

# San Joaquin Valley Sustainable Implementation Plan

Truck Routes and Parking Study



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## **INTRODUCTION**

Truck routing and truck parking are long-term priorities to ensure the safe and efficient movement of goods by truck through San Joaquin Valley (SJV) communities. The integrity of Surface Transportation Assistance Act (STAA) routes between different jurisdictions in the Valley and connectivity of the truck route system are identified as major issues. Moreover, a shortage of public or private truck parking, especially in the urban areas, causes drivers to use off-ramps and non-designated truck parking areas, or drive long distances on local roads to find a parking place. This issue is not only a safety hazard but an environmental hazard due to generation of unnecessary diesel emissions. In this report, these issues are studied in more detail and improvement recommendations are provided.

The San Joaquin Valley Freight sector depends on connectivity, continuity and efficiency of the STAA network that provides trucks with efficient and safe access to freight activity centers from major highways. The network provides access between freight generators such as manufacturers, agricultural processing centers, farms, distribution centers, rail intermodal and port facilities and a distribution pathway. Some of the existing roads frequently used by truckers may not have the geometric and/or pavement conditions appropriate to handle significant amounts of freight transportation. On the other hand, some of the old designated truck routes may conflict with pedestrians, bicyclists, and other vehicles. The first part of the report presents an inventory of the existing intercity truck route network in the San Joaquin Valley. It examines how well this truck route network provides connectivity to the major areas of freight activity in the Valley by looking at connectivity to freight clusters identified in Task 1, First/Last Mile Connectors. As part of this process, the best current information on STAA truck routes in the Valley was compiled, as these routes should form the backbone of the intercity truck route system. The STAA system was examined to determine how well it provides connections to major truck activity centers, how well it will provide connections to new truck-oriented developments that are being built in the Valley, and whether major truck routes traverse areas with incompatible land uses. Based on this examination of where trucks need to travel to access freight centers and how this compares with the designated truck routes, recommendations are provided for how to adjust the truck route network in the future. In addition, the truck route system was examined to determine if there were discontinuities at jurisdictional boundaries and/or physical constraints (e.g., height



restrictions) or truck restrictions on critical routes that should be addressed in future planning.

The second part of this report reviews important freight truck parking issues in the San Joaquin Valley. Truck parking availability is a concern for both the goods movement/logistics industry as well as local and state government agencies. Parking along truck routes is necessary for truck drivers to take breaks and rest, or to sleep and wait long enough to comply with federal laws limiting hours of on-duty driving time. According to the Jason Law report, California ranked second among all the states in terms of severity of need for truck parking spaces. There are 53.7 truck parking spaces per 100 thousand of Vehicle Miles Traveled (KVMT) or 90.6 spaces per 100 miles of National Highway System (NHS). Less than 10% of truck parking spaces are public facilities. California ranked 14<sup>th</sup> in providing public truck parking access in the nation, where rank 1 is the worst. I-5 in California is also ranked 11<sup>th</sup> in terms of cited interstates with a shortage of truck parking.

There is often a disconnect between perceived need and actual need for truck parking. Parking on a shoulder or ramp does not always correlate to a truck parking shortage. Truck drivers may park along the side of highways and exit ramps in several situations:

- When parking is at capacity, unavailable, or inadequately located, truck drivers may not risk continuing further than they should to find a legitimate space to park at their own cost.
- When the truck operator is focused on the need for or pressure to deliver their load by a specific time, leading the driver to push onward regardless of the actual possibility of making it to their destination on time or before they reach their hours of service (HOS) limit. This may cause the driver to park and wait on state routes, rather than entering city boundaries to avoid restrictions on city roads.
- When parking cost is not covered by shippers or employers separately, truck drivers are more likely to park along the side of the highways as a free alternative.
- When information about parking availability and the possibility of booking a parking space in advance at an affordable cost is not available, truck drivers must plan their trip with high uncertainty. This uncertainty is higher during the busy months and weekdays when travel time is also not reliable. In these conditions, the truck driver may run out of HOS and need to stop at a non-designated truck parking space.



Changes in federal rules between 2005 and 2013 began limiting the hours that truck drivers may be consecutively driving and requires drivers to take a 30-minute break during the first eight hours of their shift. The new HOS rules have reportedly had a profound effect on established trucking patterns across the country. Drivers must plan ever more carefully to balance the timing of deliveries, rest periods, and anticipating traffic congestion or detours. Planning accurately for all of these variables can be challenging; for example, an unexpected delay at a shipping location could easily throw off an otherwise well-planned trip, making the driver need to search for parking at an unplanned and/or unfamiliar location.

Parking on the shoulder of a limited-access highway is prohibited by law, however, law enforcement officials often compare the risk of a tired driver at his HOS limit parking and resting along freeway versus driving until the next available parking space. State officials have safety concerns with illegal side-of-highway parking from the increased risk of vehicle collisions due to poor visibility around the trucks or even the threat of terrorist activities. Having official, sanctioned truck parking is also important for truck driver safety. Driver Jason Rivenburg was killed in 2009 while sleeping in his truck at an abandoned gas station due to a lack of available, lit, and well-used truck stops near his shipping location.

In speaking with representatives of the California Highway Patrol's Commercial Vehicle Section, parking on freeway shoulders or ramps happens only sporadically, especially if a driver doesn't anticipate the need for a rest area until too late. Law enforcement officers often have a conflict when it comes to trucks parked illegally along ramps and highways; although it is illegal to park in these locations, it's also a violation of federal rules to make the driver resume driving until they reach a legal parking area, and could pose a major liability if the driver were to get involved in a collision as a result of driving during their required rest period.

In speaking with representatives of San Joaquin Valley Metropolitan Planning Organizations (MPOs) and Caltrans Districts 6 and 10, illegal parking along the shoulders or ramps of I-5 and SR 99 has been seen frequently in different seasons. With the exception of the City of McFarland in Kern County, MPOs have not received any complaints from local communities, local industries and firms or trucking companies regarding illegal truck parking. Emissions due to truck idling was identified as the only significant impact of illegal truck parking along state highways by some of the MPOs. We reached out to the California Air Resource Board (ARB), regarding truck idling violations in the San Joaquin Valley. The citation database is not publically available.



However, all the trucks newer than model year 2008 must have a "Clean Idling Certification." Trucks older than model year 2008 usually have an auxiliary generator to provide electric power while idling. Overall, violation of truck idling regulations along shoulders of state highways and freeway ramps is insignificant across the state.

While it might be true that the actual supply of parking spaces, or distribution of such facilities, is inadequate to meet demand in most regions, there is also an important communication gap in providing reliable and dynamic information about the conditions along a truck driver's route, including delays, detours, and availability of parking within the range when a driver would reach their HOS limits. Conditions along a planned route can change dramatically over the course of an 11-hour drive, meaning that a driver may be unable to make their delivery on schedule and have to wait until the next day, or that they may reach their HOS limit in an area unfamiliar to them. Better information technology could increase the efficiency of the truck parking facilities and help the driver plan as circumstances change.

In this report we analyze supply and demand for truck parking in the San Joaquin Valley with a focus on the two major corridors of I-5 and SR 99 and identify related issues and concerns for each MPO. We reviewed previous related national, statewide, regional studies and summarized their relevant and important findings for the Valley. Finally we provide recommendations to improve the efficiency of available truck parking spaces and prevention of illegal parking in the region.



## STAA TRUCK ROUTES IN SAN JOAQUIN VALLEY

The California Freight Mobility Plan (CFMP) prioritizes the highway freight network based on truck volumes and significance in providing access to major freight generator regions. Figure 1 shows the CFMP Tiers in the Valley. While all of the freight network facilities are important, the Tier 1 facilities are more likely to have projects prioritized for funding. Most of the Tier 1 highways have been identified by the Federal Highway Administration as components of the proposed national Primary Freight Network (PFN). Not all of California's portion of the PFN routes is included in Tier 1. Those portions of the PFN that are not included in Tier 1 are designated as Tier 2, with Tier 2 including additional Interstate and State Routes. Tier 3 represents the balance of the highway freight network. This is important because as future freight projects are identified and developed, it is expected that sponsoring organizations will integrate high-priority attributes into their projects. Combined, all three highway tiers represent a subset of the freight network in the San Joaquin Valley. For the purpose of this report, the freight network in the Valley is summarized in three layers:

- National STAA truck routes: includes I-5, SR 99 and SR 198
- STAA access routes
- Local truck routes

Prior to identifying a short-list of STAA improvement areas, we reached out to local jurisdictions to identify their existing STAA truck network and primary connectors. The National Highway Freight Network<sup>1</sup> and Caltrans truck routes<sup>2</sup> were used as the starting point for all jurisdictions. Some MPOs have a detailed inventory of their latest designated routes and shared these data on the Caltrans website. Local jurisdictions identify local truck routes via their municipal codes. There is a distinction between California truck routes and STAA designated routes; therefore, not all local truck routes are STAA compliant:

The Surface Transportation Assistance Act (STAA) of 1982 allows large trucks to operate on the Interstate and certain primary routes called collectively the National Network. These trucks, referred to as STAA trucks, are longer than California legal trucks. As a result, STAA trucks have a larger turning radius than most local roads can

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<sup>1</sup> <http://ops.fhwa.dot.gov/freight/infrastructure/nfn/index.htm> downloaded in June 2016

<sup>2</sup> <http://www.dot.ca.gov/trafficops/trucks/truck-network-map.html#colors> downloaded in June 2016





accommodate. On STAA routes the maximum length of trailer of a semitrailer truck is 53 feet. The maximum overall length of California Legal Trucks on non-STAA truck routes is 65 feet [Caltrans Website<sup>3</sup>].

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<sup>3</sup> <http://www.dot.ca.gov/trafficops/trucks/docs/truck-legend.pdf>



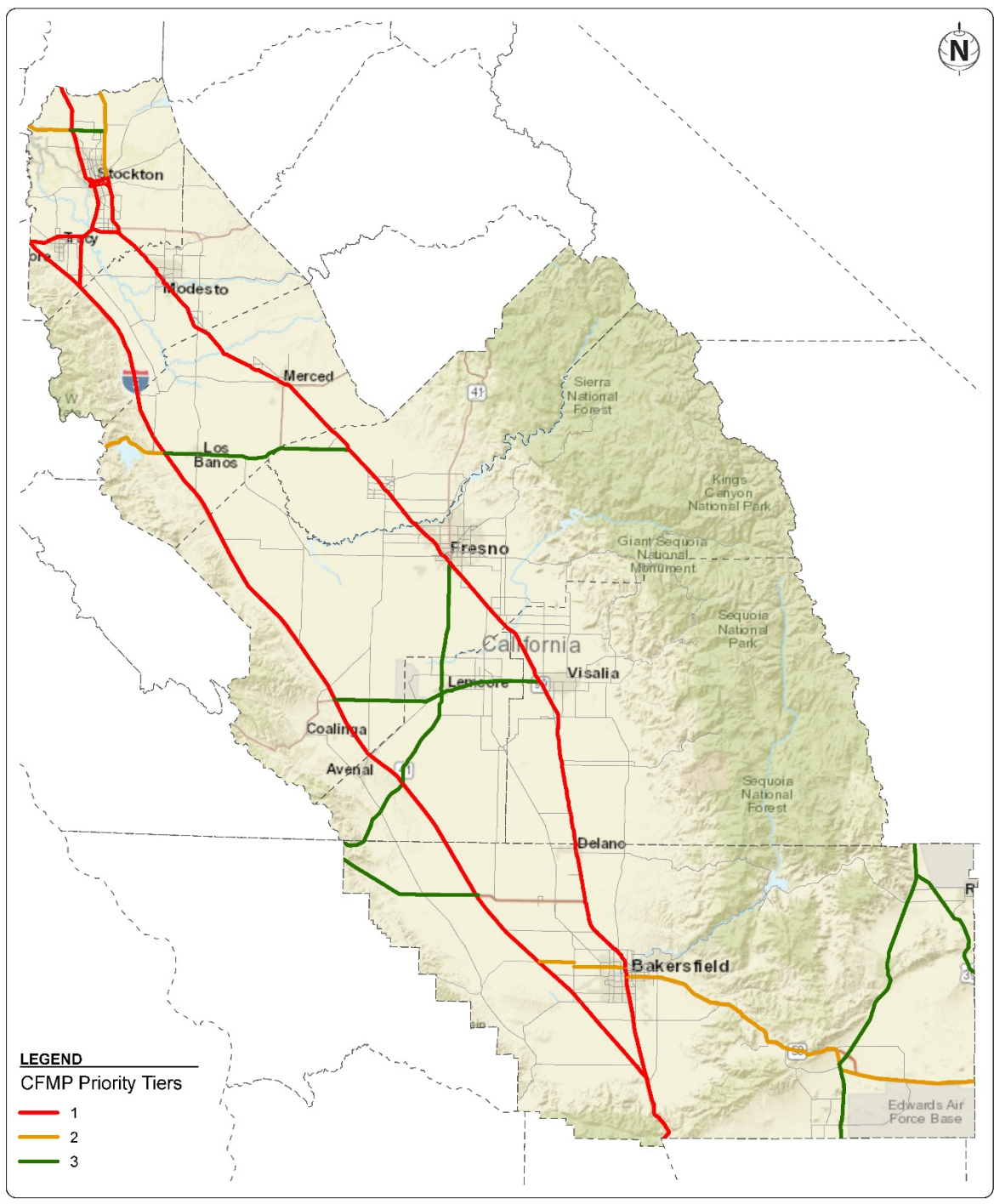


Figure 1. CFMP Highway Tiers in the Valley and Primary Connectors





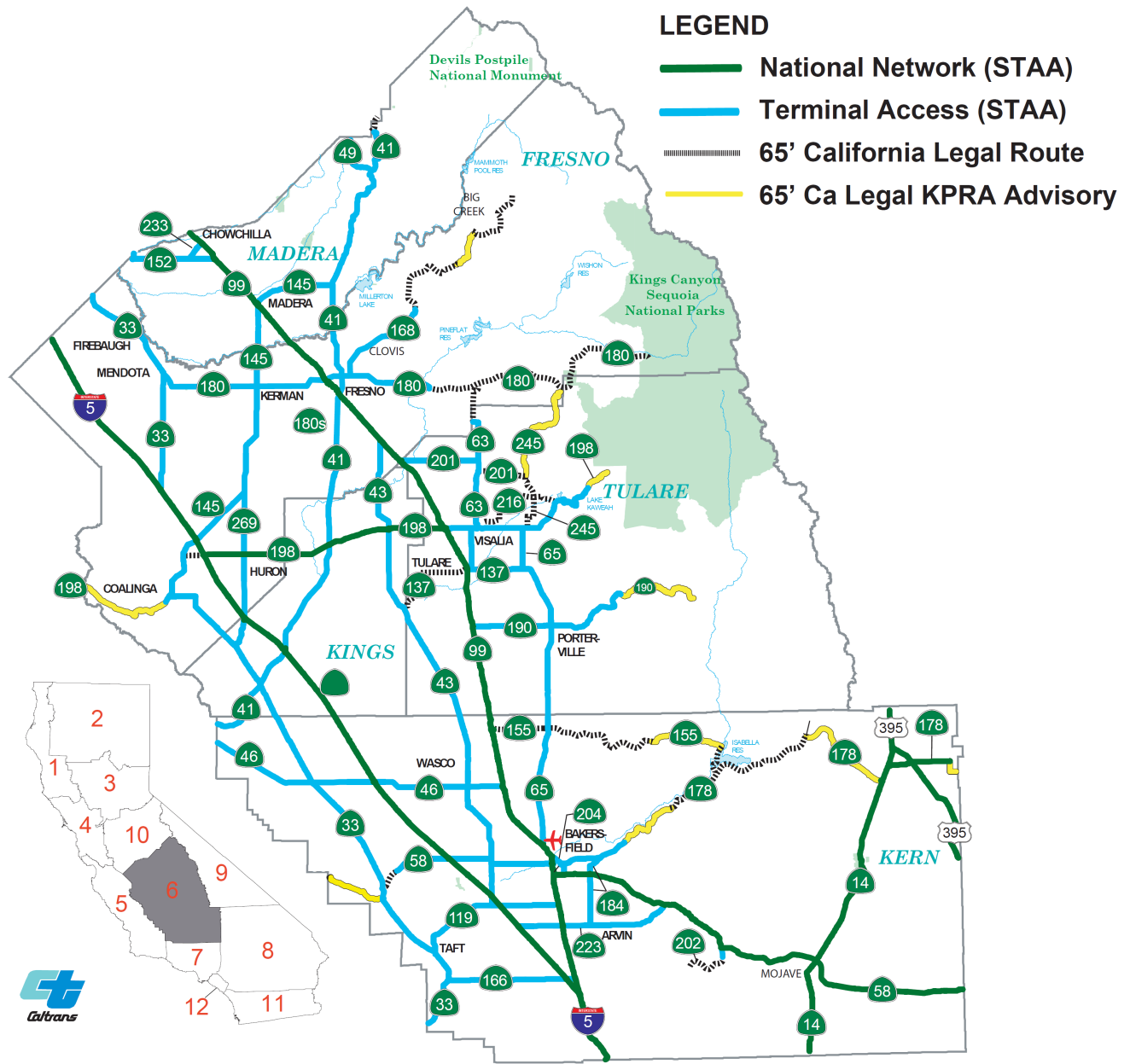


Figure 2. Truck Network on California Highways District 6



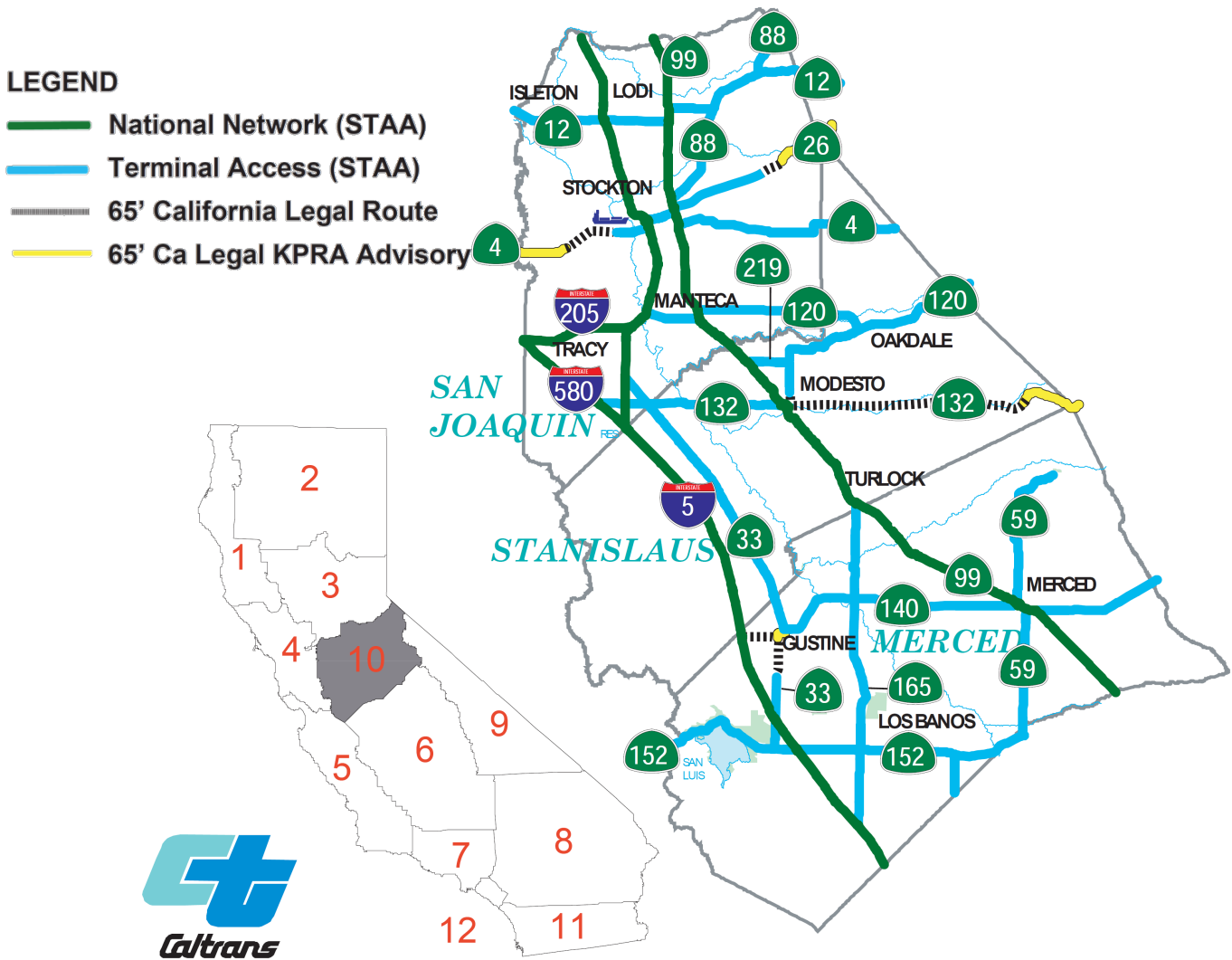


Figure 3. Truck Network on California Highways Merced, Madera and San Joaquin in District 10

Table 1 shows the list of cities with available information about their truck routes in the San Joaquin Valley. Some of these maps have not been updated in the last decade or so and do not distinguish between STAA and other routes.



**TABLE 1. AVAILABLE TRUCK ROUTE DATA IN SAN JOAQUIN VALLEY<sup>4</sup>**

COUNTY	TRUCK ROUTE MAPS City	TRUCK ROUTES / RESTRICTIONS, MUNICIPAL CODES
<b>Fresno</b>	Fresno (PDF)	Fowler (4-4.602)
		Kingsburg (10.04.030 & 040)
		Mendota (10.08.030)
		Orange Cove (10.24)
		Parlier (10.52.080)
<b>Kern</b>	Bakersfield (PDF)	Kern County (10.08)
		Bakersfield (10.44.060)
		Tehachapi (10.12.040)
		Wasco (10.48.010)
<b>Kings</b>	Hanford	Hanford (10.24.040)
<b>San Joaquin County</b>	Stockton	Escalon (10.08)
	Manteca	Ripon (10.44.040) (PDF)
	Tracy	
<b>Stanislaus</b>	Modesto	Stanislaus County (11.16)
		Newman (10.03.050)
		Turlock (4-7-1301.1)
<b>Tulare</b>		Exeter (10.36.010)
		Tulare (9.32.010)
		Visalia (10.24.010)
<b>Madera</b>		Madera County (Chapter 10.08)
<b>Merced</b>		Gustine (10-3-232)
		Livingston (11-7-1 & 11-7-1-1)
		Merced (10.40)

We used the above information to develop an inventory of truck routes for each county in the Valley because it was the best available information; however, some of this information is very dated and may be superseded by truck route designations that were not available to us for this study.

<sup>4</sup> <http://www.dot.ca.gov/trafficops/trucks/local-truck-routes.html>



We used the findings and guidelines from previous studies<sup>5</sup> along with truck volumes and collision history (where available) to provide recommendations for truck routes improvements, especially STAA network. The following principles were considered during the review process:

- Gaps in existing STAA routes
- Adequacy of design of STAA routes for existing freight clusters and new development areas
- Shortest route connections to the national network
- Existing and planned land use surrounding STAA routes especially in residential areas
- Existing STAA signage was also one of the issues that was identified. Since an inventory of truck-related signage is not available, we used historic Transportation Injury Mapping System (TIMS) collision data to evaluate the safety situation at different facilities.

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<sup>5</sup> For example: *Interregional Truck Operations On I-5 And SR 99 And STAA Routes Improvement Study, Supplemental Project Assessment, The Tioga Group, 2012*



## TRUCK ROUTES ISSUES AND IMPROVEMENT RECOMMENDATIONS IN SAN JOAQUIN VALLEY

Operating STAA trucks on roads other than the designated routes can lead to compromised traffic safety resulting in property damage (wheel off-tracking onto curbs, planters, sidewalks) or traffic accidents (trapping vehicles in adjacent lanes, crossing into oncoming traffic lanes). To minimize potential property damage and/or traffic accidents due to wheel off-tracking, it is recommended to designate STAA Truck Routes on county roads that can accommodate large trucks. These routes are identified with STAA signs posted along the roadway. Each route should be evaluated using an engineering analysis that focuses on safety concerns related to a characteristic of these longer combination vehicles referred to as "off-tracking." "Off-tracking" is a condition of a turning movement where the rear tires follow a shorter tracking path than the front tires. This off-tracking, the primary safety concern, may cause the rear wheels to go onto sidewalks, knock down signs, encroach onto shoulders, bike paths, walkways, or cross into the opposing/adjacent lane.<sup>6</sup>

Since most of the cities in San Joaquin Valley do not have an updated STAA truck route map (exceptions are Bakersfield, Tracy and Stockton), the critical first step is to prepare such a map and advertise it for trucking companies to educate them. A good example is the Sacramento County website.

In this report, we review the overall connectivity of the STAA route network in the Valley and identify potential recommended designations. Detailed review of design attributes of each facility is required to finalize these options.

### FRESNO COUNTY

The Fresno Council of Governments (Fresno COG) provided base year (2014) and future year (2040) travel demand model inputs for the industrial employment analysis. The future industrial and agricultural employment growth are highest in Fresno, Selma, and Reedley. Some traffic analysis zones (TAZs) with moderate to high agricultural employment growth are located along I-5 in the western portion of Fresno County. The industrial employment growth is concentrated in the greater Fresno area. A TAZ north of Reedley is

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<sup>6</sup> <http://www.sacdot.com/Pages/TruckRoutes-STAA.aspx>



approximately four miles from a major truck route and a TAZ west of Mendota is located a minimum of approximately two miles from a major truck route. The rest of the TAZs with industrial or agricultural employment growth over 300 are located along STAA Truck Routes.

Notable growth is predicted along Bethel Avenue in the Sanger area. Bethel Avenue is presently a truck route, with one lane in each direction and no shoulder. Bethel Avenue connects directly with SR 99, approximately 11 miles south of Sanger, which is a long distance for trucks to travel at lower speeds and with several stop-controlled intersections at cross-streets. The nearest east-west truck route is Jensen Avenue, connecting with SR 99 in Fresno. An alternate east-west route may be considered along Central Avenue, which presently serves truck-related uses near SR 99, or by continuing the Adams Avenue truck route from west of SR 99 eastwards to Bethel.

Jenson Avenue, Shaw Avenue and Herndon Avenue are major east-west truck routes connecting the major industries in Fresno to the state highway network. The truck volume varies across each corridor, as shown in Table 2. These corridors are crossing high-density mixed-use developments with several closely spaced intersections. They also have a significant history of truck-involved collisions, as shown in Figure 4. Even though most of these collisions are not severe, they cause traffic congestion, delay and disruption in the transportation system. Given the significant expected growth in the Fresno area, it is recommended to review the safety signage along these corridors and evaluate them as potential STAA routes.

**TABLE 2. CRITICAL TRUCK ROUTES IN FRESNO**

Arterials	Number of lanes	AADT	Truck AADT
Herndon Ave	6	45,000 - 65,000	2,000 - 4,000
Ashlan Ave	4	16,000- 25,000	200 - 400
Jenson Ave	4	10,000- 20,000	500 - 900
Shaw Ave	6	30,000- 45,000	2,000 - 5000

By designating Jenson Avenue and Shaw Avenue as STAA routes, improving safety and way finding signage and pavement quality, truck drivers would be encouraged to use these routes and avoid arterials with heavy auto traffic. These arterials have grade-separated interchanges with SR 99, SR 41 and SR 165. The detailed design of the interchanges must be reviewed for STAA compliance.







**Figure 4. Fresno Truck Routes and Future Growth from 2010 to 2040**





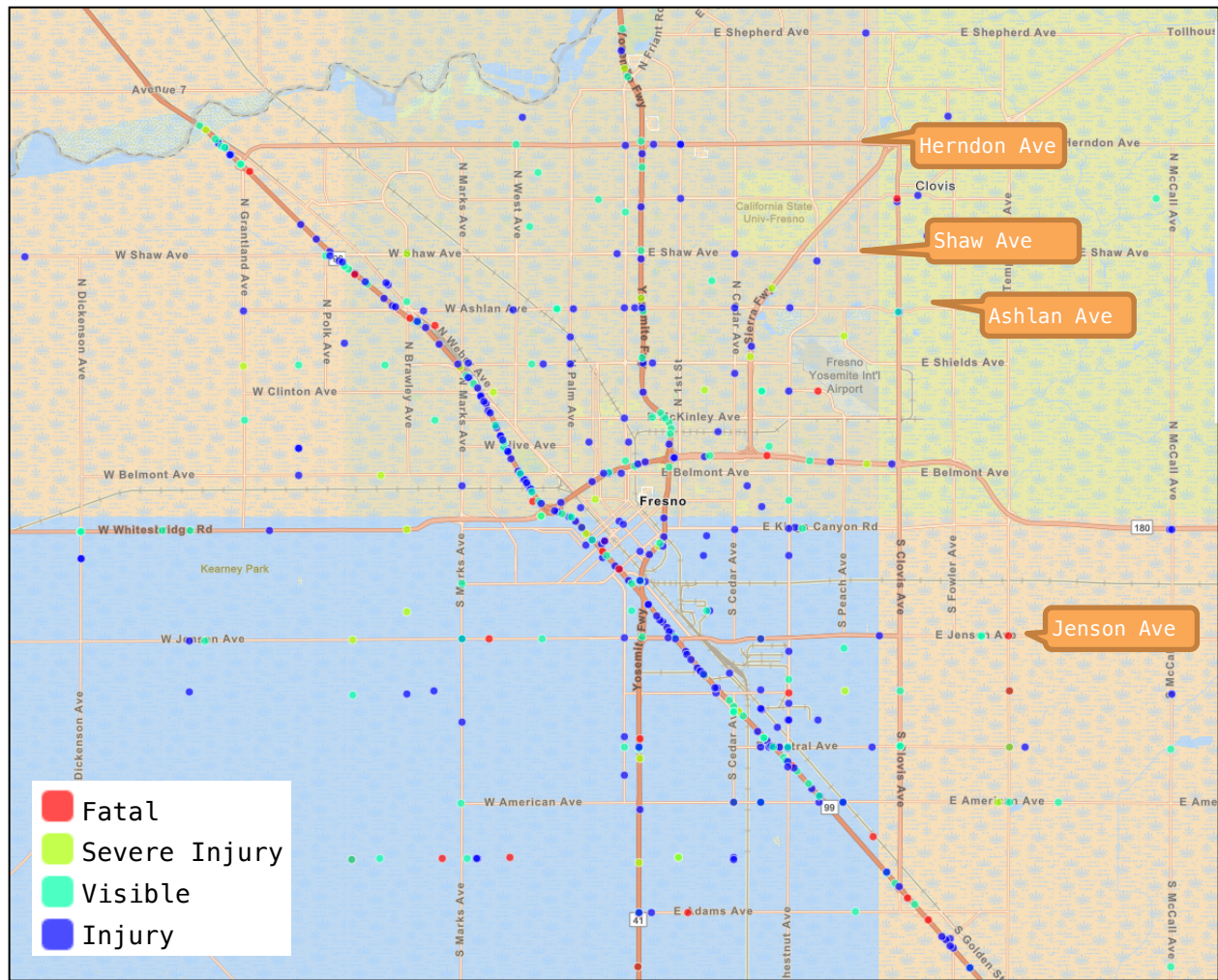


Figure 5. Truck-Involved collisions in Fresno (2009-2015)

Jenson Avenue has a raised median with good quality pavement and wide shoulders for most of the route. There are several unsignalized intersections and driveways without adequate safety signage. With posted speeds as high as 50 mph, it is recommended to improve safety measures to avoid further collisions on this corridor.

Ashlan Ave has a center 2-way turn lane on several segments of the route and mainly provides access to residential areas; therefore this road is an undesirable option for STAA route designation. It is recommended to redirect trucks from this route to Shaw Avenue, and limit this route to only last mile deliveries if needed.



## KERN COUNTY

Kern County Council of Governments (Kern COG) provided base year (2008) and future year (2040) travel demand model inputs for the industrial employment analysis. TAZs with high future industrial employment densities (over 500 employees per square mile) are located within Bakersfield, largely along existing STAA routes. Some additional high-density future industrial employment TAZs are located in Tejon, Mojave, and Ridgecrest (Figure 6). The industrial employment growth in Kern County will occur across the entire county, with growth concentrated along STAA Truck Routes. Significant Industrial employment growth is predicted southeast of Shafter between SR 43 and SR 99. The large TAZ east of Bakersfield with industrial employment growth over 500 is located between SR 178 and SR 58, but does not have direct access to a truck route. Depending on where in the TAZ the employment is located, the employment center(s) could be between three and 10 miles from a truck route; many of the roads in this region also become windy due to topography, meaning actual travel time could be quite long and there may be issues with road grade and weather conditions that could create delay and unreliability.

Kern COG provided their latest STAA route network (20116) and their future requested enhancement shown in Figure 6. The SR 58 corridor project, once completed, will provide high capacity straight connectivity not only across Kern County but also for truck trips from eastern neighboring states to I-5.

Overall the recent requested enhancements to the STAA network provide good connectivity across the county and between major freight clusters. 7<sup>th</sup> Standard Road does not have a full interchange with I-5; access is only provided to and from I-5 southbound. Northbound traffic must use the Buttonwillow Drive ramps via Wasco Way, an additional distance of about 1.5 miles. Wasco Way is a narrow, 2-lane road without paved shoulders. In order to maintain safe, direct, and reliable access for trucks, Wasco Way should be upgraded as part of the 7<sup>th</sup> Standard Road connector, or the 7<sup>th</sup> Standard Road interchange should be upgraded for access to I-5 in both directions. Establishing a north-south connector between 7<sup>th</sup> Standard Road and Lerdo Highway would facilitate access for future growth in the Shafter area.

Pegasus Drive is very wide to accommodate the needs of a typical industrial park-style area, allowing for tractor-trailers and other vehicles to park along the road. However, the high number of driveways and the reduced visibility when trucks are parked on the roadside creates a safety hazard



when paired with a relatively high speed limit and a 2-mile corridor with no need to stop. Even if most vehicles are making local trips (employees coming and going in addition to freight) and there is little cut-through traffic, there is no disincentive to drive as fast as possible. Safety measures should be considered to reduce the speed of vehicles and the risk of turning collisions at driveways. The collisions are concentrated on the northern end of Pegasus Drive between Merle Haggard Drive and the southern end of the Unicorn Road loop, a distance of less than one mile.

As Wheeler Ridge Road continues to develop, access management, speed, and road width should be considered to discourage high speeds through the area nearest to the freeway where volumes will be higher and through-motorists stopping on long trips will be mixing with freight and local traffic.

The portion of the Mount Vernon Avenue north of SR 58 to Virginia Avenue is exclusively industrial in terms of land use, but the road also provides access for residents north of Virginia Avenue to SR 58. Additional safety measures along this portion could reduce the risks of freight interaction with other motorists.

Fruitvale Avenue serves as both a freight connector and an access corridor for residents to reach SR 58. Additional safety signs to alert auto drivers about heavy truck volumes along the freight connector corridor could reduce the risk of collisions.

The Di Giorgio Road connector passes through the residential portion of Lamont, posing a safety risk due to freight and local traffic interactions. This corridor should be closely monitored for collisions and incidents. Attention should be paid to the incidence of collisions at the stop-controlled intersections from Vineland Road to Tejon Highway. Collisions such as these may not commonly involve trucks, but can cause safety risks and delays for trucks, decreasing the reliability of this route. If there are issues with visibility of the intersection and stop signs, the signs could be replaced with solar-powered LED flashing variants. Alteration of the intersection geometry and design is unlikely due to the adjacent railroad right-of-way.





**Figure 6. Kern Truck Routes and Future Growth from 2010 to 2040**



## KINGS COUNTY

Industrial clusters in Kings County are located between I-5 and SR 99, with nearer and better access to the latter. The cities of Hanford and Lemoore are located along SR 198, a STAA Truck Route. The stretch of SR 198 in Kings County has recently improved and all crossings are at-grade. However, the stretch of SR 198 in Kings and Fresno County has poor pavement and many interchanges when crossing urban areas. Several truck routes are available for north-south and east-west connectivity through the area. Trucks have multiple route options, whether coming from I-5 or SR 99 to the north or south, but the cluster is located far enough from either that some time must be spent on rural highways.

Kings County Association of Governments (KCAG) provided base year (2005) and future year (2040) travel demand model inputs for the industrial employment analysis. The TAZs with high 2040 industrial employment densities are located in the greater Lemoore, Hanford, and Corcoran areas (Figure 7). There are only a few TAZs in Kings County with industrial employment growth over 500 in Hanford and Lemoore along SR 198.

Kansas Avenue provides access between SR 43 and SR 41 with recurrent fatal or severely injured collisions. Speed is the primary factor for most of these truck-involved collisions. It is a 2-lane road with poor pavement quality crossing agriculture farms. There are many unpaved driveways without any warning along this route. Although Truck ADT on this segment is not very high (about 800), but it contribute to over 25% of total ADT. High truck perchance and unsafe conditions of this segment resulted in high truck-involved collision rates and severity of collisions. It is recommended to review safety measures on this corridor. If this is a preferred truck route for local agriculture farms, safety improvements are essential and if it is heavily used by STAA trucks, it has to be evaluated for STAA compliant.

Houston Avenue south of SR 198, and Excelsior Avenue north of SR 198 provide access between dairy farms in Kings county and major creameries in Tulare County. The existing truck volume on these routes is about 1000 trucks per day, this is about 30% of their total ADT. In speaking with Kings and Tulare County staff, they are recommended to evaluate these routes as potential STAA routes in the future to encourage trucks from using other local routes.





**Figure 7. Kings Truck Routes and Future Growth from 2005 to 2040**





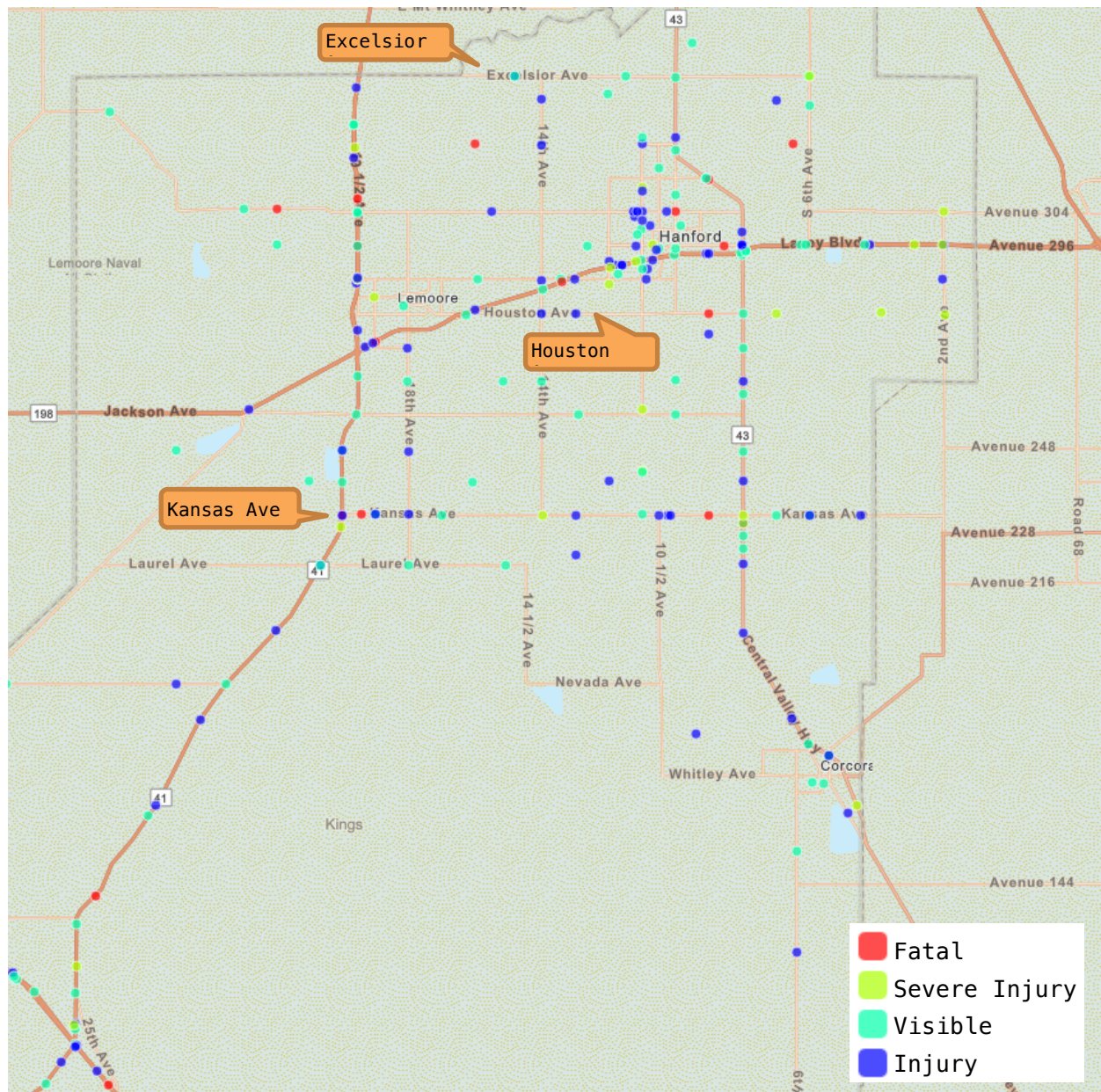


Figure 8. Truck-Involved Collisions in Kings County (2009-2015)

The 11<sup>th</sup> Avenue corridor has a substantial portion shared with non-commercial traffic, where a high number of collisions occurred in a 5-year period. Safety measures should be considered with regards to speed, turning vehicles, and intersection controls.

If future residential development continues along 10<sup>th</sup> Avenue, traffic volumes and collision rates and types should continue to be analyzed. An access





management plan can reduce risks on a corridor shared between trucks and residential traffic.

## MADERA COUNTY

Madera County Transportation Commission (MCTC) provided base year (2010) and future year (2035) travel demand model inputs for the industrial employment analysis. The 2035 industrial employment density is concentrated along the SR 99 corridor. There are also TAZs in Rolling Hills, Sumner Hill, and Oakhurst with high future industrial employment densities (Figure 10). The TAZs with high industrial employment density in the future are a mix of industry and agricultural. There are only a few TAZs in Madera County with industrial employment growth over 500. The strongest growth is projected just one mile east of SR 99 along Olive Avenue, with direct freeway access.

If possible, a before-and-after analysis of collision data along Avenue 14 and Olive Road would help support the case for improved safety due to the median divider and other design elements. If a positive relationship is found, these strategies should be extended west as future development occurs.

As future development is planned, the current design of the Airport Drive & Avenue 17 intersection will become inadequate to handle higher volumes safely and efficiently. The intersection could be designed as a roundabout rather than implementing a signal, with appropriate geometric and design considerations to accommodate regular truck traffic.

Several major industries are located along Avenue 12 and Avenue 13. Recurrent minor truck-involved collisions have been reported on Avenue 12. We do not have truck counts on these roads to evaluate traffic conditions. There is also a high school on Avenue 13 at the Stadium Road crossing. Residential blocks are on the eastern end of Avenue 13. Therefore a preferred truck access from SR 99 and SR 145 is via SR 12 then Road 26 and then Avenue 13. It is recommended to review safety measures and evaluate the design characteristics of these routes for potential STAA designation.





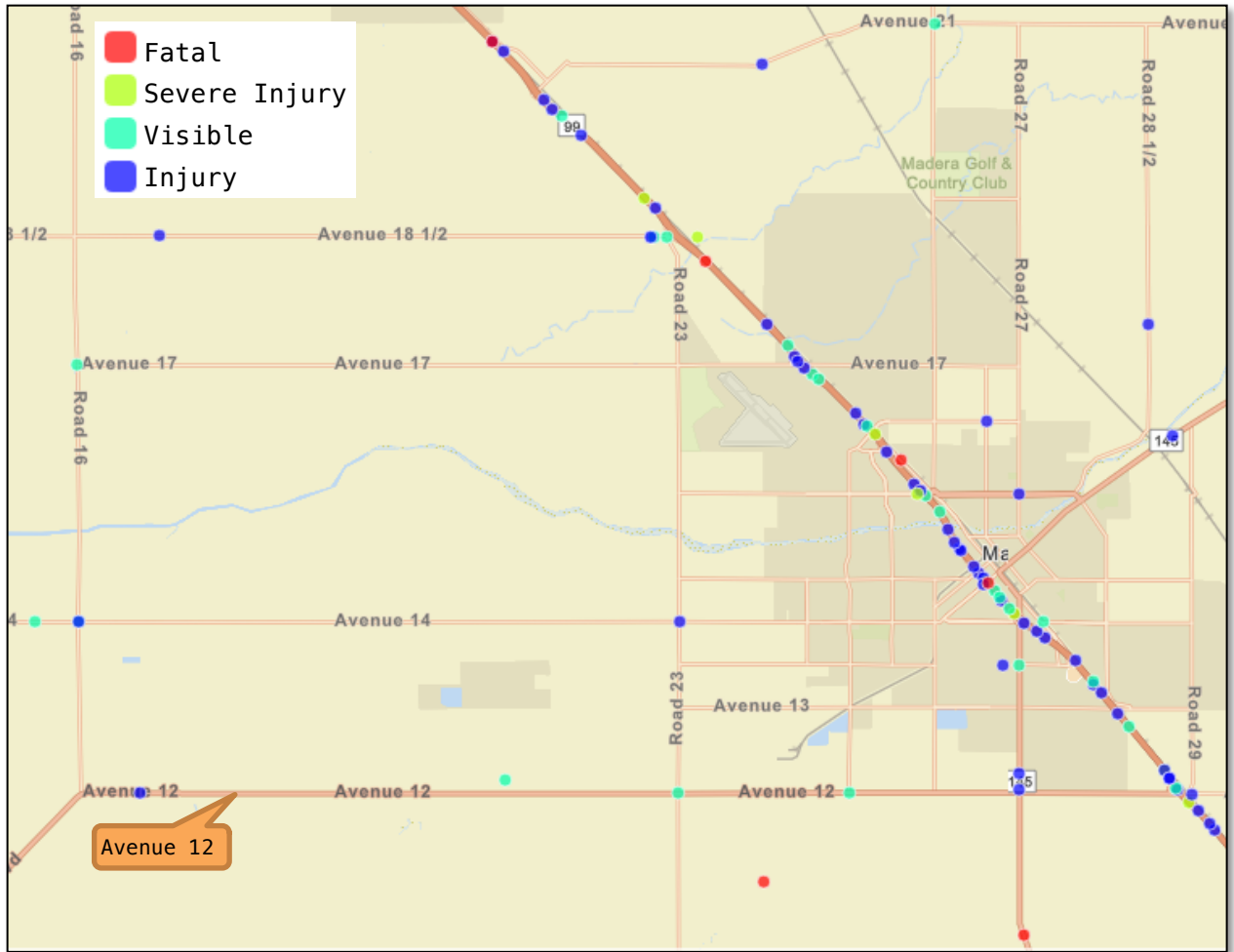


Figure 9. Truck-Involved Collisions in Madera (2009-2015)





**Figure 10. Madera Truck Routes and Future Growth from 2010 to 2035**



## MERCED COUNTY

Merced County Association of Governments (MCAG) provided base year (2010) and future year (2035) Three County Model (TCM) inputs for base the industrial employment analysis. Industrial employment was defined as Agriculture/Other and Industrial.

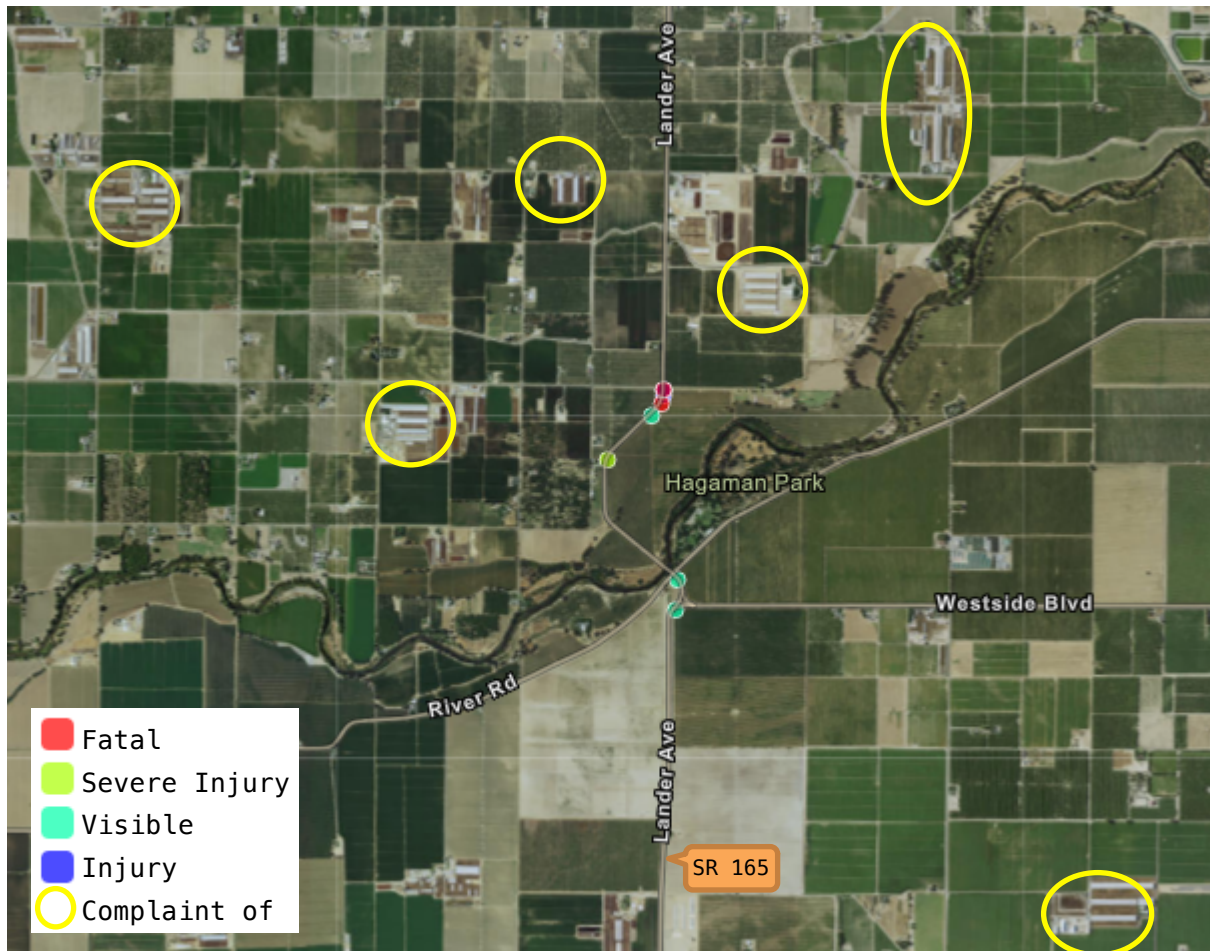
The 2040 industrial employment density is highest in the Merced and Atwater areas. There are also TAZs with high future industrial employment density in Los Banos and Gustine (Figure 13). The high industrial employment growth areas (TAZs with growth over 500) are generally located in agricultural major truck routes. A single agricultural TAZ west of Atwater is approximately three miles from a major truck route; this area is accessible from Westside Boulevard, providing a direct connection to SR 99. Westside Boulevard is narrow, and visibility of turning and entering traffic may be poor in some areas. Where possible, paved shoulders should be provided and improvements made to visibility on intersection approaches. Pavement quality should be monitored.

Based on Merced County General Plan, Transportation and circulation (2012), "Merced County has no designated truck routes. However, the major carriers of truck traffic are contained on I-5 and on SR 152, SR 99, and SR 165. This will continue through the period of this General Plan."

The intersection of Applegate Road & Atwater Jordan Road is controlled only by stop signs on Atwater Jordan with a 50 mph speed limit on Applegate. With truck and other through traffic moving quickly through a relatively narrow intersection, collisions with turning vehicles are likely. Alternatives should be studied, including reducing the speed limit on Applegate on the approach to the intersection, improving intersection visibility, and possibly installing flashing beacons in advance of the intersection for through traffic.

SR 165 is a designated STAA route and provides access to several large dairy farms; however the pavement quality and safety measures needs detail review and further improvements. For example, there is an irregular curve near Hagman Park where several fatal and severely injured truck-involved collisions have been reported. If the curve cannot be eliminated due to right-of-way constraints, it is recommended to review detailed design characteristics of this segment and implement required modification as needed.





**Figure 11. Truck-Involved Collisions in Merced County (2009-2015)**

The Collier Road ramps provide access to major dairy and fresh produce farms from SR 99 (Figure 12). Collier Road is not a designated truck route. Several fatal and severe truck collisions have been reported at SR 99 near this ramp. Without detailed truck count information, it is not possible to provide detailed analysis. It is recommended to review safety measures and how many large trucks use this ramp to access their destination. Design modification might be required to improve the safety of this segment.





**Figure 12. Truck Involved Collisions at SR 99 at Collier Road Ramp-  
Merced County (2009-2015)**



**Figure 13. Merced Truck Routes and Future Growth from 2010 to 2035**







## SAN JOAQUIN COUNTY

The San Joaquin Council of Governments (SJC0G) provided base year (2010) and future year (2035) TCM model inputs for the industrial employment analysis. Industrial employment was defined as Agriculture/Other and Industrial.

The 2040 industrial employment density is highest in the central areas of Stockton, Lathrop, Tracy, and Lodi (Figure 14). All TAZs with industrial employment growth greater than 300 are along major truck routes. The growth is in a mix of industrial and agricultural areas with high growth areas (an increase in industrial employment of greater than 500) located west of Tracy, in southeast Lathrop, and southeast Stockton.

San Joaquin County has recently conducted a thorough review of their STAA routes. The report prepared by Tioga Group provided detailed recommendations to improve accessibility, efficiency and safety of the truck network in the county. We would echo their voice here as well.

During our project outreach, two segments identified by trucking association members to be included in STAA network (Figure 15):

- French Camp Road from SR 120 to SR 99
- Escallon-Belltoia/Mariposa Road from SR 120 to I-4

These 2-lane roads pass through several small and medium dairy and agricultural farms. They provide an east/west shortcut from SR 120 to I-5. They are not currently STAA designated routes but have been frequently used by STAA trucks. Given the congestion on I-5 between SR 120 and I-4, these roads can provide congestion relief for this segment of I-5. It is recommended to review the design characteristics of these candidate roads in detail. Several fatal and severe collisions have been reported on these roads. At the minimum, safety measures on these roads require immediate improvements.

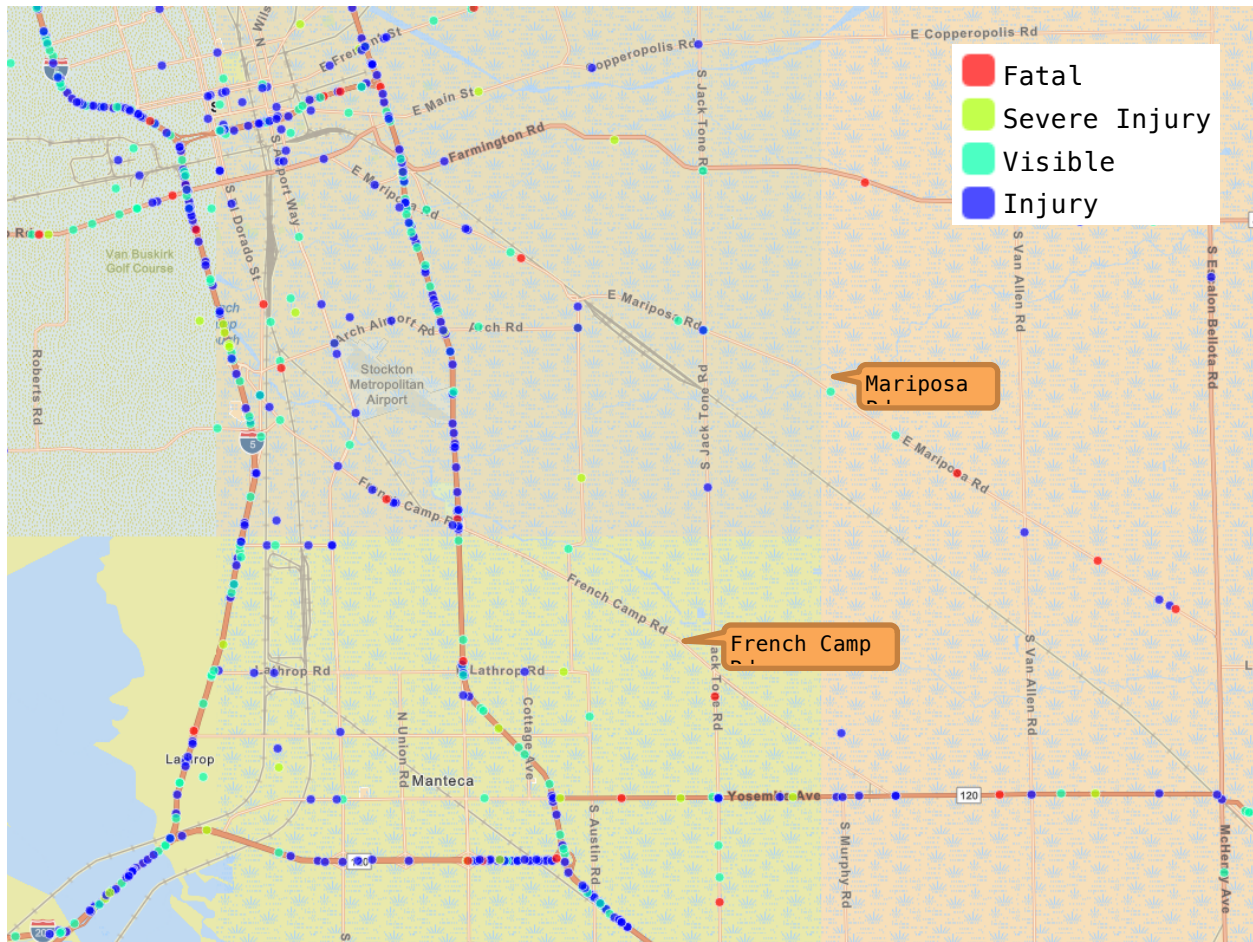




**Figure 14. San Joaquin County Truck Routes and Future Growth from 2010 to 2035**







**Figure 15. Truck-Involved Collisions in San Joaquin County (2009-2015)**

Collisions along heavily-traveled and high-speed roads tend to occur primarily at intersections. On French Camp Road in particular, the intersections at Airport Way, Union Road, and the SR 99 ramps are where nearly all collisions have occurred. Crash rates and incidents should continue to be studied to determine appropriate measures at each location:

- Liberty Road from SR 99 to SR 88
- Turner Road between I-5 and SR 99 in Lodi
- Airport Way between French Camp and SR 120
- Austin/Moffatt Road between Spreckles access and SR 99
- East Grant Line Road between interchange with I-5 and MacArthur Drive including Paradise Road and Pescadero Road



## STANISLAUS COUNTY

The Stanislaus Council of Governments (StanCOG) provided base year (2010) and future year (2035) TCM model inputs for base the industrial employment analysis. Industrial employment was defined as Agriculture/Other and Industrial.

The 2040 industrial employment density is highest along the SR 99 corridor and in central Modesto, Turlock, and Oakdale (Figure 16). All TAZs with industrial employment growth greater than 300 are along truck route corridors in greater Modesto and Oakdale. The majority of this growth is located in TAZs already dominated by industrial land use. The strongest growth is projected along or within a 2- to 5-mile radius of SR 99 in Modesto. A smaller area of growth near Oakdale is accessible by STAA routes and close to SR 108, but is at least 16 miles from the nearest SR 99 interchange. These zones are near active freight railroad lines.

The area between E. Whitmore Avenue, E. Hatch Road and Crows Landing Road south of SR 99 is an industrial cluster surrounded by residential areas. There is also a major multi modal logistic facility in this corner. We do not have detail information about the expected future growth of these facilities. E. Whitmore Avenue and Crows Landing Road are not STAA routes. It is recommended to consider evaluating these roads as future STAA access routes. Crows Landing Road requires adequate signage and warning signs especially near residential areas to improve the safety of the communities nearby. StanCOG is currently working on Cows Landing corridor feasibility study to improve the safety of this corridor.





**Figure 16. Stanislaus Truck Routes and Future Growth from 2010 to 2040**





Figure 17. Truck-Involved Collisions in Stanislaus County (2009-2015)





## TULARE COUNTY

The Tulare County Association of Governments (TCAG) provided base year (2010) and future year (2040) travel demand model inputs for the industrial employment analysis. Industrial employment was defined as the sum of all agriculture (agriculture, forestry, fishing, and hunting), mining (mining, quarrying, and oil and gas extraction), utilities, construction, manufacturing, wholesale trade, retail trade, transportation, and warehousing employment.

The highest industrial employment densities in 2040 are located in Dinuba, Visalia, Woodlake, Tulare, Lindsay, and Porterville as well as along the SR 99 corridor and SR 245 corridor (Figure 18). Most industrial employment growth in Tulare County is projected to occur along truck routes. There is an exception; a large agricultural TAZ southwest of Porterville between SR 65 and SR 99 has industrial employment growth of over 300, and lies approximately three miles from a truck route. This area is accessible from Sierra Avenue (Avenue 56).

Blackstone Street is somewhat unusual in that it is a large industrial zone with access to both rail and SR 99 without needing to interact with nearby neighborhoods or other non-commercial traffic at all. The arrangement of the Paige Avenue ramps to SR 99 is unusual and the Paige Avenue intersection in particular is not ideally configured. However, given no collisions were reported in a 5-year period, there is no apparent justification for making modifications to the intersection. If future expansion and infill of the industrial zone generates a great deal more traffic at this location, the intersection could be configured as a truck-accessible roundabout, which would reduce the risk of collision and likely decrease queuing and delay.

Bardsley Avenue borders both an exclusively industrial zone to the south and a primarily residential neighborhood to the north. The route provides an alternative access for the industrial area, but truck traffic may be more likely to use Paige Avenue to the south, which has less than 1/3 of the traffic volume and minimal interaction with non-commercial traffic. For the safety of the residential neighborhoods nearby, Bardsley Avenue should be considered an alternate route rather than the primary access.

Goshen Avenue provides straight-line access to SR 99 for residential neighborhoods on the outskirts of Visalia, who would have to drive through the industrial zone of the connector. Given the low number of collisions and the relatively low AADT, the concern is low but volumes and collisions should



be monitored. Industrial infill in this area may be desirable given the access to both SR 99 and the railroad; this should be considered when working with the railroad to expand or restore industrial spurs crossing Goshen Avenue.

Spruce Road seems to serve as a bypass to avoid following the route of SR 65 north through Exeter on the way to or from SR 198. This may be largely unavoidable, but should be considered in relation to providing a safe and reliable route for trucks to local industries. Advance warning signals and crossing upgrades for the railroad may help alert fast-driving motorists that a train is approaching and slow down earlier.

The Sierra Avenue connector has a moderate number of collisions that are by and large associated with turning traffic at cross streets. Collisions should be monitored and analyzed as a rate; based on our data, it seems like there are a high incidence of crashes per trip. Safety measures could be implemented at certain intersections to warn motorists to expect cross traffic and improve visibility for turning vehicles entering Sierra Avenue.

Collisions along County Line Road is related to local vehicles turning from or into the residential neighborhoods to the south and to a lesser degree the cross streets to the north that access area farms. Speed limits and visibility should be considered to reduce the likelihood of crashes, which could delay trucks and decrease the reliability of traveling this route.

Ave 416 connecting Dinuba to SR 99. It has recently been improved to two lane each direction. And has been heavily used by truck, up to 2000 trucks per day. It is recommended to evaluate this route as STAA access route.

In speaking with Tulare MPO staff, Famoso Porterville Hwy/Richgrove Drive (in Kern County) is identified as a shortcut truck route from SR 99 to SR 65 and to Porterville. This route is currently one lane each direction with about 200 trucks per day. This route is about 10 miles shorter than using SR 99 and SR 190 to access Porterville. Given the congestion on SR 99 and significant expected growth in Porterville, it is recommended to improve this route as STAA route and also as a congestion relief path for SR 99.

Avenue 184 between SR 99 and SR 43 with about 500 trucks per day is one of the Farm to Market route, This route is not directly connected SR 43. There has been significant records of fatal and severe collisions on this route. In speaking with local staff, severe fog and low visibility was identified as a challenge between Decembers to February. It is recommended to evaluate the





safety measures along this route. If improvements are not possible, prohibit this routes for regional trucks.





**Figure 18. Tulare Truck Routes and Future Growth from 2010 to 2035**





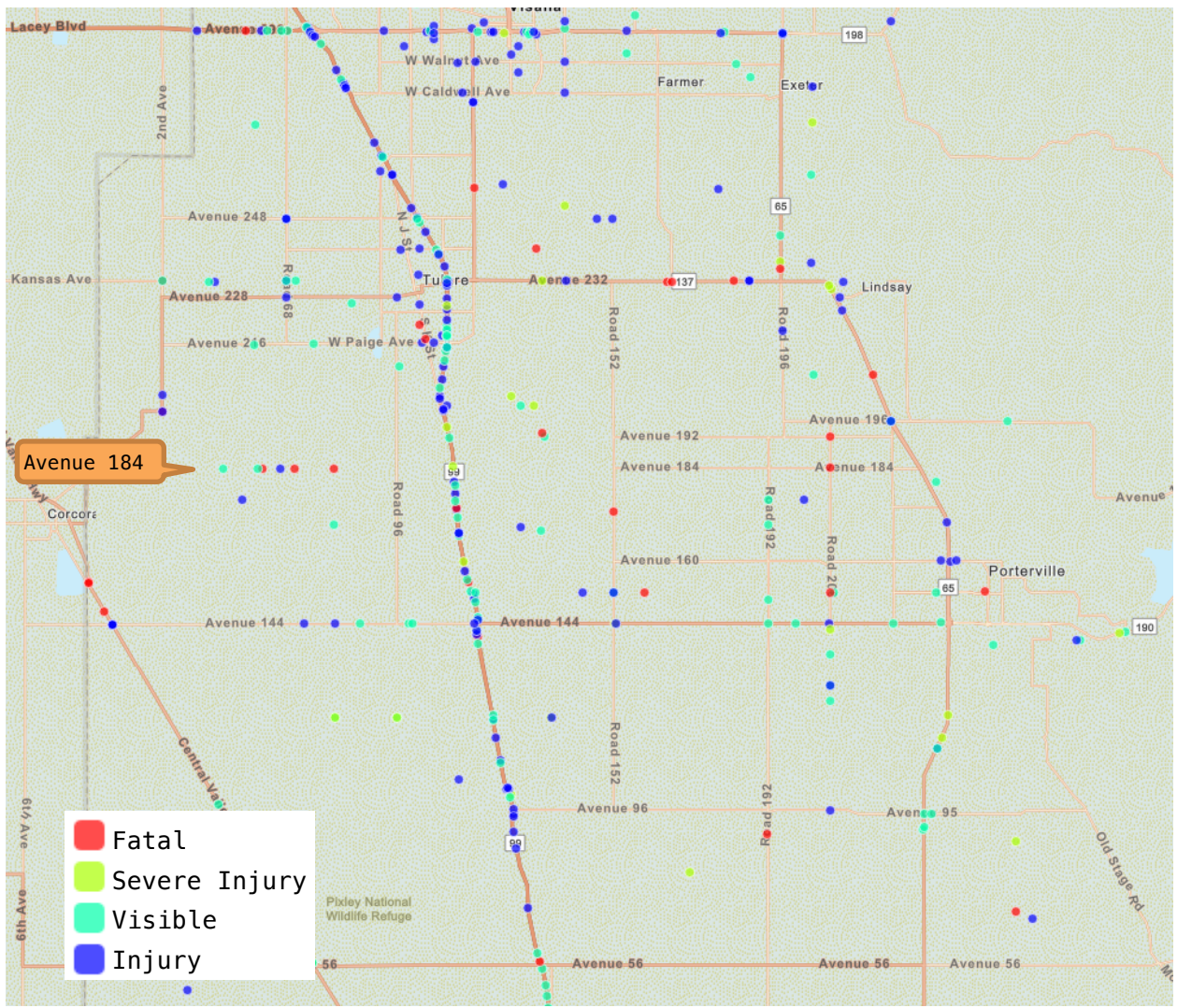


Figure 19. Truck-Involved Collisions in Tulare County (2009-2015)



## SUMMARY OF STAA TRUCK ROUTING RECOMMENDATIONS

After reviewing previous reports and discussing the existing issues with Valley MPOs, truck drivers, we identified several general recommendations to improve existing conditions and prevent future worsening. Many of them require promotion and encouragement by government agencies and a private sector investment.

- **Data management:** Develop and maintain an inventory of local STAA routes at each jurisdiction. Also regularly collect classification counts to identify the change in truck traffic patterns.
- **Routing guidance:** Prepare high-quality electronic and paper maps and broadcast them so that any truck driver can easily get a copy.
- **Public outreach:** It is important to educate drivers to use designated routes as much as possible to improve the safety and efficiency of the network.
- **Safety measures and signage:** Review STAA routes with high truck-involved collisions. Identify the factors that contribute to repeated collisions. Evaluate the design characteristics of each of these locations. If the issue is caused by poor design, develop an improvement plan. Also review the trends of truck-involved collisions on local truck routes (the non-STAA designated ones); an increase in truck-related collisions can be a warning to reevaluate truck routes to be compatible with surrounding land use changes.
- **Pavement Maintenance:** STAA trucks have more impact on pavement deterioration than smaller trucks. Poor pavement conditions will result in higher fuel consumption and safety risks. It is important to evaluate the pavement conditions on STAA routes regularly to minimize the maintenance cost.

Beyond the above recommendations, to the extent of available data, we provided detailed review of inter-city and local STAA routes at each county in the San Joaquin Valley.





## TRUCK PARKING ISSUES AND RECOMMENDATIONS

### TRUCK PARKING INVENTORY

There are 47 Caltrans truck stop facilities located in the San Joaquin Valley, as shown in Figure 20, with 22 along I-5 and 25 along SR 99. The total number of public and privately-owned parking spaces at each truck parking facility<sup>7</sup> is shown in these figures. There are many more truck parking spaces 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.

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.

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<sup>7</sup> Private truck stops are identified based on online search. There was no consolidated list available.



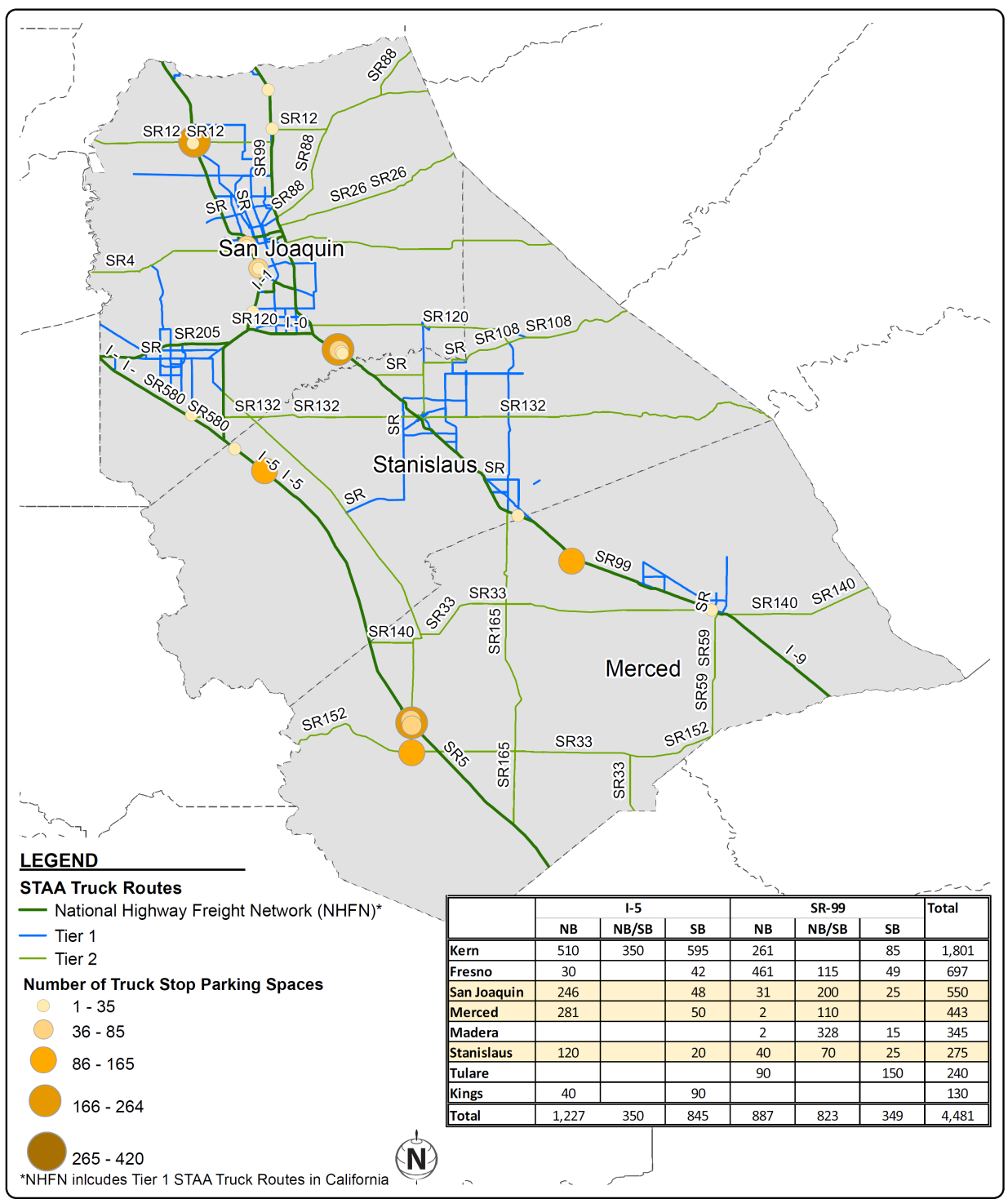
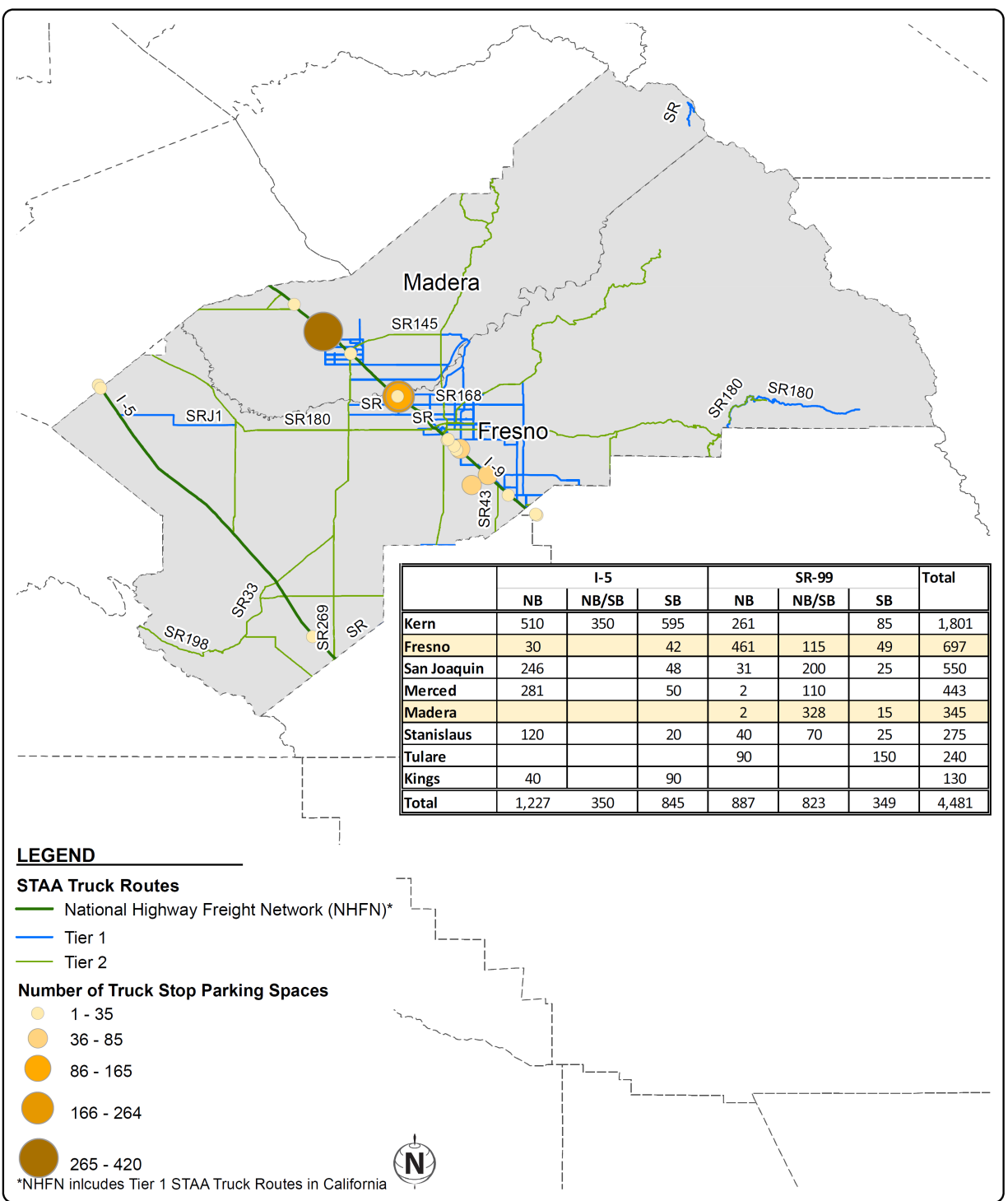


Figure 20. Truck Parking Spaces along I-5 and SR 99 in ME, Stanislaus, and San Joaquin County





**\*\*In above table, the "NB/SB" column shows that the parking is easily accessible from each direction of highway**





**Figure 21. Truck Parking Spaces along I-5 and SR 99 in Fresno and Madera County**

**\*\*In above table, the "NB/SB" column shows that the parking is easily accessible from each direction of the highway**





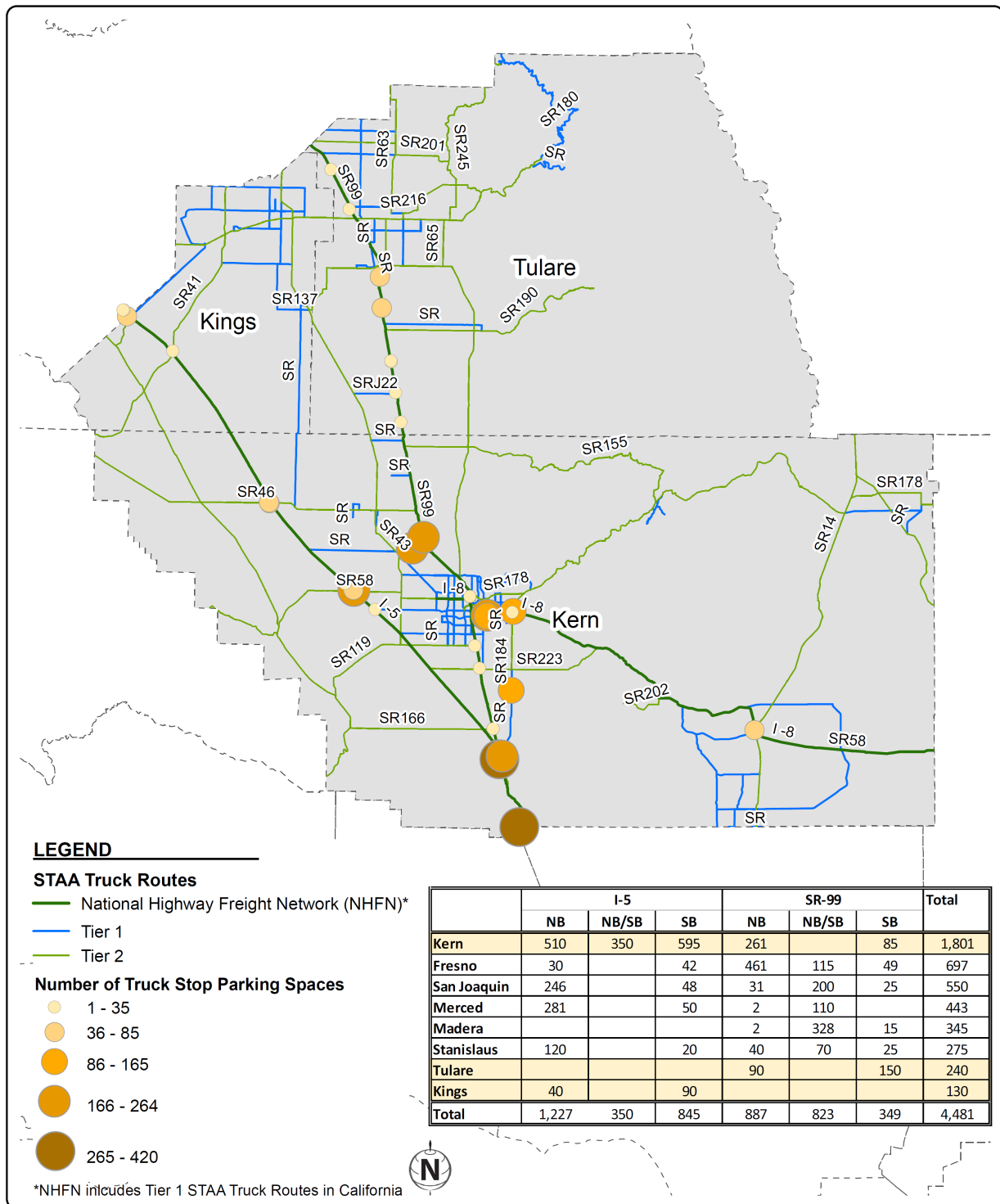


Figure 22. Truck Parking Spaces along I-5 and SR 99 in Kern, Kings and Tulare County



\*\*In above table, the "NB/SB" column shows that the parking is easily accessible from each direction of highway

## TRUCK STOP ELECTRIFICATION

The National Renewable Energy Laboratory (NREL) collects the data in the Truck Stop Electrification (TSE) Site Locator from Shorepower, CabAire, IdleAir, AireDock, and EnviroDock websites (the links are provided in the references). There are two types of truck stop electrification facilities in this database, and some require special equipment to be installed on the truck. NREL verifies the information (including station name, address, phone number, hours of operation, directions, etc.) by calling the fueling sites directly. This tool was developed as a collaborative effort between the Federal Highway Administration (FHWA) and the U.S. Department of Energy. It displays public truck stop locations that have idle reduction facilities for heavy-duty trucks.

The verification process for all records occurs approximately every six months. In addition, NREL continually checks Web sources to determine if new sites have been added. If a new TSE site is found, NREL adds it as soon as possible.

Despite the strong sustainability movement in California, there are only seven electrified sites identified in the state, and three of them are in the San Joaquin Valley (Figure 23). Affordable electrification sites encourage drivers to use designated truck parking areas. Here is an example advertisement from the IdleAir site at Ripon:

IdleAir provides long-haul truck drivers an alternative to idling their engines during rest periods. IdleAir service allows truck drivers to turn off their diesel engines and APU's and still enjoy heating, cooling, standard electric inside and outside the cab, Satellite TV, Internet, and many of the comforts of home – all while saving money and getting better sleep without the noise, vibration, and exhaust fumes from idling.





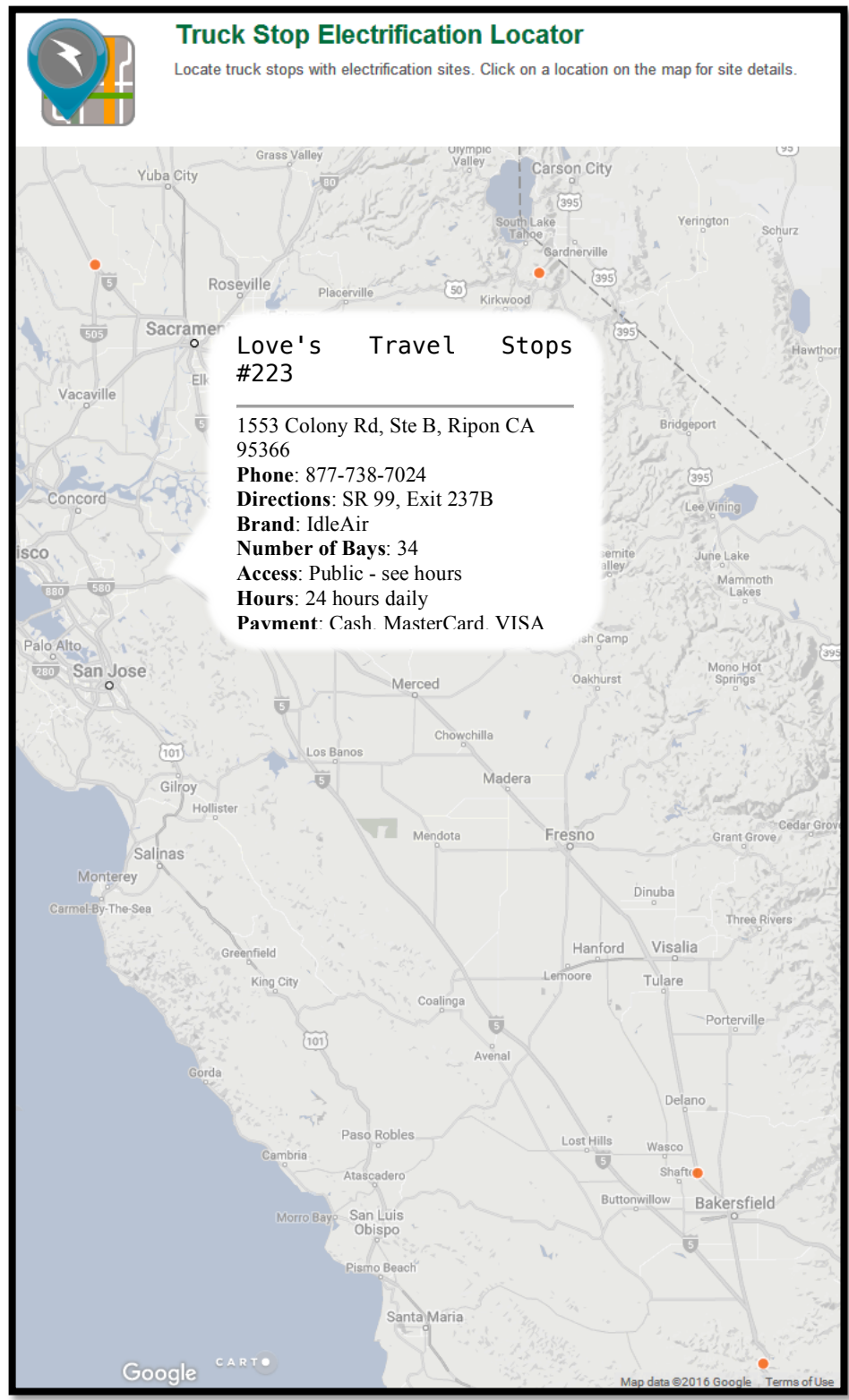


Figure 23. Truck Stop Electrification Sites



## GENERAL TRUCK PARKING ISSUES AND CHALLENGES

### JASON'S LAW TRUCK PARKING SURVEY RESULTS AND COMPARATIVE ANALYSIS

The "Jason's Law" survey was conducted as a requirement of the "Moving Ahead for Progress in the 21st Century" Act (MAP-21). In addition to state departments of transportation, the USDOT surveyed safety officials, trucker drivers, truck stop operators, and other trucking industry stakeholders.

*Jason's Law Truck Parking Survey Results and Comparative Analysis* found that nearly half of surveyed state departments of transportation reported truckers have been forced to park on highway ramps and shoulders instead of designated parking areas, which tend to be much safer for the driver as well as other motorists. California, with 53.7 parking spaces per 100 thousand miles of truck Combination Truck Vehicle Miles of Travel (VMT), ranked the second worst state (after Rhode Island). According to the survey, in California 36% of truck drivers and 42% of logistics professionals reported regularly having difficulty finding safe – and legal – parking during rest periods, and that number jumped to about 50% at night. The majority of respondents reported truck parking shortages at all times of the day on every day of the week.

A major hurdle in addressing the shortage is the fact that there is no single government or private entity responsible for truck parking facilities. The study analysis included ideas to address the issue such as: increased data collection on supply and demand, congestion, and safety with regard to truck parking, and a call for the creation of a national coalition to further examine and tackle the shortage.

The matter is further complicated, however, by reports from truck-stop operators in the survey about difficulties in expanding truck parking. Truck-stop operators reported running afoul of environmental and zoning laws, as well as protests from local communities that would prefer trucks stop elsewhere, according to the report. Truck stop operators reported that California is one of the most difficult regions in terms of acquiring permits to open new parking or to expand the existing facilities.

The report also notes that the share of public truck stops from total available truck stops in the nation has decreased significantly. In 2002 23% of truck stops were public, while in 2015 only 12% of truck stops were



public. High construction and maintenance cost and limited funding sources are the main hindrance of growth of public truck stops in the last decade.

## SHORT-TERM AND LONG-TERM TRUCK PARKING DEMAND

Recently-enacted HOS rules require truck drivers to take 30-minute rests after eight hours of driving and for longer periods after 11 hours. The laws were intended to increase safety on the road by limiting the amount of time a driver could go continuously without stopping, but the truck parking shortage has proven an unexpected negative consequence. There are major differences between short-term and long-term parking needs, and we seek an understanding of how to accommodate those differing demands. While much of the focus is usually on long-haul, overnight truck parking needs, there is a significant amount of short-term rest or queuing parking shortages. Understanding the freight movement characteristics in the region and types of truck activity that occurs is important in the assessment of the related parking needs.

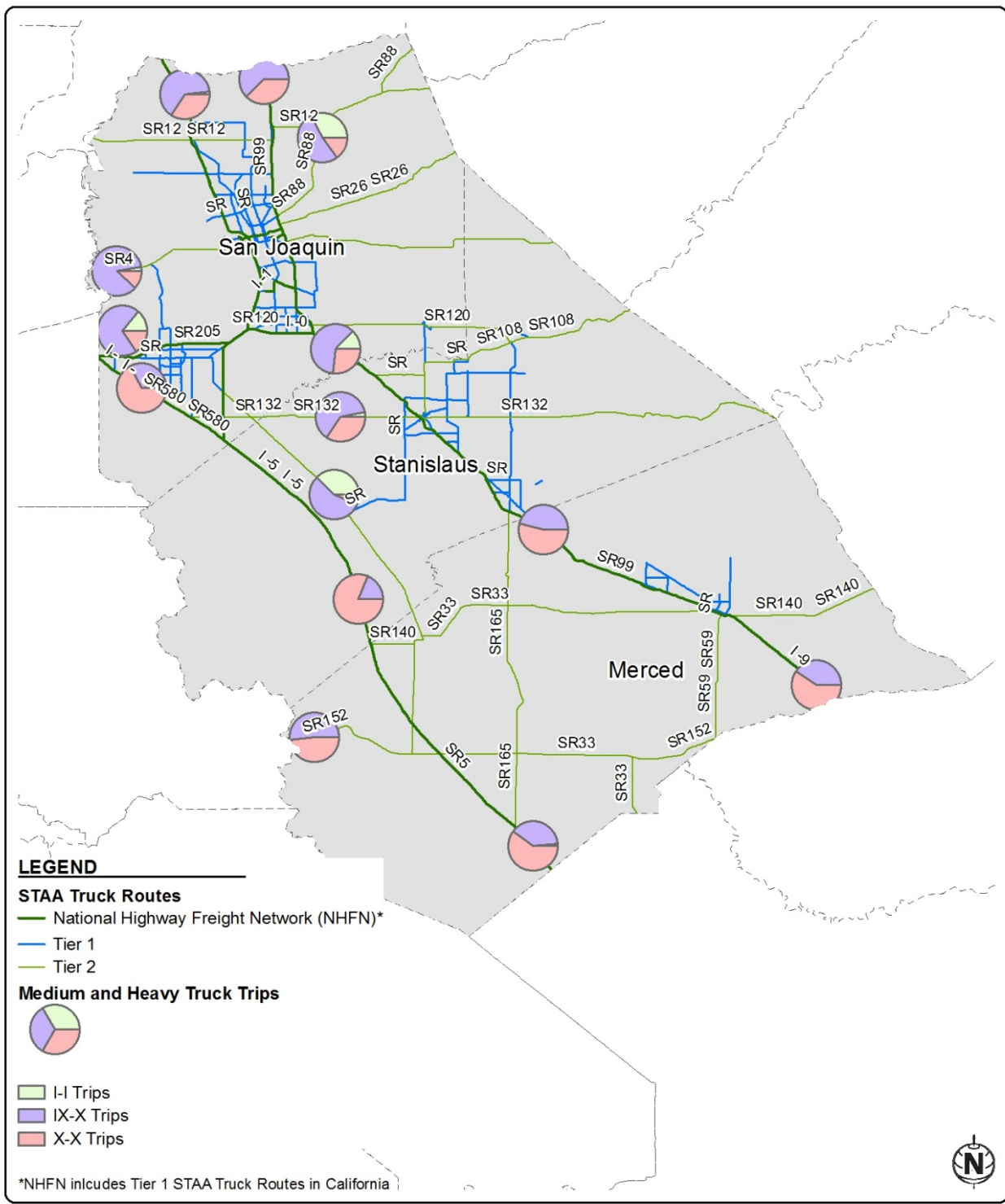
To understand the demand for short- and long-term truck parking, we looked at characteristics of truck trips on various segments of state highways in the Valley. Trips are categorized in groups:

- I-I trips or Internal-Internal: trips originating and destined inside the San Joaquin Valley
- I-X trips or Internal-External: trips originating inside San Joaquin valley but destined outside of the Valley
- X-I trips or External-Internal: trips originating outside the San Joaquin Valley but destined inside the Valley
- X-X trips or External-External: trips originating and destined outside of the San Joaquin Valley

Figure 24 to Figure 26 show the distribution of different types of trips on 40 selected segments in the Valley based on four months of GPS data in year 2015. For example, along SR 99, trucks are internal in the San Joaquin Valley. Therefore, more short-term truck stops are needed along SR 99.

Trips on I-5 are more interregional: the origin and/or destination of the trip is outside of the Valley. When the share of long-distance trips is higher, there is more need for long-term truck parking and rest stops.





**Figure 24. Truck Trip Characteristics in Merced, Stanislaus, and San Joaquin County**



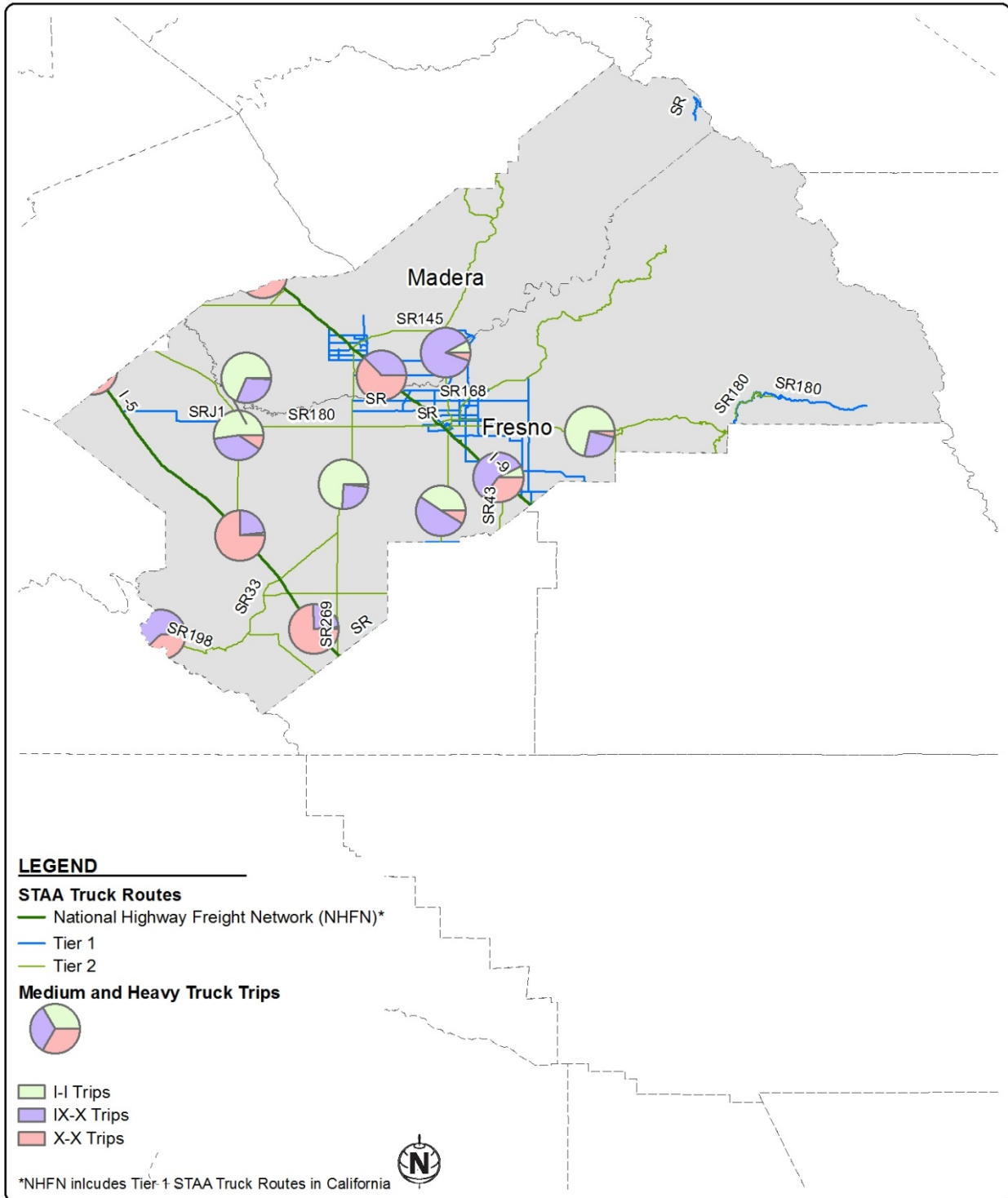
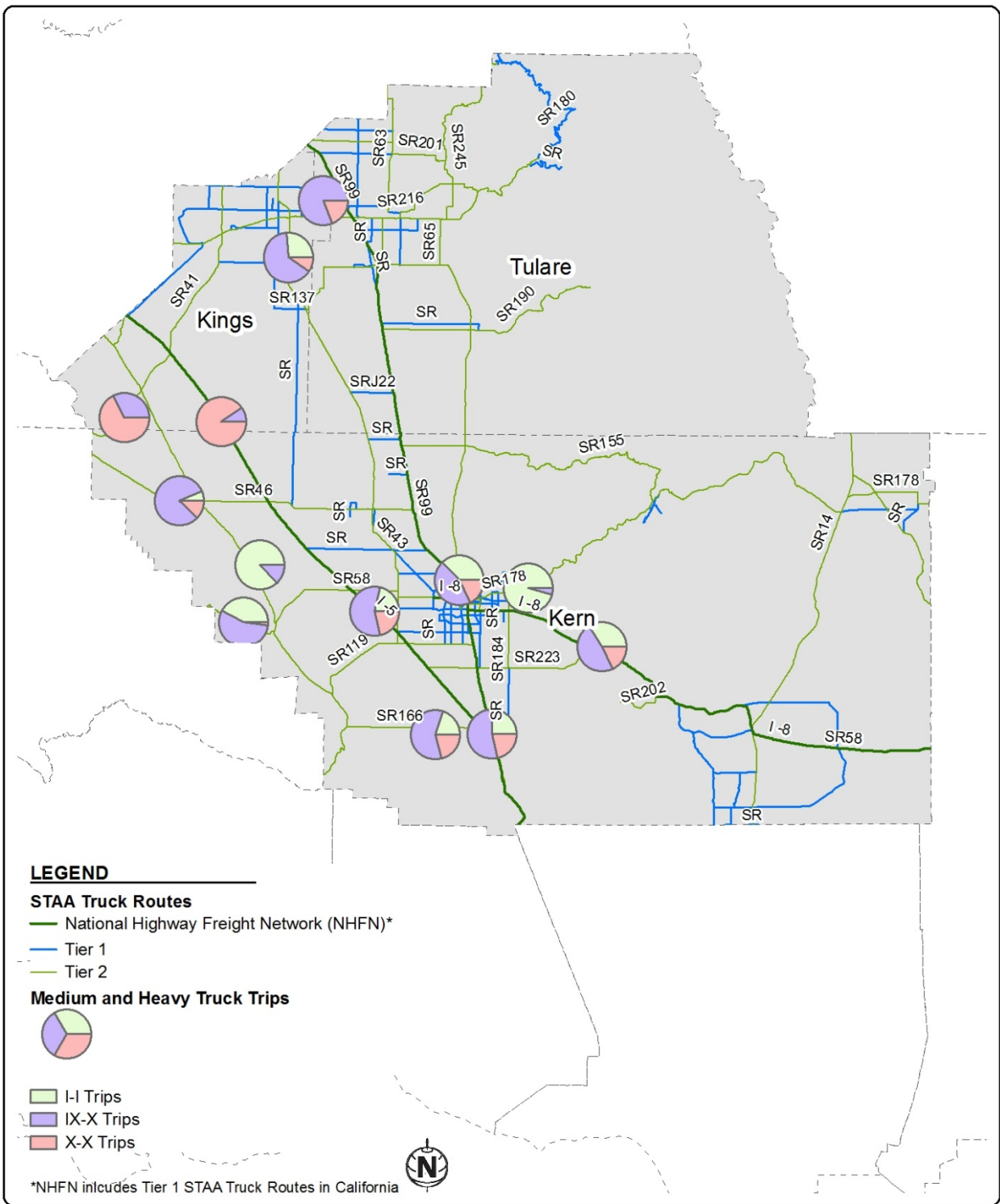


Figure 25. Truck Trip Characteristics in Madera and Fresno County





**Figure 26. Truck Trip Characteristics in Kern, Kings and Tulare County**



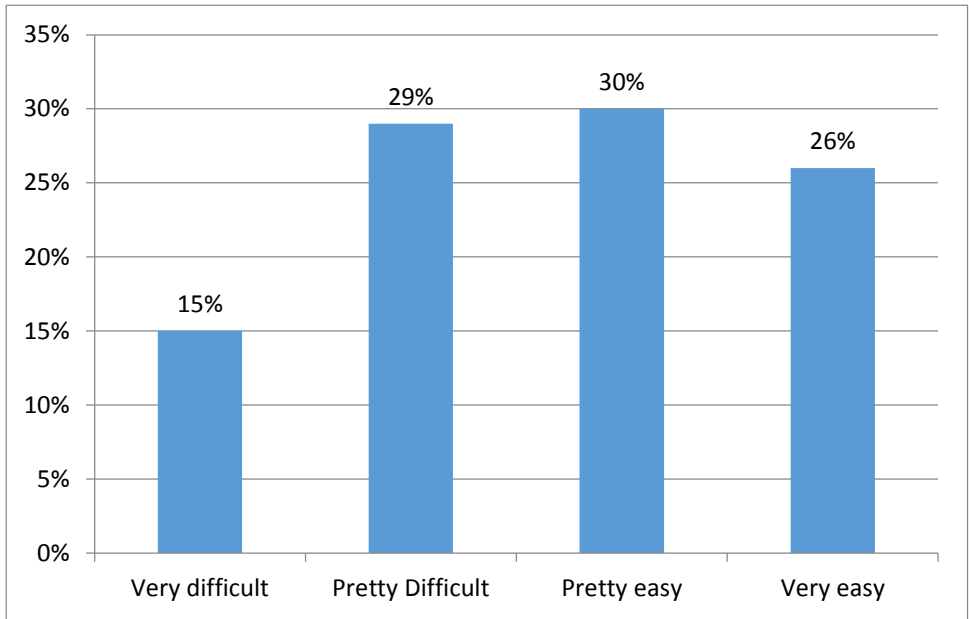


## SMART TRUCK PARKING TRUCK STOP SURVEY ON THE I-5 CORRIDOR

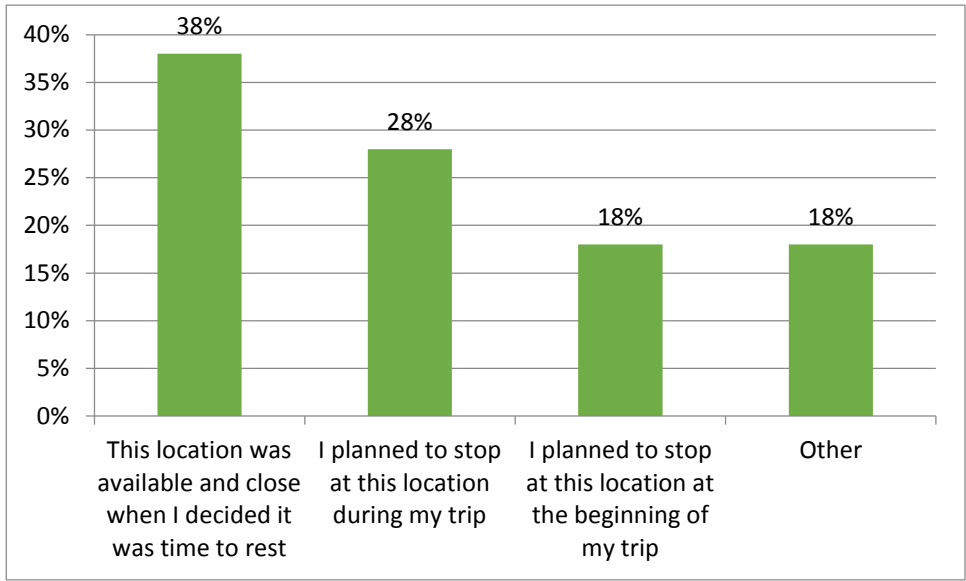
This section outlines the results of a clipboard survey of truckers along the I-5 Corridor in California. The survey was conducted to explore trucker parking habits as well as their reaction to a hypothetical system that would permit them to look up parking availability online as well as make parking reservations. The survey explored parking behavior and parking preferences, and probed willingness to pay for services provided by a smart truck parking system. The survey was conducted in 2010 at 11 truck stops along the I-5 corridor from Lodi in San Joaquin County to Firebaugh in Fresno County by UC Berkeley. About 100 completed surveys were collected. Highlights of the survey results are presented here and in Figures 19 through 21:

- 55% of drivers had some kind of GPS device (39% portable and 16% in-vehicle device).
- 33% of drivers had Qualcomm communication device, all of which appeared to be fleet vehicles.
- 50% of drivers were independent or owner operator.
- 29% of drivers had a smart phone.
- 53% of drivers selected their route based on their previous experience, 25% used paper maps.
- 39% of trucks were empty, 36% of them were fully loaded.
- 50% of drivers encountered truck stops on their current trip in which they would have liked to have parked, but could not because the lot was too full; of those 92% were looking for an overnight stay.
- 22% of drivers had never encountered a truck stop that was too full to park at along I-5. These driver may in part be representative of truck drivers who rarely park overnight or who park in locations that are rarely if ever full.
- 78% of drivers had parked overnight during their current trip. Of those drivers:
  - 15% of them rate the place “unsafe” or “not too safe.”
  - 44% of them were unable to park at their preferred location with 20% parking at their second choice.
- 29% of drivers found the information about parking availability is not useful.
- 74% of drivers would find it useful to be able to use the internet to reserve parking spaces at truck stops.
- Drivers’ top three truck stop characteristics for overnight parking are showers (67%), 24-hour hot food (65%), and safety (61%).
- 73% of drivers have never used electric anti-idling devices to power their cabin while parked (shore power), 42% of which is because their truck is not equipped to use the service.





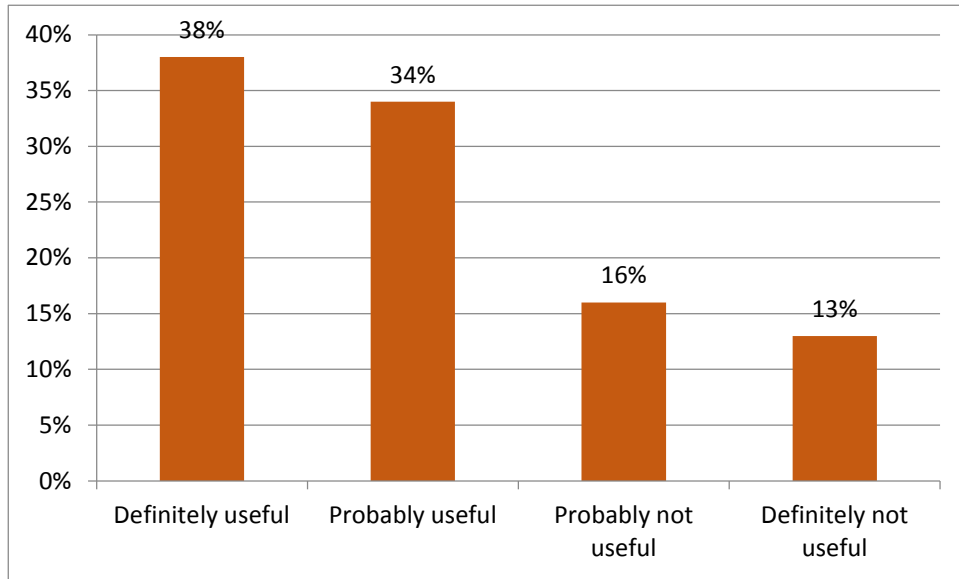
**Figure 27. How Difficult Was It To Find a Parking Space for Overnight Stay?**



**Figure 28. How Did You Decide to Park at This Location?**







**Figure 29. Would the Ability to Use the Internet to Look up Availability of Parking Space at Truck Stops Be Useful to You?**

As part of this research, UC Berkeley Transportation Sustainability Research Center (TSRC) and the California Department of Transportation (Caltrans) led development of an American Truck Parking™ web site. It is dedicated to providing truck parking space availability information to truckers hauling freight throughout the United States. American Truck Parking™ was developed to help truckers locate parking spaces, with a simple, easy-to-use interface designed for quick access to the information truckers need most to park. The site shows truck parking locations including private truck stops, logistics terminals, public rest areas, along with truck fueling locations for both conventional diesel and alternative fuels. Amenities are listed on a details page for each location in addition to directions along with parking availability and reservations at select locations. Currently, American Truck Parking™ shows dynamic parking availability for a few select locations as part of a broader truck parking availability demonstration effort. The goal of this project is to improve the availability and accessibility of truck parking information to the public.



## LOCAL TRUCK PARKING ISSUES IN THE VALLEY

### KETTLEMAN CITY

According to the County of Kings 2009 General Plan, Kettleman City Community Plan, residents have expressed a growing concern over the number of diesel trucks being parked overnight along local roads. In Kettleman City, trucks park in various areas throughout the community, which creates aesthetic problems and may also result in roadway blockages and reduced parking options for other motorists. The Kettleman City Community Plan Policy 6A.4.1 states, "The Highway and Commercial Area shall have designated truck parking and allow unlimited truck access. The Downtown Commercial Area shall have truck access restricted to the "Entryway" street and allow temporary parking behind commercial businesses. The Residential Area shall have no truck parking or truck routes, with access restricted except for when making quick delivery of merchandise or other goods." The Plan goes on to describe that designated truck routes and parking areas should be established to ensure adequate pavement depth, lane widths, and turn radii. Upon establishment of these designated areas, trucks should then be prohibited from non-truck routes except for when making deliveries within the community. The Plan has identified two proposed truck parking sites (subject to funding and a maintaining entity) in the Highway and Commercial Area. The first site is located at the west end of Bernard Street and has a high degree of visibility from the SR 41 and I-5. The second site is located at the end of Cyrill Place (Figure 30).

Currently the Kettleman City Highway and Commercial Area is zoned predominately for public parking. Trucks take advantage of this, parking their trucks and trailers along the local roads, resulting in reduced parking spaces for customers. This problem has been discussed in detail by county officials, business owners and local law enforcement who are pursuing studies and are open to suggestions for ways to mitigate traffic impacts for future development in Kettleman City.

There are three major distribution centers in Kettleman City with only two of them having a specific designated area at the site of the business for truck trailer transfers. The third distribution company does not have a designated business space and instead takes advantage of the public parking on local streets surrounding and within the Highway and Commercial Area. Again, this problem has been noted by county officials, business owners, and local law enforcement.





**Figure 30. Proposed Truck Parking Sites in the Highway Commercial Area<sup>8</sup>**

Local law enforcement has noted that when the rest stops along the I-5 are at capacity, there is an overflow area in Kettleman City that trucks utilize. This area is located on the east side of SR 41 at the I-5 interchange along the wide off-ramp area.

## AVENAL

The City of Avenal has several options for currently existing truck parking located at the following locations:

- First Avenue north of Skyline Boulevard
- Second Avenue north of Skyline Boulevard
- Tulare Street north of Skyline Boulevard
- West of Second Avenue (by permit only)

There is also a private truck parking lot located at 5<sup>th</sup> Avenue and SR 33.

No future truck parking is currently planned at this time for the City. Some residents do park their trucks in front of their homes or in their yards.

<sup>8</sup> Kettleman City Community Plan, 2009



City code enforcement and local law enforcement have to address this problem frequently in the community.

## HANFORD

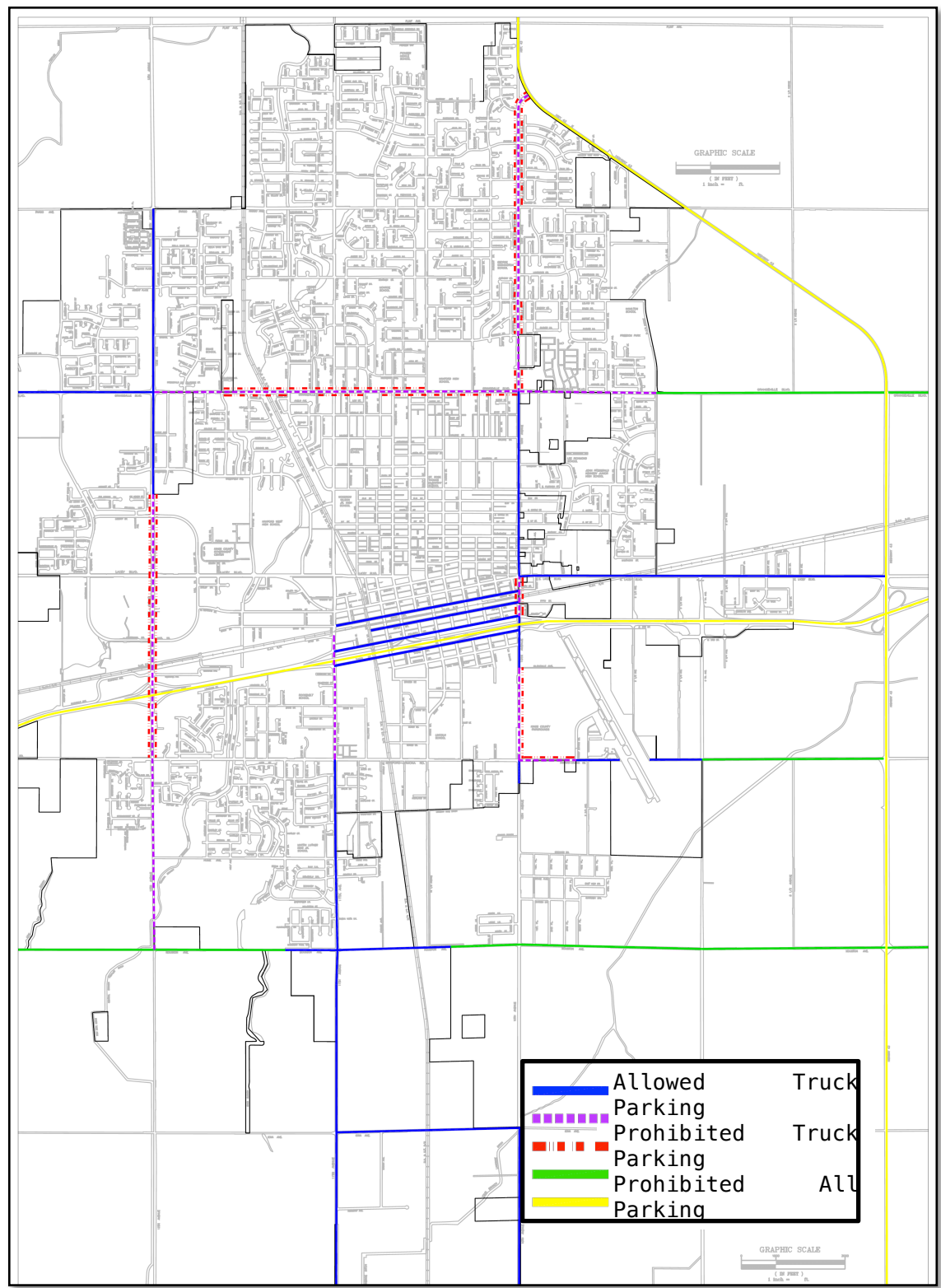
The City of Hanford has designated truck routes within the city limits where vehicles over five tons are allowed to drive and park (Figure 31). There are no designated truck parking lots within the City of Hanford and trucks may park in street parking only. In the Hanford Industrial Park, trucks may park at the respective on-site business.

## CITIES IN STANISLAUS COUNTY

The cities in Stanislaus County identify the following local issues:

- There are inadequate rest stops around the on- and off-ramps at the Hammett Interchange.
- In the downtown Salida area, there is some illegal parking near Salida Boulevard/Broadway.
- In City of Ceres along Service Road east of Mitchell Road, there are freight trucks parking illegally. Parking in that area provides truck drivers easy access to the freeway.
- The City of Hughson is not located adjacent to a major freeway. In the last several years, there have been a few freight truckers that have parked along Santa Fe Avenue in and around the City of Hughson limits. The City worked with these truckers to stop this practice and to attempt to locate available parking locations. There have been no incidences for the last several months in the city limits. However, it is still an issue at Santa Fe Avenue and Yosemite Avenue (SR 132) in the County's jurisdiction. Truckers park illegally due to convenience and lack of available, accessible parking locations. These truck drivers live in Hughson and would prefer to have their trucks nearby.
- The City of Modesto doesn't provide public parking for trucks. There is a Flying J in Ripon. Also Beard Industrial tract outside of city limits. A lack of parking spaces in the city resulted in illegal parking across the city.
- In the City of Turlock truckers park along the railroad right-of-way, primarily from Tuolumne to Fulkerth and some from Christoffersen to Olive Avenue.





**Figure 31. Truck Routes in the City of Hanford**



## ESTIMATION OF TRUCK PARKING DEMAND

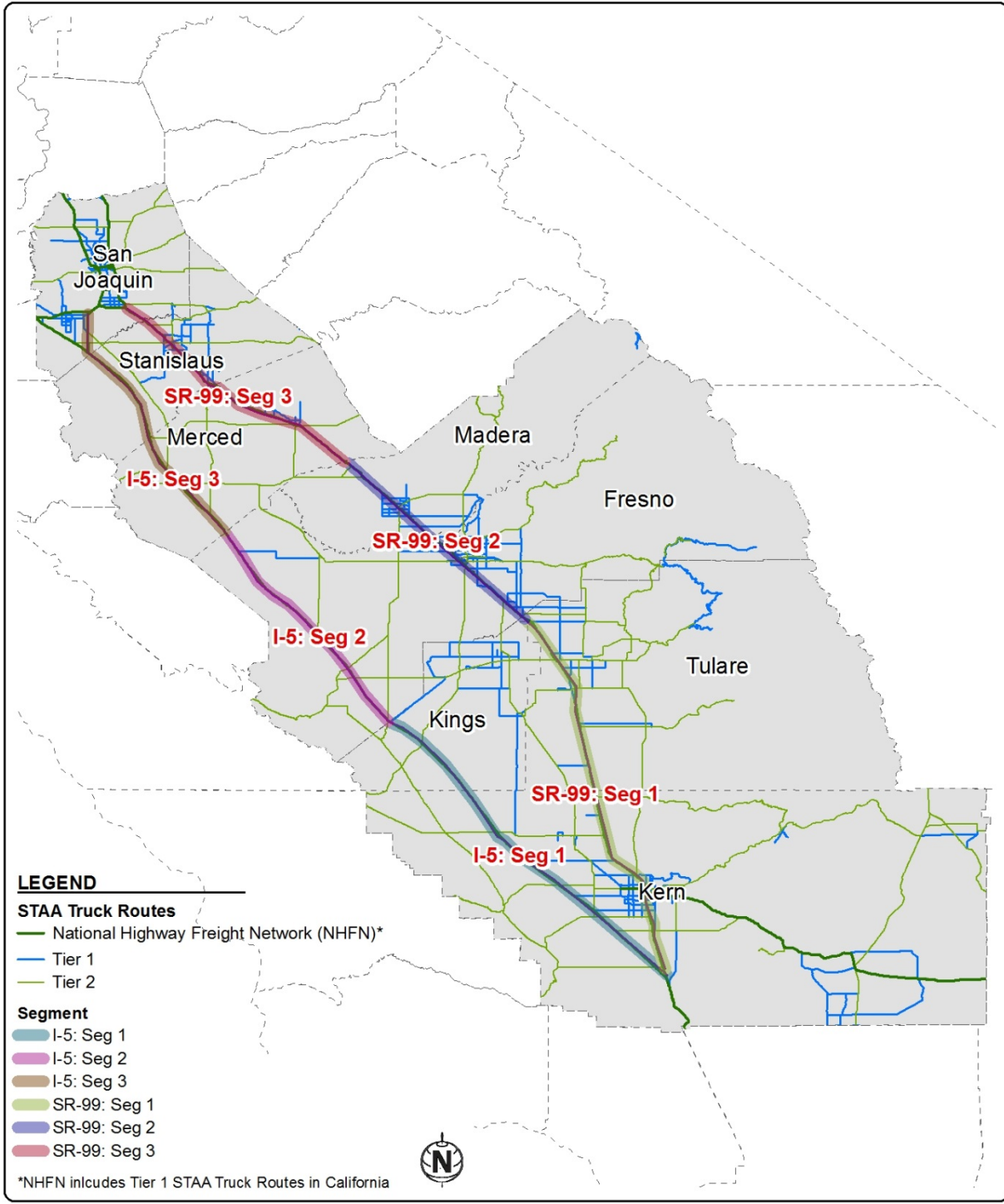
In order to estimate the demand for spaces along I-5 and SR 99 in the San Joaquin Valley, we used an empirical model developed by the FHWA as part of their National Assessment of Commercial Vehicle Parking [FHWA, 2002]. This model uses inputs of total truck-hours of travel calculated using truck volumes, distance and speed. To have a realistic estimate, the parameters of the model must be customized for each segment. We split each corridor into three segments that are 60 to 100 miles long (Figure 32).

For each segment, we calculated the average daily traffic (ADT) truck volumes and measured the segment length. We used an average speed of 60 mph on I-5 and 55 mph on SR 99.. The share of short distance trucks was initially estimated from Streetlight GPS data sample. Trips with both origin and destination in one of the eight counties in the Valley are counted as short distance trips. However the data set underrepresents owner operators and small trucks and small fleets by about 50%. Therefore the ratios were adjusted to account for short distance trips properly. Seasonal peak factor were estimated from PeMS data. Other parameters are FHWA's default values estimated based on their extensive survey (Table 3).

This methodology makes a distinction between the demand for private and public parking spaces. Based on an FHWA survey in 2002, a majority of drivers expressed a preference for public rest areas for short-term parking, while two-thirds indicated a preference for private truck stops for long-term rest needs.,. This ratio might have changed in recent years, but the recent surveys did not cover this question. Therefore we only estimated total demand for parking spaces.







**Figure 32. Analysis Segments for Truck Parking Demand Estimation**





**TABLE 3. FHWA TRUCK PARKING DEMAND ESTIMATION INPUT VARIABLES**

Model Variable	I-5			SR 99		
	(1)	(2)	(3)	(1)	(2)	(3)
Seasonal peaking factor	1.12	1.19	1.21	1.09	1.05	1.16
Short-term parking duration per hour traveled (min/hour)	5	5	5	5	5	5
Maximum hours driven per week	70	70	70	70	70	70
Average hours spent loading/unloading per week	15	15	15	15	15	15
Average hours spent at home per week	42	42	42	42	42	42
Average hours spent parking for rest at shipper/receiver per week	16	16	16	16	16	16
Proportion of total trucks that are short-haul	0.22	0.18	0.15	0.40	0.36	0.30
Proportion of total trucks that are long-haul	0.78	0.82	0.85	0.60	0.64	0.70
Peak-parking factor for short-haul trucks	0.02	0.02	0.02	0.02	0.02	0.02
Peak-parking factor for long-haul trucks	0.12	0.12	0.12	0.12	0.12	0.12
Length (Mile)	98	66	71	08	60	67
Truck ADT	7400	7200	7000	8400	8200	9000

**TABLE 4. TRUCK PARKING DEMAND ESTIMATION ON I-5 AND SR 99**

Type of truck Parking	I-5			SR 99		
	(1)	(2)	(3)	(1)	(2)	(3)
Total demand for truck	993	728	809	1027	567	845
Available parking spaces	1585	192	691	586	970	477
Parking deficiency	592	-536	-118	-441	403	-368
Sum of the Corridor		-61			-406	

This analysis shows that there is a deficiency between supply and demand for truck parking along four of the six identified segments. Along I-5, from the SR 99 split at Kern County to the SR 120 interchange in San Joaquin County, there is a deficiency of 61 parking spaces. However the parking spaces are not distributed along the corridor relative to the demand. Segment (1) has excess capacity while the demand at Segment (2) and (3) is greater than available supply of parking spaces. On the SR 99 corridor in the Valley the gap between supply and demand is larger. Overall, 400 more parking spaces are needed in Segment (1) and (3).



This method provides an initial estimate of parking demand along each segment. This estimate could be improved by collecting empirical data and customize the parameters to each specific region.

## SUMMARY OF TRUCK PARKING RECOMMENDATIONS

After reviewing previous reports and discussing the issue with public agencies, truck stop operators and truck drivers, we identified several factors that contribute to the truck parking problem in the Valley. We offer the following recommendations to improve conditions. Many of them require promotion and encouragement by government agencies and a private sector investment.

### PLANNING AND FUNDING

- Improve **data collection** and analysis to have a better understanding of short-term and long-term parking demand. Surveys that are conducted at truck stops are naturally underrepresenting short haul trips. Shipper/Carrier surveys and truck diaries are required to have better understanding of goods movement at the local level.
- Work with **law enforcement** to educate and train them about improved use of safe and available parking spaces (where parking space is actually available). This requires communication systems to identify parking availability.
- Update **plans** and investment programs to include truck parking solutions, both for facilities and technology for truck parking information services. Investigate P-3 approaches (Public Private Partnership) that involve private sector partners in the development of truck parking investments.
- MPOs should consider ways to incentivize **land use** decisions to facilitate the path for the private sector to expand their existing facility or open a new one.
- Surplus public properties can be converted to truck stops (e.g., converting a former weigh station to truck parking spaces). If the property has adequate pavement, this is fairly easy. If not, the cost is higher.
- **Funding** provided by FAST could be used to construct or expand truck parking facilities and deploy tools for commercial motor vehicle



drivers to find safe, available places to park and rest. Sponsoring parking in industrial parks, small truck stops, or converting unused public property to truck parking would increase the supply of parking spaces. The National Highway Freight Program (NHFP) created under FAST, allocates \$1.2 billion annually by formula to states to undertake freight planning, performance measures, operational improvements and construction activities. While the program is highway focused, it allows states to allocate up to 10 percent of the program funds to truck parking, rail, intermodal and port projects.

## DEMAND CONTROL

- Policies that incentivize off-peak deliveries can reduce demand for long-term parking spaces. According to the Jason Law survey, many states reported that most parking problems occur during nighttime hours. States reported that delivery timing and hours of operation at freight facilities (such as ports), can help reduce night-time parking demand.
- Truck circulation is a problem in some older parking facilities that are not designed for larger trucks. Drivers avoid places where their trucks cannot maneuver easily or may be blocked by other vehicles. Standard striping and use of way-finding signage are low cost improvements that can increase the efficiency and traffic circulation in the truck parking.
- Shippers/receivers often demand that drivers leave the facility immediately after delivery. Trucking association and public agencies may encourage industries to develop procedures or agreements to allow drivers use their parking facility as possible for short breaks if drivers need.

## TECHNOLOGY

- Problems usually occur when drivers operate outside of familiar areas. Apps showing information for adjacent or nearby interchanges that have parking helps drivers know their options. Availability of information systems are useful tools and a part of the solution to the parking problem; however, they are only helpful when there really is parking available.



- TA Petro's TruckSmart app offers users parking-availability information across the network. The information is updated every two hours by staff at each location. They are the only one of the big three chains to have implemented such a system to date. Promoting this type of information sharing even by crowd-sourcing through drivers themselves would increase the efficiency of the trucking industry.
- The predictability of available spaces is a key need for the trucking industry. Caltrans can also develop (or sponsor) an integrated truck parking app to show public and private locations, amenities, occupancy, maybe even reservations..
- Caltrans launched real time parking solutions on segments of I-5, the results shows increase in parking occupancy. More of these applications would be beneficial.

## **EMISSION REDUCTION POLICIES**

- Many EPA SmartWay carrier partners do use Truck Stop Electrification (TSE) where it fits with their travel patterns, and more seem to be establishing private TSE in their yards and allowing visiting truckers to use it. Trucking associations can encourage fleet owners to pay drivers to use designated parking areas. Caltrans can also help DOE and EPA to promote it.
- One source of opposition to establishing new open-access truck parking facilities may be that they "count" in EPA's inventory of sources of mobile sources air emissions (MOVES). If these facilities are outfitted with idle reduction equipment, they might qualify for a lower impact. Also, including TSE equipment in the proposed design of facilities could improve local acceptance.



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