San Joaquin Valley I-5/SR 99 Goods Movement Corridor Study

submitted to

Fresno Council of Governments

submitted by

Cambridge Systematics, Inc.

in association with

Fehr & Peers

The Tioga Group

CAMBRIDGE SYSTEMATICS

San Joaquin Valley I-5/SR 99 Goods Movement Study

Existing Conditions and Future Truck Traffic Forecasts

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Prepared by

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1.0 OVERVIEW

1.1 Background

The San Joaquin Valley (the Valley) has long been acknowledged as one of the critical goods movement centers in California, and Interstate 5 (I-5), as the principal interstate highway route, performs a critical role in goods movement. The Valley economy relies on an efficient and well-functioning goods movement system. The *SJV Interregional Goods Movement Plan* (SJVIGMP) reported that goods movement dependent industries (including agriculture, food processing, construction, energy production, and transportation and logistics) accounted for over 564,000 jobs and $56 billion in economic output in 2010. Over 463 million tons of goods were moved into, out of, and within the Valley in 2007, and this was expected to grow to over 800 million tons by 2040. While agriculture and food products will continue to play an important role in this growth, the Valley is also becoming a major distribution and logistics center with expanding numbers of mega-distribution centers and even new manufacturing facilities. All of this growth will contribute to needs for improved goods movement systems in the Valley, and innovative approaches will be necessary to meet this demand.

I-5 and State Route 99 (SR 99) play critical and unique roles as the major goods movement facilities in the Valley. At present, 92 percent of goods in the Valley are carried by truck, and this is not expected to change in the near future. I-5 and SR 99 carry the highest volumes of trucks in the Valley and in some locations, among the highest volumes in the state. This is a reflection of the traditional north-south orientation of freight flows in the Valley, associated with the through routing of trucks to connect the major coastal urban areas to the north and south of the Valley, the north-south orientation of the Valley's major urban centers, and the need to access major east-west interstate connections north and south of the Valley itself.

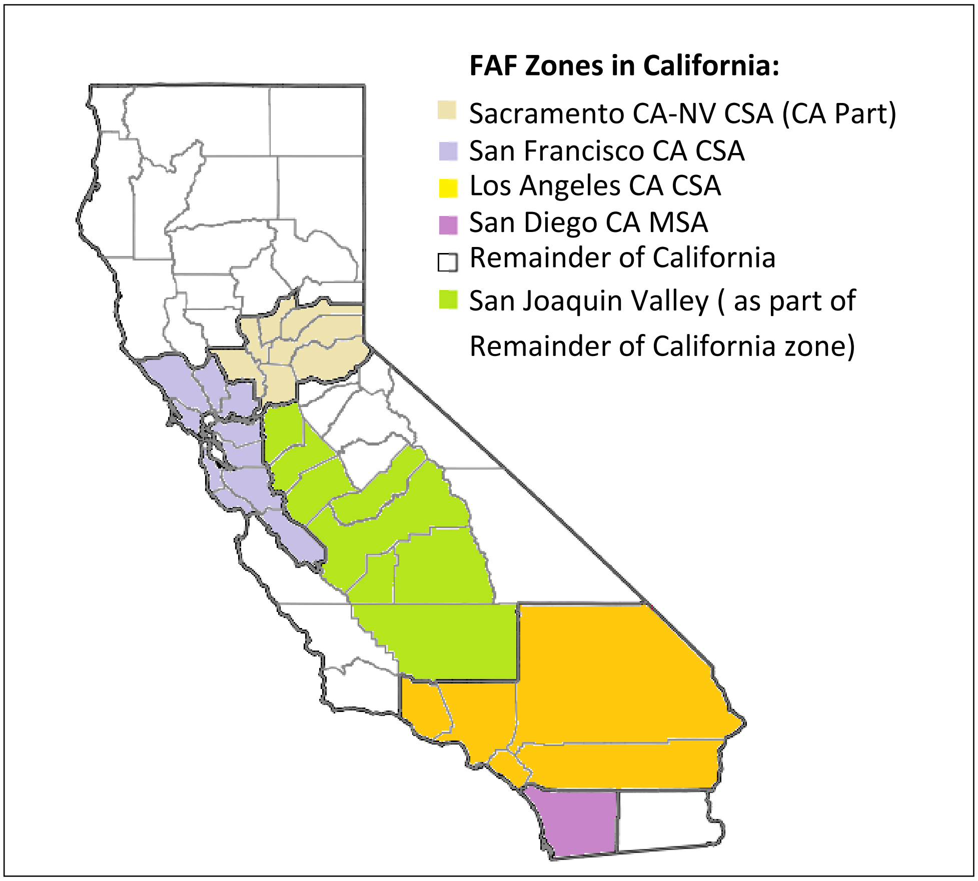
I-5 is the route that is favored for long-haul movements. It carries higher levels of through traffic and there has traditionally been less development along this route. However, new developments in warehousing and distribution centers and manufacturing are taking advantage of access to I-5. Increasing traffic that is being generated within the Valley uses I-5 for national connections**. SR 99** runs through each of the urban areas in the Valley and includes truck traffic distributing goods to/from these areas. It also provides connections to east-west routes that support the farm-to-market traffic and connections between farms and food processing that characterize the agricultural supply chain. It is the backbone of intra-Valley goods movement and a major route for commuters who share the road with trucks in the urban centers.

Both I-5 and SR 99 carry large volumes of truck traffic with comparable volumes on each. The types of truck traffic are slightly different, with I-5 carrying a higher percentage of 5+ axle trucks and SR 99 carrying more of a mix that includes local delivery and service vehicles serving population centers. Because of the limitations of the east-west network for truck movement and the distance between the two routes through much of the Valley, trucks do not tend to move from one route to the other for bypassing areas of congestion. The highest volumes of truck traffic are found on I-5 in the north, mostly in San Joaquin County. Analysis of future freight flows and associated truck traffic patterns conducted in the SJVIGMP indicated higher levels of projected growth in truck traffic on I-5 as compared to SR 99. On I-5, the highest volume-to-capacity (v/c) ratios and poorest levels of service will be found in Stanislaus and San Joaquin County, with v/c ratios only slightly better from the Kings/Fresno County line north. SR 99 already experiences high levels of congestion during peak periods in most of the urban areas, and this will worsen in the future. The pattern that shows higher truck volumes and poorer level of service in the north on I-5 in the future reflects, to some degree, the growth in distribution center traffic feeding the Bay Area that has already occurred in the north. However, there are trends that need to be examined during this study that could affect these future forecasts and create even greater volumes of truck traffic in the southern parts of the Valley. There is growing interest in locating large distribution centers and manufacturing facilities in Kern County to take advantage of proximity to the large Southern California markets and the Ports of Los Angeles /Long Beach (POLA/POLB). These connections are expected to grow and create new sources of truck traffic in Kern County. Recent studies of warehousing space supply and demand in the Southern California Association of Governments (SCAG) region conducted by Cambridge Systematics (CS) show that Southern California will not be able to meet all of the demand for warehouse space, and southern Kern County is a likely location for spillover development.

The SJVIGMP identified a number of high priority road widening projects on both I-5 and SR 99 to address future capacity deficiencies. For I-5, these projects were mostly north of the Kings/Fresno County line to the Sacramento/San Joaquin County line. The improvements on SR 99 are captured in the SR 99 Business Plan that has been a priority of focused attention in the Valley for some time. The objective of this study is to look at strategic approaches to addressing future freight demand and to identify the most feasible options that emphasize innovative approaches. This study will examine innovative approaches that create opportunities for public-private funding partnerships (such as tolled truck-only lanes), that create incentives to the trucking industry to manage demand (through use of larger combination vehicles or novel technology solutions), efficiency improvements that rely on Intelligent Transportation Systems (ITS) or other technology options, and greater use of alternative modes such as rail. While many of these approaches have been examined in past studies, there has never been a comprehensive examination to determine which options are the most feasible, which will draw the most positive response from industry, and which will work most effectively with other plans for these two highway corridors while minimizing negative impacts on connecting roadways and adjacent communities.

1.2 Goods Movement Trends in the Valley

The Freight Analysis Framework (FAF) integrates data from a variety of sources to create a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation. With data from the Commodity Flow Survey (CFS) and additional sources, FAF provides estimates for tonnage, value, and domestic ton-miles by region of origin and destination, commodity type, and mode. This is an aggregate national database that captures trends of commodity flows between metropolitan areas for broad range of commodities. The Census Bureau conducts CFS every five years. The most recent survey is from 2012 and has not been released fully yet. The FAF database is based on FAF zones. There are 5 zones in FAF 3. The eight counties in San Joaquin Valley and counties in northern California form the FAF zone "Remainder of California". Given the low rate of economic activities in northern California, it is reasonable to assume that the San Joaquin Valley is the main freight generator in this FAF zone. Fresno County was added as a new zone in FAF 4.



Source: [FAF3, 2007]

Figure 1-1. FAF3 zones in California

We compared the "Remainder of California" zone in the 2007 (FAF3), 2012 (FAF4), and 2015 (from FAF3 estimates). To ensure consistency between analysis years, we combined Fresno and the "Remainder of California" zones. The analysis in this study is based on the first version of FAF4 data published in September 2015. There might be future revisions later. Besides zoning changes, there are also some differences in FAF3 and FAF 4 methodologies and assumptions. Commodity Flow Survey (CFS) is the major data source for FAF. However, about one third of information presented in FAF is out of CFS scope. Estimation process for some of CFS out of Scope commodity groups, including crude petroleum has systematically changed in FAF4. Agriculture products are also out of CFS scope. We identified inconsistencies between FAF4 detail agriculture commodity flow report and 2012 Agriculture Census report, published by Department of Agriculture 2012.

Global recession had significant impacts on goods movement in the Valley. 2015 estimates are based on CFS 2002 when the economy was at the highest point. The estimates for 2012 are significantly below 2015 estimates. Over all there is a 20 percent reduction in tonnage and a 10 percent increase in value of goods generated in the "Remainder of California" zone between 2012 and 2007; therefore, the average price per tonnage increased by about 38 percent.

The 2008-2009 global recession accompanied by a severe drought contributed to this situation. The goods movement between the Valley and the Bay Area (San Francisco FAF zone) decreased by over 50 percent. There was also a noticeable change in the average price of goods generated in the Valley. Although reductions in both the volume and tonnage of freight generated in the "Remainder of California" zone occurred, the average price per tonnage increased by about 16 percent. Goods moving between the Valley and San Diego County experienced the highest increase in the average $/tonnage of shipments, with a more than 60 percent increase in value coupled with a 37 percent decrease in tonnage.

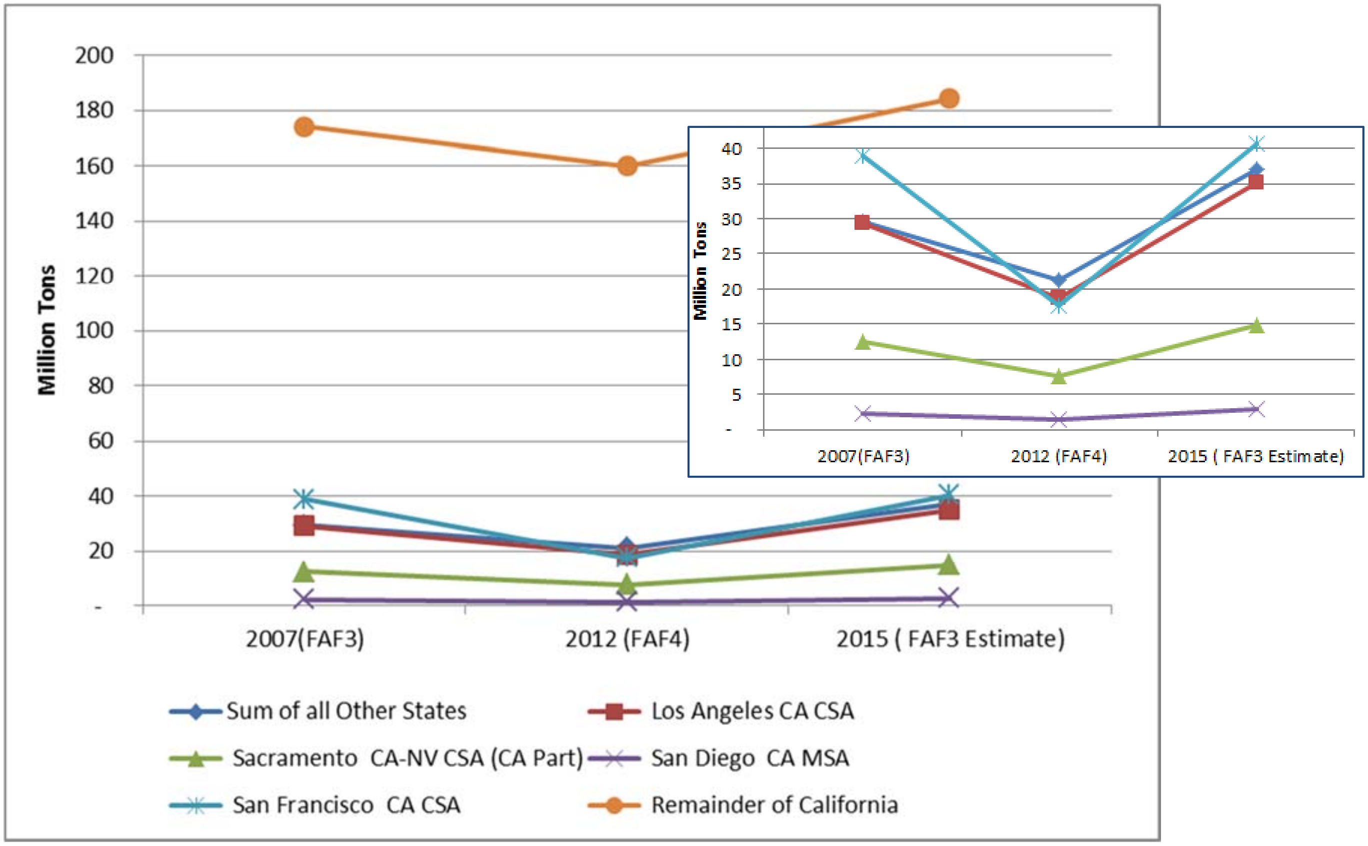
Table 1-1. Destination distribution of trips generated in the "Remainder of California" FAF zone

Destination Region	Total Tonnage (KTon)			Total Value (M$)			2012 Growth		
	2007 (FAF3)	2012 (FAF4)	2015 (FAF3 Est.)	2007	2012	2015	Weight	Value	Avg. Price
Outside California	29,513	21,296	37,107	49,851	26,739	60,757	-28%	-46%	-26%
In California	243,504	205,472	277,843	179,918	127,620	223,123	-16%	-29%	-16%
Los Angeles CA CSA	29,348	18,728	35,215	27,423	21,544	33,215	-36%	-21%	23%
Sacramento CA-NV CSA	12,540	7,661	14,883	12,540	7,774	15,006	-39%	-38%	1%
San Diego CA MSA	2,275	1,424	2,853	3,117	3,125	4,308	-37%	0.2%	60%
San Francisco CA CSA	38,876	17,581	40,618	29,674	18,379	37,925	-55%	-38%	37%
Remainder of California	174,315	160,077	184,273	107,164	76,799	132,670	-8%	-28%	-22%

Source: [FAF3, 2007; FAF4, 2012]

***Note: crude petroleum is excluded from this analysis*
FAF3 web site: *http://faf.ornl.gov/fafweb/Extraction1.aspx*
FAF4 web site: *http://faf.ornl.gov/faf4/Extraction1.aspx*

The major mode of transportation for crude petroleum is pipeline. In 2007, about 14.8 million tons of crude petroleum shipped from Remainder of California to other FAF zone. In 2012 this shipment increased to 20 million tons. The change in the FAF methodology contributed to some of this difference.



Source: [FAF3, 2007; FAF4, 2012]

***Note: crude petroleum is excluded from this analysis*

Figure 1-2. Trends of destination distribution for freight generated at "Remainder of California" FAF zone

The San Joaquin Valley is the home of significant agriculture, including farms and related industries. Table 1-2 summarizes the tonnage and value of shipments by trucks for commodities in agriculture, food, and beverages industries. Trucking is the primary mode of transportation for these industries carrying over 97 percent of agricultural, food, and beverage commodities. Overall, there has been 3 percent reduction in tonnage of shipments but a 13 percent increase in value of shipments.

Table 1-2. Agriculture, food and beverage trip production trends in the "Remainder of California" FAF zone

Commodity Group	Total Tonnage (KTon)			Total Value ($M)			2012 Growth		
	2007 (FAF3)	2012 (FAF4)	2015 (FAF3 Est.)	2007	2012	2015	Weight	Value	Avg. Price
Agriculture Products	91,966	88,993	113,386	67,787	76,315	83,827	-3%	13%	16%

Source: [FAF3, 2007; FAF4, 2012]

1.3 Key Findings

In order to better depict and describe the key findings of the existing conditions analysis, the team developed a web map with a fact sheet for more than 150 highway segments in the Valley. Each fact sheet provides the following information about the specific segment:

- Through traffic vs. traffic related to that county;
- Truck weight and classification data;
- Annual, monthly, and daily truck and auto volumes and traffic patterns/distribution;
- Operational performance, including Level of Service (LOS), Vehicle Hours of Delay and/or Travel (VHD/VHT), and/or congested speed;
- Design characteristics, including number of lanes, posted speed limits, and number of interchanges; and,
- Collision data, including type and frequency of truck-involved collisions, as well as number of collisions that resulted in injury or fatality, and GIS map of public and private truck stops and rest stops.

We developed a set of freight activity clusters in the Valley that generate and absorb the majority of truck traffic. The freight clusters include major businesses, intermodal facilities and large distribution centers and warehouses. Using GPS data, we identified the distribution of truck trips based on truck origins and destinations related to each freight cluster.

We reviewed more than 25 documents to identify future development and improvement plans related to goods movement within the study area, and summarized the findings. According to these planning documents, the recent growth in logistics facilities and manufacturing in the Valley is highly likely to continue. Understanding the potential growth and identifying priority improvements will be critical.

Although congested speed on some segments of I-5 and SR 99 are up to 15 percent slower than the posted speed limit, this does not necessarily mean there is traffic bottleneck. Outside dense urban areas the Volume/Capacity (V/C) ratio during peak periods for these corridors is less than 0.65, and the average V/C along I-5 and SR 99 during peak periods is 0.25 and 0.51 respectively. Having high truck percentage may cause slower traffic flow along SR 99. The truck percentage for each segment is shown on the fact sheet for each segment on the web map.

The 2008-2009 global recession had significant impacts on the Valley's goods movement patterns. The 2012 tonnage of goods transported s in the Valley are still 30 to 50 percent lower than 2015 forecasts based on in 2007 commodity flow survey trends.

1.4 Existing Conditions Analysis Approach Summary

This report assesses the existing goods movement demand and operations within the Valley and provides information about the role of major freight corridors, including I-5 and SR 99 in the region. This work builds on the existing conditions analysis that was completed for the SJVIGMP. It also incorporates other data sources from more recent localized studies in the Valley and provides a comprehensive analysis of safety, traffic congestion, and truck trip patterns in the Valley. A major focus of this report is to document changes caused by the 2008-2009 global recession, as well as to investigate emerging trends that could result in alterations to truck and rail system usage in the Valley.

This report relies on a significant amount of goods movement research and analysis previously conducted in the Valley. This report documents those studies and also provides a tool for visualizing data abstracted from various sources. The visualization tool depicts trucking attributes throughout the Valley as previously described. Figure 1-3 shows an example infographic for a segment along SR 99 in the study area.

The analysis process involved a systematic approach to breaking the two freeway corridors into manageable segments. This resulted in 152 analysis segments covering approximately 298 miles along I-5 and 285 miles along SR 99. This classification allows us to summarize the data and provide meaningful statistics for each segment. For this project, the team purchased global positioning system (GPS) data for a large sample of trucks to gain a complete current understanding of truck distribution patterns along the I-5/SR 99 corridor. The GPS truck fleet data provides the O/D of trips that travel on I-5 and/or SR 99, including detailed route choice, average travel time, and truck size category (Light, Medium, and Heavy-heavy duty trucks[1]) for each data point. Our selected GPS data vendor, StreetLight, partners with GPS data providers to process the data and provide a large, reliable sample set. While this data source does not include the load, commodity, value, or vehicle type, this study combined the large GPS truck sample size data with other data sources, such as the latest Freight Analysis Framework (FAF) commodity flow dataset from the Federal Highway Administration (FHWA) to identify goods movement patterns in the study area.

[1] In this analysis, Light heavy duty trucks have Gross Vehicle Weight (GVM) less than 14000 pounds, Medium heavy duty trucks' GVM is between 14000 and 26000 lbs and Heavy heavy duty trucks's GVM is greater than 26000 lbs.

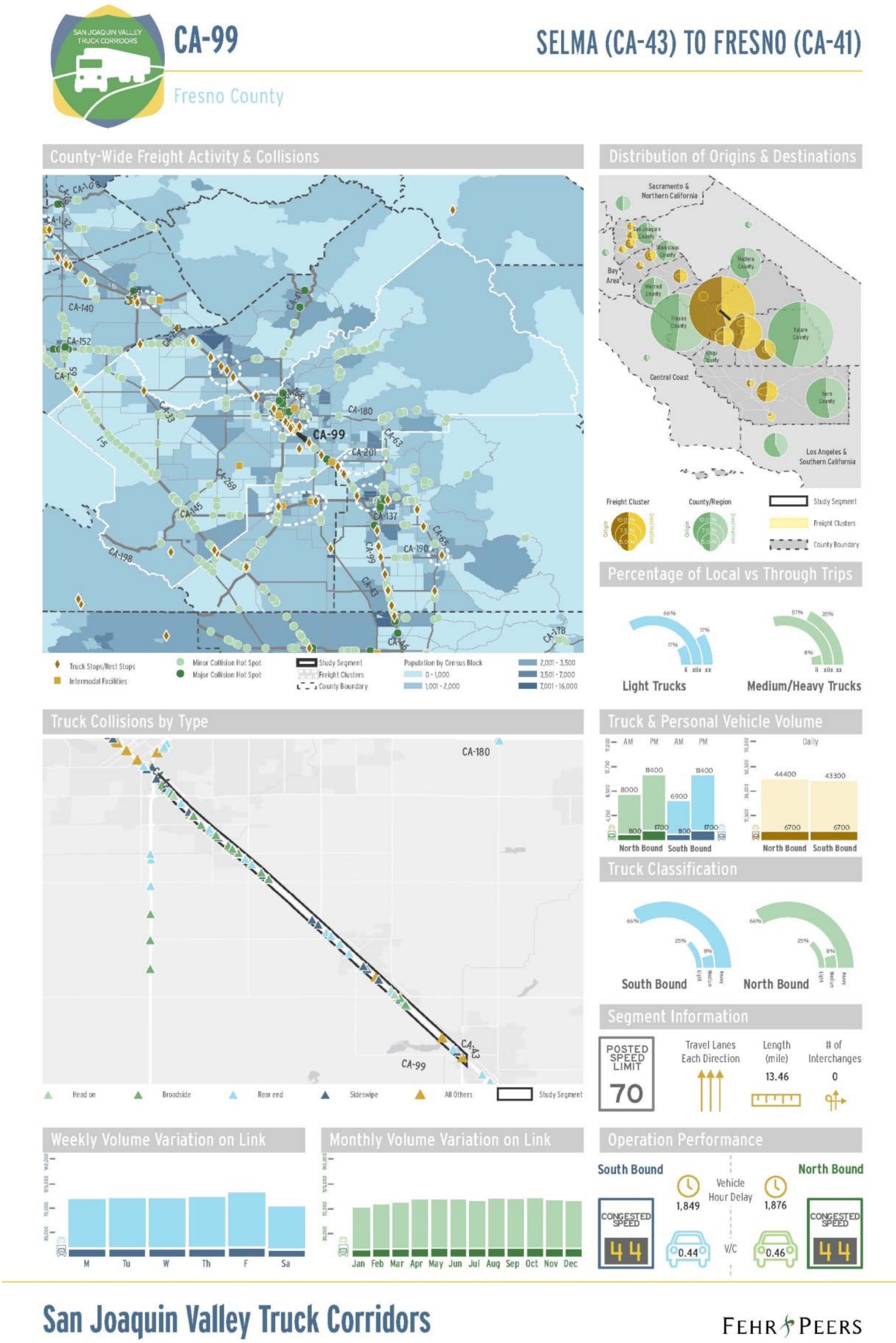


Figure 1-3. Sample of the infographic page on the web map

The Geo-Database developed for this project, integrates all of the data sources into a consistent format. When significant discrepancies were identified between data sets, other data sources were utilized to resolve the discrepancies, including:

- Caltrans Performance Measurement System (PeMS) year 2014
- Weigh-in-Motion (WIM) year 2014
- Travel Advance Monitoring System (TAMS) year 2014 and 2015
- Highway Performance Monitoring System (HPMS) 2013
- Other individual counts year 2010 and later
- Caltrans annual count book 2013
- Highway Performance Monitoring System (HPMS) 2015
- Collision data base for year 2009-2013

The data sources listed above were used to review existing truck traffic patterns and the share of truck traffic compared to overall traffic volumes on the I-5/SR 99, as well as on primary Central Valley east-west connectors. Truck volumes on I-5 are among the highest in the area, especially at the junctions with SR 99 and I-205, where Caltrans recorded more than 35,000 daily truck trips. While I-5 tends to carry more through truck traffic, SR 99's proximity to urban centers generates truck trips serving the Valley. At the junction of I-5 and SR 99, truck volumes exceeded 13,000 per day in 2012, according to Caltrans.

Various data sources were used, including the Valleywide Truck Model and California Statewide Freight Forecasting Model (CSFFM) to clarify truck distribution on I-5 and SR 99. Based on these data, a defined network consisting of I-5, SR 99 and crossing arterials, was developed to estimate the truck volumes on representative links of each segment, and to provide existing and future (2040) daily truck volume forecasts for major segments on this network.

This effort included a detailed review of the freight and truck forecasts from the Valleywide truck model that were used in the SJVIGMP to determine if any modifications to the Valleywide truck model were necessary. The Valleywide truck model was last updated with commodity flow data from FAF version 2 and there have been several subsequent updates of the FAF data to account for post-recession and recovery effects. Therefore, for this project, CSFFM was determined to be a better option. The CSFFM will be the primary tool for conducting the impact assessments later in the project so it will need to reflect the latest trend information and freight forecasts.

In addition to the GIS map discussed before, Fehr & Peers will host the web map during the course of the project for all study partners to view. The web-based map will provide information listed in Table 1-3, including daily and monthly seasonal pattern, truck classification count, and/or congested speeds. However, the information presented for all segments along I-5 and SR 99 is not complete and may be out of date. This data will be supplemented with data contained in the CSFFM during the next phase of the study.

Table 1-3. Segment fact sheets

Data category	Detail variables
Design characteristics	Approximate length of each segment
	Number of main lanes at each segment
	Functional classification
	Posted speed limit
	Number of grade separated interchanges along each segment
	Capacity
Volumes	Daily AM and PM peak period (total traffic and truck only traffic)
	Day of week traffic pattern (total traffic and truck only traffic)
	Monthly traffic pattern (total traffic and truck only traffic)
	Percentage of small, medium and heavy trucks
Origin-Destination data	Percentage of through trips vs trips generated in the Valley
	Distribution of origin and destination of trucks
Operation Performance measures	Average peak periods V/C
	Average congested speed during peak periods
	Peak period vehicle hours of delay
Land use information	Population density at block group level
	Caltrans and private truck stops and rest stops
	Intermodal facilities near each segment
	Freight clusters near each segment including large businesses (greater than 100 employees), distribution centers and warehouses
Safety status	Number of truck-related collisions per vehicle mile travelled
	Number of severe collisions per vehicle mile travelled
	Frequency, severity and type of collisions along each segment
	Truck signage inventory along each segment

2.0 ECONOMY, LAND USE AND DEMOGRAPHIC SUMMARY

The San Joaquin Valley is comprised of 8 counties, 62 cities, and is home to nearly 4 million people. The largest cities, Fresno, Bakersfield, Modesto, and Stockton have populations in excess of 200,000. It is a primarily agricultural region and one of the most productive in the country, with a major role in the distribution of agricultural products, processed food, and energy products throughout California. The Valley is home to a vast and diverse agricultural industry, producing crops such as cotton, grapes, nuts, as well as raising livestock. Much of the industry throughout the Valley works in support of the farming community. Several large oil fields located across the San Joaquin Valley contribute to a strong presence of the oil industry.

According to data published by the State of California Employment Development Department, the estimated labor force in the Valley is 1,822,600 with an unemployment rate of more than 10 percent in 2015. The statewide average in October 2015 was 5.7 percent. The average for the eight counties in 2014 was 11.6 percent and the trend since then has been a gradual improvement.

Table 2-1 presents the establishments by size in the eight counties of San Joaquin Valley (Kern, Kings, Tulare, Fresno, Madera, Merced, Stanislaus, and San Joaquin).

Table 2-1. Establishments by size in the Valley

Industry	Number of Establishments	Number of Employees				
		1-99	'100-249'	'250-499'	'500-999'	'1000 or more'
Agriculture, Forestry, Fishing and Hunting	529	508	12	7	0	2
Mining, Quarrying, and Oil and Gas Extraction	270	243	17	6	3	1
Utilities	273	264	5	2	0	2
Construction	5,320	5,270	38	7	3	2
Manufacturing	2,379	2,163	147	43	18	8
Wholesale Trade	3,477	3,398	60	17	2	0
Retail Trade	9,334	9,104	195	35	0	0
Transportation and Warehousing	2,487	2,401	61	16	7	2
Total	**24,069**	**23,351**	**535**	**133**	**33**	**17**

Source: [CBP, 2013]

3.0 TRANSPORTATION NETWORK AND ACCESSSIBILITY

3.1 Roadway Network

I-5 and SR 99 Freeways

Interstate 5 and California State Route 99 make up the two primary north-south freeway routes through the San Joaquin Valley, connecting cities within the Valley as well as interregional travel between southern and northern California. Within the next few years, SR 99 will become exclusively a controlled-access freeway, like I-5, with the upgrading of the remaining non-freeway segments. The last traffic signal on SR 99 was bypassed in 1996, bringing the highway one step closer towards an uninterrupted corridor. SR 99 directly connects the major cities in the Valley, from Bakersfield north through Fresno, Modesto, and Stockton, while I-5 is primarily a through-corridor with few cities along the way.

Both highways are at least two lanes in each direction. SR 99 has been widened to three lanes along most of its length excluding some portions such as the cities of Atwater, Merced, and portions south to Madera. I-5 is almost exclusively two lanes from southern Kern County until it reaches I-205 near Tracy. The speed limit for most of I-5 through the region is 70 mph. Many long sections of SR 99 allow speeds up to 70 mph, but are reduced in urban areas to 65 mph or lower.

Other State Highways in the San Joaquin Valley

Many state highways cross the Valley and connect farms and industry to both I-5 and SR 99. Some of these include (from south to north):

- Primarily East-West
  - CA-4
  - CA-12
  - CA-120/205
  - CA-132
  - CA-140
  - CA-152
  - CA-155
  - CA-180
  - CA-198
  - CA-223
  - CA-46
  - CA-58
  - CA-65
- Primarily North-South
  - CA-33
  - CA-41
  - CA-43
  - CA-59
  - CA-145
  - CA-165

These highways encompass a wide variety of characteristics from freeways to rural roads, and many become more controlled (grade separation and ramps or signals) as they approach urban areas. For example, Routes 41, 43, 46, 152, and 198 are primarily classified as expressways or freeways for much of their length through the Valley, with limited driveway or local road access and typically higher speeds. Other routes have a less regional function and are characterized by more signals and intersections, undivided roadway, and lower speeds. In general, however, the speed limit on most state highways between I-5 and SR 99 is a minimum of 55 mph. Most of these routes are primarily one lane in each direction, but segments of Routes 41, 43, 198, and most of 152 are two lanes. Some routes, such as SR 132 and SR 58 are being planned for major improvement projects to increase capacity and mobility.

Truck Stops and Rest Stops in the Valley

There are 47 Caltrans truck stop facilities located in the San Joaquin Valley, as shown in Figure 3-1, including 22 along I-5 and 25 along SR 99. There are many more privately-owned truck stops[2] available along SR 99, with a fairly even distribution along the length, while I-5 has very sparse coverage with lengthy gaps between stops. According to our estimates, there are 74 total (public and private) truck stops within one mile of SR 99, which is 285 miles long in the study area. There are only 37 total truck stops within one mile of I-5, which is 298 miles long through the study area. In both cases, truck stops tend to cluster, but the clustering of stops along I-5 is greater, leaving gaps ranging from only a few miles to as long as 65 miles between available facilities. On SR 99 the gaps are generally much smaller, with no gap greater than 16 miles observed. Please refer to the GIS web maps for location of truck stops along each segment.

There is at least one truck stop facility per county on I-5. Kern County has the most evenly distributed and highest quantity of truck stops. On SR 99, truck stop coverage is generally evenly distributed among each county. Truck stops are often located near interchanges with state routes, especially on I-5 between Kern, Kings, Merced, and San Joaquin counties. This is less true along SR 99, where the urbanized areas are more frequent and geographic coverage is greater.

3.2 Rail Transportation: Short Lines and National Connections

The rail freight network in the San Joaquin Valley includes two Class I railroads, the BNSF Railway and Union Pacific Railroad (UPRR), and a number of Class III "short line" railroads which primarily provide local freight service and organization of freight (switching) for larger railroads. Railroads are grouped into three classes based on annual operating revenue limits established by the Surface Transportation Board (STB). Class I railroads generate more than $399 million in annual operating revenues, while Class III short lines generate less than $31.9 million in annual operating revenues. There are no Class II railroads operating in California.

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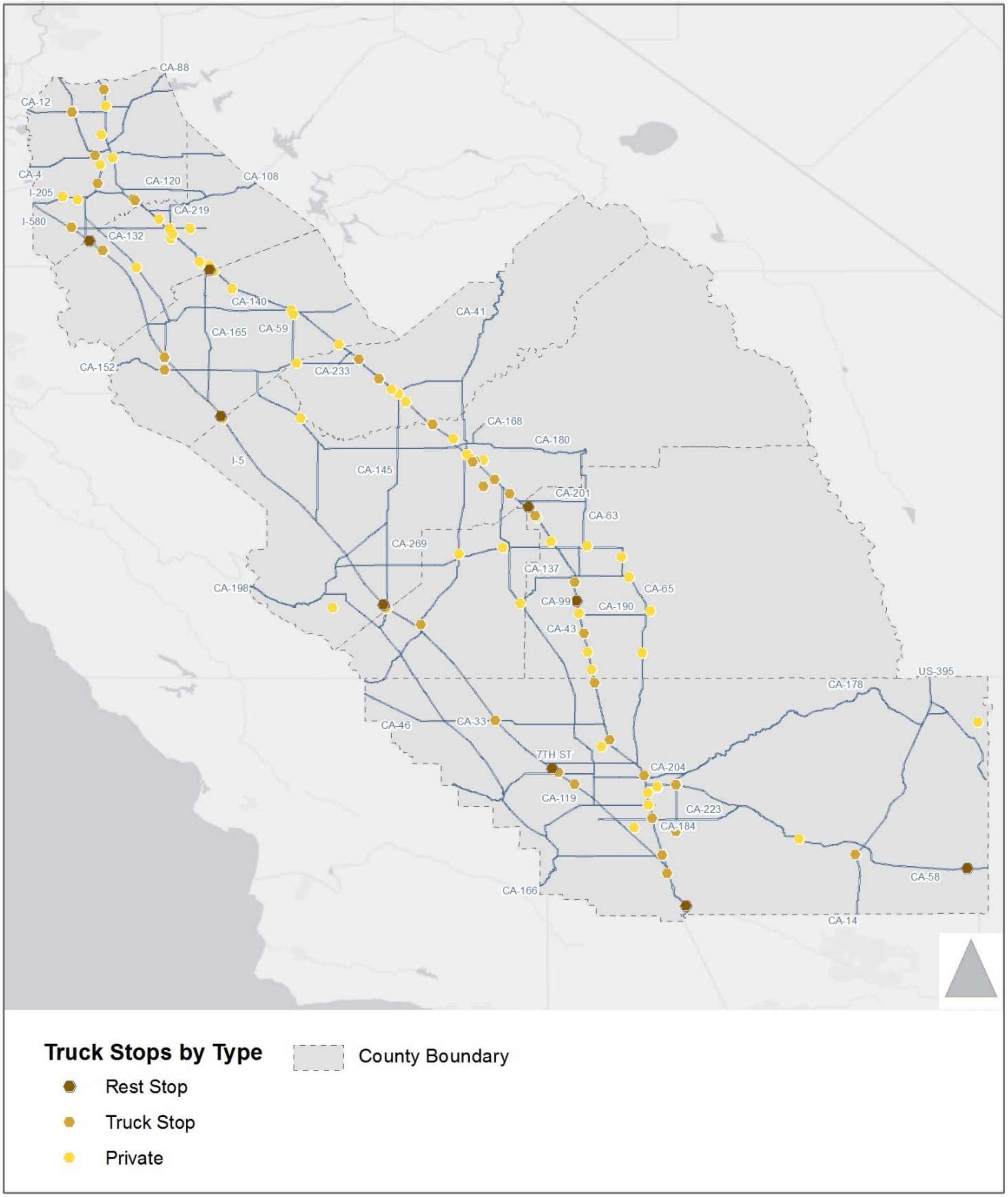
[2] Private truck stops are identified based on online search. There was no consolidated list available.



Source: Online data sources (8)

Figure 3-1. Location of truck stops in the Valley

According to the 2013 California State Rail Plan, there are 26 active short line and switching railroads across the state. At least eight of these (operating more than 10 miles of track) are active in the San Joaquin Valley. The report identifies several projects in the Valley that improve connections between railroads and the Port of Stockton, and other short line projects to upgrade track and improve the ability of short lines to carry the heavier loads that larger railroads move.

Future Roadway and Rail Plans and Projects

Fehr & Peers conducted an extensive literature review covering many studies and plans from the past decade on freight and mobility topics that have a statewide or San Joaquin Valley focus. The documents are generally grouped by subject matter: <u>congestion and demand management; safety; air quality, sustainability, and the environment; rail and intermodal freight; and finally, funding</u>. A summary of each document is provided in the subsequent sections. Some documents touch on several or all of these topics. There are studies that collected and analyzed freight travel data in support of future planning efforts, and other documents that comprehensively identify improvement projects for selected corridors. A few documents identify high-level policies or recommended practices that may relate to goods movement.

Congestion & Demand Management Projects

Most of the documents included in the literature review are primarily concerned with road congestion and demand management, by inventorying planned projects to address specific issues, or through policy recommendations such as congestion pricing. There are several documents with a broad geographic focus, primarily those developed by Caltrans. Some are more regionally focused, typically studies conducted by Councils of Governments.

- *Transportation Concept Report (Caltrans, various years)*
    - These four documents provide direction for policies and plans within a specific Caltrans district for reducing congestion and improving safety.
        - *SR-99 District 6 (2003)*
        - *SR-99 District 10 (2002, 2008, 2011)*
        - *I-5 District 6 (2013)*
        - *I-5 District 10 (2012)*
- *Updated Business Plan for SR-99, Vol I-III (Caltrans 2013)*
    - Identifies funding sources for a set of projects based on long-range goals to improve operations and meet demand for capacity. Projects include interchange improvements, select highway widening, and addition of new interchanges.
- *State of California Freight Mobility Plan (CFMP) (Caltrans 2014)*
    - "Address[es] the needs of California's full, multimodal, integrated freight system… An aggregate of the freight projects included in each of the State's regional transportation plans yields a list of 700 projects, addressing all freight modes"
- *Tulare County Association of Governments Regional Transportation Plan, Goods Movement Chapter (2014)*

- Primarily a policy document that focuses on agricultural commodities movement and related improvements on State Route 99. Also notes major projects such as widenings of Road 80, Avenue 416, State Route 65 south of Porterville, and the conversion of Spruce Road (future SR-65 alignment) into a 2-lane expressway.

- *Fresno Council of Governments (COG) Regional Transportation Plan (2014)*
  - High-level policy document with limited emphasis on freight. Does not identify specific projects, except with regards to the near-term expansion of SR-99 to six lanes along all portions in the county.
- *Alameda County's Goods Movement Plan: Inventory of Plans and Studies (2014)*
  - Policy document that reviews all other related plans in the county, region, and state noting goals, trends/issues, land use trends/issues, projects, and mitigation measures. Identifies projects with high level analysis of each plan, including the Alameda Countywide Transportation Plan with $239 million for road/freight/goods movement.
- *Kern COG Regional Transportation Plan/Sustainable Communities Strategies (2014)*
  - High-level policy document with a "Freight Movement Action Element." Lists short- and long-term proposed actions including the widening and construction of new roadways, expansion of rail, intermodal options, truck climbing lanes on SR 58, and the creation of Paramount Logistics Park for freight activities.
- *Kings County Regional Transportation Plan and Sustainable Communities Strategies (2014)*
  - High-level policy document with a "Goods Movement" chapter, focused on railroad and freight truck movements and emphasizes the agricultural industry product movements. Does not list specific freight projects.
- *San Joaquin Valley Interregional Goods Movement, Executive Summary (2013)*
  - Long range plan through 2040, includes a prioritized project list and top 50 freight projects for the San Joaquin Valley.
- *I-5, SR-99 Origin and Destination Truck Study (2009)*
  - Study uses survey and truck travel data to understand goods movement in the San Joaquin Valley. Does not list specific freight projects.
- *SR-99, SR-198 Gateways Truck Origin and Destination Study (2015)*
  - Uses survey and truck travel data to understand goods movement in the San Joaquin Valley, and does not list specific freight projects.

Safety Improvement Projects

Improving safety is often an impetus for infrastructure projects, and is thus included in various forms in documents such as the Caltrans *Updated Business Plan for SR-99*, the Caltrans *Transportation Concept Report* series, or many of the above plans conducted on behalf of various regional governments. These documents primarily identify specific projects along major freeway facilities, such as improving interchange designs or deploying intelligent transportation systems (ITS), many of which have safety benefits as a primary or secondary goal. The Federal Motor Carrier Safety Administration (FMCSA) *Large Truck and Bus Collision Facts 2013* does not identify any projects or policies but provides national statistics on commercial vehicle collision data. The list below includes only documents specifically concerned with safety data and analysis:

- *Large Truck and Bus Collision Facts (FMCSA, 2015)*
- *Traffic Safety Facts 2013 (National Highway Traffic Safety Administration, 2013)*

Air Quality, Sustainability, and Environmental Projects

The effects of highway travel on the environment are becoming a greater concern over time, leading to several policy-focused documents that will have an influence on goods movement.

- *CARB Sustainable Freight (2015)*
    - Lists enforcement policies and regulations to reduce emissions, and generalized land use and highway planning goals.
- *San Joaquin Valley Goods Movement Sustainable Implementation Plan (RFP, 2015)*
    - Plan which prioritizes freight first/last mile issues, truck routing and parking needs, rural priority corridors, goods movement performance measurement and system modeling frameworks, a sustainable communities and freight strategy integration, and public outreach.
- *Land of Risk/Land of Opportunity: Cumulative Environmental Vulnerability in California's San Joaquin Valley. UC Davis Center for Regional Change (2011)*
    - Provides a health assessment of the San Joaquin Valley, including the risks of living near freeways. Does not identify specific actions or mitigations related to highway management.

Rail and Intermodal Freight Movement Improvement Projects

In many cases, the subject of rail and intermodal freight movement is closely related to the congestion and demand management topic. The documents listed below are those primarily concerned with rail planning, but several documents in the above congestion topic include projects or policies related to rail transport.

- *California State Rail Plan (Caltrans 2013)*
    - "Establishes a statewide vision and objectives, sets priorities, and develops implementation strategies to enhance passenger and freight rail service in the public interest." Specifically identifies a number of grade crossing projects and short line railroad projects, noting that short lines are often vital to improving freight mobility but may lack the resources of national railroad companies.
- *San Joaquin Corridor Strategic Plan, Caltrans, (2008)*
    - Focuses on strategic rail improvements within the corridor. The plan highlights Alternative 1 as the best development strategy for the corridor, which improves frequency and tracks and prioritizes improvements into immediate, near-term, medium-term, and long-term projects.

- *Service Development Plan for San Joaquin Corridor (2013)*
    - Plan for improved intercity passenger rail service in the San Joaquin Corridor. Describes service expansion and operational improvements.

Funding Sources for Projects

The funding of projects is an ever-present concern, but as several documents note, such as the *San Joaquin Valley Interregional Goods Movement Plan*, funding specifically for goods movement is especially scarce and must be assembled from many sources. Many of the documents listed already identify potential funding sources, such as the *Updated Business Plan for SR-99,* the *California State Rail Plan*, Regional Transportation Plans and other strategic plans. San Joaquin Valley Interregional Goods Movement Plan (2013) provided a complete review of funding resources for prioritized projects in the Valley.

4.0 EXISTING TRAFFIC CONDITION

To systematically study truck traffic in the San Joaquin Valley via I-5 and SR 99 and other major state routes, the roadway network was divided into 152 segments. *Source: California Statewide Model Network, Aerial images*

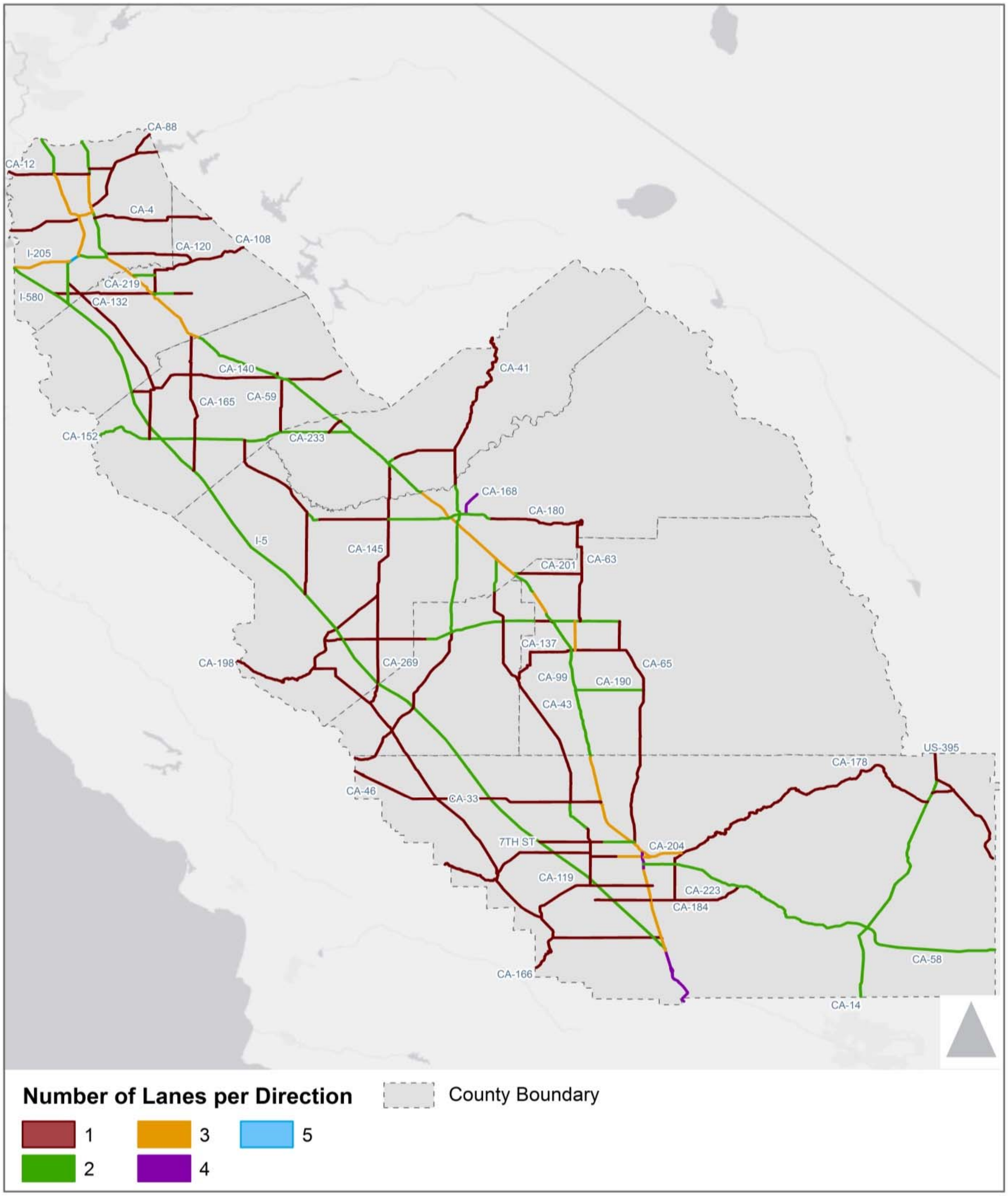
Figure 4-1 shows the study network. These segments cover 298 miles of I-5, 285 miles of SR 99, and 1,780 miles of other state routes. We prepared a Geo-Database to integrate all the data sources in consistent format. There are significant discrepancies in the data from different data sources due to data collection methods, and assumptions in reporting the data. Where these discrepancies were significant, we selected the information from the source that was most appropriate based on our knowledge of the area. The data sources are used for traffic volumes are:

- Performance Measuring System (PeMS) year 2014
- Weigh in Motion (WIM) year 2014
- Travel Advance Monitoring System (TAMS) year 2014 and 2015
- Other individual counts year 2010 and later
- Caltrans annual count book 2013 and 2014
- Highway Performance Monitoring System (HPMRS) (two month summary in 2015)

Fehr & Peers developed a web map with visual summary fact sheets for each segment to facilitate reviewing process. Fehr & Peers will host the web map during the course of the project and deliver the geo-database to client at the end of the project. The goal is to provide the traffic and other information presented in Table 1-3 for each segment.

Table 4-1. Segment fact sheets

Data category	Detail variables
Design characteristics	Approximate length of each segment
	Number of main lanes at each segment
	Functional class
	Posted speed
	Number of grade separated interchanges along each segment
	Capacity
Volumes	Average daily AM and PM peak period (total traffic and truck only traffic)
	Day of week traffic pattern (total traffic and truck only traffic)
	Monthly traffic pattern (total traffic and truck only traffic)
	Percent of small, medium and heavy trucks
Operation Performance measures	Average peak period V/C
	Average congested speed during peak periods
	Peak periods vehicle hours of delay



Source: California Statewide Model Network, Aerial images

Figure 4-1. Study segments

The Caltrans statewide truck network and the San Joaquin passenger model network were used to identify design characteristics of each segment in the study area. Furthermore, a close examination of overall traffic along I-5 and SR 99 provided an understanding of the relationship between commodity flows and truck traffic patterns along I-5 and SR 99 in the region.

4.1 Overall Traffic Patterns

The data from 912 PeMS stations located on state highways and freeway main lines for 2014 were combined and processed. There are 382 stations on SR 99, 151 stations on I-5, 71 stations on North/South highways, and 237 on East/West truck routes in the Valley. Since the focus of this study is interregional movements, stations in high-density urban areas were excluded.

PeMS is the only data source that provides continuous information about speeds and volumes throughout the year at each location. It is the best data source to examine seasonality, day of week patterns and peak and off-peak hour volumes. It also provides average speed during each hour. This information was used to calculate vehicle hours of delay during peak periods. PeMS detectors do not differentiate vehicle type but combining this database with local counts, GPS data and weigh-in-motion (WIM) counts provides a good indication of overall traffic and truck traffic flows in the study area.

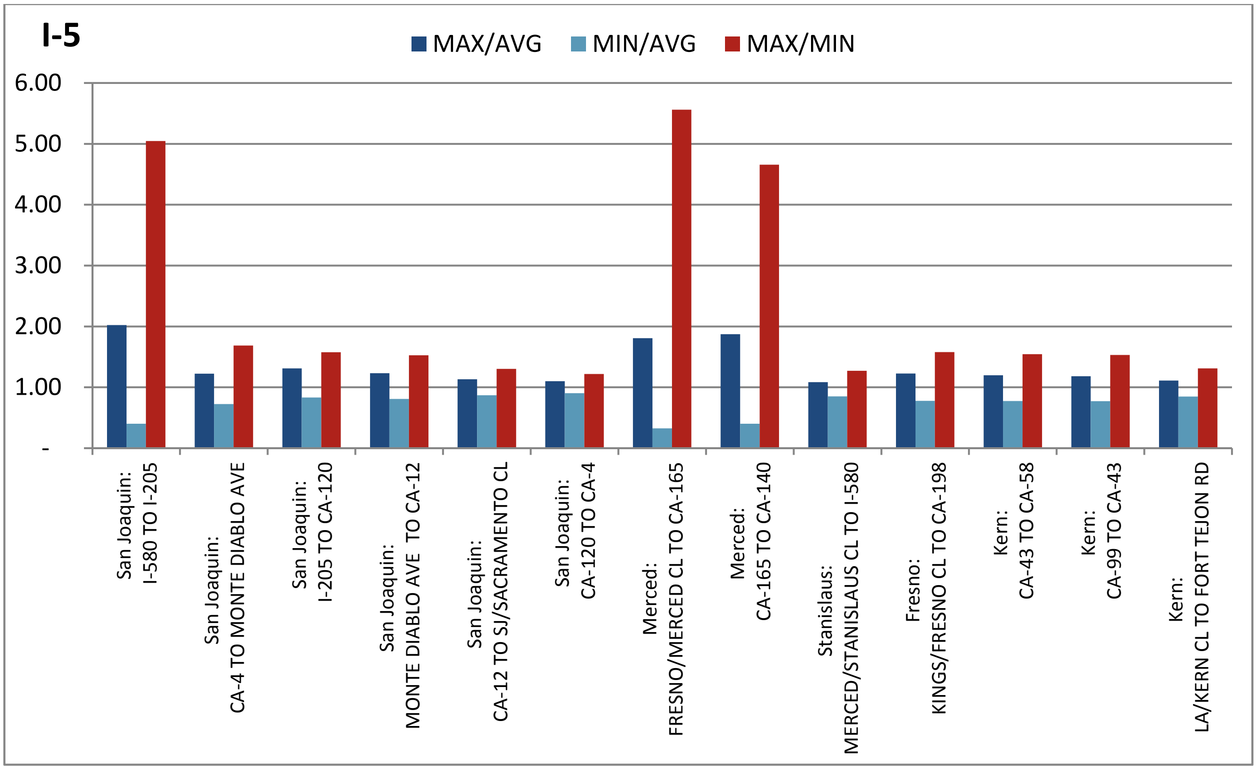
Monthly Traffic Pattern

Monthly and daily traffic patterns for each segment are provided on the web map. Fifty of 152 segments in the study area have a PeMS station. Some segments have more than one PeMS station. At the time of this study there was no PeMS station at Kings County. Therefor there is no representative of study segments from Kings County in figures and tables of seasonality and temporal analysis.

The seasonality effect is not the same for all segments. To measure the extent of seasonal variation in traffic, three ratio of $\frac{Maximum\ month}{minimum\ month}$, $\frac{Maximum\ month}{monthly\ average}$, $\frac{Minimum\ month}{monthly\ average}$ for each segment is calculated, where these ratios are close to 1 the average, maximum and minimum traffic volume along the segment are close and the seasonality effect is not significant.

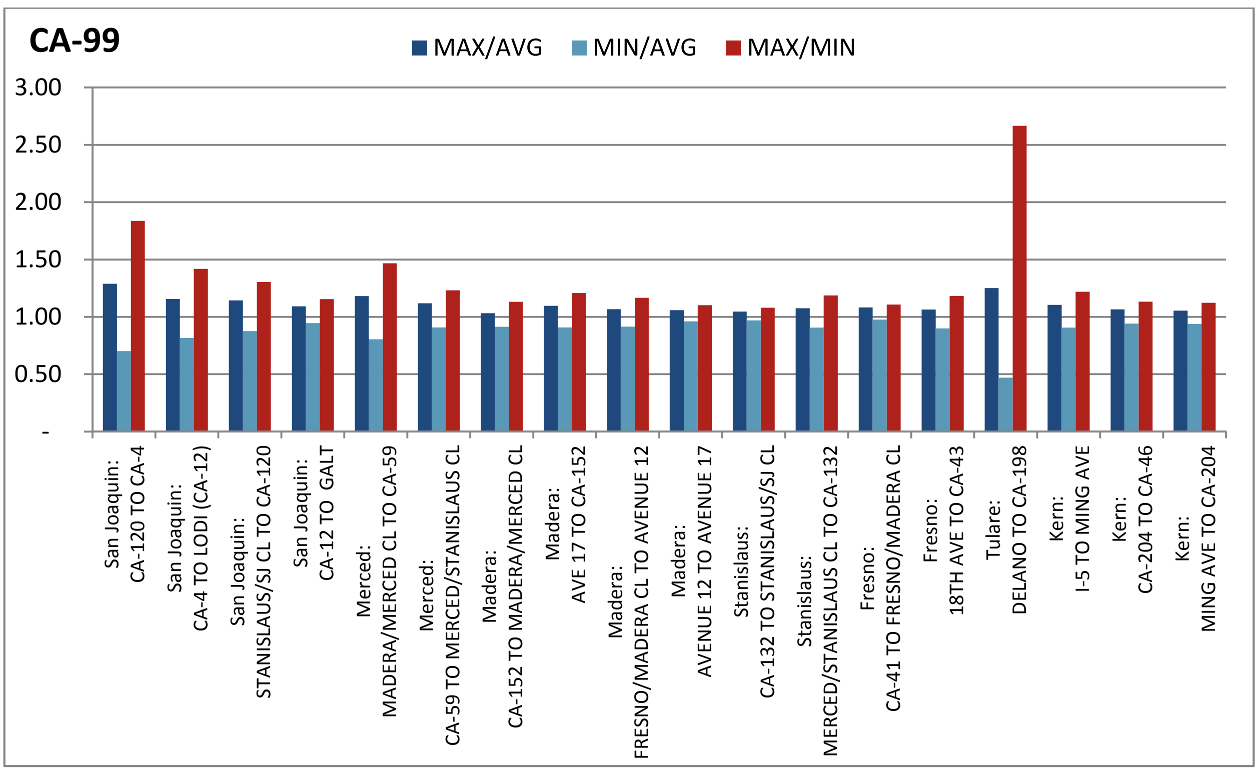
Source: [PeMS, 2014]
Figure 4-2 and *Source: [PeMS, 2014]*
Figure 4-3 show seasonality of several segments along I-5 and SR 99. In general, I-5 traffic patterns show more variability by month. The highest seasonality effects for both corridors are in San Joaquin and Merced counties.

The highest and lowest months are not consistent among different segments of the I-5 and SR 99 corridors. Overall the highest months are April to July and the lowest months are December to February.



Source: [PeMS, 2014]

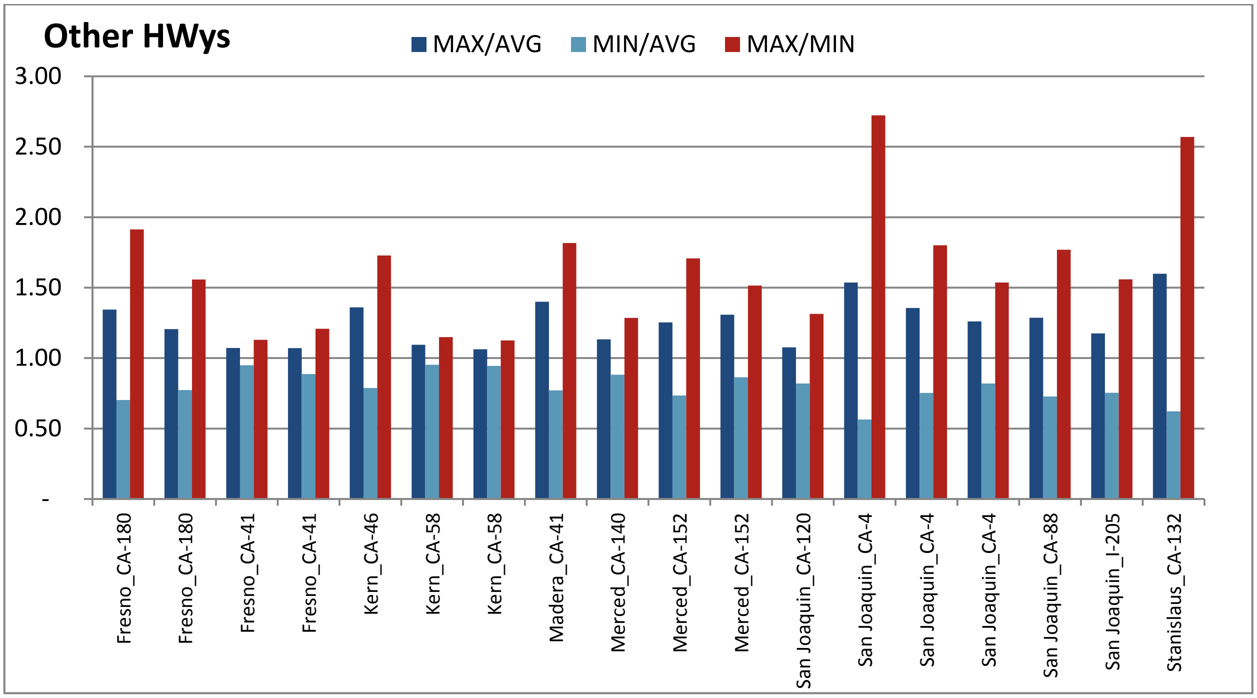
Figure 4-2. Seasonality effect for stations on I-5



Source: [PeMS, 2014]

Figure 4-3. Seasonality effect for stations on SR 99

The seasonality effects on the other state highways are shown in *Source: [PeMS, 2014]*
Figure 4-4. The seasonality effect in San Joaquin and Merced County is greater than other counties. The highest and lowest month varies and there is no consistent pattern. Please refer to the fact sheets on the web map for each segment for the detailed seasonality pattern. A count of available PeMS detectors per highway segment is available in the appendix of this report.

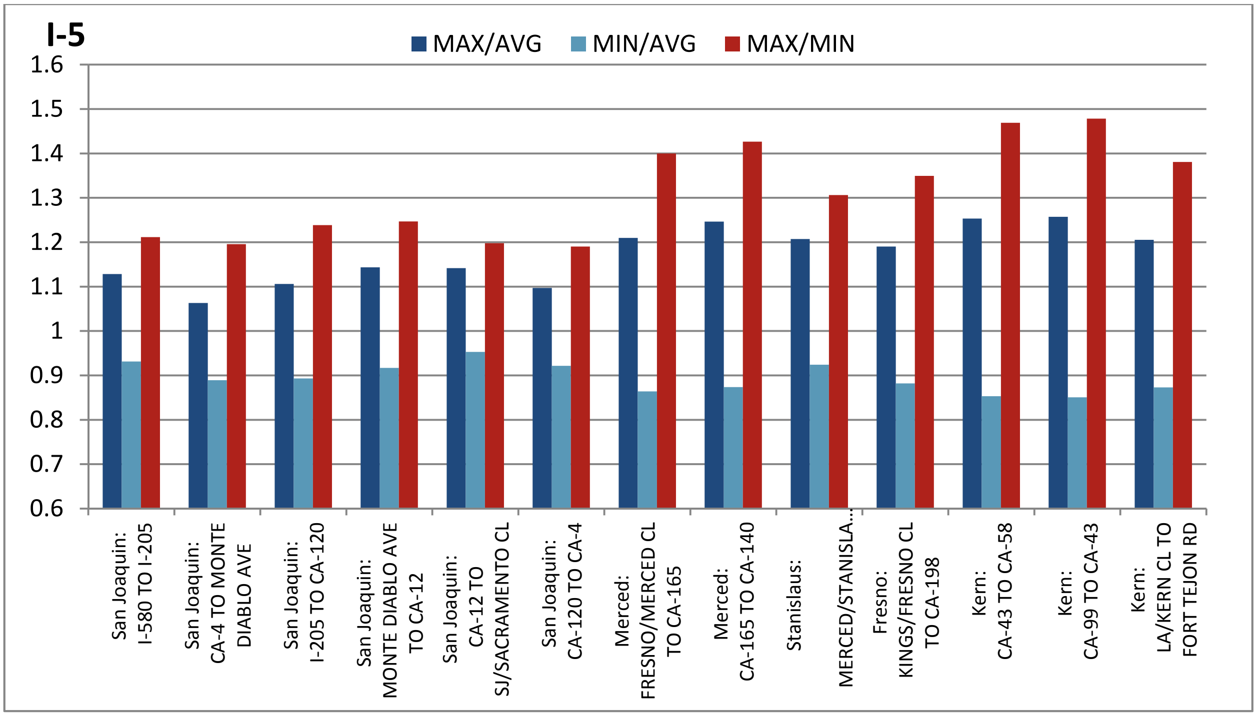


Source: [PeMS, 2014]

Figure 4-4. Seasonality effect for stations on other Highways in the Valley

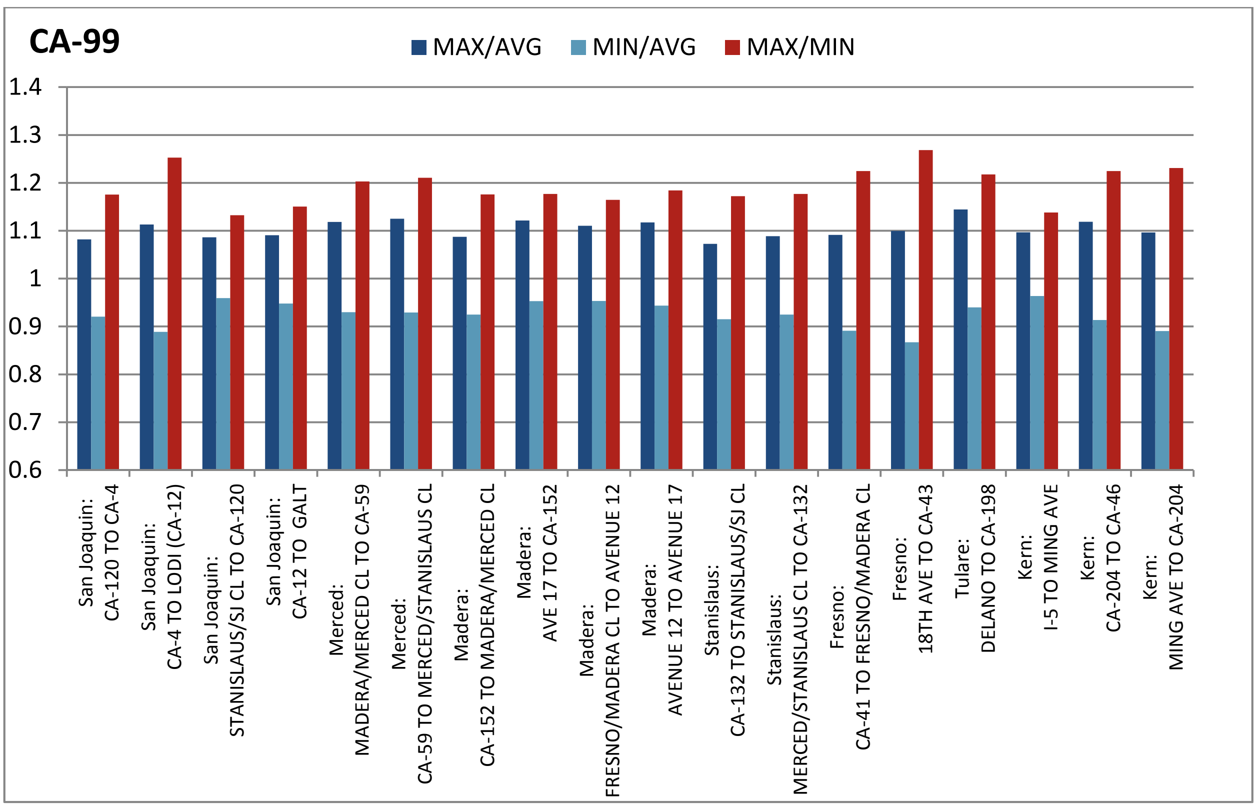
Day of Week Traffic Pattern

The fluctuations of traffic by days of the week are more significant and consistent along the corridor than seasonal patterns. Similar to monthly traffic patterns, Merced County and San Joaquin County present the highest daily fluctuation. *Source: [PeMS, 2014]*
Figure 4-5 , *Source: [PeMS, 2014]*
Figure 4-6 and *Source: [PeMS, 2014]*
Figure 4-7 show the daily effect on segments along I-5, SR 99 and other state highways. Thursdays and Fridays are consistently the busiest days of the week across most segments of I-5, SR 99 and other state highways in the Valley. The lowest daily traffic on most segments of SR 99 and other state highways happen on Saturday and Monday, while the I-5 corridor has the least daily traffic on Saturday or Tuesday.



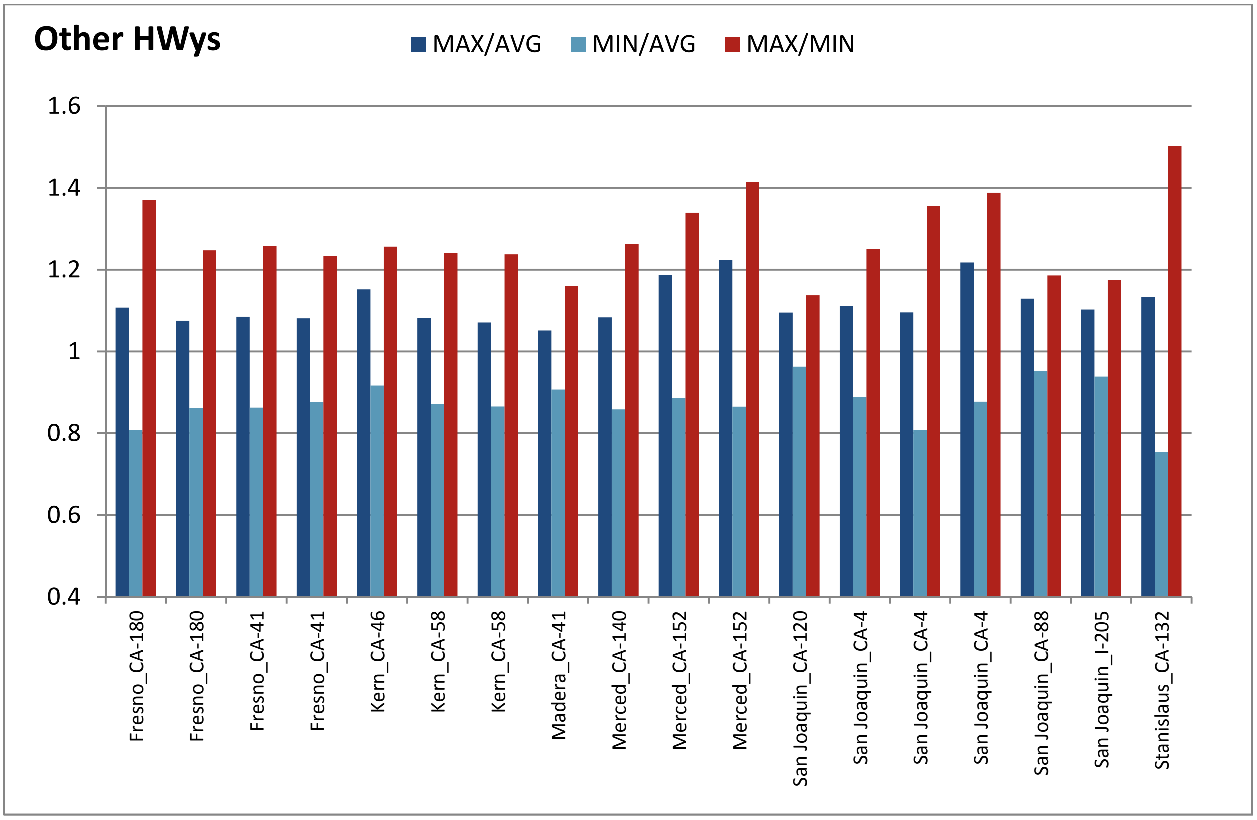
Source: [PeMS, 2014]

Figure 4-5. Daily effect for stations on I-5



Source: [PeMS, 2014]

Figure 4-6. Daily effect for different stations on SR 99



Source: [PeMS, 2014]

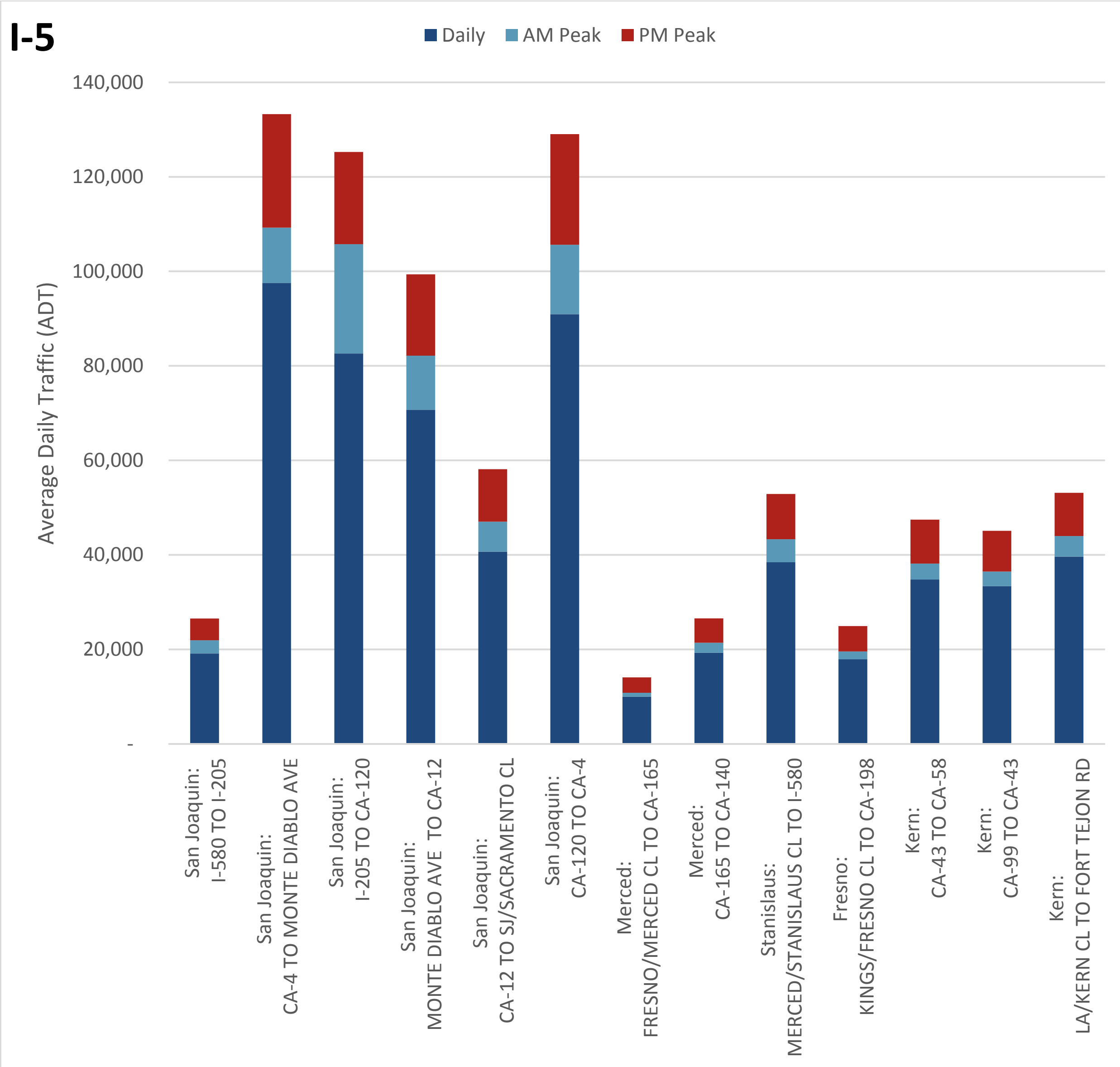
Figure 4-7. Daily effect for stations on other highways in the Valley

Time of Day Traffic Pattern

For this study AM and PM peak periods are defined as 6:00 to 9:00 AM and 3:00 to 7:00 PM respectively. *Source: [PeMS, 2014]*
Figure 4-8 and *Source: [PeMS, 2014]*
Figure 4-9 show average daily traffic (ADT) on different segments of I-5 and SR 99 and their share of AM and PM peak period traffic.

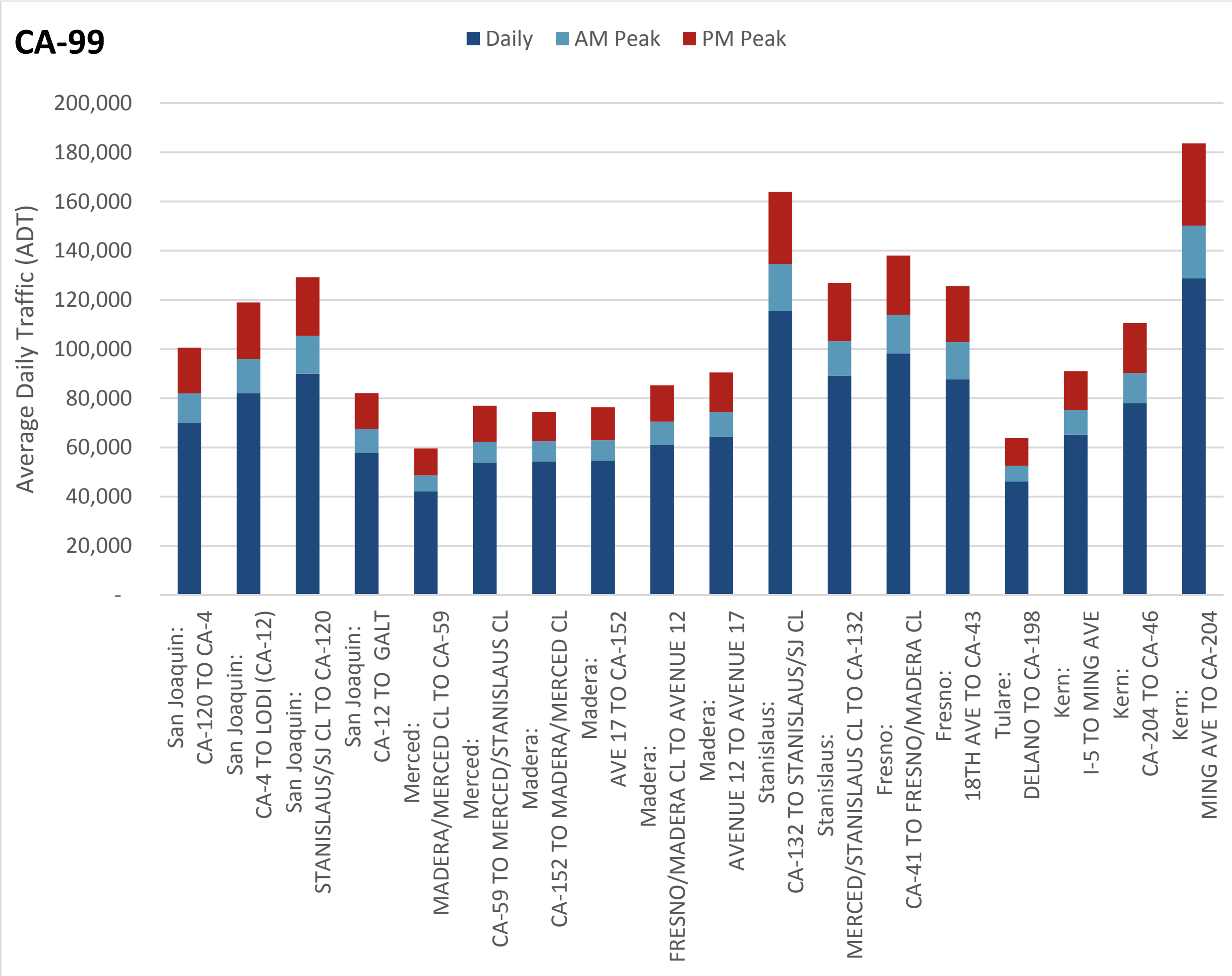
On the I-5 corridor, on average, 10 to15 percent of daily traffic occurs during 3-hour AM peak period and 24 to 32 percent of the traffic happens during the 4-hour PM peak period. There are two exceptional segments: 1) I-5 between I-205 and CA-120 with a morning peak of 28 percent of daily traffic, and 2) I-5 between the Merced/Fresno County line and CA-165, with a PM peak period at 37 percent of daily traffic.

On SR 99, the average share of morning peak period to daily traffic is 14 to 17 percent and the average share of PM peak period is 25 to 30 percent. Therefore, the traffic on SR 99 has more time of day peaking than I-5.



Source: [PeMS, 2014]

Figure 4-8. Daily and peak period volumes for stations on I-5

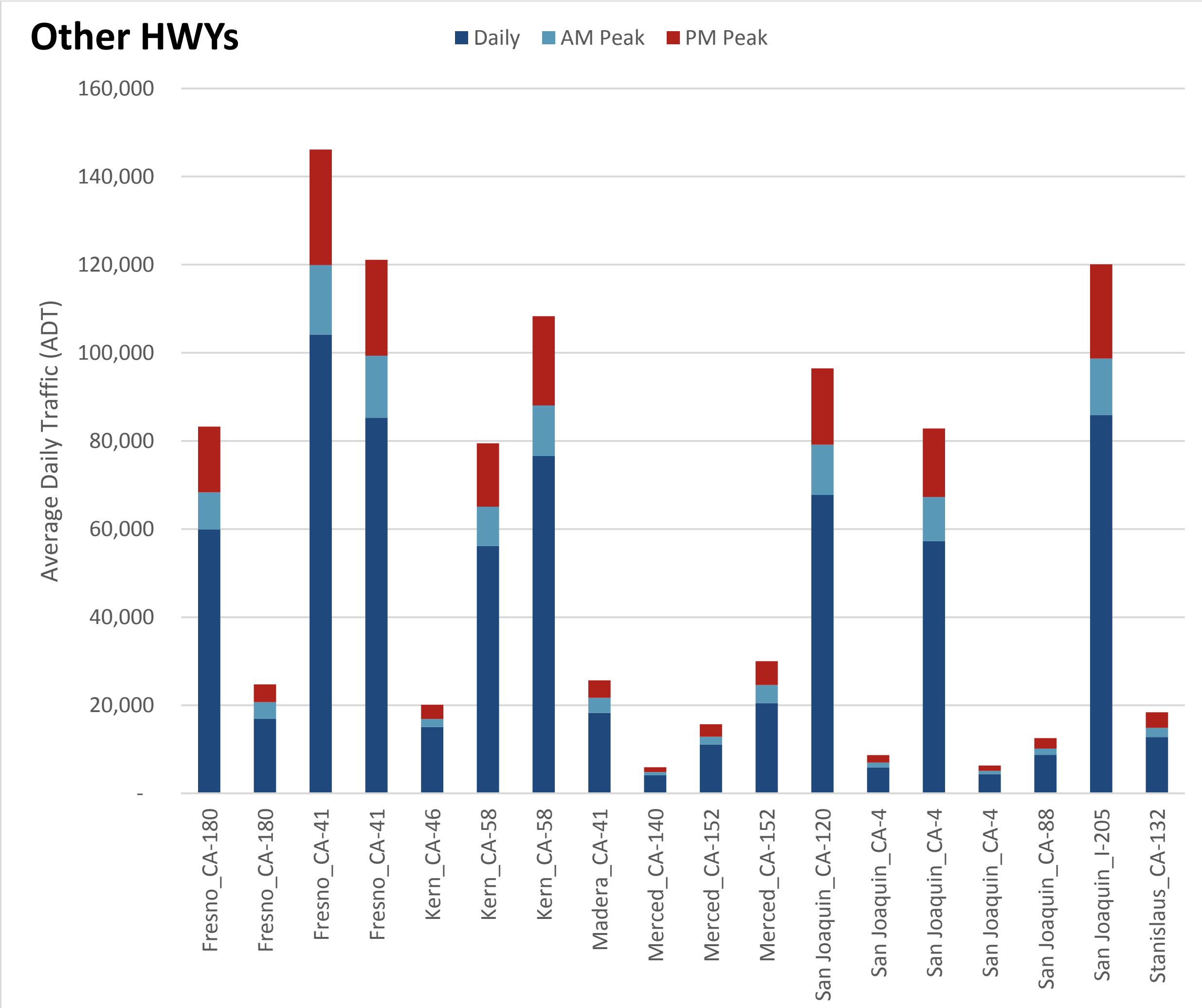


Source: [PeMS, 2014]

Figure 4-9. Daily and peak period volumes for stations on SR 99

On the other state highways, the traffic during the AM peak period is about 15 to 20 percent of the average daily traffic. The exceptions are: CA-180 between Clovis (Temperance Avenue) to CA-63 and CA-46 between I-5 and the San Luis Obispo/Kern County line. The AM peak period traffic on these two segments are 22 and 12 percent, respectively.

Traffic during the PM peak period is between 22 to 28 percent of the average daily traffic on the other state highways in the Valley. *Source: [PeMS, 2014]*
Figure 4-10 shows the AM and PM peak period shares of traffic and average daily traffic on the other state highways in the Valley.



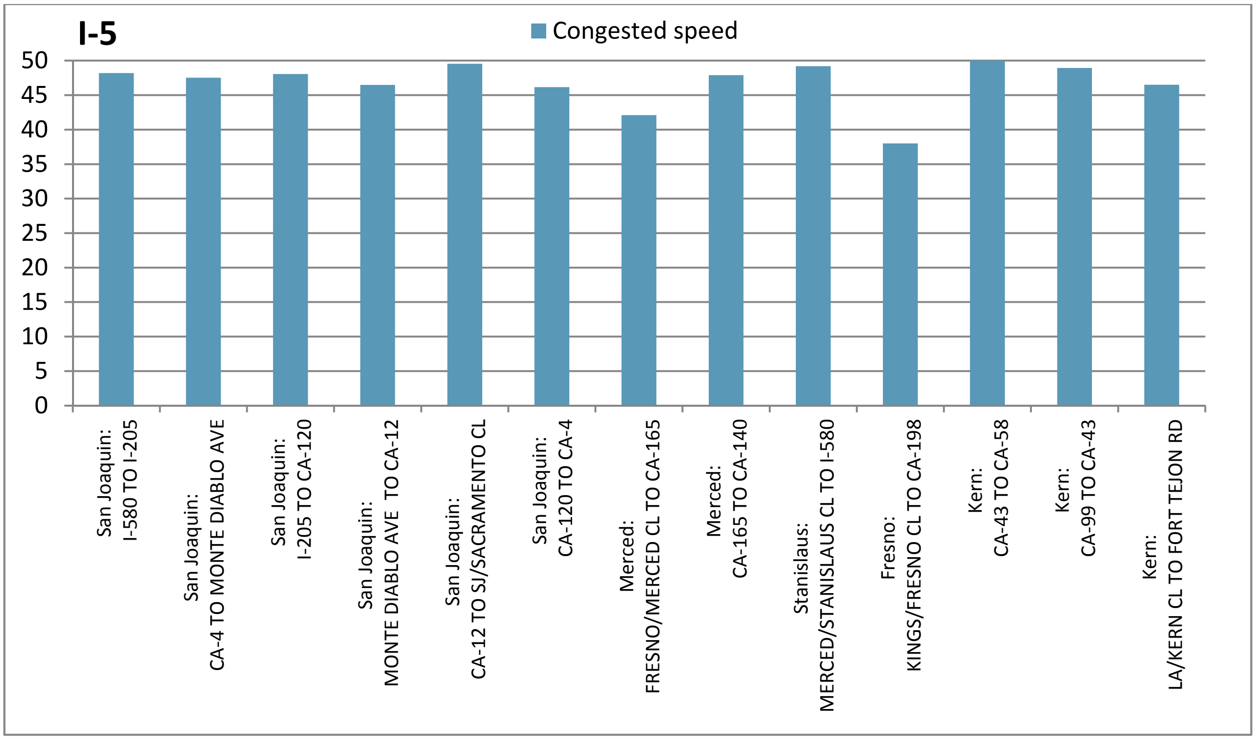
Source: [PeMS, 2014]

Figure 4-10. Daily and peak period for stations on other highways in the Valley

Traffic Operation Performance Measures

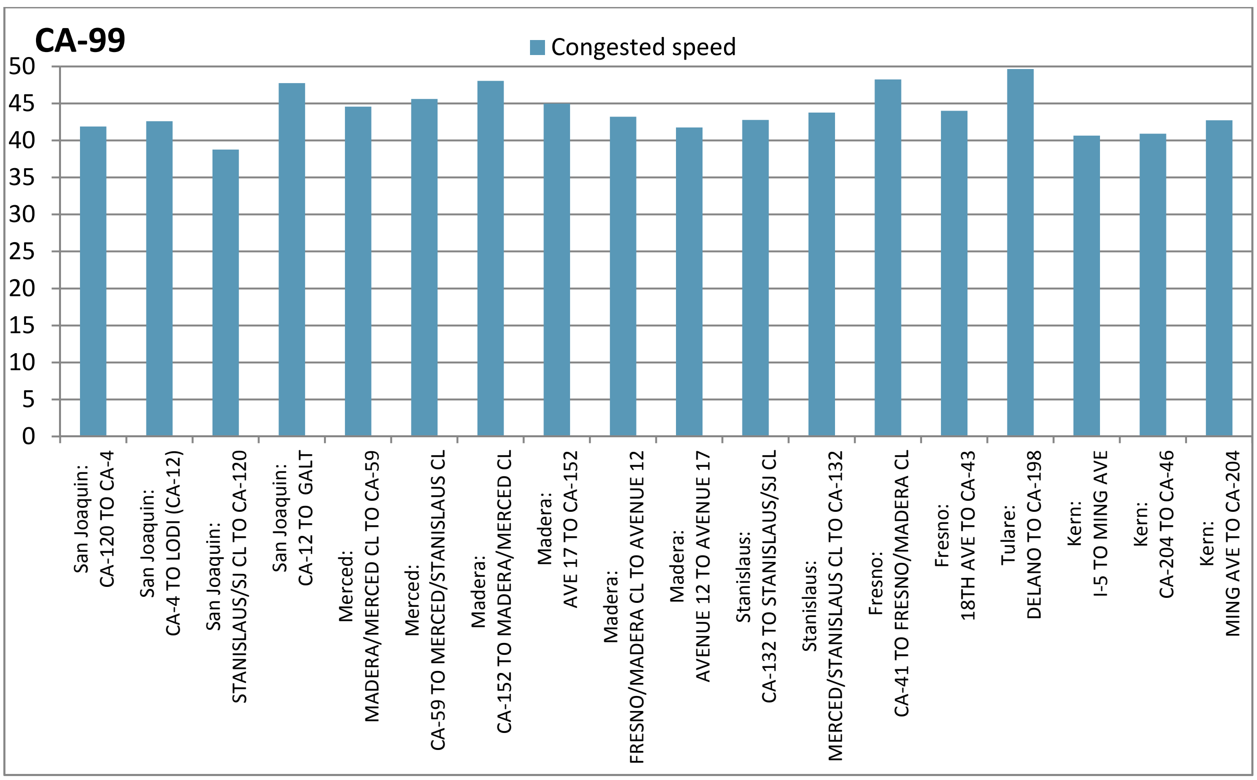
The average congested speed during the AM and PM peak periods for the year of 2014 along segments of I-5 and SR 99 are calculated and shown in *Source: [PeMS, 2014]*
Figure 4-11 and *Source: [PeMS, 2014]*
Figure 4-12. The posted speed limit on all of these segments is 65 mph.

Although congested speeds on some segments of I-5 and SR 99 are 10 to 15 percent slower than posted speed, this does not necessarily mean there is traffic bottleneck. Outside dense urban areas the V/C ratio during peak periods for these corridors is less than 0.65, and the average V/C along I-5 and SR 99 during peak periods is 0.25 and 0.51, respectively.



Source: [PeMS, 2014]

Figure 4-11. Congested speed during peak periods on different stations on I-5



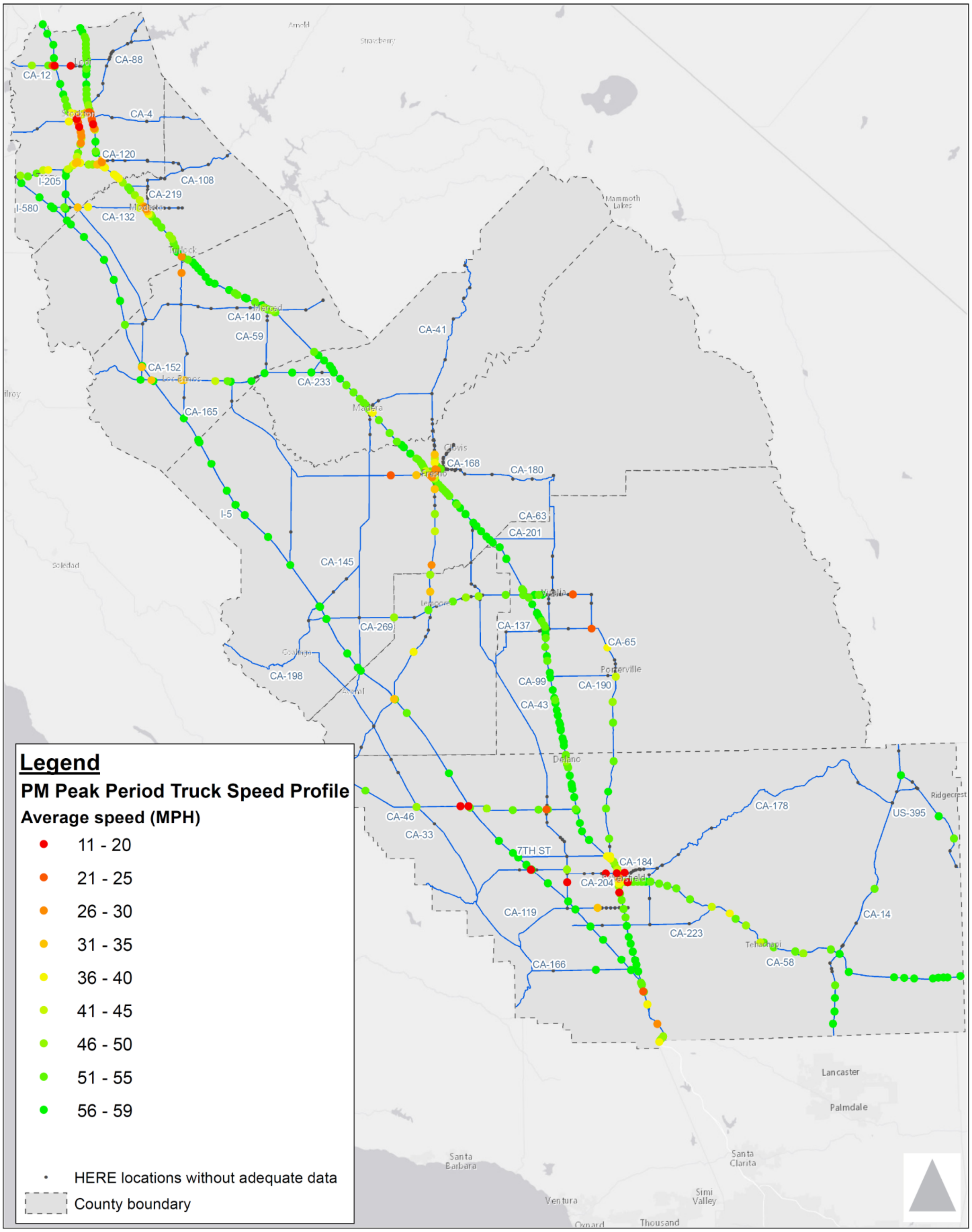
Source: [PeMS, 2014]

Figure 4-12. Congested speed during peak periods on stations on SR 99

We also analyzed HERE speed data for the month of October 2015 to identify congested locations along the state highways in the Valley. "HERE" also known as the National Performance Management Research Data Set (NPMRDS) and have larger coverage relative to PeMS. These data are collected at locations across the state highway network of the United States. Each location is made up of a certain length of roadway and is available in either direction. Data are averaged by five-minute increments and gathered into one-month batches by state. The data coverage is generally comprehensive, but not all locations have robust data sets for all times of all days of a given month.

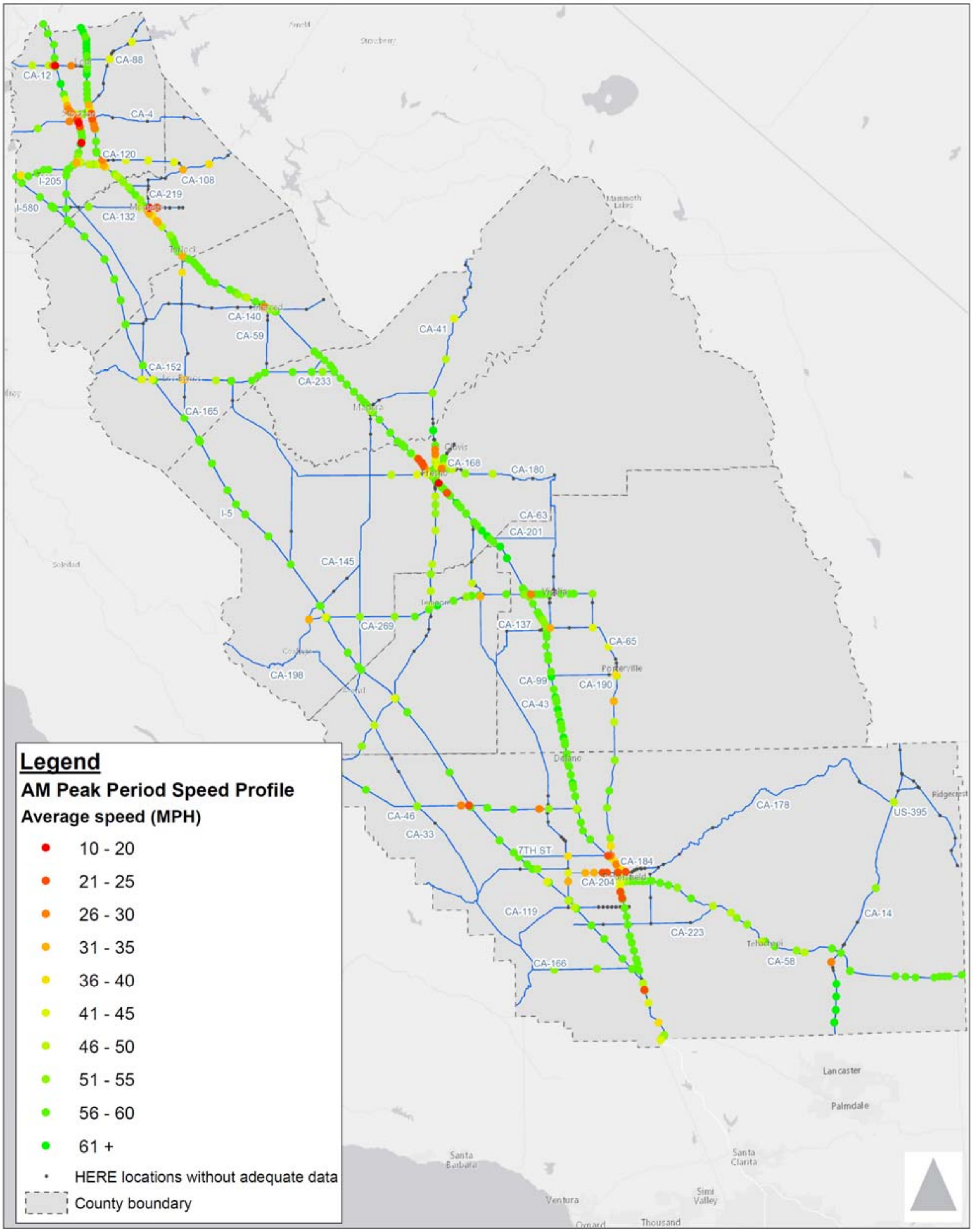
The speed profile for all locations on Tuesday through Thursdays of the month during AM and PM peak periods (6-9am/4-7pm) were extracted. Locations with at least 10 days of available data were considered for this analysis. To evaluate the performance of each segment during peak periods, the lowest 15 minute average speed (slowest average weekday travel speeds for any 15 minutes of the peak period) was considered as congested speed. The results for AM and PM peak periods are shown in *Source: [HERE, October 2015]*

Figure 4-13 and



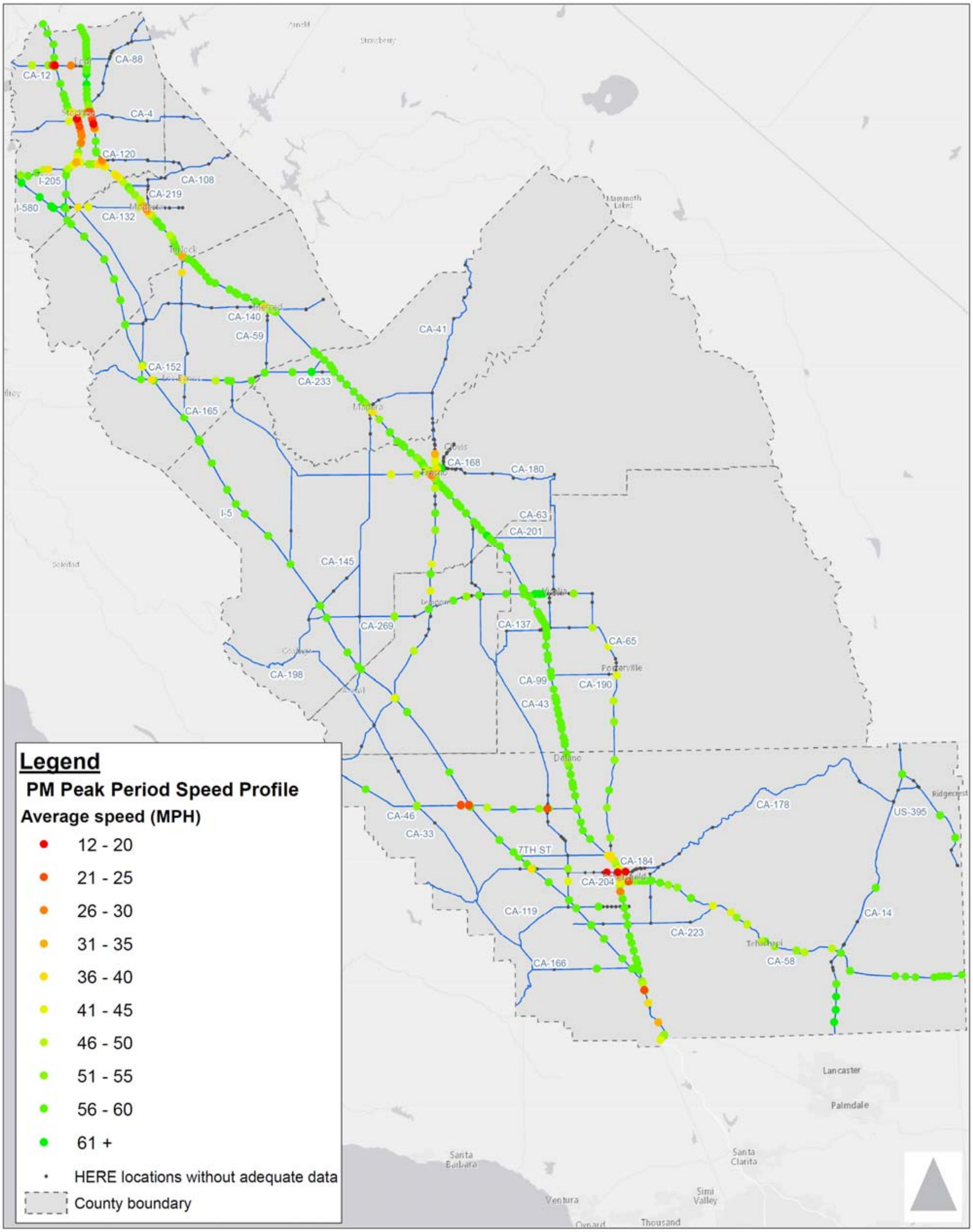
Source: [HERE, October 2015]
Figure 4-22.

Similar to PeMS speed profile, the HERE speed data does not show any major congestion bottlenecks outside urban areas. It should be noted that HERE and PeMS data base do not have detail coverage at ramps and interchanges where most road users experience delay.



Source: [HERE, October 2015]

Figure 4-13. Congested speed during AM peak periods



Source: [HERE, October 2015]

Figure 4-14. Congested speed during PM peak periods

4.2 Truck Traffic Patterns

There are 13 Caltrans WIM Stations in the San Joaquin Valley. This is the only continuously available database that provides truck classification data by axle configuration. There are four stations along I-5, three stations along SR 99, and six other stations on other state highways, as shown in Table 4-2.

Table 4-2. Segments Fact Sheets

WIM Station ID	Location
I-5 Stations:	
1	I-5 San Joaquin County at post mile 43.7 near Lodi
27	I-5 San Joaquin County at post mile 7.4 near Tracy
7	I-5 San Merced County at post mile 20.2 near Santa Nella
73	I-5 Kern County at post mile 48.7 near Stockdale
SR 99 Stations:	
74	SR 99 Kern County at post mile 20.2 near Bakersfield*
10	SR 99 Fresno County at post mile 25 near Fresno
75	SR 99 Stanislaus County at post mile R8.4 near Keyes
Other Highways:	
113	CA-580 San Joaquin County at post mile 8.2 near Carbona
44	CA-205 San Joaquin County at post mile R9.5 near Banta
99	CA-102 Tuolumne County at post mile 6.4 near Tulloch
115	CA-65 Tulare County at post mile R23.4 near Porterville
114	CA-58 Kern County at post mile R64.9 near Arvin
36	CA-33 Merced County at post mile 20.2 near Los Banos
The 2014 database did not include data for* ***WIM Station 74 on SR-99*	

Source: [WIM, 2014]

Data collected by the WIM stations in 2014 was processed and summarized to study seasonal and daily traffic patterns. Some stations were under maintenance during some months, and due to technical issues, the April data was deemed unusable.

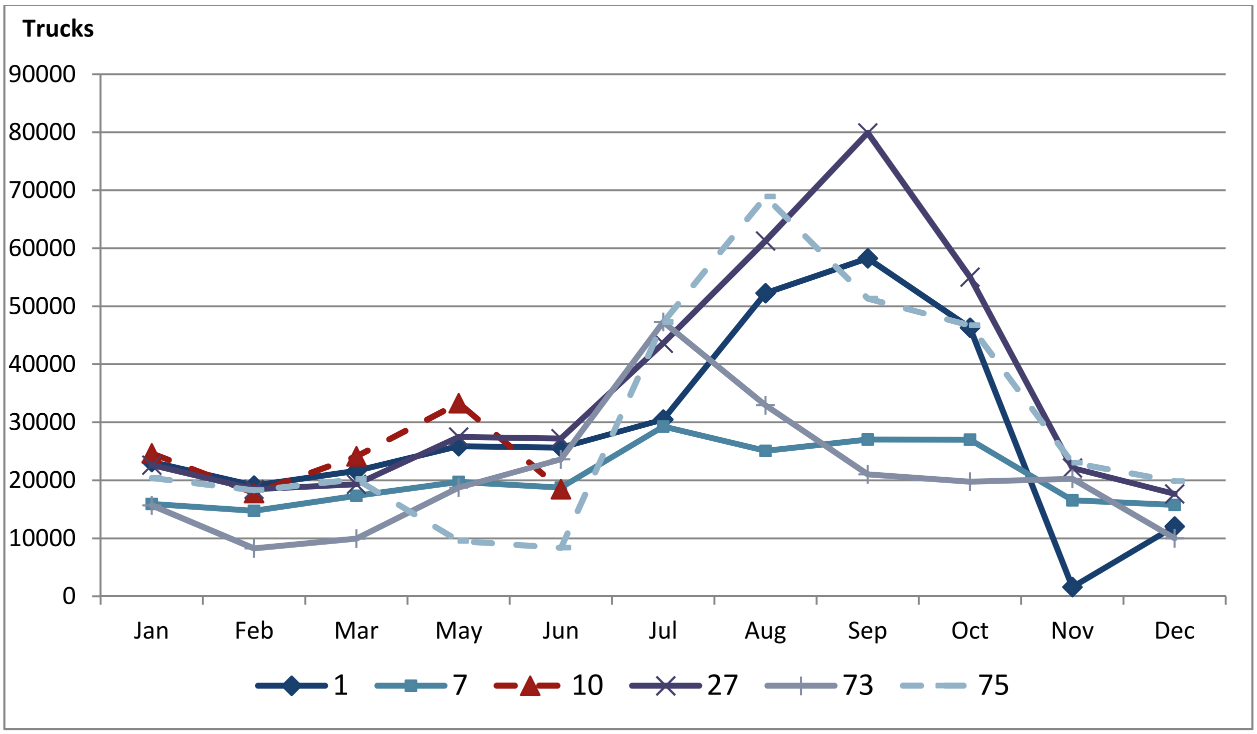
The truck data available from the WIM stations is classified using the FHWA's axle-based truck classifications. For the purpose of this study, the nine FHWA truck classifications were aggregated into three groups as follows:

- Heavy-heavy duty trucks: multi-trailer trucks with 5 or more axles representing FHWA classes 11-13
- Medium-heavy duty trucks: Single-trailer trucks with 3 or more axles representing FHWA classes 8-10

- Light-heavy duty trucks: Single unit trucks representing FHWA classes 5-7

Although WIM counts do not reveal body classification or origin/destination information, previous surveys indicate that the origin and/or destination of the majority of trucks on SR 99 is within the San Joaquin Valley; whereas, the majority of trucks on I-5 have origins or destinations in Southern California, the Bay Area, or Sacramento. This topic is discussed further in Section 6.

Figure 4-15, *Source: [WIM, 2014]*
Figure 4-16, and *Source: [WIM, 2014]*
Figure 4-17 show monthly traffic patterns for Heavy-, Medium- and Light- heavy duty trucks for stations along I-5 and SR 99 with available truck classification data. Dashed lines display the stations along SR 99 and solid lines display stations along I-5.



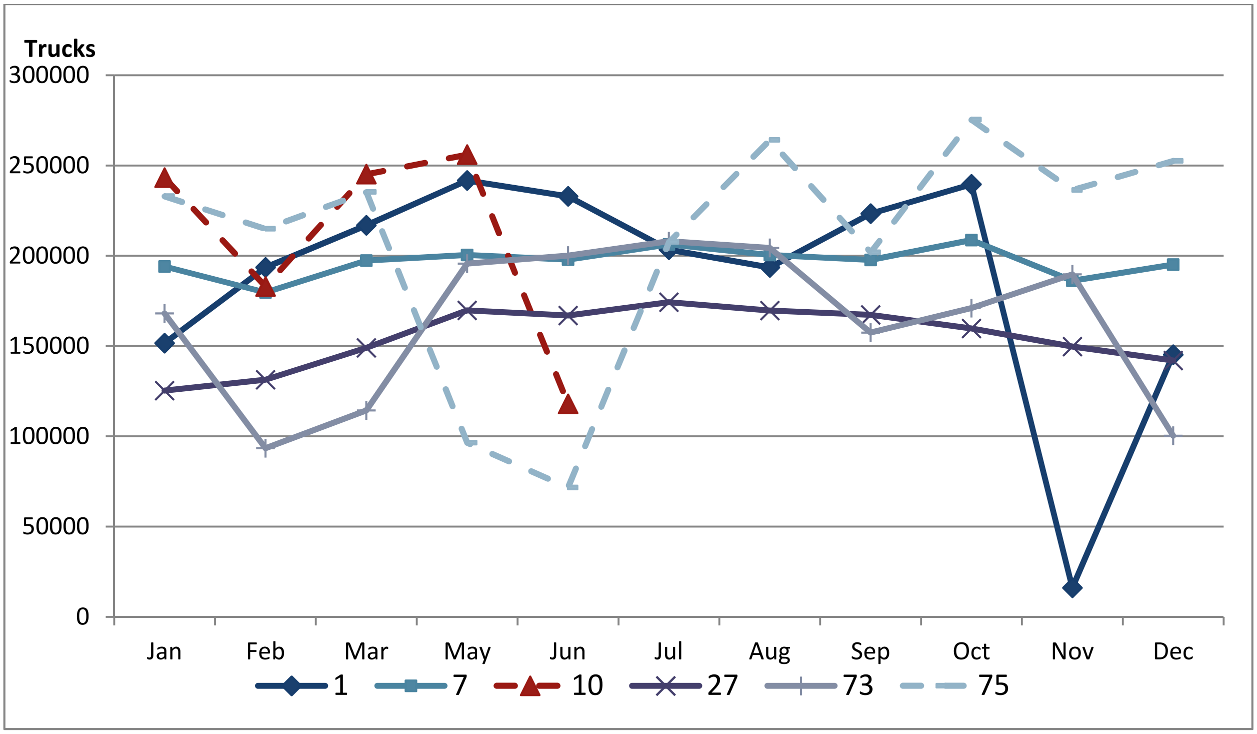
Source: [WIM, 2014]

Figure 4-15. Monthly traffic pattern for Heavy-heavy duty trucks on I-5 & SR 99

There is a clear difference in the seasonality effect for different truck classes. The peak season for Heavy-heavy duty trucks is between July and October for both I-5 and SR 99. The data for Station 1 on I-5 for November is not reasonable. This might be due to a calibration issue at the station. The data for Station 10 on SR 99 in Fresno County was not available between July and December. Heavy-heavy duty trucks contribute between 7 to 14 percent of total truck traffic on I-5 of SR 99. The share of Heavy-heavy duty trucks on I-5 is slightly higher (11 percent on I-5 versus 9 percent on SR 99)

Overall, Medium-heavy duty trucks have more monthly variation. Station 75 on SR 99 at Stanislaus County shows the largest monthly variation. Station 10 on SR 99 at Fresno County also shows similar fluctuation for available months.

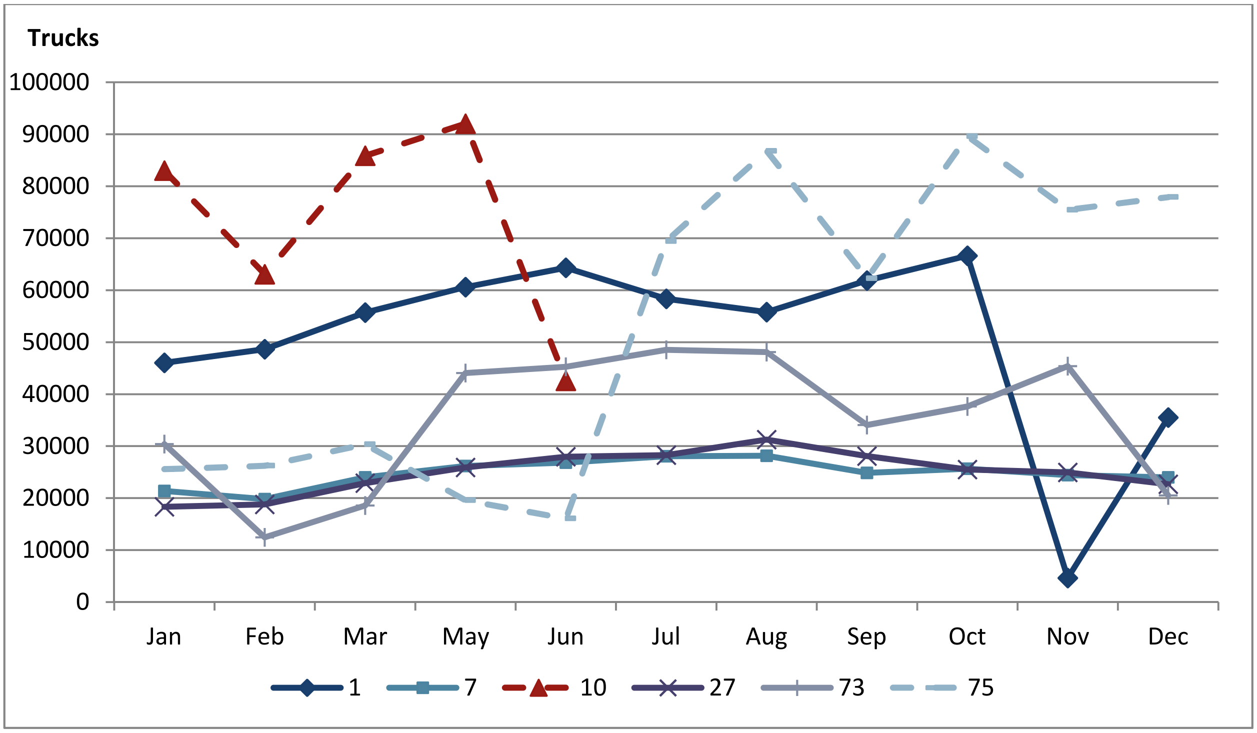
Medium-heavy duty trucks contribute between 60 to 85 percent of the total truck traffic on I-5 and SR 99. The average share of Medium-heavy duty truck on I-5 is 75 percent, whereas it is 70 percent on SR 99.



Source: [WIM, 2014]

Figure 4-16. Monthly traffic pattern for Medium-heavy duty trucks on I-5 & SR

The Light-heavy duty trucks are 11 to 24 percent of total truck traffic on SR 99 and 1 to 21 percent of total traffic on I-5. The monthly variation of Light-heavy duty trucks varies significantly at different stations with no specific pattern. Please refer to the fact sheets for each segment for detailed seasonal effects of truck traffic at each segment.



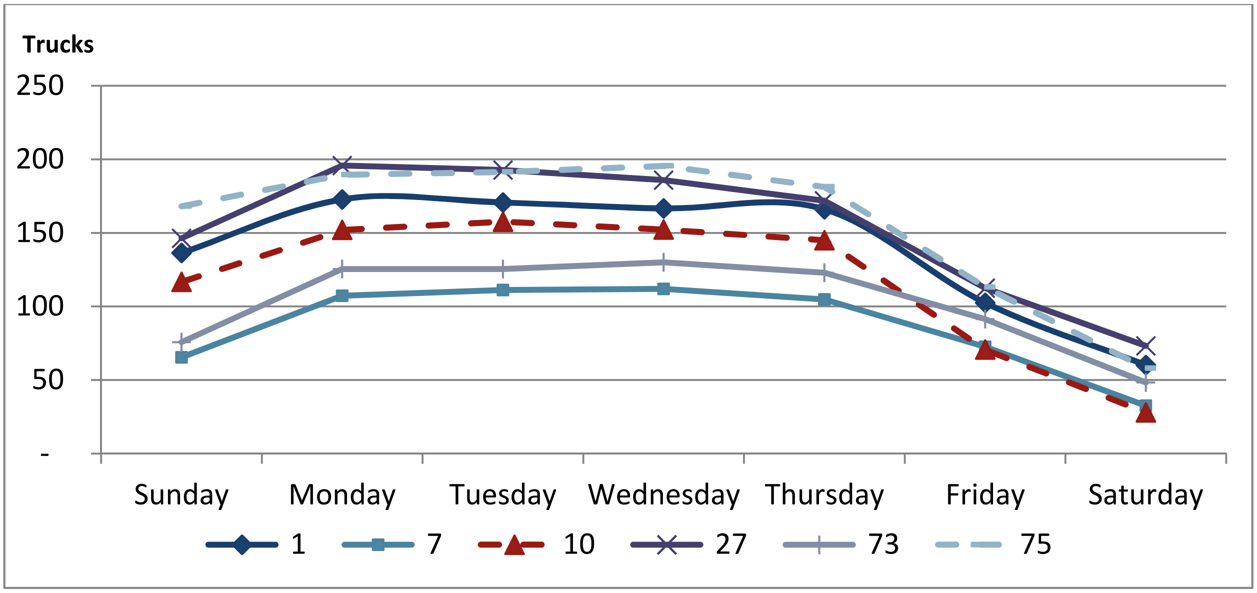
Source: [WIM, 2014]

Figure 4-17. Monthly traffic pattern for Light-heavy duty trucks on I-5 and SR 99

Truck Traffic Patterns by Day of Week

Source: [WIM, 2014]
Figure 4-18 and *Source: [WIM, 2014]*
Figure 4-19 and *Source: [WIM, 2014]*
Figure 4-20 represent the day of week traffic patterns for Heavy-, Medium-, and Light-heavy duty truck traffic on I-5 and SR 99. The pattern for all truck categories is similar. Mondays through Thursdays have steady and higher traffic than Fridays and Sundays. As expected, Saturdays have the lowest truck traffic.

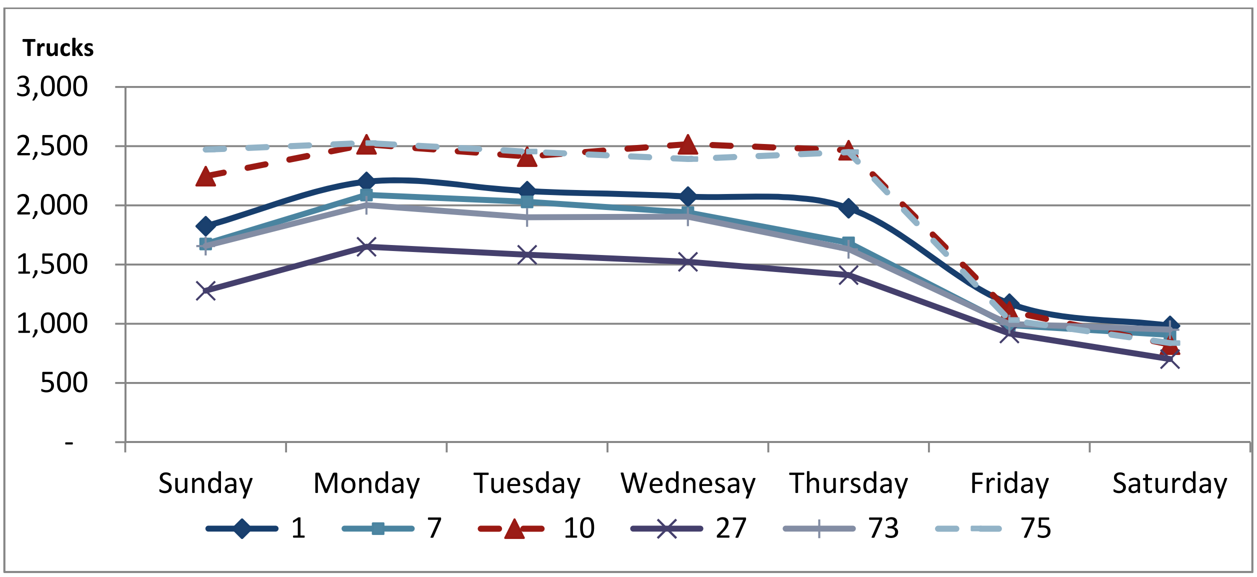
Survey data shows that the duration of trips for trucks on SR 99 are usually less than a day round trip and many trucks are traveling between similar facilities for a week.



Source: [WIM, 2014]

Figure 4-18. Day of Week traffic pattern for Heavy-heavy duty trucks on I-5 & SR 99

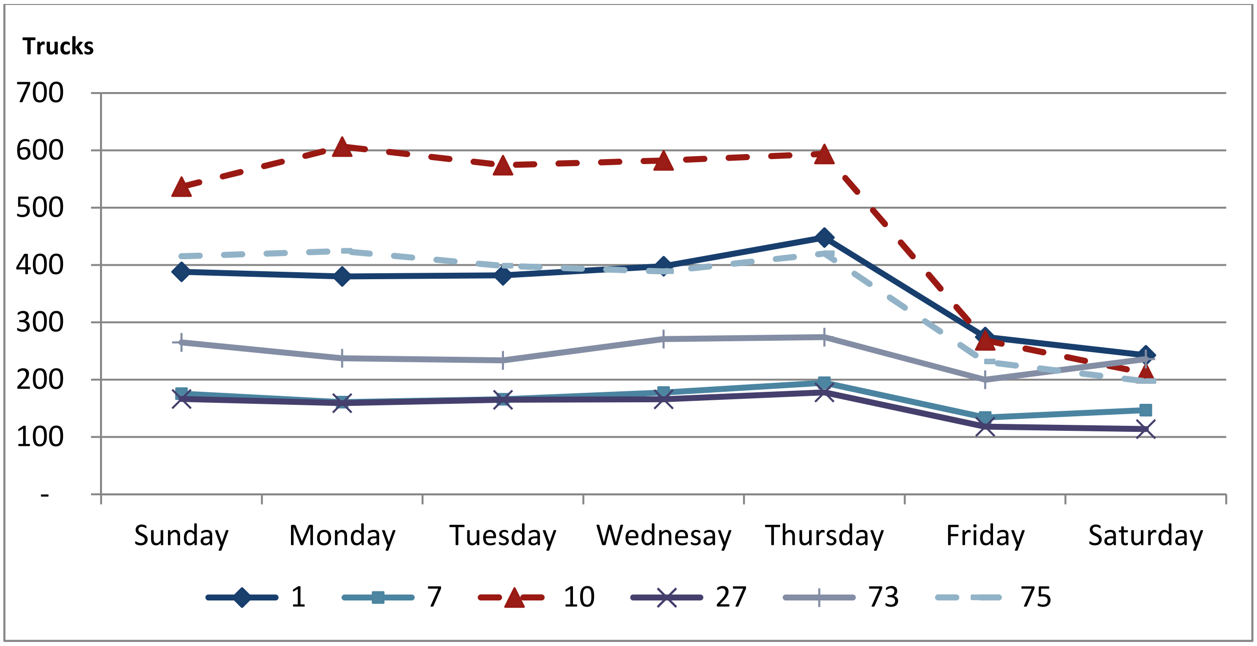
Heavy-duty trucks on I-5 on Fridays and Sundays are about 60 to 75 percent of average daily traffic, whereas for SR 99 this ratio is 50 to 60 percent.



Source: [WIM, 2014]

Figure 4-19. Day of week traffic pattern for Medium-heavy duty trucks on I-5 & SR 99

Medium-heavy duty trucks on I-5 on Fridays are about 50 to 60 percent of average daily traffic, and on Sundays are about 88 percent of average daily traffic. Medium-heavy duty trucks on SR 99 on Fridays are about 40 to 45 percent of average daily traffic, and on Sundays are about 90 percent of average daily traffic.



Source: *[WIM, 2014]*

Figure 4-20. Day of week traffic pattern for Light-heavy duty trucks on I-5 & SR 99

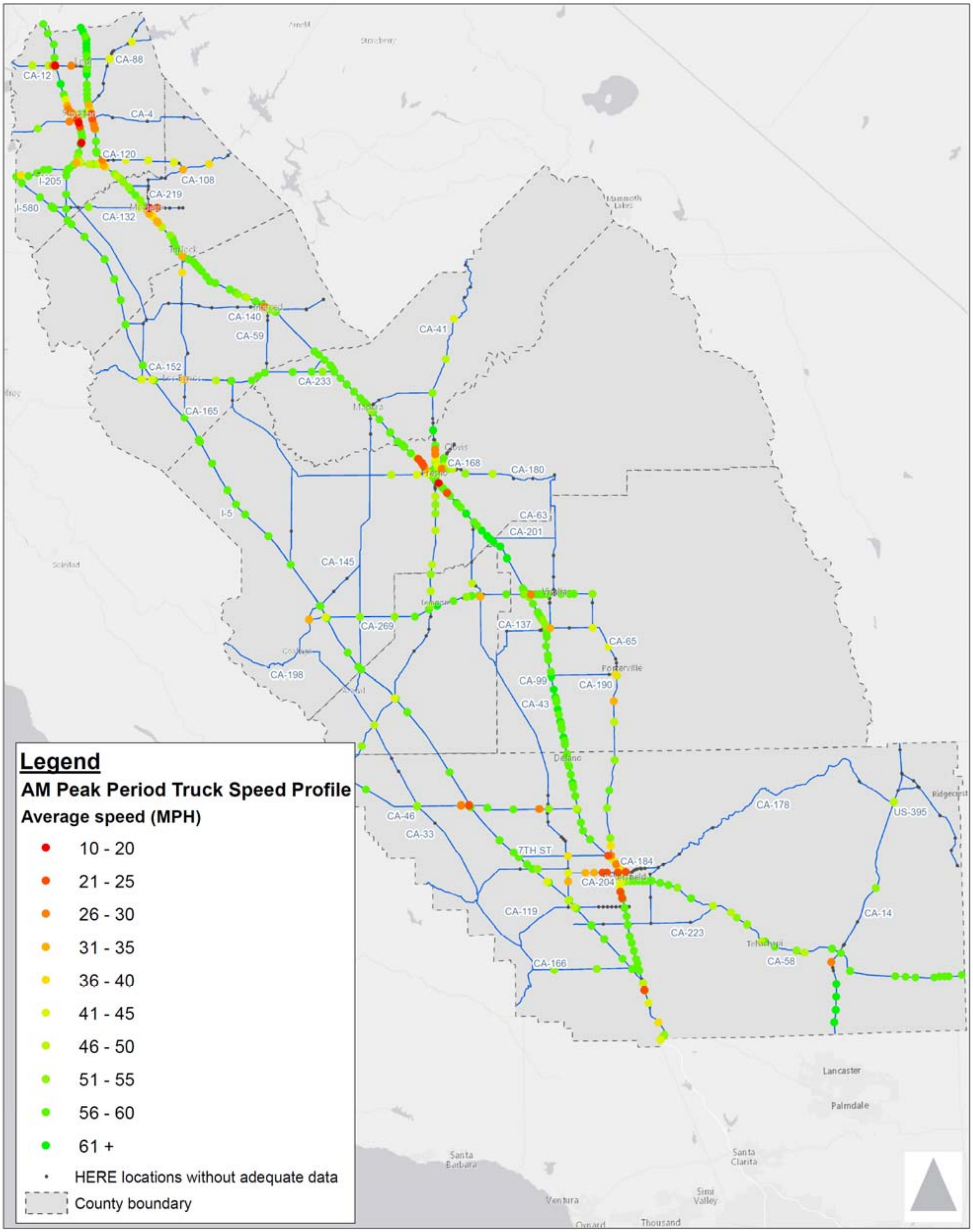
Light-heavy duty trucks on I-5 on Fridays are about 68 to 78 percent of average daily traffic, and on Sundays are about the same as average daily traffic. Light-heavy duty trucks on SR 99 on Fridays are about 51 percent of average daily traffic, and on Sundays are about 5 percent of average daily traffic.

Truck Traffic Operation Performance Measures

As explained in section 4.1 HERE data is used to analyze the speed profile. The average congested truck speed during the AM and PM peak periods for different segments of state highway in the Valley are calculated and shown in Source: *[PeMS, 2014]*

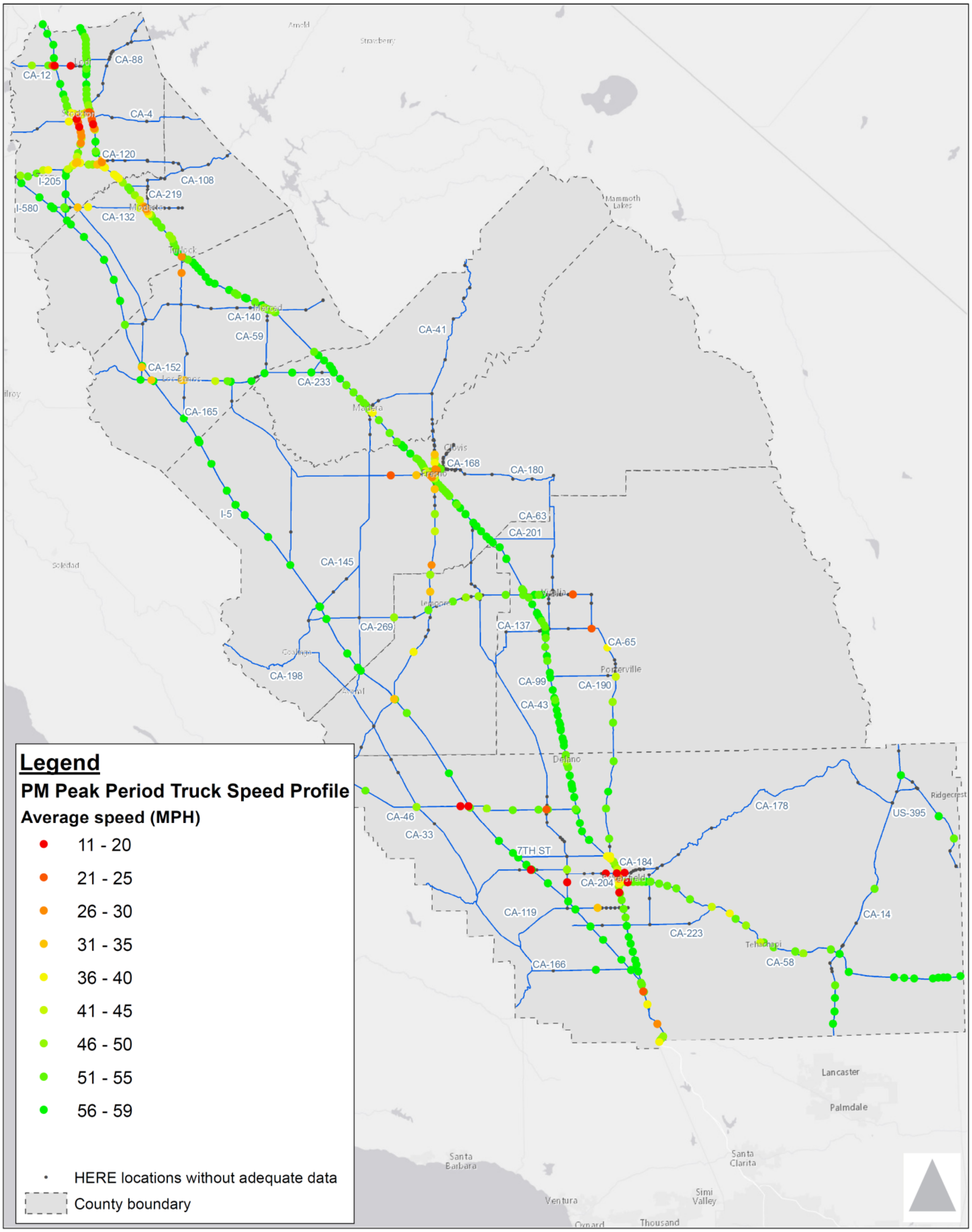
Figure 4-11 and Source: *[PeMS, 2014]*

Figure 4-12. Although congested speeds on some segments of I-5 and SR 99 are 10 to 15 percent slower than posted speed, this does not necessarily mean there is traffic bottleneck. Most congested locations are near ramps in urban areas where we do not have good coverage of HERE or PeMS data. Outside dense urban areas the V/C ratio during peak periods for these corridors is less than 0.65, and the average V/C along I-5 and SR 99 during peak periods is 0.25 and 0.51, respectively. Having high truck percentage may cause slower traffic flow along SR 99. The truck percentage for each segment is shown on the fact sheet for each segment on the web map.



Source: [HERE, October 2015]

Figure 4-21. Truck congested speed during AM peak periods



Source: [HERE, October 2015]

Figure 4-22. Congested speed during PM peak periods

5.0 SAFETY AND COLLISION PROFILES

Fehr & Peers analyzed collision data along highway facilities throughout the San Joaquin Valley using data from the Statewide Integrated Transportation Injury Mapping System (TIMS). TIMS provides a user-friendly geocoded database of all collisions reported by California Highway Patrol (CHP) and completely recorded collisions from Local Police Departments (LPD). Incomplete LPD reports, especially where location of the incident is not clear, are not included in TIMS. Although Traffic Records System (SWITRS) is a complete data set of all collision records, the format is not usable for regional safety analysis. The difference between SWITRS and TIMS records is different in different regions and depends on the state of the practice of LPDs. For some jurisdictions in San Joaquin Valley, such as Kings County, this difference is significant. The number of TIMS records was slightly more than 20 percent of the number of SWITRS records. Therefore the severity of safety issues might be underestimated for these regions.

TIMS Data were obtained for all collisions coded as occurring on a state highway in the eight counties between January 1, 2009 and December 31, 2013, the most recent year available. Collisions include all types, causes, and levels of severity, with special attention to comparing patterns for all collisions to only those involving trucks, regardless of fault.

Table 5-1 summarizes collisions by involvement of trucks and by year. During the 5-year period, collisions average 4,551 per year, with truck-involved collisions accounting for over 10 percent of all collisions each year.

Table 5-1. Collisions by truck involvement and year

Collision Involvement	2009	2010	2011	2012	2013	Total
No Truck Involved	4,253	4,147	4,059	3,992	3,886	20,337
Truck Involved	483	479	490	479	489	2,420
% Truck Collisions	10.2%	10.4%	10.8%	10.7%	11.2%	10.6%
Total	4,736	4,626	4,549	4,471	4,375	22,757

Source: [TIMS, 2009-2013]

For context, statewide reporting, which includes local roads and highways, typically focuses solely on fatal collisions. In 2013, there were 3,000 fatal collisions statewide and 227 of those collisions involved trucks. Of those truck-involved fatal collisions, 38 occurred on state highways in the study area. Collisions in this analysis are limited to only those documented along a highway facility (including Interstate and U.S. routes). Table 5-2 below shows the breakdown of collision severity in the study area during the 5-year period. Although truck-involved collisions are about 10 percent of all collisions, fatal and severe injury truck involved collisions are 20.6 and 14.5 percent of all fatal and severe injury collisions, respectively.

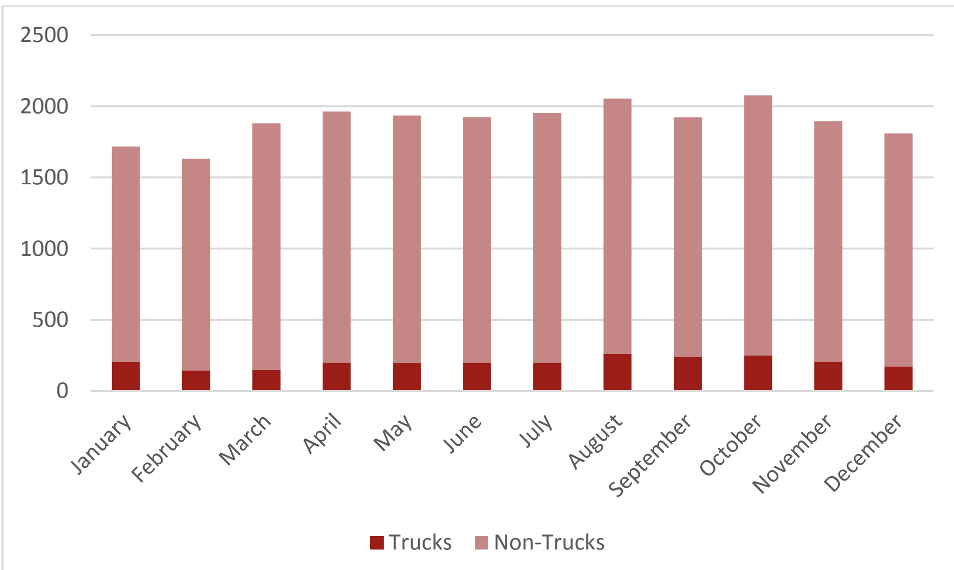
Table 5-2. Collisions by severity

Collision Involvement	Fatal	Severe Injury	Minor Injury	Complaint of Pain
No Truck Involved	629	1,270	5,573	12,865
Truck Involved	163	215	703	1,339
% Truck Collisions	20.6%	14.5%	11.2%	9.4%
Total	**792**	**1,485**	**6,276**	**14,204**

Source: [TIMS, 2009-2013]

Source: [TIMS, 2009-2013]

Figure 5-1 shows the average count of collisions by month over the 5-year period as a stacked-bar chart, with truck-involved collisions appearing at the bottom. There is a clear variation in the monthly average, with February being the lowest, and October being the highest.

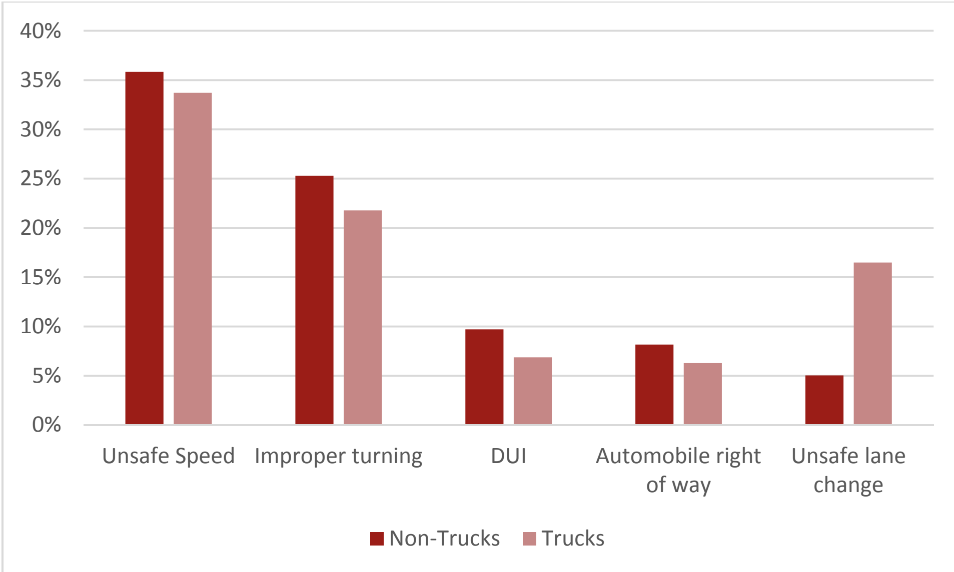


Source: [TIMS, 2009-2013]

Figure 5-1. Average collisions by month and truck involvement

Each collision is documented by the moving vehicle violation type (the behavior that primarily led to a collision) and the collision action type (what or how the vehicle hit something or someone). Across all vehicles, unsafe speed is the leading violation category and rear-end collisions are the most common collision type. *Source: [TIMS, 2009-2013]*

Figure 5-2 compares the five most common violation categories for collisions involving any vehicle to those only involving trucks. Note that for truck-involved collisions, the third most common violation is an unsafe lane change, but this does not indicate whether it is trucks or other vehicles that are more often at fault.

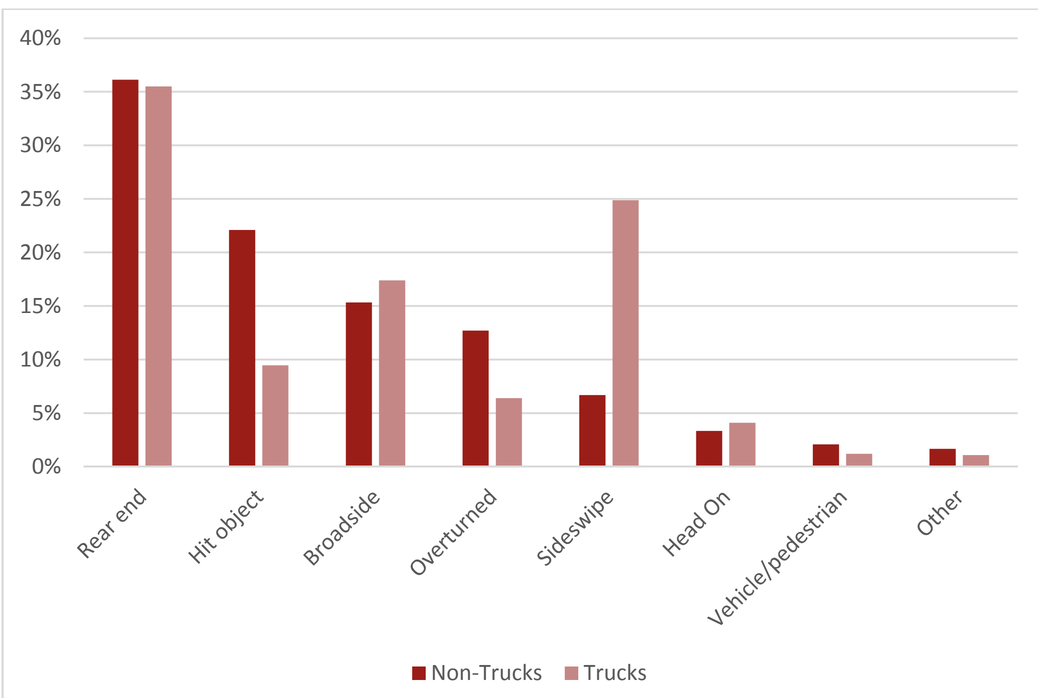


Source: [TIMS, 2009-2013]

Figure 5-2. Top five violation categories by truck involvement

Source: [TIMS, 2009-2013]

Figure 5-3 compares the collision type of collisions involving trucks with those that do not involve trucks. A notable difference is the significant jump in the proportion of sideswipe collisions among truck-involved incidents. Although sideswipe collisions account for 25 percent of truck-involved collisions, sideswipes are responsible for only 9 percent of all collisions.



Source: [TIMS, 2009-2013]

Figure 5-3. Collision types by truck involvement

Weather could be a factor in collisions. Table 5-3 shows the percentage of documented weather factors in collisions by severity. Only 4 percent of all collisions occur in rainy or foggy conditions. Fatal collisions are somewhat more common in foggy conditions, but are less common in rainy conditions.

Table 5-3. Weather factors by severity

Weather Condition	Fatal	Severe Injury	Minor Injury	Complaint of Pain	All
Clear	85%	84%	82%	80%	81%
Cloudy	10%	11%	14%	14%	14%
Raining	1%	3%	2%	3%	3%
Snowing	0%	0%	0%	0%	0%
Fog	3%	1%	1%	1%	1%
Other	0%	0%	0%	0%	0%
Wind	0%	0%	0%	0%	0%
Not Stated	0%	0%	1%	1%	1%

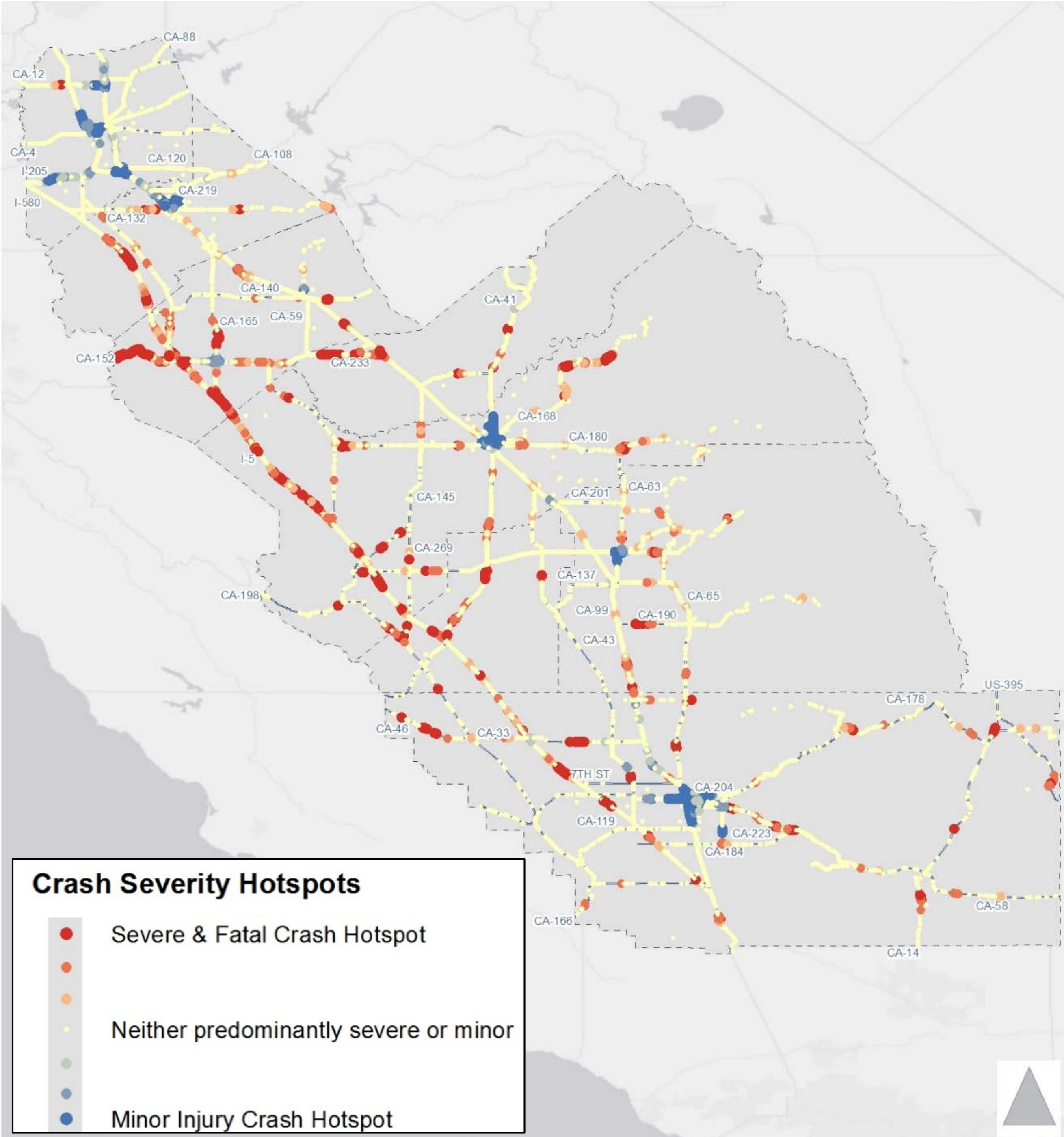
Source: [TIMS, 2009-2013]

5.1 Spatial Analysis of Collisions

A geographic information systems (GIS) analysis of the data was conducted using ESRI ArcMap to look for spatial patterns. Hot spots of collisions could indicate troublesome locations along a roadway. The Getis-Ord GI Optimized Hot Spot Analysis tool identifies statistically significant "hot" and "cold" spots based on high and low values in the data; in this instance, the severity of each collision in relation to the severity of others nearby. Collisions are coded on a scale of 1-4, with 1 meaning fatal and 4 being only complaint of pain. In *Source: [TIMS, 2009-2013]*
Figure 5-4, every dot represents a unique incident. Red dots indicate statistically significant hot spots of severe collisions (groups of points near where most other collisions are severe or fatal). Blue dots indicate statistically significant groups of minor collisions (nearby collisions are mostly not severe or fatal). The yellow dots represent incidents where there is not a statistically significant prevalence of either severe or fatal collisions.

The blue hot spots are found almost exclusively in urban areas, especially Bakersfield, Fresno, and Stockton. These areas are expected to have higher volumes of collisions in general, and hot spots of minor collisions are a reasonable result because speeds are lower in urban areas.

Red hot spots are much more widespread across the study area, but are still heaviest along I-5 where speeds are higher and potential points of conflict (ramps, for example) are fewer. Red hot spots along rural highways are more likely to face a diverse set of challenges. For example, there could be poor sight lines at crossroads or driveways, leading to high incidence of broadside (t-bone) collisions.



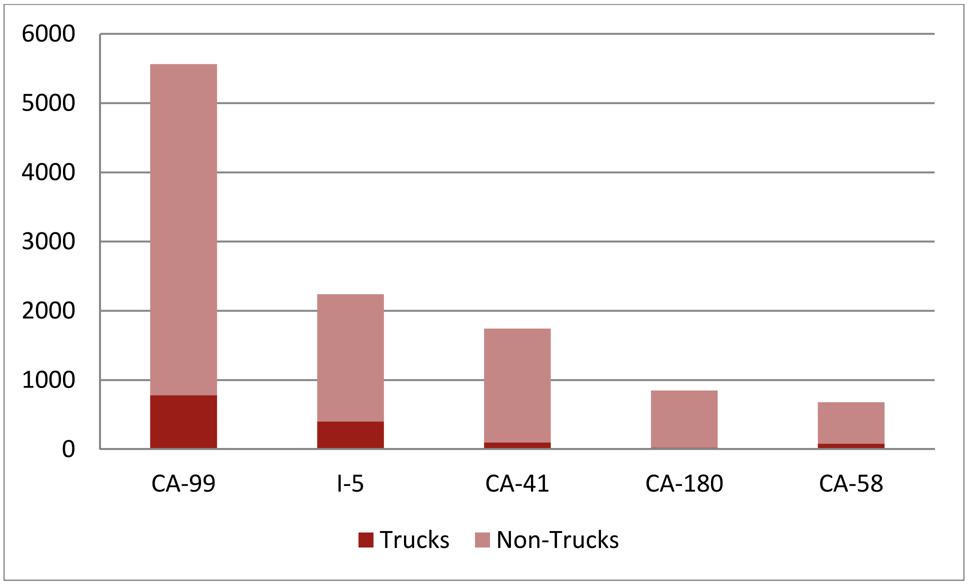
Source: [TIMS, 2009-2013]

Figure 5-4. All Collisions severity hotspots analysis

SR 99 has comparably few and smaller hot spots than I-5 along its length. SR 99 has by far the highest absolute number of collisions during the study period at 5,564, while there were only 2,240 incidents on I-5.

Source: [TIMS, 2009-2013]

For the majority of their length Figure 5-5 shows the absolute number of collisions by truck involvement for the top five state routes in the study area.



Source: [TIMS, 2009-2013]

For the majority of their length Figure 5-5. Absolute number of collisions by truck involvement

Table 5-4 illustrates the differences in proportion of severity for the same five routes. Note that I-5 has 11 percent severe or fatal collisions compared to 7 percent along SR 99, while CA-58 has 15 percent for the same level of severity.

Table 5-4. Severe collisions at different segments

Highway	Collision Severity				
	Fatal	Severe Injury	Minor Injury	Complaint of Pain	Number of incidents
SR 99	3%	4%	27%	65%	5564
I-5	5%	6%	34%	55%	2240
CA-41	3%	5%	27%	65%	1744
CA-180	3%	7%	28%	62%	849
CA-58	5%	10%	3%	82%	680

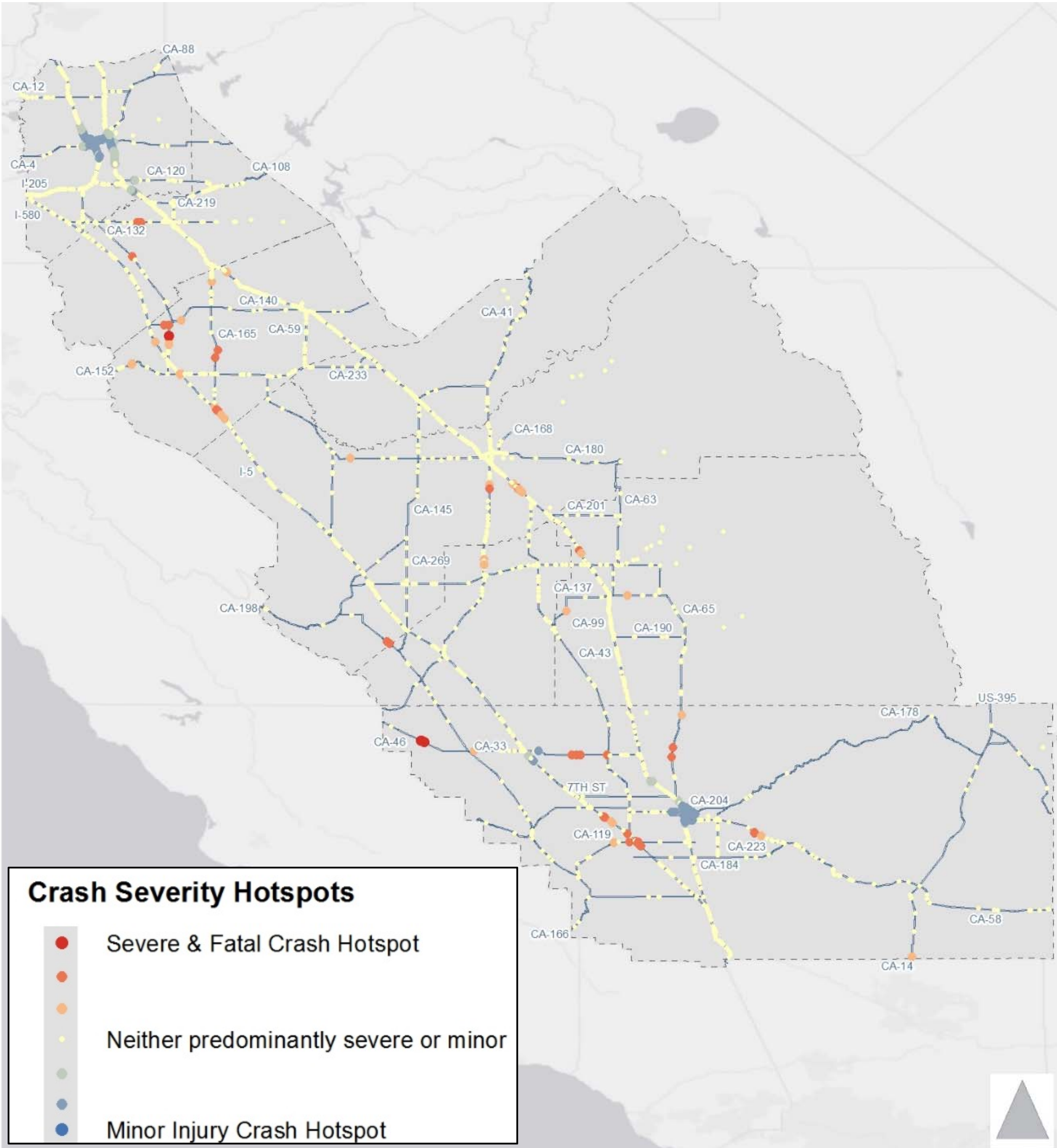
Source: [TIMS, 2009-2013]

Hot spots for collisions involving only trucks are comparatively fewer, as shown in Figure 5-6. Minor collision hot spots appear in Bakersfield and Stockton, while some small hot spots of severe collisions appear primarily along or near I-5. While severe and fatal collisions make up 10 percent of all incidents, among truck-involved collisions they account for 15.6 percent. However, the hot spot-identified severe incidents account for less than 2 percent of truck-involved collisions, suggesting that severe truck collisions are spatially dispersed and not significantly clustered within the study area.

Source: [TIMS, 2009-2013]

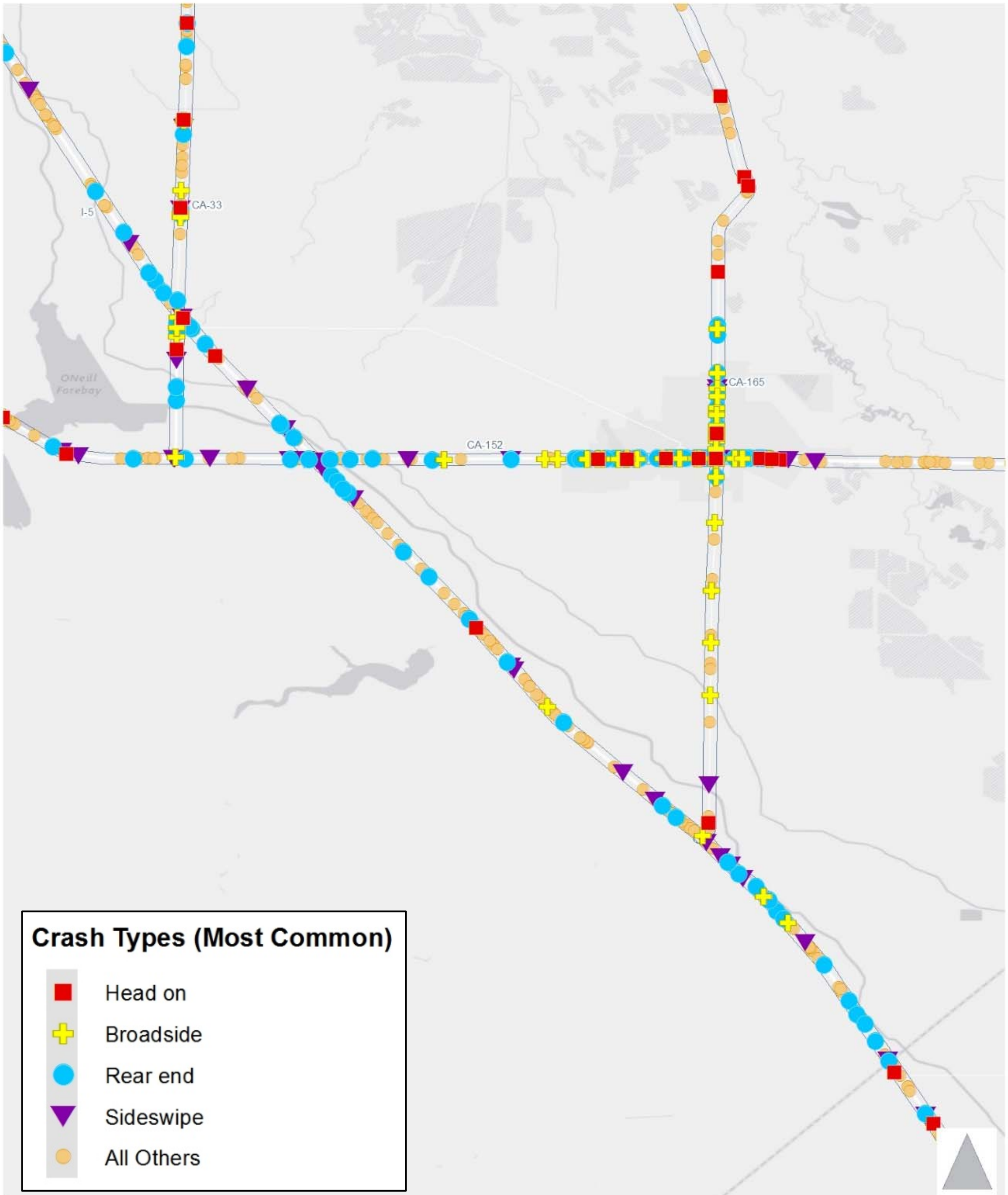
Figure 5-7 illustrates the difference in spatial context between I-5 and more rural highways and the prevalence of crash types. For example, along I-5 towards the center of the map, there is a clear prevalence of rear end collisions, as well as sideswipes, both of which are more common along freeways and in situations with greater numbers of trucks. The portion of I-5 northbound approaching CA-165 is one of the few hotspots for severe collisions among not only all vehicles but also those specifically those involving trucks.

By contrast, along CA-152 (an east-west route between I-5 and SR 99) and CA-165 (north-south), the proportion of broadside and head-on collisions is greater. Head-on collisions are especially notable along CA-152 through the Los Banos area where higher density local streets intersect with the state highway. CA-165 is mostly undivided with one lane in each direction and several at grade intersections. CA-152 is mostly divided with 2 lanes in each direction. The daily truck traffic on CA-152 near Los Banos is 1,300. Total daily traffic is 9,500. Truck traffic is about 15 percent of overall traffic. The characteristics of this facility and high traffic volume may contribute to higher head-on collisions.



Source: [TIMS, 2009-2013]

Figure 5-6. Hot spots for truck-involved collisions



Source: [TIMS, 2009-2013]

Figure 5-7. Difference between I-5 and rural highways and the prevalence of collision types

6.0 MULTIMODAL FACILITIES AND WAREHOUSE/DISTRIBUTION CENTERS

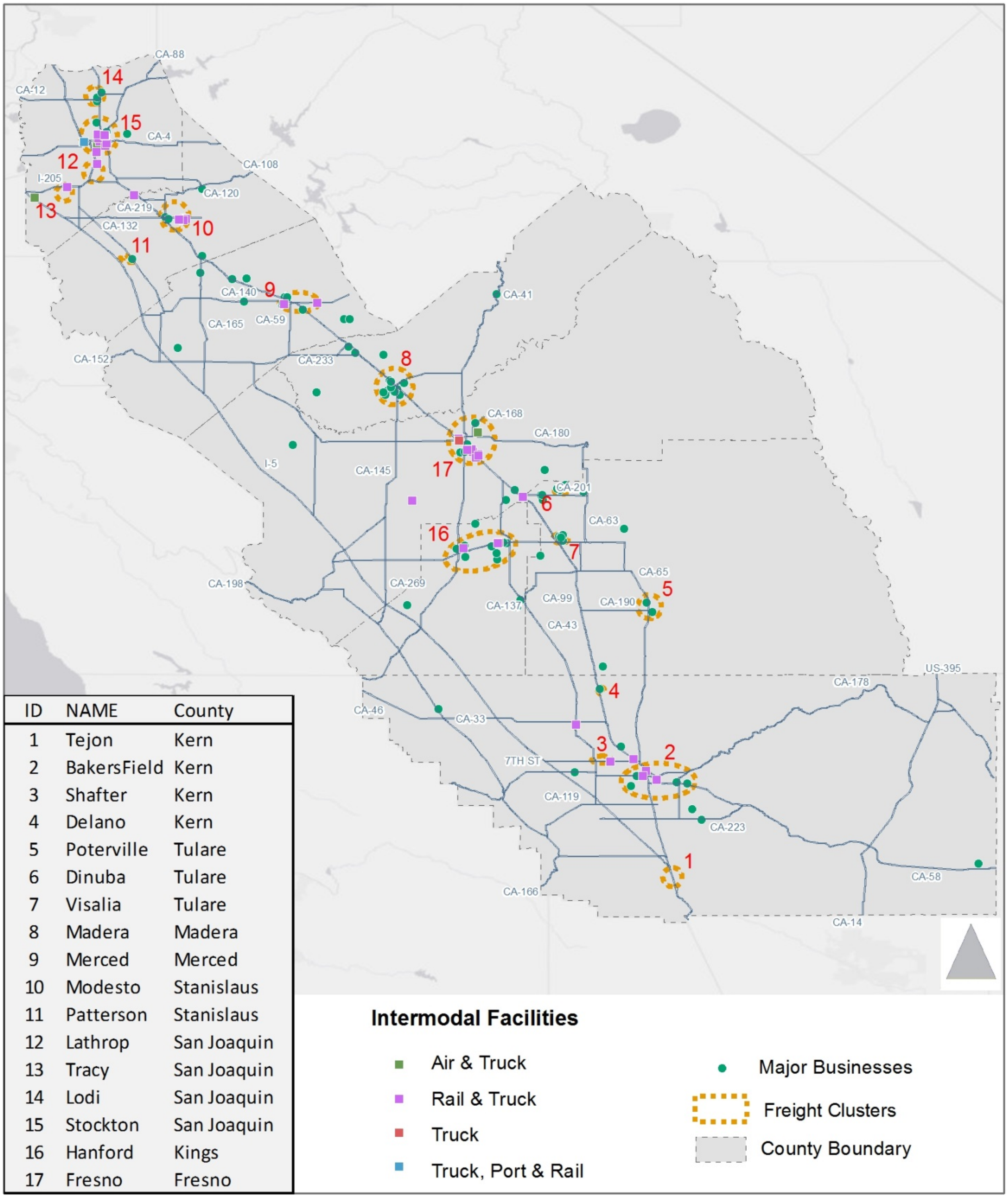
An important element in identifying effective strategic programs is the clustering of multimodal facilities, such as: intermodal rail terminals, warehouses, and distribution facilities. This clustering may point to how modal diversion strategies can work in a corridor, but also will help identify where within a corridor demand is likely to be greatest. This section also describes non-highway freight infrastructure in each corridor and how the freeways connect or interact with other infrastructure, including:

- **Seaports.** The San Joaquin Valley region is effectively served by all major California seaports, although only the Port of Stockton is actually within the region itself. The Ports of Oakland, West Sacramento, Los Angeles, Long Beach, and others are linked to the Valley origins and destinations by truck. We used GPS data to estimate the contribution of truck traffic generated at these ports on I-5/SR 99.

- **Airports.** Airports in the Valley collectively account for less than 1 percent of all air cargo handled by California's civilian airports. However, on a tonnage basis, the leading exports from Los Angeles International (LAX) and San Francisco International (SFO) are agricultural commodities, substantial shares of which were grown in the Valley. Products moved by air continue to use airports outside of the Valley. Due to the lack of direct flights linking the Valley airports with overseas markets, virtually all of these airborne exports must first be trucked to LAX or SFO to reach overseas markets. Therefore, I-5/SR 99 is the major access to connect agricultural industries in the Valley to these airports.

- **Railyards.** The Union Pacific Railroad (UP) and the BNSF Railway (BNSF) both have lines that run north/south through the Valley and both have major intermodal terminals and rail classification yards. Capacity constraints on these lines and at these terminals is important to understand the potential for modal diversion strategies, especially short haul intermodal shuttle services.

Besides intermodal facilities, the Valley is home to many major distribution centers and industries. To facilitate goods movement analysis and truck trips distribution in the study area, we identify several freight clusters in San Joaquin Valley. Each cluster is a combination of intermodal facilities and/or a major distribution center and/or large manufacturing firms. A sample of GPS data was used to identify trip distribution patterns between these freight clusters, counties in the Valley or other regions in California. *Source: [*California EDD*]*
Figure 6-1 shows the location of freight clusters in the Valley.



ID	NAME	County
1	Tejon	Kern
2	BakersField	Kern
3	Shafter	Kern
4	Delano	Kern
5	Poterville	Tulare
6	Dinuba	Tulare
7	Visalia	Tulare
8	Madera	Madera
9	Merced	Merced
10	Modesto	Stanislaus
11	Patterson	Stanislaus
12	Lathrop	San Joaquin
13	Tracy	San Joaquin
14	Lodi	San Joaquin
15	Stockton	San Joaquin
16	Hanford	Kings
17	Fresno	Fresno

Source: [California EDD]

Figure 6-1. Location of freight clusters with intermodal facilities/large businesses

6.1 Freight Activity Clusters

Sixteen major freight activity clusters are identified in the Valley, as shown in *Source: [*California EDD*]*
Figure 6-1.

In this section, we study freight activity in each cluster with an overview of their existing characteristics and future development plans. Actual trip distribution (origin and destination patterns) and access routes to each cluster were identified using truck GPS data with a sample of 20 million trips.

- **Fresno/Fresno County**

The Fresno cluster features five distribution centers, two large agricultural businesses, an airport, and an intermodal distribution facility. The distribution centers focus on transportation and warehousing as well as wholesale and retail trade. One of the centers specializes in groceries/retail and employs 500 to 999 employees and another center employs 1,000 to 4,999 employees. The agricultural businesses each employ 1,000 to 4,999 people. The intermodal facility makes connections between rail and trucks. The Fresno cluster boasts the intersection of a number of highway connections such as CA-99, CA-41, CA-168, and CA-180.

- **Hanford/Kings County**

The Hanford cluster has two distribution centers, six large businesses, and one intermodal facility within its boundaries. The distribution centers focus on wholesale and retail trade, each with 250 to 499 employees. The six businesses have a range of specialties in the agriculture and manufacturing industries. Of the cluster businesses, three employ 100 to 249 employees, two employ 250 to 499, and one employs 1,000 to 4,999. The intermodal facility provides connection between rail and trucks. The Hanford cluster enjoys access to a number of highways including CA-43 and CA-198 and is within 10 miles of CA-99 and CA-41 and 25 miles of I-5.

- **Tracy/San Joaquin County**

The Tracy cluster contains two distribution centers that focus on wholesale and retail trade including Amazon fulfillment center. This cluster enjoys connections with three interstate highways that include I-5, I-205, and I-580. These highways provide a significant connection to Bay Area and its ports as well.

- **Lathrop/San Joaquin County**

The Lathrop cluster features three distribution centers that focus on wholesale and retail trade. The cluster connects directly to I-5 and highways CA-99 and CA-120, which give access to area clusters such as Stockton and Tracy. Also, Lathrop enjoys a connection to the Bay Area ports.

- **Lodi/San Joaquin County**

The Lodi cluster includes three significant businesses. Two of these businesses specialize in manufacturing; one employs 500 to 999 employees and the other 1,000 to 4,999 employees. This cluster location includes direct access to CA-99 and CA-12 and is five miles from I-5. Lodi's location also provides access to the Bay Area ports.

- **Stockton/San Joaquin County**

The Stockton cluster has five distribution centers and two intermodal facilities including the Port of Stockton. Two of the distribution centers specialize in wholesale and retail trade and each employ 500 to 999 employees. One distribution center focuses on transportation and warehousing and employs 1,000 to 4,999 employees. The Port of Stockton provides intermodal service for trucks, rail, and serves as an inland deep water port. One other intermodal business provides connection between rail and trucks. The port is a very important operation in San Joaquin County. In 2015, the port welcomed a record 247 ships carrying more than 3.8 million metric tons of cargo, an increase from 2014's record of 230 incoming vessels. This cluster also includes Stockton Metropolitan Airport. Historically this airport did not have significant cargo operations, but the authorities are planning to increase the cargo operation at the airport. The Stockton cluster enjoys access to a number of highways such as I-5, CA-99, CA-4, and CA-88.

- **Patterson/Stanislaus County**

The Patterson cluster contains one distribution center and one large business. The distribution center specializes in wholesale and retail trade. The business focuses on manufacturing and employs 500 to 999 employees. This cluster has significant accessibility via I-5 and CA-33.

- **Modesto/Stanislaus County**

The Modesto cluster features a number of large agricultural industry employers, two distribution centers, and an intermodal facility. Eight of the businesses focus on the wine industry and employ 1,000 to 4,999 employees. Two businesses specialize in manufacturing; one employs 1,000 to 4,999 people and the other 500 to 999 employees. One distribution center employs 500 to 999 employees and focuses on wholesale and retail trade. The other center resides in an industrial district with a number of large tenants and provides these businesses with connections to highways, rail, and the airport. The intermodal center provides services for rail and truck. The Modesto cluster enjoys significant highway connections such as CA-99, CA-132, and CA-108.

- **Madera/Madera County**

The Madera cluster includes a number of large businesses and distribution centers. Three of the businesses focus on agriculture and employ 100 to 499 people. Four of the businesses specialize in manufacturing; one employs 100 to 249 people, two employ 250 to 499 people, and the fourth business employs 500 to 999 people. Two of the focus on wholesale and retail trade and employ 100 to 499 employees. The distribution entity specializes in transportation and warehousing and employs 100 to 249 people. The Madera cluster enjoys connections via highways such as CA-99 and CA-145.

- **Merced/Merced County**

The Merced cluster features six large businesses and distribution centers. Three of these entities focus on wholesale and retail trade and employ between 100 to 499 people. One of the businesses specializes in agriculture and employs 250 to 499 people. Another business serves as a distribution center and focuses on transportation and warehousing and has 250 to 499 employees. The last business concentrates on manufacturing and employs 500 to 999 people. The Merced cluster connects to the region via highways such as CA-99, CA-140, and CA-59.

- **Bakersfield/Kern County**

The Bakersfield cluster has two distribution centers and five large businesses connected with goods movement. One distribution center specializes in agricultural production and shipping and employs 1,000 to 4,999 people. Another distribution center provides logistic park access for other businesses. Cluster businesses include two with 500 to 999 employees and three businesses with 1,000 to 4,999 employees. These businesses focus on industries such as agriculture, mining, manufacturing, and wholesale and retail trade. Several ongoing projects in recent years have improved the accessibility and connectivity of this cluster including widening 7th Standard Road and SR 58. These projects are also part of the National Highway Freight Network. Bakersfield enjoys a plethora of connections via highways such as CA-99, CA-65, CA-178, CA-58, and CA-43 and 7th Standard Road. I-5 also travels in proximity to the city and provides access to the western San Joaquin Valley to the north.

- **Shafter/Kern County**

The Shafter cluster location is in direct proximity to the Bakersfield cluster and includes a distribution center logistics park. A number of highways such as CA-43, CA-99 and I-5 provide access to the cluster.

- **Delano/Kern County**

The Delano cluster features a distribution center and large agricultural business. The distribution center specializes in wholesale and retail trade and employs 500 to 999 people. The agricultural business employs 1,000 to 4,999 people. The Delano cluster connects to the region via CA-99 and CA-43.

- **Tejon/Kern County**

The Tejon Ranch cluster includes a number of distribution centers and space for growth. This cluster location at the junction of I-5 and Highway 99 provides accessibility to the Central Valley and Southern California.

- **Visalia/Tulare County**

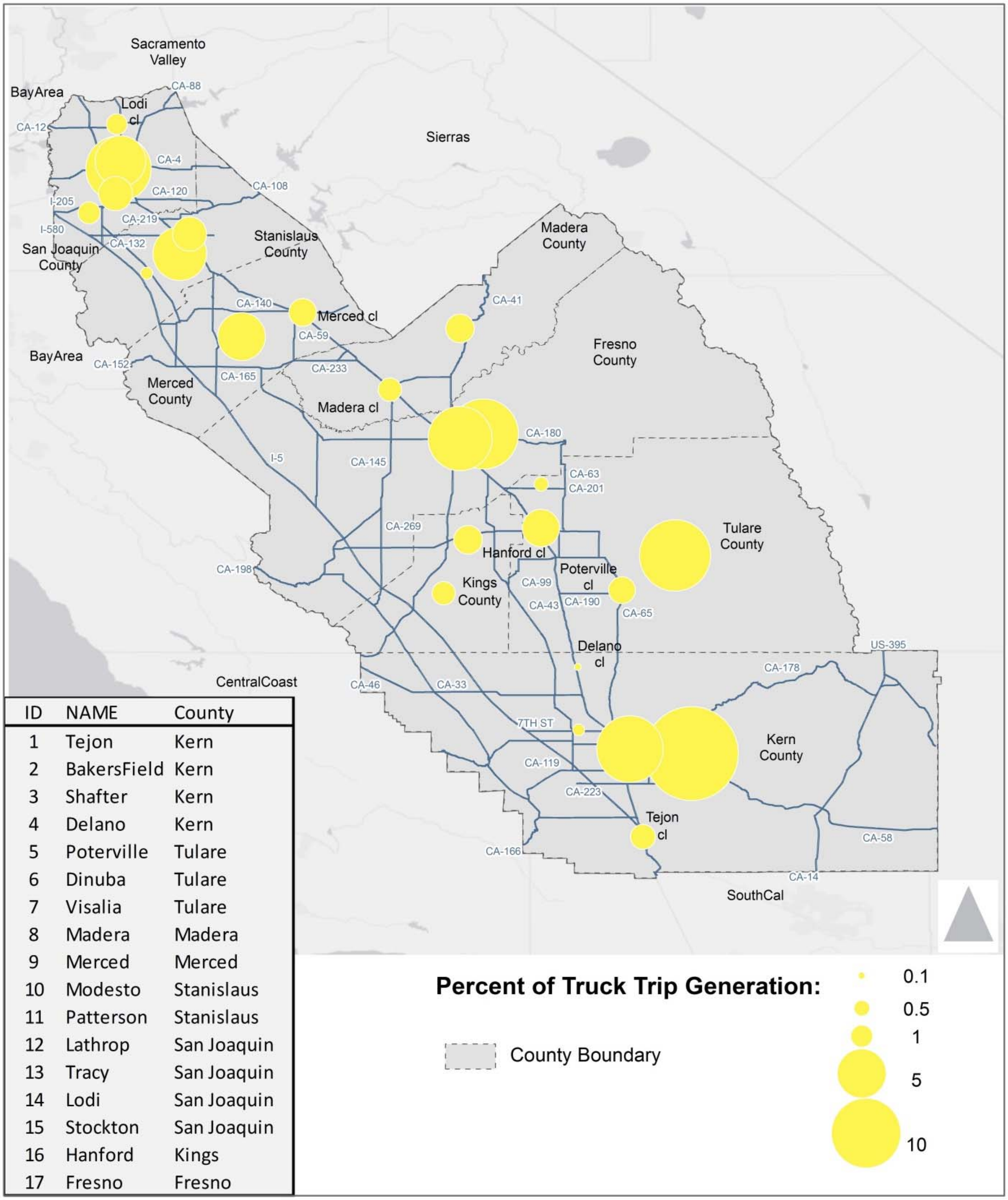
The Visalia cluster includes a number of distribution centers and businesses. One distribution center focuses on wholesale and retail trade. Businesses focus on agriculture, manufacturing, wholesale and retail trade. A number of highways provide access to this cluster and include CA-198, CA-99, and CA-63.

- **Porterville/Tulare County**

The Porterville cluster contains a distribution center and one large business. The distribution center employs 1,000 to 4,999 employees with a focus on wholesale and retail trade. The business employs 250 to 499 employees and also focuses on wholesale and retail trade. The cluster connects to the region via highways CA-65 and CA-190.

Source: [StreetLight, 2014]

Figure 6-2 shows the relative magnitude of each freight cluster in generating truck trips and their spatial distribution in the Valley. It should be noted that the freight clusters in this study are not homogenous in characteristics and size (industrial area, number of employment, number and type of establishments, size of intermodal facilities). The objective of this map is to show the geographic distribution of truck trip generation in the Valley.



ID	NAME	County
1	Tejon	Kern
2	BakersField	Kern
3	Shafter	Kern
4	Delano	Kern
5	Poterville	Tulare
6	Dinuba	Tulare
7	Visalia	Tulare
8	Madera	Madera
9	Merced	Merced
10	Modesto	Stanislaus
11	Patterson	Stanislaus
12	Lathrop	San Joaquin
13	Tracy	San Joaquin
14	Lodi	San Joaquin
15	Stockton	San Joaquin
16	Hanford	Kings
17	Fresno	Fresno

Source: [StreetLight, 2014]

Figure 6-2. Share of each freight cluster in generating truck trips in the Valley

Table 6-1 shows the truck trip distribution between counties in the Valley and other regions in California. The top table shows the percent trip distribution by each origin region. San Joaquin, Merced and Kern County have the highest intra-valley (trips between Valley and other regions in the state) trip share. Kern County hosts several large distribution centers and intermodal facilities that provide service to southern California (8.2 percent of trips generated in Kern county ends in Southern California). San Joaquin County hosts Port of Stockton. 6.2 percent of trips generated at San Joaquin county ends at Sacramento valley and 7.2 percent ends at Bay area. About 98% of trips originated in Fresno, Kings and Tulare County ends within each county respectively.

Table 6-1 on the bottom shows the percent trip distribution by each destination region. The patterns are similar to the top table, where San Joaquin, Merced and Kern County have the highest intra-valley (trips between Valley and other regions in the state) trip share.

Table 6-2 Error! Reference source not found. **shows the distribution for the destination of trips originated at each cluster. Except Lodi and Tracy, the destination of at least 50 percent of trips originated at each cluster is within the Valley. Fifty-eight percent of trips that originate at Lodi end at the Sacramento Valley. The Bay Area has the largest share for trips generated at Patterson and Tracy (35 percent) and Southern California is the major destination for the Porterville Cluster (34 percent).**

Table 6-3 shows the distribution for origin of trips at each cluster. This distribution has fewer peaks, which shows that the freight clusters have a strong regional role and absorb trips from different counties in the Valley and different regions outside of the Valley. About 40 percent of trips destined to the Patterson and Tracy Cluster are from the Bay Area. The Sacramento Valley is the origin of 60 percent of trips that end at Lodi. Thirty-seven percent of trips to the Porterville Cluster are from Southern California.

Table 6-1. Truck Trip distribution- Top: percent trips by origin, Bottom: percent trips by Destination

% Trips by Origin	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	Total SJV	Bay Area	Central Coast	Northern California	Sacramento Valley	Sierras	Southern California	Grand Total
Fresno County	81.0	2.2	2.1	3.4	2.4	0.8	0.7	5.9	98.5	0.3	0.3	0.0	0.3	0.0	0.6	100
Kern County	1.3	85.1	0.4	0.2	0.6	0.4	0.3	2.4	90.6	0.2	0.7	0.0	0.2	0.1	8.2	100
Kings County	13.0	3.0	65.0	0.5	0.9	0.4	0.3	14.7	97.9	0.3	0.7	0.0	0.3	0.0	0.8	100
Madera County	24.3	1.6	0.6	49.6	9.6	3.3	3.2	4.5	96.7	0.7	0.5	0.2	1.1	0.2	0.4	100
Merced County	7.0	2.8	0.6	3.9	57.5	6.6	9.0	1.6	89.0	4.1	2.4	0.6	2.7	0.2	1.0	100
San Joaquin County	1.1	0.5	0.1	0.7	2.3	72.9	6.4	0.5	84.5	7.4	0.5	0.9	6.2	0.3	0.2	100
Stanislaus County	1.6	0.7	0.1	1.2	7.0	12.7	69.1	0.6	92.9	3.1	0.4	0.4	2.6	0.5	0.2	100
Tulare County	7.4	5.9	3.0	0.8	0.7	0.3	0.4	79.5	98.0	0.1	0.1	0.0	0.1	0.0	1.7	100
Bay Area	0.1	0.0	0.0	0.0	0.2	1.2	0.3	0.0	1.8	96.1	0.8	0.2	1.1	0.0	0.0	100
CentralCoast County	0.2	1.3	0.1	0.1	0.6	0.2	0.1	0.0	2.5	3.2	92.2	0.0	0.1	0.0	2.0	100
NorthCal	0.1	0.1	0.0	0.1	0.3	1.7	0.3	0.0	2.5	2.0	0.1	90.1	5.3	0.0	0.0	100
Sacramento Valley	0.1	0.1	0.0	0.1	0.4	3.4	0.6	0.0	4.8	3.5	0.1	1.8	89.6	0.2	0.0	100
Sierras	0.1	1.3	0.0	0.3	0.4	2.3	1.7	0.1	6.2	0.4	0.0	0.0	2.5	87.3	3.6	100
SouthCal	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.0	0.1	0.0	0.0	0.0	99.1	100

% Trips by Destination	Fresno	Kern	Kings	Madera	Merced	San Joaquin	Stanislaus	Tulare	Bay Area	Central Coast	Northern California	Sacramento Valley	Sierras	Southern California
Fresno County	81.4	1.4	13.4	23.6	7.2	0.8	1.6	8.1	0.1	0.2	0.1	0.1	0.1	0.0
Kern County	2.0	85.7	3.6	1.8	2.9	0.7	0.9	5.1	0.1	0.8	0.1	0.1	0.8	0.6
Kings County	2.0	0.3	64.0	0.6	0.4	0.1	0.1	3.1	0.0	0.1	0.0	0.0	0.0	0.0
Madera County	3.5	0.2	0.5	49.0	4.2	0.5	1.0	0.9	0.0	0.1	0.0	0.1	0.3	0.0
Merced County	2.4	0.6	1.2	8.9	58.0	2.3	6.5	0.7	0.2	0.7	0.3	0.5	0.5	0.0
San Joaquin County	1.0	0.3	0.7	4.9	6.9	73.6	13.6	0.6	1.3	0.4	1.4	3.1	2.5	0.0
Stanislaus County	0.7	0.2	0.4	3.8	9.6	6.0	68.6	0.4	0.2	0.2	0.3	0.6	1.8	0.0
Tulare County	5.4	2.8	13.9	4.1	1.6	0.2	0.6	79.2	0.0	0.1	0.0	0.0	0.1	0.1
Total SJV	98.5	91.5	97.6	96.7	90.8	84.1	92.9	98.1	1.9	2.5	2.2	4.6	6.1	0.8
Bay Area	0.3	0.1	0.3	0.8	3.4	7.1	3.3	0.1	95.9	3.6	1.7	3.2	0.2	0.0
Central Coast	0.2	1.0	0.6	0.4	2.1	0.2	0.3	0.1	0.7	91.4	0.0	0.1	0.0	0.1
Northern California	0.1	0.0	0.0	0.2	0.5	1.2	0.4	0.0	0.2	0.0	90.7	1.8	0.0	0.0
Sacramento Valley	0.3	0.1	0.3	1.0	2.1	6.9	2.5	0.1	1.2	0.2	5.4	90.1	2.5	0.0
Sierras	0.0	0.1	0.0	0.2	0.2	0.3	0.5	0.0	0.0	0.0	0.0	0.2	87.9	0.0
Southern California	0.6	7.1	1.2	0.6	0.9	0.2	0.2	1.6	0.0	2.3	0.0	0.0	3.3	99.1
Grand Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: [StreetLight, 2014]

Table 6-2. Percent Truck origin distribution for trips generated in each cluster

	Origin/ Destination	Freight Activity Clusters																	Counties in the Valley								Total %
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Freight Activity Clusters	1 BakersField	70.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.6	-	-	-	-	-	1.0	95.7
	2 Delano	4.7	9.8	-	1.4	-	-	-	-	-	-	-	0.7	-	-	2.3	-	-	2.9	49.6	-	-	0.5	-	-	17.7	89.7
	3 Dinuba	-	-	26.1	3.8	0.6	-	-	-	-	-	-	0.7	-	-	-	-	3.9	12.7	0.7	-	0.6	-	-	-	49.3	98.3
	4 Fresno	-	-	-	59.4	0.7	-	-	1.7	-	-	-	-	-	-	-	-	-	22.9	1.1	0.6	2.7	2.4	-	0.5	4.2	96.5
	5 Hanford	-	-	-	3.5	62.6	-	-	-	-	-	-	-	-	-	-	-	2.4	9.7	1.1	7.8	-	-	-	-	10.0	97.0
	6 Lathrop	-	-	-	0.6	-	25.0	0.8	0.5	-	2.3	-	-	-	12.5	-	4.1	-	1.1	0.8	-	0.8	3.6	24.0	3.8	0.5	80.4
	7 Lodi	-	-	-	-	-	2.1	43.8	-	-	1.1	-	-	-	14.1	-	-	-	-	-	-	-	-	21.1	1.6	-	83.6
	8 Madera	-	-	-	11.7	-	-	-	56.0	2.0	-	-	-	-	-	-	-	-	10.1	-	-	9.6	3.1	1.0	1.0	1.9	96.4
	9 Merced	-	-	-	2.6	-	0.6	-	1.1	57.6	1.3	-	-	-	0.5	-	-	-	2.3	-	-	3.5	19.7	1.8	4.1	1.0	96.2
	10 Modesto	-	-	-	0.5	-	1.5	-	-	0.7	47.6	-	-	-	3.1	-	-	-	-	-	-	0.8	2.9	7.8	28.0	-	92.9
	11 Patterson	-	-	-	0.5	-	3.1	-	-	0.5	2.7	37.1	-	-	2.7	-	1.5	-	0.6	-	-	-	3.6	7.9	31.2	-	91.4
	12 Poterville	2.1	-	-	1.8	0.8	-	-	-	-	-	-	56.4	-	-	0.7	-	0.8	1.7	6.9	-	-	0.7	-	-	21.9	93.7
	13 Shafter	13.6	-	-	0.7	-	-	-	-	-	-	-	-	18.6	-	4.2	-	-	1.4	44.8	-	-	0.5	-	0.8	3.0	87.7
	14 Stockton	-	-	-	-	-	4.4	2.0	-	-	1.4	-	-	-	49.6	-	0.9	-	-	-	-	-	1.0	24.9	3.2	-	87.5
	15 Tejon	3.7	-	-	0.7	-	-	-	-	-	-	-	0.7	0.6	-	16.7	-	-	2.2	32.8	0.7	-	2.1	0.7	0.6	3.5	64.9
	16 Tracy	-	-	-	-	-	10.6	-	-	-	1.5	0.5	-	-	5.2	-	25.6	-	-	-	-	-	1.8	33.4	3.4	-	82.2
	17 Visalia	0.5	-	1.4	2.8	3.2	-	-	-	-	-	-	1.1	-	-	-	-	31.9	5.7	2.3	5.5	0.7	-	-	-	42.1	97.2
Counties in the Valley	18 Fresno	-	-	0.5	18.7	1.6	-	-	1.1	-	-	-	-	-	-	-	-	0.6	61.0	2.0	1.1	1.5	1.7	0.5	0.6	5.3	96.3
	19 Kern	12.2	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1	-	-	1.0	67.4	-	-	0.7	-	-	2.2	85.6
	20 Kings	0.6	-	-	4.3	12.7	-	-	-	-	-	-	-	-	-	-	-	5.7	8.6	4.2	44.0	-	1.6	-	0.6	11.1	93.4
	21 Madera	-	-	-	15.7	-	0.8	-	5.3	3.3	0.9	-	-	-	0.9	-	-	0.7	10.1	1.6	-	34.6	9.1	2.5	3.4	4.8	93.7
	22 Merced	-	-	-	4.4	-	1.3	-	0.6	6.3	1.3	-	-	-	1.4	-	-	-	3.4	2.9	0.6	3.1	44.5	4.7	8.7	1.5	84.4
	23 San Joaquin	-	-	-	0.6	-	5.6	2.0	-	-	2.3	-	-	-	14.0	-	3.3	-	0.7	0.5	-	0.7	2.5	43.4	5.3	-	80.9
	24 Stanislaus	-	-	-	0.8	-	1.2	-	-	1.2	11.1	1.3	-	-	2.8	-	-	-	1.0	0.7	-	1.1	7.2	7.6	53.8	0.6	90.6
	25 Tulare	1.1	-	2.0	2.7	1.4	-	-	-	-	-	-	2.9	-	-	-	-	4.0	4.8	4.2	1.3	0.6	0.6	-	-	71.0	96.5

Source: [StreetLight, 2014]

*Values less than 0.05% are not shown in the table.

Table 6-3. Percent Truck destination distribution for trips generated in each cluster

	Origin/ Destination	Freight Activity Clusters																	Counties in the Valley							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Freight Activity Clusters	1 BakersField	69.7	3.8	-	-	-	-	-	-	-	-	-	1.6	13.3	-	3.4	-	-	-	12.4	0.5	-	-	-	-	0.9
	2 Delano	-	12.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 Dinuba	-	-	26.4	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	0.5	-	-	-	-	-	-	2.0
	4 Fresno	-	2.3	4.2	60.1	3.5	-	-	13.7	2.6	0.5	-	1.6	0.6	-	0.8	-	3.0	19.3	0.5	4.6	14.1	4.5	-	0.7	3.4
	5 Hanford	-	-	0.7	0.7	62.9	-	-	-	-	-	-	0.6	-	-	-	-	3.8	1.6	-	11.3	-	-	-	-	1.6
	6 Lathrop	-	-	-	-	-	28.8	2.2	1.2	0.6	2.3	3.2	-	-	5.6	-	10.8	-	-	-	-	1.2	1.9	6.5	1.5	-
	7 Lodi	-	-	-	-	-	0.9	44.6	-	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	2.1	-	-
	8 Madera	-	-	-	1.4	-	-	-	52.6	1.3	-	-	-	-	-	-	-	-	1.0	-	-	5.9	0.7	-	-	-
	9 Merced	-	-	-	-	-	-	-	1.7	58.8	0.9	-	-	-	-	-	-	-	-	-	-	3.4	6.7	-	1.1	-
	10 Modesto	-	-	-	-	-	1.7	1.2	-	1.1	46.6	2.0	-	-	1.4	-	1.0	-	-	-	-	1.1	1.5	2.1	11.1	-
	11 Patterson	-	-	-	-	-	-	-	-	-	-	38.2	-	-	-	-	-	-	-	-	-	-	-	-	1.3	-
	12 Poterville	-	1.1	-	-	0.7	-	-	-	-	-	-	61.7	1.0	-	1.0	-	1.1	-	0.6	0.6	-	-	-	-	3.0
	13 Shafter	-	-	-	-	-	-	-	-	-	-	-	-	24.4	-	1.1	-	-	-	0.7	-	-	-	-	-	-
	14 Stockton	-	-	-	-	-	10.9	12.3	-	0.5	3.1	2.4	-	-	48.9	-	5.2	-	-	-	-	1.3	1.1	14.7	2.9	-
	15 Tejon	0.5	2.9	-	-	-	-	-	-	-	-	-	0.7	3.8	-	21.0	-	-	-	2.4	0.8	-	0.6	-	-	-
	16 Tracy	-	-	-	-	-	4.8	-	-	-	0.6	2.0	-	-	0.9	-	26.8	-	-	-	-	-	-	3.5	0.5	-
	17 Visalia	-	-	3.6	-	2.1	-	-	-	-	-	-	0.9	-	-	-	-	32.8	0.6	-	5.2	-	-	-	-	4.4
Counties in the Valley	18 Fresno	-	2.8	12.5	22.6	9.6	0.8	-	10.1	2.0	-	0.8	1.2	1.2	-	2.6	0.5	5.6	61.1	1.1	9.2	9.3	3.6	0.6	1.1	5.0
	19 Kern	24.0	41.6	0.8	1.0	1.1	1.0	-	0.9	-	-	1.2	4.6	40.8	-	35.2	0.8	2.1	1.8	67.0	5.2	1.6	2.9	0.6	0.9	3.7
	20 Kings	-	-	-	0.6	8.4	-	-	-	-	-	-	-	-	-	-	-	6.0	1.0	-	42.1	-	-	-	-	1.2
	21 Madera	-	0.8	0.5	3.1	-	0.6	-	8.4	3.5	0.6	-	-	-	-	-	-	1.0	1.7	-	-	35.4	3.3	-	1.0	0.7
	22 Merced	-	0.5	-	2.4	-	2.9	0.5	2.5	18.8	2.5	3.7	-	0.8	1.2	2.2	2.1	-	1.5	0.7	2.2	8.7	44.6	2.4	6.8	0.6
	23 San Joaquin	-	-	-	0.6	-	23.5	20.1	1.2	1.8	8.3	6.5	-	-	23.2	0.6	32.4	-	0.6	-	-	3.6	4.8	42.8	7.9	-
	24 Stanislaus	-	-	-	0.5	-	3.4	1.6	1.1	4.6	27.4	32.1	-	-	3.2	0.6	3.2	-	0.6	-	0.5	4.1	9.3	5.1	53.7	-
	25 Tulare	1.2	19.1	48.8	3.4	8.9	-	-	2.6	0.9	-	-	22.4	2.5	-	3.1	-	39.3	5.0	2.4	11.1	3.5	1.4	-	0.6	69.5
	Total	95.5	87.1	97.5	96.4	97.2	79.2	82.5	95.8	96.4	92.7	92.0	95.3	88.5	86.7	71.5	82.8	96.3	96.3	87.9	93.2	93.1	86.9	80.4	91.2	96.0

Source: [StreetLight, 2014]
*Values less than 0.05% are not shown in the table.

Table 6-3 shows the distribution of trucks on selected segments in study area based on origin and destination of the trip. Internal/External (IX-XI) trips are those either started or ended outside each county. Internal trips (I-I) trips are those started and ended in the same county. External trips (X-X) trips are through trips that neither origin nor destination of the trip is in the respective county where the segment is located. I-5 and SR-99 segments are highlighted in bold. The share of IX-XI, I-I and X-X trips varies throughout the corridor as expected. Knowing the distribution of the trips helps to understand the role of each facility in regional goods movement.

Table 6-4. Percent origin distribution for trips generated in each cluster

County	Name	% IX-XI	% I-I	% X-X
Fresno County	**I-5: KINGS/FRESNO CL TO CA-198**	**24**	**2**	**75**
	I-5: CA-198 TO CA-33	**23**	**2**	**75**
	CA-99: SELMA (CA-43) TO FRESNO (CA-41)	**58**	**7**	**35**
	CA-33: I-5 TO MENDOTA (CA-180)	38	52	10
	CA-41: KINGS/FRESNO CL TO CA-99	51	40	9
	CA-145: I-5 TO FRESNO/MADERA CL	24	74	2
	CA-180: CLOVIS (TEMPERANCE AVE) TO CA-63	25	71	4
	CA-180: MENDOTA (CA-33) TO FRESNO SLOUGH	30	69	1
	CA-198: MONTEREY/FRESNO CL TO I-5	62	1	38
Kern County	**I-5: CA-99 TO CA-43**	**59**	**20**	**21**
	I-5: CA-43 TO CA-58	**57**	**22**	**21**
	CA-99: I-5 TO BAKERSFIELD (MING AVE)	**54**	**25**	**21**
	CA-99: BAKERSFIELD (CA-204) TO CA-46	**45**	**37**	**18**
	CA-58: BAKERSFIELD (WASHINGTON ST) TO BORON	48	34	18
	CA-33: CA-58 TO KERN/KINGS CL	13	87	0
	CA-46: I-5 TO SAN LUIS OBISPO/KERN CL	81	6	12
	CA-58: SAN LUIS OBISPO/KERN CL TO I-5	56	42	2
	CA-178: BAKERSIELD (CA-184) TO US 395	4	96	0
Kings County	**I-5: KERN/KINGS CL TO KINGS/FRESNO CL (CA-269)**	**10**	**0**	**90**
	CA-41: KERN/KINGS CL TO I-5	32	0	67
	CA-43: CORCORAN (SANTA FE AVE) TO HANFORD (CA-198)	64	26	10
	CA-198: HANFORD (CA-43) TO KINGS/TULARE CL	80	1	19
Madera County	**CA-99: FRESNO/MADERA CL TO AVENUE 12**	**37**	**1**	**62**
	CA-41: FRESNO/MADERA CL TO MADERA/MARIPOSA CL	87	8	6
Merced County	**I-5: FRESNO/MERCED CL TO CA-165**	**39**	**1**	**60**
	CA-99: MERCED (CA-59) TO MERCED/STANISLAUS CL	**46**	**1**	**53**
	CA-99: MADERA/MERCED CL TO MERCED (CA-59)	**40**	**1**	**59**
	CA-152: SANTA CLARA/MERCED CL TO CA-33	52	0	48
San Joaquin County	I-580: I-5 (SAN JOAQUIN CL) TO CA-205	31	2	67
	I-5: CA-12 TO SAN JOAQUIN/SACRAMENTO CL	**64**	**2**	**34**
	I-5: MERCED/STANISLAUS CL TO I-580 (SAN JOAQUIN CL)	**19**	**0**	**81**
	CA-99: LODI TO GALT (SAN JOAQUIN/SACRAMENTO CL)	**62**	**1**	**37**
	CA-99: STANISLAUS/SAN JOAQUIN CL TO MANTECA (CA-120)	**61**	**13**	**27**
	CA-4: CONTRA COSTA/SAN JOAQUIN CL TO STOCKTON (I-5)	86	3	12

	CA-88: STOCKTON (CA-99) TO CA-12	53	32	15
	CA-132: SAN JOAQUIN/STANISLAUS CL TO MODESTO (CA-99)	62	3	35
	I-205: STOCKTON (I-5) TO CA-580	70	14	16
Tulare County	**CA-99: DELANO (KERN/TULARE CL) TO VISALIA (CA-198)**	**0**	**0**	**100**
	CA-43: KERN/TULARE CL TO CORCORAN (SANTA FE AVE)	0	0	100
	CA-65: KERN/TULARE CL TO CA-198	0	0	100

Source: [StreetLight, 2014]

6.2 Future Developments in Major Freight Activity Clusters

An analysis of freight activity clusters was conducted to better understand the clusters' growth and potential impacts on future conditions of freight activity in the region and state. A number of the clusters will see further development of freight infrastructure such as intermodal freight facilities, expansion and maintenance of current roadways and railways, and the development of inland ports. The San Joaquin Valley seeks to bring freight facilities closer to production locations, thereby increasing shipping efficiency and lowering vehicle miles traveled and greenhouse gas emissions.

- **Stockton/San Joaquin County**

Stockton Metro Airport Authority is planning to increase their air cargo operations. Air Transport International Inc., an air cargo charter airline, is expect to begin daily operations at Stockton Metropolitan Airport in Spring 2016, employing about 30 cargo handlers and supervisors, the company and airport officials announced Friday. The cargo operation will take advantage of the airport's cargo apron, a 10-acre facility on the northeast side of the main runway and able to accommodate up to four large air freighters at a time, the cargo apron has gone unused for nearly a decade.

The Port of Stockton is also looking forward to a future of increased traffic and usage several projects underway at and around Rough and Ready Island will make one of the area's largest employers more attractive to private industry shipping companies from around the world such as SCB International, a materials supplier serving the cement manufacturing.

- **Lathrop/San Joaquin County**

The Lathrop cluster will grow as it accommodates expansion from the Bay Area ports. This growth will provide opportunities for increased efficiency of shipping. Lathrop will see improved access between Union Pacific Lathrop Yard and SR 99 through the widening of Roth Road from two to four lanes.

- **Modesto/Stanislaus County**

SR 132 West serves as a major access route for an increasing number of Central Valley commuters traveling to work in and around Modesto as well as a major truck route to industries in this cluster. The project to improve operations on this facility by creating a 4-lane freeway/expressway on a new alignment connecting SR 132 with the City of Modesto is currently in the environmental phase and expected to be open to traffic by 2028. It is expected that this Improvement will impact the routing and truck traffic patterns to this cluster. This project is also part of the National Highway Freight Network.

- **Patterson/Stanislaus County**

The 1 million-square-foot Amazon Fulfilment Center started to operate in Patterson 2015. Another similar size retail warehouse and distribution center known as "Project XX" in west Patterson is also expected to start soon. These large distribution centers increase truck traffic to and from this cluster significantly. The SJV Interregional Goods Movement Plan calls for the development of a new route between SR-99 and I-5 from Turlock to Patterson.

- **Delano/Kern County**

The Delano cluster expects future growth in freight activity. The Kern County Sustainable Communities Strategy calls for increased activity at Delano RailEx intermodal rail freight facilities and the movement of distribution centers closer to the center of the state's population distribution, which is in Kern County. The SJV Interregional Goods Movement Plan calls for the expansion of the RailEx intermodal facility. Also, these plans call for the short line rail rehabilitation and gap closure.

- **Shafter/Kern County**

The Shafter Inland Port Phase II and III is noted in the SJV Interregional Goods Movement Plan. The Kern County Sustainable Communities Strategy calls for increased activity at Shafter PLP intermodal rail freight facilities and the movement of distribution centers closer to the center of the state's population distribution, which is in Kern County. Shafter County will also see the private $2 million development of four warehouses/distribution centers.

- **Tejon/Kern County**

The Tejon Ranch cluster is fully entitled to build up to 20 million square feet of new warehouse and industrial space. Also, the area will see the I-5 widened to 10 lanes between Fort Tejon and SR-99.

7.0 FUTURE TRUCK TRAFFIC IN THE VALLEY

7.1 Goods Movement Trends

Based on the latest Freight Analysis Framework (FAF3.4), there will be an approximately 72 percent increase in goods movement in the Valley (Table 7-1) over the next 25 years. According to FAF3.4, over all goods movement and truck traffic in San Joaquin Valley will increase by 77 percent in 2040 (Table 7-2).However the Ton-Miles by trucks increased by 98% in 2040 showing that longer trips are be expected in future.

Table 7-1. Goods movement growth in California-all modes

Origin Zone	Total Ktons	Total Ton-Mile	Total M$
2015 (All Modes)			
Los Angeles CA CSA	644,815	242,689	1,372,952
Sacramento CA-NV CSA (CA Part)	122,665	27,904	75,692
San Diego CA MSA	63,773	13,769	144,576
San Francisco CA CSA	358,324	71,826	500,243
Remainder of California	314,950	101,588	283,880
2040 (All Modes)			
Los Angeles CA CSA	954,369	505,417	2,870,627
Sacramento CA-NV CSA (CA Part)	212,330	47,988	166,833
San Diego CA MSA	92,876	28,673	294,802
San Francisco CA CSA	564,398	125,470	1,170,924
Remainder of California	542,732	181,252	558,693
Growth (All Modes)			
Los Angeles CA CSA	48%	108%	109%
Sacramento CA-NV CSA (CA Part)	73%	72%	120%
San Diego CA MSA	46%	108%	104%
San Francisco CA CSA	58%	75%	134%
Remainder of California	72%	78%	97%

Source: [FAF 3.4]

Table 7-2. Goods Movement growth in California- by Truck

Origin zone	Total KTons	Total Ton-Mile	Total M$
2015 (Truck Only)			
Los Angeles CA CSA	485,653	150,398	959,298
Sacramento CA-NV CSA (CA Part)	104,638	17,831	62,867
San Diego CA MSA	61,598	11,342	110,549
San Francisco CA CSA	246,743	39,514	337,971
Remainder of California	277,111	70,754	248,621

2040 (Truck Only)			
Los Angeles CA CSA	733,541	302,141	1,927,478
Sacramento CA-NV CSA (CA Part)	185,104	30,425	135,507
San Diego CA MSA	88,216	21,931	212,414
San Francisco CA CSA	401,500	72,166	808,496
Remainder of California	490,270	129,119	491,932
Growth (Truck Only)			
Los Angeles CA CSA	51%	101%	101%
Sacramento CA-NV CSA (CA Part)	77%	71%	116%
San Diego CA MSA	43%	93%	92%
San Francisco CA CSA	63%	83%	139%
Remainder of California	77%	82%	98%

Source: [FAF 3.4]

7.2 Year 2040 Truck Traffic Forecasts

The purpose of this task is to understand the overall truck traffic growth pattern in the Valley along on I-5, SR-99 and major Highways in the Valley. Therefore a total sample of 40 segments from state highway network in the Valley is selected. These segments are part of STAA truck network that provide major access to freight clusters and have existing count data. Where possible, segments are selected close to county lines to have an understanding of intraregional flow between counties and internal versus through trips for each MPO.

The California Statewide Freight Model was used to estimate 2040 truck traffic as the best available tool. The land use forecast in the current model for year 2040 was prepared in 2008 and is not consistent with recent MPOs' land use forecast. Caltrans is in the process of updating future land use data for the statewide models. Knowing that, there might be some discrepancies in the truck traffic forecasts using recent land use data for the year 2040 compared to older land use growth estimates, and it is recommended that these forecasts are revisited once better data are available. For some selected segments in the report the model forecasts are adjusted based on the GPS truck routing data. Future (2040) truck traffic on selected segments of I-5, SR 99 and other highways in the Valley is estimated and presented in

Table 7-3, *Source: [Counts (7), model results]*

Figure 7-1, and Figure 7-2 shows these segments on the map and the relative change from 2014 to 2040.

Overall along I-5 corridor the percent growth increases from north to south. This is expected given the major developments in Kern County and hosting several intermodal facility and Shafter and Delano and distribution center at Tejon.

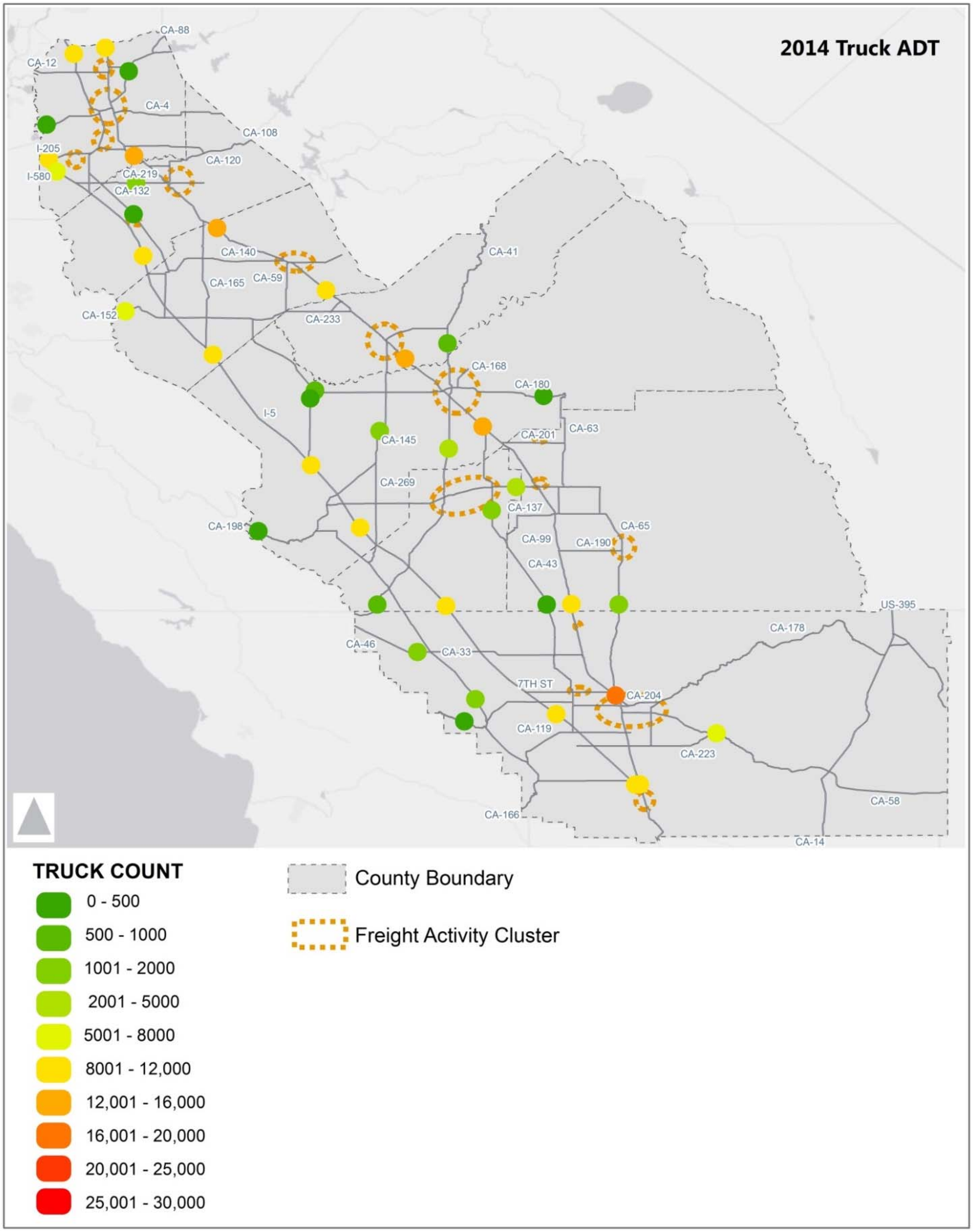
The traffic growth on SR-99 has wider range depends on the location of local developments. Largest growth on SR-99 expected to be in Kern and Merced County area.

Table 7-3. 2040 Truck traffic forecast (ADT)

County	Segment Address	2014 ADT	2014 TRUCK	2040 TRUCK	Truck GROWTH
Fresno	CA-145: I-5 TO FRESNO/MADERA CL	4700	1,034	1,700	64%
	CA-180: CLOVIS (TEMPERANCE AVE) TO CA-63	5800	348	400	15%
	CA-180: MENDOTA (CA-33) TO FRESNO SLOUGH	6500	650	900	38%
	CA-198: MONTEREY/FRESNO CL TO I-5	800	60	100	67%
	CA-33: I-5 TO MENDOTA (CA-180)	1850	389	800	106%
	CA-41: KINGS/FRESNO CL TO CA-99	14800	2,368	3,500	48%
	CA-99: SELMA (CA-43) TO FRESNO (CA-41)	80000	12,800	17,600	38%
	I-5: KINGS/FRESNO CL TO CA-198	33500	9,380	16,000	71%
	I-5: CA-198 TO CA-33	35500	9,940	18,100	82%
Kern	CA-33: CA-58 TO KERN/KINGS CL	4650	1,488	2,900	95%
	CA-46: I-5 TO SAN LUIS OBISPO/KERN CL	6800	1,700	2,500	47%
	CA-58: BAKERSFIELD (WASHINGTON ST) TO BORON	19700	6,304	8,100	28%
	CA-58: SAN LUIS OBISPO/KERN CL TO I-5	620	167	600	258%
	CA-99: BAKERSFIELD (CA-204) TO CA-46	82000	18,860	30,000	59%
	CA-99: I-5 TO BAKERSFIELD (MING AVE)	40500	10,125	16,400	62%
	I-5: CA-99 TO CA-43	33000	8,910	16,400	84%
	I-5: CA-43 TO CA-58	35000	8,400	15,300	82%
Kings	CA-198: HANFORD (CA-43) TO KINGS/TULARE CL	25000	2,500	3,800	52%
	CA-41: KERN/KINGS CL TO I-5	6500	975	1,200	23%
	CA-43: CORCORAN (SANTA FE AVE) TO HANFORD (CA-198)	5900	1,121	2,500	123%
	I-5: KERN/KINGS CL TO KINGS/FRESNO CL (CA-269)	32000	8,640	15,600	81%
Madera	CA-41: FRESNO/MADERA CL TO MADERA/MARIPOSA CL	18500	925	1,400	51%
	CA-99: FRESNO/MADERA CL TO AVENUE 12	66000	13,200	21,300	61%
Merced	CA-152: SANTA CLARA/MERCED CL TO CA-33	33000	5,280	9,700	84%
	CA-99: MADERA/MERCED CL TO MERCED (CA-59)	38000	8,360	13,700	64%
	CA-99: MERCED (CA-59) TO MERCED/STANISLAUS CL	61000	15,250	22,400	47%
	I-5: FRESNO/MERCED CL TO CA-165	29000	8,120	14,900	83%
San Joaquin	CA-4: CONTRA COSTA/SAN JOAQUIN CL TO STOCKTON (I-5)	992	109	400	267%
	CA-88: STOCKTON (CA-99) TO CA-12	8100	405	500	23%
	CA-99: STANISLAUS/SAN JOAQUIN CL TO MANTECA (CA-120)	114000	15,960	27,300	71%
	CA-99: LODI (CA-12) TO GALT (SAN JOAQUIN/SACRAMENTO CL)	62000	8,060	11,600	44%
	I-205: STOCKTON (I-5) TO CA-580	89000	10,680	18,700	75%
	I-5: CA-12 TO SAN JOAQUIN/SACRAMENTO CL	51000	10,710	17,500	63%
	I-580: I-5 (SAN JOAQUIN CL) TO CA-205	30500	5,490	9,000	64%

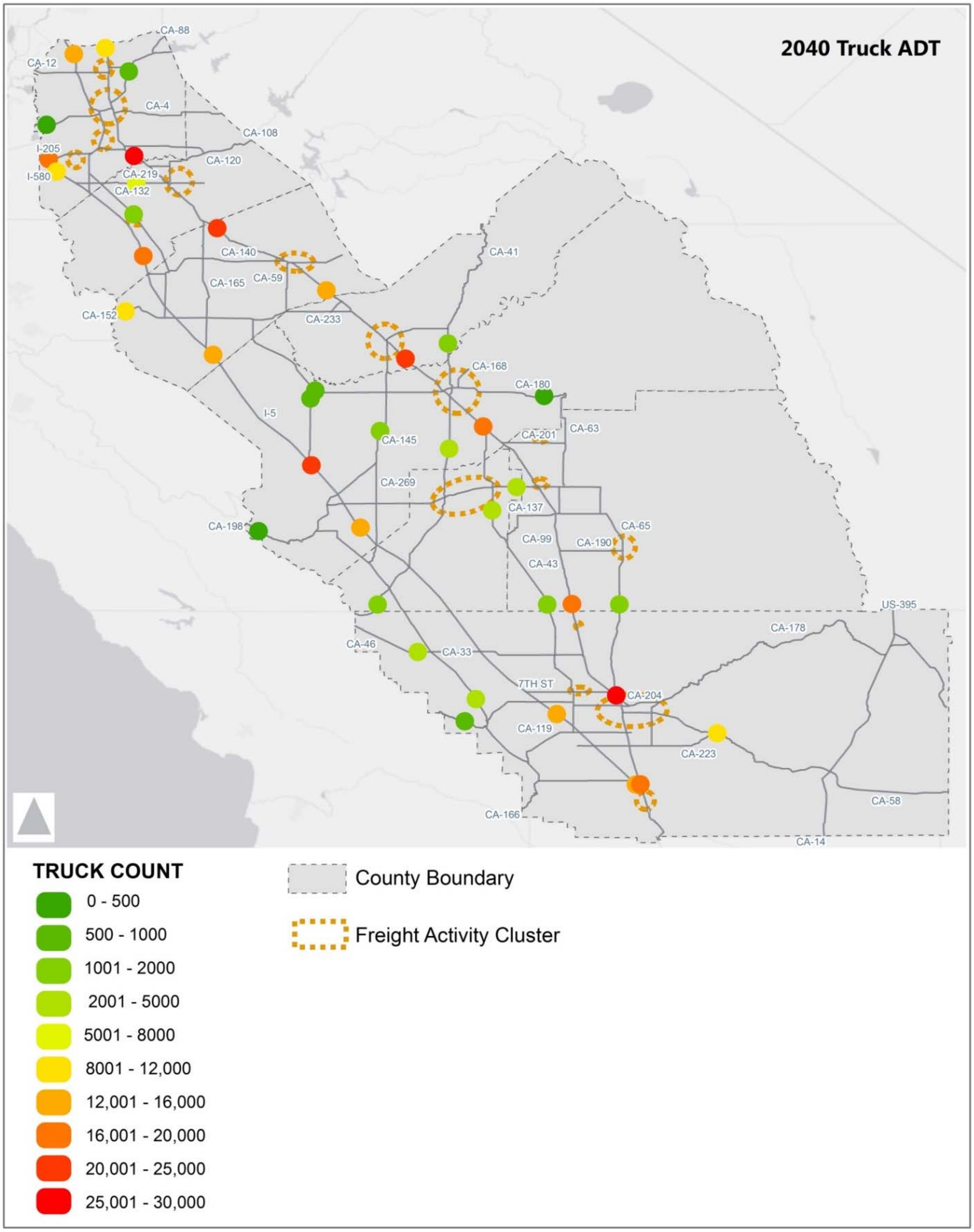
Stanislaus	CA-132: SAN JOAQUIN/STANISLAUS CL TO MODESTO (CA-99)	10400	1,872	4,900	162%
	CA-33: MERCED/STANISLAUS CL TO STANISLAUS/SAN JOAQUIN CL	4400	440	1,200	173%
	I-5: MERCED/STANISLAUS CL TO I-580 (SAN JOAQUIN CL)	39000	9,750	19,000	95%
Tulare	CA-43: KERN/TULARE CL TO CORCORAN (SANTA FE AVE)	2650	451	1,100	144%
	CA-65: KERN/TULARE CL TO CA-198	6800	1,088	1,200	10%
	CA-99: DELANO (KERN/TULARE CL) TO VISALIA (CA-198)	47500	9,500	16,700	76%

Source: [Counts (7), model results]



Source: [Counts (7), model results]

Figure 7-1. 2014 Truck traffic counts for selected segments



Source: [model results]

Figure 7-2. 2040 Truck traffic forecast for selected segments

8.0 TRUCKING AND GOODS MOVEMENT ISSUES

Using the data and information compiled in the database, the most critical trucking and goods movement issues in the I-5/SR 99 corridors were identified in order to determine which of the strategic programs will be most beneficial in addressing these needs. Our approach was to organize, summarize and visualize available information about each segment to understand the big picture of truck movements in the Valley. We focused on the I-5/SR 99 segments that are most heavily impacted by truck traffic in order to guide the development of successful strategies to improve goods movement. We shared the online web map and fact sheets for each segment with Valley MPOs, Caltrans, and TAC members for their review and feedback to ensure that all issues are fully captured and accurately covered.

8.1 Traffic Congestion and Travel Time Reliability Issues

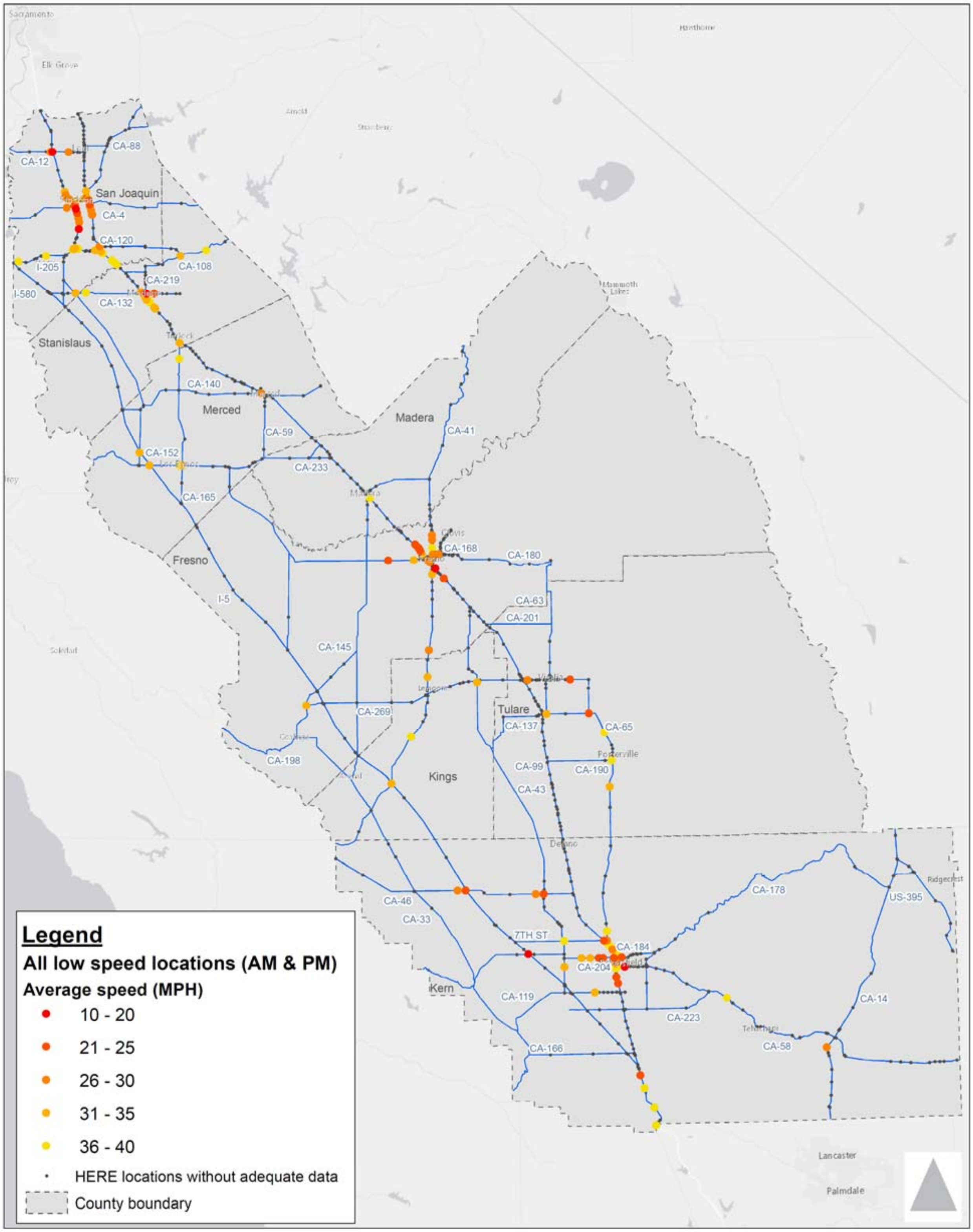
To identify segments with mobility and reliability issues HERE data are used. For this analysis, speed data is processes for Tuesdays through Thursdays for the month of October, 2015 in order to establish average weekday values. The time period was further refined to the peak hours for analysis of 6:00 to 9:00 AM and 4:00 to 7:00 PM. In order to ensure the quality of data, the selection was refined once more to only locations that had at least 10 days of data on average for each five-minute data point. The HERE dataset is not cleaned of outliers or other possible data errors ahead of time, so this refining process reduces the likelihood that a location would show irrational or skewed averages because, for example, there was only one day of data.

To understand the peak hour issues across the entire region, the average speed data was aggregated to 15-minute periods and the lowest average speed for any 15-minute period for both AM and PM peak was selected. This method allows for the variation among regions or even among different road segments which may experience the worst of the peak period at very different times, rather than arbitrarily applying a single 15-minute time period across the entire Valley.

The worst 15-minute average speed was selected as congested peak period speed of that facility, then the congested speed was compared to posted speed limit (free flow speed). In some cases congested speed is 25% of the posted speed limit. In other words, on a highway with a posted speed of 65mph, the average speed would be about 16mph. The congested speed is calculated for both “all vehicles” and “trucks only”, where the data were available. It is important to note that on some segments of major freeways and multilane highways, trucks are subject to speed restrictions (often, a limit of 10mph less than general traffic) that would not be captured by the posted speed limit data source used.

Source: *[HERE, October 2015]*
Figure 8-1. Congested locations during AM or PM peak period provides example areas for further analysis. From the lowest speed locations, ten locations were selected where truck volumes account for at least 10% of all traffic (the lowest ultimately was 12%) and the slow areas were at least one mile in length. Each location selected was supported by HERE data and validated against Google Maps historical traffic data to ensure some other condition, such as construction in

the HERE data collection period, was not skewing the results. The locations selected cover a variety of areas across the region, although some counties do not feature an example that met all of the criteria. While the list is dominated by urban areas where AADT tends to be higher and exit and entry ramps or interchanges are more frequent, there are several examples of multilane or single-lane state highways with low AADT and high truck volumes.



Source: *[HERE, October 2015]*

Figure 8-1. Congested locations during AM or PM peak period

8.2 Safety Issues

A regional hot-spot analysis is useful to identify areas to examine more closely, but does not effectively assess the frequency of collisions relative to the use of the road. Where data were available, the rate of collisions per 1,000 average daily trips was calculated. Highways across the study area carry a wide range of traffic volumes, so collision rates are a better indicator of a problem.

The length of segments in the study varies and the ADT values are estimates. Some segments have more ADT data available than others, so the collision rate (collisions per 1,000 ADT) should be understood as an order of magnitude difference, rather than an absolute value.

The average collision rate among the 44 segments with available ADT data was 12.38 collisions per 1,000 ADT. The range is wide, from 1.6 to 184 collisions per 1,000 ADT. Table 8-1 displays the 10 segments with the highest collision rates. At least four of these segments can be considered part of the greater Stockton area.

Table 8-1. List of top 10 segments with high collision rates in the Valley

Highway	Segment	Collisions 2009-2013	ADT	Collisions Per 1,000 ADT
CA-108	Modesto (CA-132) To Tuolumne/Stanislaus Cl	888	4,800	184.0
CA-120	Manteca (CA-99) To San Joaquin/Stanislaus Cl	145	2,900	50.1
CA-41	Fresno/Madera Cl To Madera/Mariposa Cl	482	18,300	26.4
I-580	I-5 (San Joaquin Cl) To CA-205	116	4,800	24.3
CA-88	Stockton (CA-99) To CA-12	212	8,800	24.2
CA-4	Contra Costa/San Joaquin Cl To Stockton (I-5)	137	5,900	23.2
CA-12	Sacramento/San Joaquin Cl To Lodi West City Limit	84	5,700	14.8
CA-152	Santa Clara/Merced Cl To CA-33	299	20,500	14.6
CA-140	CA-165 To Merced (CA-99)	58	4,100	14.1
CA-4	Stockton (CA-99) To San Joaquin/Stanislaus Cl	52	4,400	11.9

Source: *[TIMS, Counts (7)]*

Only the data for SR 99 and I-5 are displayed below in Table 8-2, where data collection for traffic volumes is generally more consistent. Compared to the available segments for other highways, SR

99 and I-5 are relatively much safer despite significantly higher volumes. The average collision rate for other highways where ADT was available is 23.92, compared to 4.54 for SR 99 and 3.88 for I-5.

Table 8-2. List of segments with high collisions on I-5 and SR 99

Highway	Segment	Collisions 2009-2013	ADT	Collisions Per 1,000 ADT
SR 99	Delano (Kern/Tulare Cl) To Visalia (CA-198)	530	46,200	11.5
SR 99	Merced (CA-59) To Merced/Stanislaus Cl	422	54,000	7.8
SR 99	Merced/Stanislaus Cl To Modesto (CA-132)	689	89,100	7.7
SR 99	Manteca (CA-120) To Stockton (CA-4)	436	69,900	6.2
SR 99	Fresno (CA-41) To Fresno/Madera Cl	588	98,200	6.0
SR 99	I-5 To Bakersfield (Ming Ave)	322	65,300	4.9
SR 99	Modesto (CA-132) To Stanislaus/San Joaquin Cl	520	115,400	4.5
SR 99	Stockton (CA-4) To Lodi (CA-12)	321	82,100	3.9
SR 99	Bakersfield (CA-204) To CA-46	290	78,100	3.7
SR 99	Selma (CA-43) To Fresno (CA-41)	314	87,800	3.6
SR 99	Lodi (CA-12) To Galt (San Joaquin/Sacramento Cl)	193	57,900	3.3
SR 99	Ming Ave To CA-204 (Bakersfield)	407	128,700	3.2
SR 99	Avenue 12 To Avenue 17 (Madera)	192	64,400	3.0
SR 99	Stanislaus/San Joaquin Cl To Manteca (CA-120)	225	89,900	2.5
SR 99	Fresno/Madera Cl To Avenue 12	118	61,000	1.9
SR 99	CA-152 To Madera/Merced Cl	99	54,400	1.8
SR 99	CA-46 To Delano (Kern/Tulare Cl)	97	61,600	1.6
I-5	I-5 (San Joaquin Cl) To CA-205	671	70,700	9.5
I-5	Monte Diablo Ave (Stockton) To CA-12	148	19,300	7.7
I-5	CA-165 To Merced/Stanislaus Cl (CA-140)	355	90,900	3.9
I-5	Lathrop (CA-120) To Stockton (CA-4)	108	40,700	2.7
I-5	CA-12 To San Joaquin/Sacramento Cl	80	33,400	2.4
I-5	CA-99 To CA-43	35	19,200	1.8
I-5	I-580 To I-205	55	34,800	1.6
I-5	CA-43 To CA-58	128	82,600	1.6

Source: *[TIMS, Counts (7)]*

9.0 REFERENCES

Reports and Planning Documents:

- Alameda County's Goods Movement Plan, prepared by CSI 2014
- California State Rail Plan, Caltrans, 2013
- Corridor System Management Plan I-5, Caltrans District 10, 2012
- Corridor System Management Plan I-5, Caltrans District 6, 2013
- Corridor System Management Plan SR-99, Caltrans District 10, 2002, 2008, 2011
- Corridor System Management Plan SR-99, Caltrans District 6, 2003
- Fresno COG Regional Transportation Plan, 2014
- I-5, SR-99 Origin and Destination Truck Study, KOA, 2009
- Kern COG Regional Transportation Plan/Sustainable Communities Strategies, 2014
- Kings County Regional Transportation Plan and Sustainable Communities Strategies, 2014
- Land of Risk/Land of Opportunity: Cumulative Environmental Vulnerability in California's San Joaquin Valley. UC Davis Center for Regional Change, 2011
- San Joaquin Corridor Strategic Plan, Caltrans, 2008
- San Joaquin Valley Interregional Goods Movement, prepared by FP & CSI et al, 2013
- Service Development Plan for San Joaquin Corridor, AECOM, 2013
- SR-99, SR-198 Gateways Truck Origin and Destination Study, F&P, 2015
- Tulare County Association of Governments Regional Transportation Plan, Goods Movement Chapter 2014
- The State of California Freight Mobility Plan, Caltrans, 2014
- Updated Business Plan for SR-99, Vol I, II, II, Caltrans, 2013

Data Sources:

1. Caltrans Performance Measurement System (PeMS), 2014 http://pems.dot.ca.gov/
2. Weigh-in-Motion Data, available upon request from Caltrans Traffic Operation division, 2014, http://www.dot.ca.gov/hq/traffops/trucks/datawim/
3. Freight Analysis Framework, FAF3, 2007, http://faf.ornl.gov/fafweb/Extraction1.aspx
4. Freight Analysis Framework, FAF3, 2007, http://faf.ornl.gov/faf4/Extraction1.aspx
5. StreetLight Data, Data Period: 2015: [3, 4, 5, 6] Copyright © 2011-2015,
6. Transportation Injury Mapping System (TIMS) , 2009-2013, http://tims.berkeley.edu/
7. Count data bases
   - Caltrans vehicle classification counts for 2013 and 2014 for state highways
   - District 6 vehicle classification counts for primary urban roads for 2014 and 2015
   - District 10 vehicle classification counts for primary urban roads for 2014 and 2015
   - Other counts collected by consultant team during between 2010-2015
8. Websites that used to identify truck stops and rest stops:
   - Caltrans Truck stops: http://dot.ca.gov/hq/traffops/trucks/routes/truck-stops.htm
   - http://www.truckstopguide.com/
   - http://www.truckmaster.com/truck-stop-in-ca
   - Jason's Law facilities and spaces shape file http://www.ops.fhwa.dot.gov/freight/infrastructure/truck_parking/index.htm
9. California EDD: America's Labor Market Information System (ALMIS) Employer Database, 2011 First Edition , Geocoded by consultant team

10.0 APPENDIX

10.1 Truck Stops in San Joaquin valley

Table 9-1 Truck stops in San Joaquin Valley

Name	No. of Spaces*	Type	County	Address
Rest Area	NA	Private	Kings	Coalinga/Avenal Southbound Rest Area
Hillcrest Travel Plaza	NA	Private	Kings	44779 S. Lassen Ave, Avenal, CA 93204
Valero #3074	NA	Private	Kern	3225 Buck Owens Blvd, Bakersfield, CA 93308
Bruce's Truck Stop	140	Private	Kern	8311 E Brundage Ln., Bakersfield, CA 93307
Bear Mountain Truck Stop	NA	Private	Kern	15840 Costajo Rd, Bakersfield, CA 93313
Pacific Pride	NA	Private	Kern	1841 W Mettler Frontage Rd, Bakersfield, CA 93305
Wal-Mart	NA	Private	Kern	2300 White Lane, Bakersfield, CA 93304
Kimber Renegade Shell	NA	Private	Kern	8200 Kimber Ave, Bakersfield, CA 93307
24/Seven Travel Plaza	200	Private	Kern	129 Weedpatch Hwy, Bakersfield, CA 93307
Mikuls Pumpkin Center Truck Terminal	NA	Private	Kern	
Flyers Energy	NA	Private	Kern	2023 Mettler Frontage Rd, Bakersfield, CA 93313
Pacific Pride	NA	Private	Kern	15840 Costajo St, Bakersfield, CA 93313
Flying J #613	250	Private	Kern	17047 Zachary Avenue, Bakersfield,CA 93308
Ahmed's	NA	Private	Madera	18208 Avenue 24, Chowchilla, CA 93610
Weigh Station	NA	Private	Madera	
Pacific Pride	NA	Private	Madera	22798 Rd 4, Chowchilla, CA 93610
Red Top Truck Stop	NA	Private	Madera	22798 Road 4 (Lincoln Rd), Chowchilla,CA 93610
Jayne Travel Center	NA	Private	Fresno	41027 S. Glen Ave, Coalinga,CA 93210
Pacific Pride	NA	Private	Kings	1130 Pickerell Avenue, Corcoran,CA 93212
Akal Travel Plaza	NA	Private	Kern	1640 Highway 99, Delano,CA 93215
Oasis Market & Truck Stop	NA	Private	Tulare	23215 Ave 56, Ducor,CA 93218
A & A Shell Food Mart	NA	Private	Tulare	23314 Ave 56, Ducor,CA 93218
Big B's Travel Center	NA	Private	Tulare	1164 N Front St, Earlimart,CA 93219
Pacific Pride	NA	Private	Tulare	1149 S Kaweah, Exeter,CA 93221
Renos Mega Mart Chevron	NA	Private	Fresno	1207 N St, Firebaugh,CA 93622
MBP Truck/Auto Plaza	NA	Private	Fresno	15838 Paul Negra Rd, Firebaugh,CA 93622

Burford's Star Mart #5	NA	Private	Fresno	2747 E Manning Ave, Fowler,CA 93625
Beacon 5th Wheel Truck Stop	NA	Private	Fresno	3767 S Golden State Blvd, Fresno,CA 93725
E-Z Trip	264	Private	Fresno	6725N Golden State Blvd, Fresno,CA 93722
RVJ's Truck Stop	NA	Private	Fresno	4021 S Maple Ave, Fresno,CA 93725
Fleet Card Fuels Fresno	NA	Private	Fresno	2898 E. Jensen Ave, Fresno,CA 93706
Seibert's Fuel Center	NA	Private	Fresno	2837 N Parkway Dr, Fresno,CA 93722
Pacific Pride	NA	Private	Fresno	2581 SE Ave, Fresno,CA 93706
Cal Fresno Oil	NA	Private	Fresno	3242 E Garrett Ave, Fresno,CA 93706
EZ Trip Golden State	NA	Private	Fresno	6639 N. Parkway Dr, Fresno,CA 93722
Pacific Pride	NA	Private	Fresno	3220 S Parkway Dr, Fresno,CA 95358
Pacific Pride	NA	Private	Kings	9535 E Third St, Hanford,CA 93230
Rest Area	NA	Private	Fresno	
Shop & Go #611	NA	Private	Fresno	38440 Highway 99, Kingsburg,CA 93631
Joe's Travel Plaza	NA	Private	San Joaquin	15600 S Harlan Rd, Lathrop,CA 95330
Pacific Pride	NA	Private	Kings	1735 W D St, Lemoore,CA 93245
Lindsay Food Mart	NA	Private	Tulare	235 N Fremont Dr, Lindsay,CA 93247
Livingston Travel Center	110	Private	Merced	
Flying J #617	187	Private	San Joaquin	15237 Thornton Road, Lodi,CA 95242
Pacific Pride	NA	Private	San Joaquin	351 N Beckman Rd, Lodi,CA 95240
3B's Truck/Auto Plaza	NA	Private	San Joaquin	14749 N. Thornton Rd., Lodi,CA 95242
Pacific Pride	NA	Private	San Joaquin	14749 N Thornton Rd, Lodi,CA 95242
Pacific Pride	NA	Private	Madera	631 S Gateway Dr, Madera,CA 93637
Wal-Mart	NA	Private	Madera	1977 West Cleveland Ave, Madera,CA 93637
Pilot Travel Center #365	150	Private	Madera	22717 Avenue 18 1/2, Madera,CA 93637
Family Food Mart	NA	Private	Madera	28650 Avenue 12, Madera,CA 93637
Pacific Pride	NA	Private	Merced	1455 R St, Merced,CA 95340
Pacific Pride	NA	Private	Merced	385 S Hwy 59, Merced,CA 95341
Pacific Pride	NA	Private	Stanislaus	401 9th St, Modesto,CA 95350
Pacific Pride	NA	Private	Stanislaus	237 E Whitmore Ave, Modesto,CA 95358
Modesto Travel Plaza	NA	Private	Stanislaus	1201 7th St, Modesto,CA 95351
Pacific Pride	NA	Private	Stanislaus	320 Codoni Ave, Modesto,CA 95350
Wal-Mart	NA	Private	Stanislaus	2225 Plaza Parkway, Modesto,CA 95350
Pacific Pride	NA	Private	Stanislaus	226 N 2nd Street, Patterson,CA 95363
Westley Triangle Truck	NA	Private	Stanislaus	

Stop				
Bob's Truck Stop	NA	Private	Tulare	444 E Court Ave, Pixley,CA 93256
Texaco	NA	Private	Tulare	451 S Park Dr, Pixley,CA 93256
Pacific Pride	NA	Private	Tulare	73 W Vine St, Porterville,CA 93257
Wal-Mart	NA	Private	Kern	911 South China Lake Blvd, Ridgecrest,CA 93555
Love's Travel Stop	NA	Private	Stanislaus	1553 Colony Rd., Ripon,CA 95366
Flying J #618	197	Private	Stanislaus	1501 N. Jack Tone Road, Ripon,CA 95366
Pacific Pride	NA	Private	Stanislaus	816 S Frontage Rd, Ripon,CA 95366
Jimco Truck Plaza	NA	Private	Stanislaus	1022 Frontage Rd, Ripon,CA 95366
Shane & Dave's Truck Shop	NA	Private	San Joaquin	3550 S Highway 99, Stockton,CA 95215
Vanco Truck & Auto Plaza	NA	Private	San Joaquin	1033 W Charter Way, Stockton,CA 95206
Pacific Pride	NA	Private	San Joaquin	5777 French Camp Rd, Stockton,CA 95201
Wal-Mart Supercenter	NA	Private	San Joaquin	3223 East Hammer Lane, Stockton,CA 95212
76 Express	NA	Private	San Joaquin	5777 S French Camp Rd, Stockton,CA 95206
Pacific Pride	NA	Private	San Joaquin	1033 W Charter Way, Stockton,CA 95206
Love's Travel Stop #392	NA	Private	Kern	2000 East Tehacapi Blvd., Tehachapi,CA 93561
Rest Area	NA	Private	Tulare	Phillip Raine Rest Area SB
Town & Country Market	NA	Private	Tulare	412 S Burnett Rd, Tipton,CA 93272
Rest Area	NA	Private	Tulare	Phillip Raine Rest Area NB
Pacific Pride	NA	Private	San Joaquin	5491 F St, Tracy,CA 95201
Country Mart	NA	Private	San Joaquin	34243 S Chrisman Rd, Tracy,CA 95304
Tracy Truck & Auto Stop	NA	Private	San Joaquin	3940 N Tracy Blvd, Tracy,CA 95304
Pacific Pride	NA	Private	San Joaquin	34243 S Chrisman Rd, Tracy,CA 95304
RJ Travel Center	NA	Private	Tulare	36220 Highway 99, Traver,CA 93673
Rest Area	NA	Private	Stanislaus	SB
Pacific Pride	NA	Private	Stanislaus	309 S Tully, Turlock,CA 95380
Pacific Pride	NA	Private	Stanislaus	1001 S Berkeley Ave, Turlock,CA 95380
G&S(CFN Cardlock)	NA	Private	Stanislaus	725 N Tully Rd, Turlock,CA 95380
Rest Area	NA	Private	Stanislaus	NB
Goshen Arco Travel Plaza	NA	Private	Tulare	30821 Route 99, Visalia,CA 93279
Pacific Pride	NA	Private	Tulare	205 N Ben Maddoz Way, Visalia,CA 93292

Texaco Truck Stop #5	85	CT	Fresno	2747 E Manning Ave, Fowler, CA 93625, USA
Beacon 5th Wheel Truck Stop	40	CT	Fresno	3767 S Golden State Blvd, Fresno, CA 93725, USA
Kleins Truck Stop	150	CT	Fresno	6725 N Golden State Blvd, Fresno, CA 93722, USA
RVJ's Truck Stop	12	CT	Fresno	4021 S Maple Ave, Fresno, CA 93725, USA
Red Triangle (Exxon)	8	CT	Fresno	38440 6th St, Kingsburg, CA 93631, USA
Boyett Petroleum	50	CT	Fresno	3000 E Floral Ave, Selma, CA 93662, USA
Kailey's Break Place, Inc.	10	CT	Fresno	13025 S Van Horn Ave, Selma, CA 93662, USA
Truck Stops of America	165	CT	Kern	5800 N Wheeler Ridge Rd, Arvin, CA 93203, USA
Beacon Truck Stop	6	CT	Kern	3225 Buck Owens Blvd, Bakersfield, CA 93308, USA
Bear Mountain Truck Stop	50	CT	Kern	15840 Costajo Rd, Bakersfield, CA 93313, USA
Bruce's Truckstop	150	CT	Kern	8311 E Brundage Ln, Bakersfield, CA 93307, USA
Easy Trip Exxon	1	CT	Kern	29541 Stockdale Hwy, Bakersfield, CA 93314, USA
Flying J Travel Plaza #5320	250	CT	Kern	17047 Zachary Rd, Bakersfield, CA 93308, USA
Kimber Avenue Texaco	30	CT	Kern	8200 Kimber Ave, Bakersfield, CA 93307, USA
Renegade Truck Stop	20	CT	Kern	2023 Mettler Frontage Rd W, Bakersfield, CA 93313, USA
Bruce's Buttonwillow	55	CT	Kern	27780 Lagoon Dr, Buttonwillow, CA 93206, USA
Buttonwillow TA Travel Center	200	CT	Kern	27769 Lagoon Dr, Buttonwillow, CA 93206, USA
Akal Truck Stop	50	CT	Kern	Delano, CA, USA
Lost Hills TA Travel Center	80	CT	Kern	14814 Aloma St, Lost Hills, CA 93249, USA
Giant Truck Stop of Mojave	50	CT	Kern	16600 Sierra Hwy, Mojave, CA 93501, USA
Petro Stopping Center 28	420	CT	Kern	5821 Dennis McCarthy Dr, Arvin, CA 93203, USA
Beacon Truck Stop	10	CT	Kings	Kettleman City, CA 93239, USA
Ahmed's Exxon	15	CT	Madera	18208 Avenue 24, Chowchilla, CA 93610, USA
Pilot Travel Center #365	328	CT	Madera	22717 Ave 18 1/2, Madera, CA 93637, USA
San Luis Travel Plaza "Petro"	150	CT	Merced	28991 Gonzaga Rd, Santa Nella Village, CA 95322, USA
Pilot Travel Center	75	CT	Merced	29025 Plaza Dr, Santa Nella Village, CA 95322, USA
Rotten Robbie Truck/Auto Plaza	50	CT	Merced	12860 CA-33, Santa Nella Village, CA 95322, USA
TA Santa Nella Travel	206	CT	Merced	Santa Nella Blvd & I-5, Gustine, CA

Center				95322, USA
Jahant Food & Fuel	25	CT	San Joaquin	24323 CA-99, Acampo, CA 95220, USA
Joe's Travel Plaza	2	CT	San Joaquin	15600 Harlan Rd, Lathrop, CA 95330, USA
3 B's Truck/Auto Plaza	12	CT	San Joaquin	14749 Thornton Rd, Lodi, CA 95242, USA
Flying J Travel Plaza	176	CT	San Joaquin	1501 Jack Tone Rd, Ripon, CA 95366, USA
Jimco Truck Plaza	30	CT	San Joaquin	1022 Frontage Rd, Ripon, CA 95366, USA
Joes's Travel Plaza	2	CT	San Joaquin	15600 Harlan Rd, Lathrop, CA 95330, USA
Vanco Truck & Auto Plaza	45	CT	San Joaquin	1033 W Charter Way, Stockton, CA 95206, USA
Country Mart Diesel & Gas	22	CT	San Joaquin	34243 N Chrisman Rd, Tracy, CA 95304, USA
Westley Triangle Truck Stop	100	CT	Stanislaus	7051 McCracken Rd, Westley, CA 95387, USA
Bob's Auto And Ts	25	CT	Tulare	444 E Court Ave, Pixley, CA 93256, USA
USA Petroleum #217	6	CT	Tulare	415 N Park Dr, Pixley, CA 93256, USA
C. Roche Truck Stop	80	CT	Tulare	1120 E Paige Ave, Tulare, CA 93274, USA
Tejon Pass	NA	CTR	Kern	3.5 mi. N. of Gorman
Buttonwillow	NA	CTR	Kern	2 mi. N. of Rte. 58 Interchange
Coalinga - Avenal	NA	CTR	Fresno	1.2 mi. N. of Lassen Avenue
John "Chuck" Erreca	NA	CTR	Merced	0.7 mi. N. of Fresno Co. Line
Westley	NA	CTR	Stanislaus	0.9 mi. S. of San Joaquin Co. Line
Boron	NA	CTR	Kern	3.9 mi. W. of Boron
Phillip S. Raine	NA	CTR	Tulare	2.5 mi. N. of Tipton
C. H. Warlow	NA	CTR	Tulare	At Dodge Ave. Near Kings River
Enoch Christoffersen	NA	CTR	Stanislaus	2.3 mi.S. of Turlock

CTR = Caltrans Truck Rest stop
CT = Caltrans Truck stop
*NA= There is no information about number of spaces

10.2 PeMS Detector Availability

Table 9-2 Details the number of detectors used to collect PeMS data available per study segment.

Highway and County	Detectors	Highway and County	Detectors
CA-108	**2**	**CA-41**	**60**
Stanislaus	2	Fresno	56
CA-12	**17**	Kings	2
San Joaquin	17	Madera	2
CA-120	**26**	**CA-46**	**6**
San Joaquin	26	Kern	6
CA-132	**17**	**CA-59**	**1**
San Joaquin	11	Merced	1
Stanislaus	6	**CA-88**	**10**
CA-140	**11**	San Joaquin	10
Merced	11	**CA-99**	**382**
CA-145	**2**	Fresno	58
Madera	2	Kern	55
CA-152	**12**	Madera	26
Merced	12	Merced	96
CA-168	**27**	San Joaquin	114
Fresno	27	Stanislaus	30
CA-180	**24**	Tulare	3
Fresno	24	**I-205**	**40**
CA-184	**2**	San Joaquin	40
Kern	2	**I-5**	**151**
CA-198	**2**	Fresno	2
Tulare	2	Kern	11
CA-219	**2**	Merced	23
Stanislaus	2	San Joaquin	110
CA-33	**2**	Stanislaus	5
Merced	2	**I-580**	**2**
CA-4	**29**	San Joaquin	2
San Joaquin	29		

10.3 Major Freight Generators in San Joaquin Valley

This appendix provides further information about existing freight generators and major future industrial projects in each county. The information is provided by local jurisdictions.

Kern County

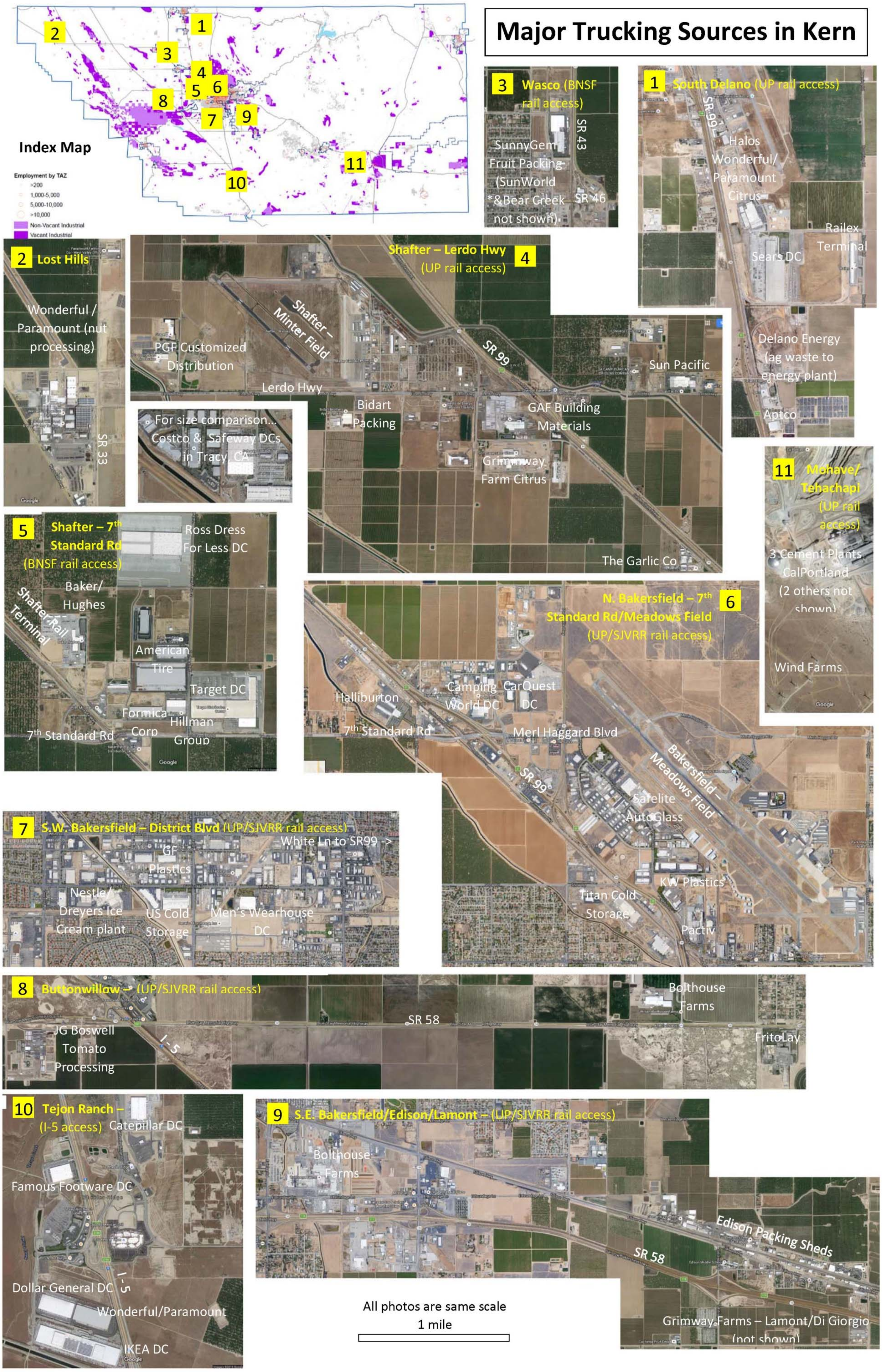


Figure 10-1. Kern County major freight generators *[provided by KernCOG]*

San Joaquin County

- **Centerpoint Intermodal Center at Manteca**

This 190 Acre campus provides direct access to UP Intermodal facility. It is centrally located between I–5 and HWY 99 and will accommodating up to 3.1 Million SF with flexible layouts (Figure 10-2).

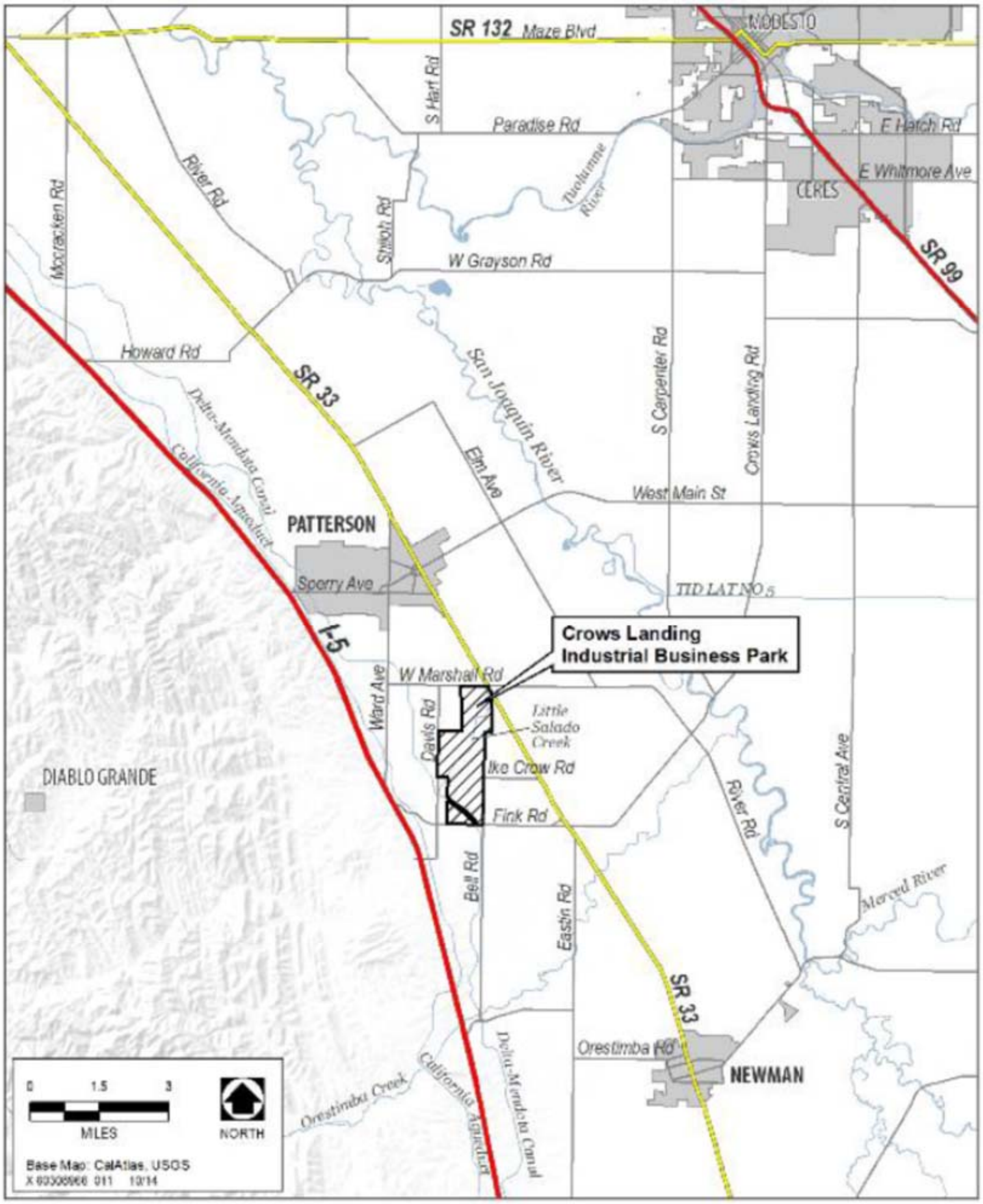
Figure 10-2. Centerpoint Intermodal Center [*provided by* StanCOG]

Stanislaus County

- **Crows Landing Industrial Business Park (CLIBP)**

The proposed CLIBP or "project" would be constructed within the boundaries of the former National Aeronautics and Space Administration (NASA) Crows Landing Air Facility. The approximately 1,532-acre project site is located in an unincorporated area of western Stanislaus County that is within 2 miles of Interstate 5 (I-5) and south of the Patterson city limits and its Urban Services Boundary/Sphere of Influence. The project site is bounded by Marshall Road to the north, Fink Road to the south, Bell Road to the east, and Davis Road to the west (Figure 10-3).

The County anticipates that development of the CLIBP at the former Crows Landing military site would require more than 30 years to reach full buildout, and the needs associated with parcel development will continue to evolve. Therefore, the proposed CLIBP does not offer specific parcels for development, but areas that can be sized based on the individual needs of site tenants and developers. The proposed CLIBP Specific Plan, which will be appended to the EIR, will provide objectives, goals, and policies for the approximately 1,532-acre site that will further the County's vision for the property. The Specific Plan would allow proposed tenants to develop parcels that are suitable for their diverse and unique needs. The County assumes that the proposed project would be developed in three, 10-year phases or an overall 30-year timeframe, and it would provide backbone on and off-site infrastructure and roadway improvements to meet the needs associated with each phase.



Source: AECOM 2014

Figure 10-3. Crows Landing Industrial Business Park *[provided by StanCOG]*

- **Beard Industrial Business Park**

The Beard Industrial District is located in Modesto with easy access to Highway 99. Modesto, California is an ideal centralized location for Northern, Central California and West Coast Markets and is located approximately 80 miles from the Port of Oakland. It is also connects by M&ET with both BNSF & UP railroads (Figure 10-4). This project provides:

- ~2,000-Acre Industrial Business Park
- Industrial Warehouse Distribution, Manufacturing & Related Space totaling Over ±9 MSF
- Build-to-Suit Opportunities (25,000 to over 1 MSF)
- Home to several Fortune 500 Companies

Source: CBRE

Figure 10-4. Beard Industrial Business Park ***[provided by StanCOG]***

Tulare County

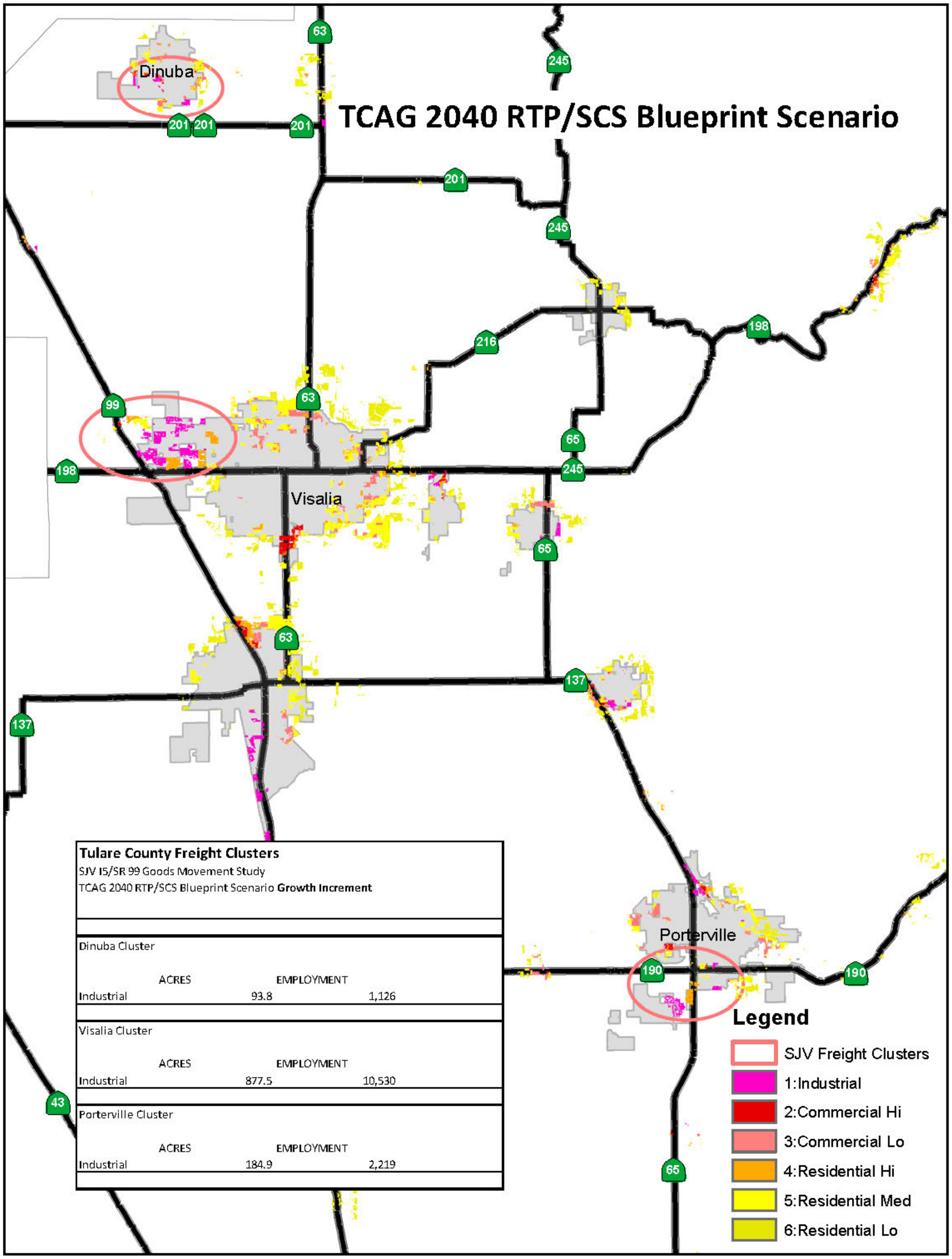


Figure 10-5. Tulare County freight clusters *[provided by TCAG]*