electronic Message Sign (CMS)

This program would seek to add additional electronic changeable message signs along U.S. 101 and key east-west routes, including State Routes 198, 46, 41, 58, and 156. Signage would provide information related to congestion, scheduled road work, detours, safety, and recommended truck routes, in addition to information for regular traffic. Signs will be integrated with Caltrans District 5 Traffic Management Center. Signs can either be placed permanently above the roadway or as mobile units placed along the side of the highway. Caltrans' QuickMap website, which provides real-time traffic data online, does not indicate any operating CMS on the U.S. 101 Corridor or the key State Routes identified above.³

Closed-Circuit Television Cameras

Closely linked with the need for CMS is the addition of CCTV monitoring cameras along U.S. 101 and key east-west intersecting routes to fill gaps in the existing CCTV network. Cameras allow responders to quickly find an incident location and operations personnel to monitor weather, congestion, or other conditions of the roadway and transmit that information to changeable message signs or public alert systems. There is a significant gap in CCTV coverage on U.S. 101 between Paso Robles and Salinas, a similar gap between Santa Barbara and Santa Maria, and no coverage on the key east-west State Routes that link U.S. 101 and I-5. All project components will integrate into the Caltrans QuickMap website which provides real-time access to CCTV and electronic message sign information.

Ramp Metering Program

This ITS feature is essentially a stop light on a highway entrance ramp which controls vehicle entry onto the highway at a slower rate in order to maintain the flow of existing highway traffic and prevent bottlenecks. This increases safety, produces more consistent and reliable travel times, and helps smooth traffic flow on the main road for all vehicles. This program would implement a ramp meter program on U.S.101 and key east-west routes including 198, 46, 41, 58, and 156, emphasizing onramps particularly congested during peak

² Association of Monterey Bay Area Governments & CCITS Coordinating Group. *Central Coast ITS Implementation Plan*. Fall 2007. Online at: http://local.iteris.com/ccits-admin/assets/CCITS_Imp_Plan_complete_2.pdf.

³ <http://quickmap.dot.ca.gov/>.

harvest season times. This program would relieve harvest season agricultural related shipping peaks and improve the efficiency and safety of the U.S. 101 Corridor.

Costs for the technology described above are identified in Table 5.1 below.

Table 5.1 ITS Technology Costs (2007 Estimate)

Technology	Capital Cost (per Unit)	Additional Costs ^a	Total Cost	Operations and Maintenance
Closed Circuit Television Camera	\$46,000	\$23,000	\$69,000	\$4,600
Ramp Metering	\$63,250	\$31,625	\$94,875	\$6,325
Changeable Message Signs (Fixed)	\$230,000	\$115,000	\$345,000	\$23,000
Changeable Message Signs (Portable)	\$149,500	\$75,000	\$224,250	\$14,950

Source: http://local.iteris.com/ccits-admin/assets/CCITS_Imp_Plan_complete_2.pdf.

^a Additional costs include Project Admin (10 percent), Reqs and Design (15 percent), Installation and Integration (15 percent), and Testing and Evaluation (10 percent).

5.2 Grade Crossing Improvement Program

The goal of this program would be to improve at-grade highway interchanges and intersections. Highway interchanges and at-grade intersections are one of the largest safety concerns in the U.S. 101 Corridor. Highway interchanges, especially with SR 156 and SR 41/46 are some of the most congested locations on U.S. 101, and increased congestion typically results in increased potential for collisions. Between 2010 and 2012, U.S. 101 and SR 156 in Monterey and San Benito Counties saw 20 incidents involving trucks that claimed two lives and injured 30.

At-grade intersections are also recognized as safety hazards due to the high speeds involved and potential for more dangerous types of incidents. Interviews with stakeholders identified highway at-grade intersections as one of the largest safety concerns in the corridor. Although the total number of incidents at these locations was low, they represent a significant percent of the injuries caused by truck-related crashes.

Freight Parking Program

A lack of legal and safe truck parking has been identified in numerous plans as a challenge for commercial vehicle movements along the U.S.101 Corridor. At the national level, FHWA released the results from Jason's Law Truck Parking Survey in August 2015. This report was required as part of Jason's Law and incorporated into MAP-21. Jason's Law was named in honor of a trucker who was robbed and murdered while parked at an abandoned gas station waiting for his delivery location to open. The study found an inadequate supply of truck parking spaces nationwide, resulting in tired drivers remaining on the road beyond their legal hours in order to find a safe space, or stopping in unsafe locations.

Truck parking is difficult to expand due to capital and operating costs and difficulty in identifying suitable locations. Freight, especially truck traffic, is often seen as having a negative impact on local roads. Most municipalities want to limit the number of trucks in their region, and building a truck stop, especially if it is not immediately adjacent to a highway, are likely to increase truck traffic. Because land use zoning is controlled at the local level, municipalities may restrict the ability of private operators to open a truck stop.

A program should be developed to incentivize the creation of additional truck parking along the U.S. 101 corridor. A feasibility and truck intercept study should be undertaken in the corridor to determine the best locations for additional parking based on truck origins/destinations and truck needs. State and regional governments need to work with local municipalities to ensure that there is an available supply of appropriately zoned land to allow for parking. If a private facility is pursued, incentives may be required to attract a private developer to build a facility.

The National Coalition on Truck Parking which will begin meeting in December 2015 may develop new recommendations that could help municipalities and regions that are facing truck parking shortages. Stakeholders in the study region should closely monitor this group's proceedings and aid in data collection or other activities as best as possible.

5.3 Truck Route Signage Improvement Program

Only fourteen municipalities and counties in the study region currently have truck routes. Expanding the number of municipalities with designated truck routes and improving truck route education amongst drivers will help focus truck trips on routes that can best handle the traffic. Locally based truck route analyses, improved signage, and improved truck route education programs can improve goods movement into and out of freight nodes located in cities and counties along the U.S. 101 corridor.

While U.S. 101 is well-signed as a designated truck route throughout the study area, the “first- and last-mile” routes that connect U.S. 101 to origins and destinations near the highway are not well signed. Most businesses that utilize U.S. 101 are located off of local streets. Improving signage for routing trucks between U.S. 101 and local roadways is critical to efficiency and safety of truck-based goods movement and will reduce wear and maintenance costs for local roads. This will also save time and money for carriers by reducing delays related to truckers taking long detours after entering local roads with insufficient turn space, insufficient overhead clearance, or other navigational barriers. This program should accomplish two objectives: (1) Designating and improving truck routes to better guide truck movement to/from U.S. 101, and (2) Employing wayfinding tools to help trucks find fueling stations, parking locations, key freight origins and destinations, or other truck related infrastructure located in local municipalities.

While key wayfinding guides can be implemented along the U.S. 101 at a regional level, there should be additional freight truck guidance at the local level. This program should be implemented at the local level in a way that takes into consideration locally specific truck routing issues in each City and County. A key step in designing an local truck signage program is performing a truck routing analysis on local streets to identify critical truck routes between U.S. 101 and local origins and destinations. Leveraging existing resources, Cities and Counties may build off of the truck volume analysis and needs identified in this study and truck movement data found in the Regional Travel Demand Models maintained by regional Metropolitan Planning Organizations. A truck routing analysis should also contain an assessment of jurisdictionally-specific issues and truck routing concerns.

Signs to help direct pedestrian or tourist traffic are common in most towns and cities. However, signs to direct commercial vehicle traffic are limited. A comprehensive local truck routing analysis should lead to recommendations on how to improve the existing truck signage network, including standards for signage, improved signage, and demarcation along the truck route network. For example, major entrance and exit points along U.S. 101 should have standardized signage directing trucks to fueling stations, parking or rest areas, and major freight sites nearby. This would help trucks avoid getting lost, protecting roadway

infrastructure, and reducing the miles traveled and emissions produced as truckers search for amenities. A similar program is currently being developed in the San Francisco Bay Area.

An education program would facilitate a self-enforcing truck route program. Among truck drivers there is a lack of awareness about City and County-based truck routes, related regulations, and policies. Further complicating the issues, there is a lack of truck route information available from local jurisdictions, with only one municipality in the region providing truck route information in an easily accessible map. An education program would improve understanding about designated routes and policies, providing for a higher level of voluntary adherence to truck route regulations and policies. It is recommended that jurisdictions work with external partners such as business associations, trucking associations, industry associations, and individual businesses to expand outreach through the distribution of maps, truck route information, and regulations. Jurisdictions should also pursue increased dialogue and interaction with local stakeholders to understand the needs of individual users.

5.4 Early Environmental Impact Report for Freight Industrial Zones

For Cities and Counties interested in attracting freight business and infrastructure, pre-approving freight, agricultural processing, and transportation/shipping uses through an Early Environmental Impact Report (EIR) in industrially zoned areas is an incentive to attracting freight related businesses. This allows freight related companies to quickly deploy facilities throughout the region with a minimum of up-front cost. EIR costs can be recouped by the implementing agency through an EIR repayment fee levied upon on the properties covered by the EIR, spreading out EIR costs among freight related businesses, and spreading the up-front environmental costs over a longer-term period, making these costs more manageable for freight businesses.

Appendix A.

The following table lists all of the projects in the study area that would help meet the three goals identified in this plan. The top 20 projects listed in this plan were extracted from this list through the grading process indicated in the plan. Specific project ratings as well as sources of the projects are also included.

County	Route or Facility ID	Project Category	Project Location/ Description	Overall Importance of Need	Economic Goal	Mobility Goal	Environmental Goal	Composite Score	Source of Project
Monterey	SR 156	Capacity Expansion. Modify interchange	Add capacity and control access from Castroville Boulevard to U.S.101. Convert to freeway and widen to four lanes	H	H	H	L	10	CFMP
	Hwy 101	Modify ramps	U.S. 101 @ Sanborn Rd (Salinas) Operational Improvements: modify SB off-ramps to address truck congestion	H	L	H	L	8	CFMP
	Hwy 101	Modify ramps. ITS	U.S. 101 from Harris Rd to Russell Rd/Espinosa Rd (north Salinas). Operational Improvements: modify interchanges; ramp metering	H	L	H	L	8	CFMP
	River Road (SR 68 to Arroyo Seco Rd)	Route designation	Designate River Road as a tourism/ freight wine corridor between Salinas and Soledad, parallel to U.S.101	H	M	L	L	7	Projects via Email
	Intermodal	Intermodal	Construct a new intermodal truck-rail facility Gonzales or Chualar along UP Coast Mainline	L	M	L	H	7	CFMP
	Hwy 101	Capacity Expansion	Salinas Corridor (Widening)	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Harris Road Interchange	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Sanborn/Elvee	M	L	H	L	7	MTP/SCS RTP/SCS

County	Route or Facility ID	Project Category	Project Location/ Description	Overall Importance of Need	Economic Goal	Mobility Goal	Environmental Goal	Composite Score	Source of Project
Monterey (continued)	Hwy 101	New Road	U.S. 101 from Soledad to Harris Rd/Abbott St (south Salinas). Freeway Conversion: new frontage roads (Phase 1) & new interchange at Harris Rd (Phase 2) to address corridor and truck mobility	H	L	M	L	7	CFMP/TAMC FTP
	Hwy 101	Modify interchange	1st Street Interchange	M	L	M	L	6	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Gloria Road Interchange Improvements	L	L	M	L	5	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Walnut Ave Interchange	L	L	M	L	5	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	North and South Interchange (Front Street), Soledad?	L	L	M	L	5	MTP/SCS RTP/SCS
Regionwide	Hwy 101	Truck Parking	Additional truck parking locations. Reduce frequency and length of closures at existing public rest stop and truck parking locations, expand truck parking capacity at existing rest areas, and add new rest areas catering to truck drivers	H	L	H	L	8	Email Conversations
	TBD	Truck Parking	Truck service enterprise zone/ trucking priority development zone. Encourage establishment of new private truck stops which cater to freight truck drivers such as Pilot Flying J travel centers.	H	L	H	L	8	Email from Paul
San Benito	SR 152	New truck infrastructure	New alignment of SR 152 between 101 and the Merced County line, including changes in Santa Clara County, and adding an eastbound truck climbing lane over Pacheco Pass	H	H	H	L	10	FTP Folder
	SR 25	New Road	New four-lane highway from San Felipe Road in Hollister to Hudner Lane North of SR 156, 3.8 miles total	H	H	H	L	10	FTP Folder
	SR 156	Capacity Expansion.	SR 156 Alameda St. to San Benito River Bridge. Add Capacity & Access Control: widen	H	L	H	L	8	CFMP

County	Route or Facility ID	Project Category	Project Location/ Description	Overall Importance of Need	Economic Goal	Mobility Goal	Environmental Goal	Composite Score	Source of Project
		ITS	to 4 lanes to address congestion and truck mobility						
San Luis Obispo	Santa Maria Valley Railroad	Rail Capacity	Reactivate train yard in San Luis Obispo	H	H	M	L	11	Projects via Email
	SR 166	New truck infrastructure	Operational Improvements: new passing lanes	H	H	H	L	10	CFMP
	SR 46	Modify clearance	Fix low clearance issue for large freight trucks at railroad overpass	H	H	H	L	10	SLO Meeting notes
	Hwy 101	Modify interchange	SR 46E interchange Northbound off-ramp	H	M	H	L	9	MTP/SCS RTP/SCS
	SR 41	New truck infrastructure	Operational Improvements: new climbing lane	H	M	L	L	7	CFMP
	SR 46	Capacity Expansion. Modify interchange	SR46 Shandon to Kern County. Add Capacity: widen to 4 Lanes; expressway conversion; modify intersection to address congestion and truck mobility	H	H	M	L	9	CFMP
	SR 46	New Interchange	SR 46 from Shandon Rest Area to 41/46 Wye. Operational Improvements: new interchange to improve corridor and truck mobility	H	H	M	L	9	CFMP
	Hwy 101	Freeway Conversion	freeway conversion: Arroyo Grande to Los Berros Rd	M	L	H	L	7	MTP/SCS RTP/SCS
San Luis Obispo	Hwy 101	Freeway Conversion	expressway conversion: Monterey St. to SR 58	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Santa Rosa St and Broad Street Interchange	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Tefft St Interchange	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	Modify Ramps	Traffic Way SB ramps	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	New truck	Arroyo Grande to Pismo Beach. Multiple	M	L	H	L	7	FTP Folder

County	Route or Facility ID	Project Category	Project Location/ Description	Overall Importance of Need	Economic Goal	Mobility Goal	Environmental Goal	Composite Score	Source of Project
		infrastructure. Modify ramps	projects within segment. MP 16 to MP 21. Major elements include ramp reconfiguration @ Dinasauro Caves Park SB and Spyglass Hill truck climbing lane						
	Hwy 101	Freeway Conversion	San Migueal freeway conversion	M	L	M	L	6	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Santa Barbara Rd Interchange	M	L	M	L	6	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Main St Interchange Improvements	M	L	M	L	6	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	San Anselmo Rd Interchange Improvements and Hwy 101 Rosario Ave Interchange	M	L	M	L	6	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	U.S. 101 at Wellsona Rd (North of Paso Robles). Freeway Conversion: new interchange to address corridor and truck mobility	L	L	M	L	5	CFMP/MTP.S CS
	Hwy 101	Modify interchange	Interchange Improvements SB/NB ramps and SR 166 and Thompson Ave intersection	M	M	H	L	8	MTP/SCS RTP/SCS
Santa Barbara	Hwy 101	New truck infrastructure	U.S. 101 from Brisco Rd/Halcyon Rd to Oak Park Blvd. Operational Improvements: new SB climbing lane	H	L	H	L	8	CFMP
	Union Pacific	Rail Capacity	Construct new rail sidings throughout the rail line in Santa Barbara County. One location specified- Ortega siding six miles south of Santa Barbara Train Station	H	H	M	L	9	CFMP
	Hwy 101	Truck Parking	Relocate and expand Gaviota roadside rest areas Northbound and Southbound to better accommodate freight truck parking	H	L	H	L	8	CFMP
	Hwy 101	Capacity Expansion	Extended 3rd NB lane, Fairview to Glen Annie Rd.	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	ITS	Patterson Avenue Ramp Meter	M	L	H	L	7	MTP/SCS RTP/SCS

County	Route or Facility ID	Project Category	Project Location/ Description	Overall Importance of Need	Economic Goal	Mobility Goal	Environmental Goal	Composite Score	Source of Project
	Hwy 101	ITS	Intelligent Transportation System (ITS) Ramp Metering	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Linden Ave/Casitas Pass Interchanges Widening Phase 3	M	L	H	L	7	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	San Ysidro Interchange Improvement	M	L	H	L	7	MTP/SCS RTP/SCS
	Union Pacific	Rail Capacity	Centralized Traffic Control	L	H	M	L	7	CFMP
	Hwy 101	Capacity Expansion	Widening from Clark Ave to Santa Maria Way	M	L	M	L	6	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	McCoy Interchange	M	L	M	L	6	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	SR 135 Interchange (Santa Maria)	L	L	M	L	5	MTP/SCS RTP/SCS
	Hwy 101	Modify interchange	Castillo Interchange Improvement (Castillo Street)	L	L	M	L	5	MTP/SCS RTP/SCS
	SR 1	Modify ramps	U.S. 101 at Betteravia Rd (South Santa Maria). Operational Improvements: modify NB on-ramp to address truck congestion	L	L	M	L	5	CFMP
Santa Barbara (continued)	Union Pacific	Rail Capacity	Track realignment	L	M	L	L	5	CFMP
	Union Pacific	Rail Crossing	Track realignment; overpass replacement	L	L	M	L	5	CFMP
	Hwy 101	Capacity Expansion. Modify interchange	U.S. 101 from Carpinteria to Santa Barbara: Add HOV lanes to reduce commuter travel and truck congestion; modify interchange at Hot Springs Road/Cabrillo Boulevard and North Jameson Lane and U.S.101	M	L	H	M	8	CFMP
	SR 166	Capacity Expansion. ITS	Add Capacity & Access Control on SR 166 from Guadalupe to Santa Maria: Widen to four lanes to reduce congestion and improve truck mobility	H	L	H	L	8	CFMP
Santa Cruz	Iowa Pacific	Intermodal	Construct transload facility at Watsonville to facilitate truck loading onto rail, increase rail	H	H	L	H	10	Projects via

County	Route or Facility ID	Project Category	Project Location/ Description	Overall Importance of Need	Economic Goal	Mobility Goal	Environmental Goal	Composite Score	Source of Project
			shipping, and reduce truck traffic on roadways						Email
	Union Pacific	Rail Capacity	Upgrade rail to Federal Rail Administration Class 2 rail, allowing freight train speeds of up to 25 MPH on sections of rail throughout Santa Cruz County	M	H	M	L	8	CFMP

Source: Projects were received from a number of sources including the California Freight and Mobility Plan (CFMP), emails from stakeholders, and project lists and emails from MPO staff in the study region.