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

Technical Memorandum

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

Strategic Programs and Their Feasibility Assessment

submitted to

Fresno Council of Governments

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date

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Table of Contents

List of Tables

List of Figures

1.0 Overview of Task 4 Report

Building on the Tasks 2 and 3 Report, which identified issues, summarized proposed improvements, and developed additional solutions for improving the movement of freight along I-5 and SR 99, this report (Task 4) evaluates those identified projects and programs. The evaluation process includes the selection of performance measures, anticipated benefits of projects identified by the counties, and the analysis of I-5/SR 99 connector routes given certain levels of improvement. This last analysis focuses on the potential for shifting long haul or through truck trips from SR 99 to I-5.

This document is structured as follows:

Section 2: A summary of projects and strategic programs identified in Tasks 2 and 3, a list of performance measures and their relationship to the Study's strategic goals, and an assessment of key projects and programs based on the identified performance measures;

Section 3: An overview of funding sources at the Federal, State, regional, and local levels, an examination of project readiness including implementation timelines, and identification of potential barriers to implementation; and

Section 4: Prioritization of projects based on performance, approval status, and funding availability and a description of next steps.

2.0 Assessment of Strategic Projects and Programs

2.1 Summary of Tasks 2 & 3 Memorandum

Tasks 2 and 3 of this project accomplished a number of goals. First, they identified strategic goals and objectives in the region related to freight movement and identified projects and programs that can help achieve those goals. Second, the Tasks summarized recent project concepts reports including truck only toll lanes and inland port facilities. Third, they explored ongoing research in the realms of truck parking, intelligent transportation systems (ITS), and truck platooning. Finally, the Tasks discussed best practices for goods movement performance measures and potential criteria for the feasibility analysis.

The strategic goals of the I-5/SR 99 Programs include:

- Improve Economic Competitiveness;
- Preserve Infrastructure;
- Improve Mobility and Travel Time Reliability;
- Improve Safety and Security;
- Improve the Environment;
- Use Innovative Technology and Practices; and
- Plan and Collaborate to Fund Investments

Table 2.1 presents a comprehensive list of all projects identified in previous tasks with cost, a timeline for completion, and the strategic goal addressed. In addition to these specific projects, a number of programmatic projects were identified and are shown in Table 2.2. The strategic programs would help address the four topic areas above but are not definable as specific projects.

Table 2.1 I-5/SR 99 Goods Movement Corridor Study Project List

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
Fresno	» FRE-03	» FRE500766	SR 99	California High-Speed Rail Project-SR 99 Re-Alignment	0-5	$ 189,500	Economic Competitiveness
Fresno	FRE-10	FRE111353	SR 99	Herndon @ SR 99- Widen Undercrossing	6-15	$ 26,365	Safety/Security
Fresno	FRE-11	FRE500404	SR 99	Mountain View and SR 99 Overcrossing: Widen Overcrossing and Improve Ramps	0-5	$ 45,000	Safety/Security
Fresno	FRE-12	FRE500143	SR 99	NB SR 99 Herndon Off Ramp: Signalize & Widen Ramp	0-5	$ 1,000	Safety/Security
Fresno	FRE-15	FRE500520	SR 99	SR 99 & SR 43/Floral Rd Interchange: Widen and Replace Bridge	16-24	$ 13,000	Infrastructure Preservation, Mobility/Reliability
Fresno	FRE-16	FRE111352	SR 99	SR 99 @ American Avenue Interchange	6-15	$ 10,385	Safety/Security
Fresno	FRE-17	FRE500521	SR 99	SR 99 Interchange at Shaw: Improvements	16-24	$ 86,000	Safety/Security
Fresno	FRE-18	FRE111355	SR 99	SR 99 Interchange North & Cedar	6-15	$ 81,605	Safety/Security
Fresno	FRE-19	FRE500518	SR 99	SR 99-Central and Chestnut: Upgrade Interchange	6-15	$ 72,500	Safety/Security
Fresno	FRE-20	FRE111328	SR 99	Veterans Blvd Barstow to Bullard Bryan-New 6 LD Super Arterial, Freeway Interchange & Grade Separation @ SR 99	6-15	$ 105,619	Mobility/Reliability
Fresno	FRE-21	15d	I-5	Widen I-5 between Kings County and Merced County lines	0-5	$ 198,000	Mobility/Reliability
Fresno	FRE-26	99e	SR 99	Widen SR 99 from 6 to 8 lanes from Central Ave to Bullard Ave.	0-5	$ 283,000	Mobility/Reliability
Fresno	FRE-08	FRE500514/21	SR 180	Extend SR 180 from Mendota to I-5	6-15	$ 223,000	Mobility/Reliability. Improve Economic Competitiveness
Fresno	FRE-24	NEW	SR 198	Widen SR 198 from 2 to 4 lanes from Lemoore Naval Air Station to I-5 (Fresno County Portion).	6-15	$ 193,000	Mobility/Reliability
Kern	KER-02	KER08RTP020	SR 58	Centennial Corridor	0-5	$ 698,000	Mobility/Reliability. Improve Economic

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
							Competitiveness
Kern	KER-03	51 / KER08RTP114	Centennial Connector	Centennial Connector – SR 58/Cottonwood Rd to Westside Parkway	0-5	$ 698,000	Mobility/Reliability. Improve Economic Competitiveness
Kern	KER-52	KER08RTP020	Centennial Corridor	I-5 to Westside Parkway at Heath Rd	25 or more years	$ 500,000	Mobility/Reliability. Improve Economic Competitiveness
Kern	KER-32	15e / KER08RTP027	I-5	Widen I-5 between Fort Tejon and SR 99.	25 or more years	$ 86,000	Mobility/Reliability
Kern	KER-51	KER14RTP001	SR 46	Brown Material Rd to I-5 – interchange upgrade at 1-5 – Phase 4A	0-5	$ 27,000	Safety/Security
Kern		KER08RTP018	SR 46	Brown Material Rd to I-5 – interchange upgrade at 1-5 – Phase 4B	6-15	$ 70,000	Safety/Security
Kern	KER-31	45 / KER08RTP072 KER08RTP113	7th Standard Rd	Widen 7th Standard Road from I-5 to Sante Fe Way.	6-15	$ 90,000	Mobility/Reliability
Kern	KER-43	KER08RTP028	I-5	7th Standard Rd Interchange – reconstruct	25 or more years	$ 54,000	Safety/Security, Infrastructure Preservation
Kern	KER-45	KER08RTP105	SR 99	At various locations – ramp improvements (HOV – ramp metering)	16-24	$ 148,000	Innovative Technology and Practices
Kern	KER-45a	KER08RTP105	SR 99	SR 99 & Hwy 119	16-24		
Kern	KER-45b	KER08RTP105	SR 99	SR 99 & Hosking Avenue (completed 2016)	16-24		
Kern	KER-45c	KER08RTP105	SR 99	SR 99 & Panama Lane	16-24		
Kern	KER-45d	KER08RTP105	SR 99	SR 99 & White Lane	16-24		
Kern	KER-45e	KER08RTP10	SR 99	SR 99 & Ming Avenue	16-24		

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
		5					
Kern	KER-45f	KER08RTP105	SR 99	SR 99 & California Avenue	16-24		
Kern	KER-45g	KER08RTP105	SR 99	SR 99 & Rosedale Highway	16-24		
Kern	KER-45h	KER08RTP105	SR 99	Hageman Flyover	16-24		
Kern	KER-45i	KER08RTP105	SR 99	SR 99 & Olive Drive	16-24		
Kern	KER-45j	KER08RTP105	SR 99	SR 99 & Snow Road (New Interchange)	16-24		Safety/Security, Economic Competitiveness
Kern	KER-45k	KER08RTP105	SR 99	SR 99 & 7th Standard Road	16-24		
Kern	KER-46	KER08RTP115	SR 99	At Snow Rd – construct new interchange	16-24	$ 138,200	Safety/Security, Economic Competitiveness
Kern	KER-49		SR 99	Reconstruct interchange at Whisler	25 or more years	$ 54,000	Safety/Security
Kern	KER-48		SR 99	Reconstruct interchange at Pond Rd	25 or more years	$ 54,000	Safety/Security
Kern	KER-47	KER18RTP001	SR 99	Construct new interchange at Hanawalt	25 or more years	$ 88,811	Safety/Security, Economic Competitiveness
Kern	KER-44	KER08RTP056	SR 99	Rt 99 – widen bridge to four lanes; reconstruct ramps	25 or more years	$ 134,000	Mobility/Reliability
Kern	KER-60	KER18RTP002	North Beltway	I-5 to SR 65 – Burbank Street Alignment – construct new highway	25 or more years	$ 500,000	Mobility/Reliability. Improve Economic Competitiveness
Kern	KER-59	KER08RTP139	West Beltway	Pacheco Rd. Westside Parkway – construct new facility	16-24	$ 115,793	Mobility/Reliability. Improve Economic Competitiveness
Kern	KER-58	KER08RTP10	West	Rosedale Hwy to 7th Standard Rd – construct new	6-15	$ 115,793	Mobility/Reliability.

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
		2,	Beltway	facility			Improve Economic Competitiveness
Kern	KER-57	KER08RTP09 7	West Beltway	Taft Hwy to Pacheco Rd – construct new facility	16-24	$ 90,000	Mobility/Reliability. Improve Economic Competitiveness
Kern	KER-55	KER08RTP07 6	West Beltway-North	7th Standard Rd to SR 99 –extend freeway	25 or more years	$ 100,000	Mobility/Reliability. Improve Economic Competitiveness
Kern	KER-54	KER08RTP07 5	West Beltway-South	Taft Hwy to I-5 – extend freeway	25 or more years	$ 100,000	Mobility/Reliability. Improve Economic Competitiveness
Kern	KER-50	KER08RTP01 6	West Beltway	Rosedale Hwy to Westside Parkway – construct new facility	6-15	$ 93,500	Mobility/Reliability. Improve Economic Competitiveness
Kern	KER-56	KER08RTP09 2	SR 58 (existing)	Rosedale Hwy – SR 43 to Allen Rd – widen existing highway	6-15	$ 59,000	Mobility/Reliability
Kern	KER-53	KER08RTP03 8, KER08RTP09 2	SR 58 (existing)	Widen SR 58 (Rosedale Hwy) – I-5 to SR 43		$ 500,000	Mobility/Reliability
Kings	KIN-01	NEW	I-5	Widen I-5 from 2 to 4 lanes between Kern and Fresno Counties.	6-15	$ 80,000	Mobility/Reliability
Kings	KIN-02	63	SR 198	Widen SR 198 from 2 to 4 lanes from Lemoore Naval Air Station to I-5 (Kings County Portion).	6-15	$ 31,000	Mobility/Reliability
Kings	KIN-03	65	SR 41	Widen SR 41 from 2 to 4 lanes from SR 198 to I-5.	6-15	$ 68,000	Mobility/Reliability
Madera	MAD-01	MAD41700 4	SR 99	SR99: 4-Lane Freeway to 6-Lane Freeway Ave 12 to Ave 17	0-5	$ 91,010	Mobility/Reliability
Madera	MAD-02	MAD41700 3	SR 99	SR99: 4-Lane Freeway to 6-Lane Freeway, Ave 7 to Ave 12	16-24	$ 160,571	Mobility/Reliability
Madera	MAD-03	MAD21703 0	SR 99	4th Street/SR 99 Interchange Improvements		$ 5,918	Safety/Security
Madera	MAD-05	5335	SR 99	Madera 6 Lane	0-5		Mobility/Reliability
Madera	MAD-06	MAD41700	SR 99	Reconstruct Interchange	0-5	$ 68,000	Safety/Security

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
		1					
Madera	MAD-07	6297	SR 99	South Madera 6 Lane	0-5		Mobility/Reliability
Madera	MAD-08	MAD41800 2	SR 99	Widen SR99: In Fresno & Madera Counties, from south of Grantland Ave UC to north of Avenue 7	0-5	$ 54,000	Mobility/Reliability
Madera	MAD-11	0	SR 99	Widen SR 99 from 4 to 6 lanes from Avenue 17 to Avenue 21	Unknown	N/A	Mobility/Reliability
Madera	MAD-12	0	SR 99	Widen SR 99 from 4 to 6 lanes from Avenue 23 to Madera County Line	Unknown	N/A	Mobility/Reliability
Merced	MER-03	0161A	SR 99	Highway 99: Livingston Widening Northbound	0-5	$ 42,870	Mobility/Reliability
Merced	MER-04	0161B	SR 99	Highway 99: Livingston Widening Southbound	0-5	$ 38,950	Mobility/Reliability
Merced	MER-09		I-5	Widen I 5 from 4 to 6 lanes in Merced County	25 or more	N/A	Mobility/Reliabiilty
Merced	MER-01a		Atwater-Merced Expressw ay	Atwater-Merced Expressway, Phase 1B: Green Sands Ave to Santa Fe Drive (Access to Castle Development & Airport)	6-15	$ 66,200	Mobility/Reliability. Improve Economic Competitiveness
Merced	MER-01b		Atwater-Merced Expressw ay	Atwater-Merced Expressway, Phase 3: New Hwy 99 Interchange to Hwy 140	6-15	$ 71,800	Mobility/Reliability. Improve Economic Competitiveness
Merced	MER-06	5707A	SR 152	Los Banos Bypass, Segment 1: Btwn. Hwy 165 and E. Hwy 152 with signalized intersections	6-15	$ 54,000	Mobility/Reliability, Safety/Security
Merced	MER-07	5707B	SR 152	Los Banos Bypass, Segment 2: Btwn. Hwy 165 and W. Hwy 152 with signalized intersections	25 or more	$ 206,000	Mobility/Reliability, Safety/Security
Merced	MER-08		SR 152	Los Banos Bypass, Segment 3: Construct 3 interchanges at W. Hwy 152, Hwy 165 and E. Hwy 152	25 or more	$ 192,000	Mobility/Reliability, Safety/Security
Merced	MER-10	19	SR 152	Widen SR 152 between SR 99 and US 101 (in Merced County)	0-5	N/A	Mobility/Reliability
San Joaquin	SJ-08	SJ07-2020	I-5	I-5 at Eight Mile Road Interchange	6-15	$ 51,400	Safety/Security
San Joaquin	SJ-09	SJ11-2004	I-5	I-5 at Hammer Lane Interchange	6-15	$ 37,200	Safety/Security
San	SJ-11	SJ07-2005	I-5	I-5 at Louise Avenue Interchange	0-5	$ 33,000	Safety/Security

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
Joaquin							
San Joaquin	SJ-12	SJ11-2006	I-5	I-5 at Otto Drive Interchange	6-15	$ 92,800	Safety/Security
San Joaquin	SJ-13	SJ11-3066	I-5	I-5 at Roth Road Interchange	0-5	$ 16,800	Safety/Security
San Joaquin	SJ-14	15b	I-5	Widen I-5 between SR 120 and I-205	0-5	$ 207,970	Mobility/Reliability
San Joaquin	SJ-15	15a	I-5	Widen I-5 from 1 mile north of SR-12 to SR-120	0-5	$ 91,000	Mobility/Reliability
San Joaquin	SJ-16	15c	I-5	Widen I-5 from 4 to 6 lanes from 1 mile north of SR-12 to Sacramento County line	6-15	$ 94,000	Mobility/Reliability
San Joaquin	SJ-24	99a	SR 99	Widen SR 99 from French Camp Rd to Mariposa Rd 6 to 8 lanes, with new interchange	0-5	$ 100,000	Mobility/Reliability
San Joaquin	SJ-26b	SJ11-2023	SR 99	SR 99 at Austin Road Interchange	0-5	$ 3,000	Safety/Security
San Joaquin	SJ-30	SJ11-2002	SR 99	SR 99 at Eight Mile Road Interchange	0-5	$ 65,900	Safety/Security
San Joaquin	SJ-31	SJ11-2008	SR 99	SR 99 at Gateway Boulevard Interchange	0-5	$ 9,930	Safety/Security
San Joaquin	SJ-32	SJ07-2006	SR 99	SR 99 at Harney Lane Interchange	16-24	$ 39,183	Safety/Security
San Joaquin	SJ-33	SJ07-2015	SJ07-2015	SR 99 at Main Street/UPRR Interchange (Ripon)	0-5	$ 10,000	Safety/Security
San Joaquin	SJ-34	SJ11-2001	SJ11-2001	SR 99 at Morada Interchange	0-5	$ 69,800	Safety/Security
San Joaquin	SJ-35	SJ 14-2001	SJ 14-2001	SR 99 at Raymus Expressway Interchange	0-5	$ 3,000	Safety/Security
San Joaquin	SJ-36	SJ11-2015	SJ11-2015	SR 99 at SR-12 West (Kettleman Lane) Interchange	6-15	$ 16,164	Safety/Security
San Joaquin	SJ-37	SJ14-1003	SJ14-1003	SR 99 Widening	Unknown	$ 3,000	Mobility/Reliability
San Joaquin	SJ-38	3045	3045	Turner Road Interchange Operational Improvements	0-5	$ 3,061	Safety/Security, Mobility/Reliability

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
San Joaquin	SJ-39	0	0	Widen SR 99 From Lodi to Sacramento County Line	6-15	$ 40,000	Mobility/Reliability
San Joaquin	SJ-07	6	6	I-580 Westbound Truck Climbing Lanes	6-15	$ 114,200	Mobility/Reliability, Environment, Safety/Security
San Joaquin	SJ-25	26	26	Widen SR 12 between I-5 and SR 99	0-5	$ 60,000	Mobility/Reliability
San Joaquin	SJ-26a	16	16	Widen SR 120 between I-5 and SR 99, with new interchange at SR 99	0-5	$ 115,191	Mobility/Reliability
Stanislaus	STA-02	RE02	SR 99	Keyes Rd to Taylor Rd	6-15	$ 6,227	
Stanislaus	STA-03	RE05	SR 99	Fulkerth Rd to West Main Street	6-15	$ 6,403	
Stanislaus	STA-04	RE04	SR 99	Monte Vista Ave to Fulkerth Rd	6-15	$ 6,462	
Stanislaus	STA-05	RE03	SR 99	Taylor Rd to Monte Vista Ave	6-15	$ 6,520	
Stanislaus	STA-06	T26	SR 99	W. Main St Interchange	6-15	$ 19,091	Safety/Security
Stanislaus	STA-07	T25	SR 99	SR 99, Lander Ave (SR 165) to S. City Limits	6-15	$ 35,785	
Stanislaus	STA-08	TIER II	SR 99	Mitchell Rd/Service Rd Interchange Phase 2	6-15	$ 49,586	Safety/Security
Stanislaus	STA-09	C08	SR 99	Mitchell Rd/Service Rd Interchange Phase 1	6-15	$ 122,987	Safety/Security
Stanislaus	STA-14	RE07	SR 99	Mitchell Rd to Merced County Line	16-24	$ 3,097	
Stanislaus	STA-15	RE06	SR 99	San Joaquin County Line to Mitchell Rd	6-15	$ 15,758	
Stanislaus	STA-16	TIER II	SR 99	Interchange Ramp and Auxiliary Lane Improvements	0-5	$ 27,685	Safety/Security
Stanislaus	STA-17	SC02	SR 99	SR 99 & Hammett Rd	0-5	$ 95,524	
Stanislaus	STA-18	TIER II	SR 99	Golden State to Youngstown Road	6-15	$ 20	
Stanislaus	STA-20	M15	SR 99	SR 99 & Briggsmore Interchange	0-5	$ 12,668	Safety/Security
Stanislaus	STA-21	T27	SR 99	Taylor Rd & SR 99: Reconstruct Interchange	6-15	$ 7,694	Safety/Security
Stanislaus	STA-22	TIER II	SR 99	Hatch Rd & SR 99: Reconstruct Interchange	16-24	$ 222,129	Safety/Security
Stanislaus	STA-23	T01	SR 99	Reconstruct Interchange at Fulkerth Road	0-5	$ 12,667	Safety/Security
Stanislaus	STA-24	TIER II	SR 99	SR 99 & Standiford Ave: Reconstruct Interchange	16-24	$ 78,944	Safety/Security
Stanislaus	STA-26	M17	SR 99	Reconstruct to 8-lane Interchange – Phase II	0-5	$ 5,835	Safety/Security, Mobility/Reliability
Stanislaus	STA-29	P02	I-5	I-5 to Rogers Road: Interchange Improvements and Widen Sperry Ave	0-5	$ 17,505	
Stanislaus	STA-32	TIER II	SR 99	SR 99: Kansas Ave to Carpenter Rd	6-15	$ 60,046	
Stanislaus	STA-33	TIER II	SR 99	Carpenter Rd to San Joaquin County Line	6-15	$ 82,278	

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
Stanislaus	STA-34	TIER II	SR 99	Widen SR99 from Hatch Rd to Tuolumne Rd	6-15	$ 102,701	Mobility/Reliability
Stanislaus	STA-35	TIER II	SR 99	Widen SR99 from Tuolumne Rd to Kansas Ave	6-15	$ 128,243	Mobility/Reliability
Stanislaus	STA-36	TIER II	SR 99	Widen SR99 from Mitchen Rd to Hatch Rd	6-15	$ 221,877	Mobility/Reliability
Stanislaus	STA-37	M02	SR 99	Widen from 6 to 8 lanes	0-5	$ 50,671	Mobility/Reliability
Stanislaus	STA-38	(TIER II)	I-5	Widen I-5 from 4 to 6 lanes SJ County line to Sperry Ave	16-24	$ 300,063	Mobility/Reliability
Stanislaus	STA-40	99b	SR 99	Widen SR 99 from 6 to 8 lanes in Stanislaus County	0-5	$ 473,000	Mobility/Reliability
Stanislaus	STA-41	ST06	SR 99	Widen STA-99 between Carpenter Road and the SJ County line to eight lanes	25 or more	$ 82,278	Mobility/Reliability
Stanislaus	STA-42	ST03	SR 99	Widen STA-99 between Hatch and Tuolumne Road to eight lanes	25 or more	$ 102,701	Mobility/Reliability
Stanislaus	STA-43	ST05	SR 99	Widen STA-99 between Kansas Ave. and Carpenter Road to eight lanes	25 or more	$ 60,046	Mobility/Reliability
Stanislaus	STA-44	ST02	SR 99	Widen STA-99 between Mitchell and Hatch Road to eight lanes	25 or more	$ 221,877	Mobility/Reliability
Stanislaus	STA-45	ST04	SR 99	Widen STA-99 between Tuolumne Road and Kansas Ave. to eight lanes	25 or more	$ 128,243	Mobility/Reliability
Stanislaus	STA-01	M01	SR 132	State Route 132 West Freeway/Expressway	2020 Open to traffic Year	$ 59,085	Mobility/Reliability. Improve Economic Competitiveness
Stanislaus	STA-12	103	South County Corridor	Expressway connector between SR 99 and I-5 from Turlock to Patterson	6-15	N/A	Mobility/Reliability. Improve Economic Competitiveness
Stanislaus	STA-39	17	SR 132	Widen SR 132 connecting SR 99 and I-580	0-5	$ 100,000	Mobility/Reliability
Stanislaus	STA-46	RE01	SR 132	SR 132 West Freeway/Exressway	2028 Open to traffic year	$ 335,009	Mobility/Reliability. Improve Economic Competitiveness
Tulare	TUL-14	99f	SR 99	Widen SR 99 from Avenue 200 to 1.2m south of Avenue 280.	6-15	$ 186,800	Mobility/Reliability
Tulare	TUL-15	99g	SR 99	Widen SR 99 from Kern County line to Avenue 200.	25 or more	$ 332,500	Mobility/Reliability
Tulare	TUL-16		SR 99	State Route 99/Betty Drive Interchange	0-5	$ 66,720	Mobility/Reliability
Tulare	TUL-17		SR 99	State Route 99/Caldwell Avenue Interchange	6-15	$ 76,303	Mobility/Reliability

County	Study ID	Project ID	Route or Facility ID	Title and Description	Timeline (Years)	Total Project Cost (thousands)	Strategic Goal Addressed
Tulare	TUL-18		SR 99	State Route 99/Commercial Interchange	6-15	$ 60,980	Mobility/Reliability
Tulare	TUL-19		SR 99	State Route 99/Paige Avenue interchange	6-15	$ 73,969	Mobility/Reliability

Source: SJVCOG member counties input and the following source documents: Source: (a) CalSTA and Caltrans, 2014 California Freight Mobility Plan[1]; (b) Fresno Council of Governments (COG) 2014 Regional Transportation Plan (RTP)[2]; (c) Kern Council of Governments (COG) 2014 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)[3]; (d) Kings County Association of Governments (CAG) 2014 Regional Transportation Improvement Program (RTIP)[4], I Madera County Transportation Commission 2014 RTP/SCS[5], (f) Merced County Association of Governments 2014 RTP/SCS[6], (g) San Joaquin Council of Governments (COG) 2014 RTP/SCS[7]; (h) Stanislaus Council of Governments (COG) 2014 RTP/SCS[8]; and (i) Tulare County Association of Governments 2014 RTP/SCS[9]

[1] http://www.dot.ca.gov/hq/tpp/offices/ogm/ CFMP/Web/Display_VisionGoalsObj_ARCH_E_36x48.pdf#zoom=85 (last accessed on May 11, 2016)

[2] http://www.fresnocog.org/sites/default/files/publications/RTP/Final_RTP/2014_RTP_Chapter_Six_Final.pdf (last accessed on May 11, 2016)

[3] http://www.kerncog.org/images/docs/rtp/2014_RTP.pdf (last accessed on May 11, 2016)

[4] http://www.kingscog.org/vertical/sites/ percent7BC427AE30-9936-4733-B9D4-140709AD3BBF percent7D/uploads/Chap_3_-_Policy_Element_-_2014_Final_RTP.pdf (last accessed on May 11, 2016)

[5] http://www.maderactc.org/wp-content/uploads/2014/07/MCTC-2014-Final-RTP-SCS.pdf (last accessed on May 11, 2016)

[6] http://www.mcagov.org/DocumentCenter/View/314 (last accessed on May 11, 2016)

[7] http://www.sjcog.org/DocumentCenter/View/484 (last accessed on May 11, 2016)

[8] http://www.stancog.org/pdf/rtp/chapter-6-transportation-plan-and-policies.pdf (last accessed on May 11, 2016)

[9] http://www.tularecog.org/wp-content/uploads/2015/06/Final-2014-Regional-Transportation-Plan-Sustainable-Communities-Strategy-FULL-DOCUMENT.pdf (last accessed on May 11, 2016)

Table 2.2 I-5/SR 99 Goods Movement Corridor Study Strategic Programs

Strategic Program	Strategic Goal Addressed
I-5/SR 99 Roadway Pavement and Bridge Maintenance	Infrastructure
Overweight/ oversize policy to allow heavier/longer trucks on I-5 in both directions between San Joaquin County boundary to Kern County boundary (exact boundaries of this project can be identified during future project development)	Economic Competitiveness, Environment
Truck only Toll Lanes on I-5 between I-5 and I-205 junction in San Joaquin County and I-5 and SR 99 junction in Kern County	Mobility/Reliability, Environment, Innovative Technology and Practices
Truck climbing lanes at steep locations such as Altamont Pass, Pacheco Pass and Tehachapi Passes (Grapevine area and SR 58 Eastbound).	Mobility/Reliability, Safety/ Security
I-5/SR 99 Capital Projects for Bottlenecks Congestion Relief	Mobility/Reliability
I-5/SR 99 Operational Projects for Bottlenecks Congestion Relief	Mobility/Reliability
I-5 to SR 99 Connector Capital and Operational Projects for Improved Accessibility	Mobility/Reliability, Economic Competitiveness
I-5/SR 99 Interchanges Reconfiguration Program for Key Freight Access Interchanges with Inadequate Design	Mobility/Reliability,
I-5/SR 99 Capital Projects for Safety Hotspots Alleviation	Safety/Security, Mobility/Reliability
I-5/SR 99 Operational Projects for Safety Hotspots Alleviation	Safety/Security
Container depot service near Stockton for Port of Oakland and in Shafter for Ports of Long Beach and Los Angeles service	Economic Competitiveness
Short-haul rail service between SJV region and Port of Oakland	Economic Competitiveness, Environment
Short-haul rail service between SJV region and Ports of Long Beach/Los Angeles	Economic Competitiveness, Environment
Caltrans' Truck Parking Information System on I-5	Safety/Security, Innovative Technology and Practices
Truck Platooning	Safety/Security, Mobility/Reliability, Innovative Technology and Practices

Source: (a) CalSTA and Caltrans, 2014 California Freight Mobility Plan[10]; (b) Fresno Council of Governments (COG) 2014 Regional Transportation Plan (RTP)[11]; (c) Kern Council of Governments (COG) 2014 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)[12]; (d) Kings County Association of Governments (CAG) 2014 Regional Transportation Improvement Program

[10] http://www.dot.ca.gov/hq/tpp/offices/ogm/CFMP/Web/Display_VisionGoalsObj_ARCH_E_36x48.pdf#zoom=85 (last accessed on May 11, 2016)

[11] http://www.fresnocog.org/sites/default/files/publications/RTP/Final_RTP/2014_RTP_Chapter_Six_Final.pdf (last accessed on May 11, 2016)

[12] http://www.kerncog.org/images/docs/rtp/2014_RTP.pdf (last accessed on May 11, 2016)

(RTIP)[13], I Madera County Transportation Commission 2014 RTP/SCS[14], (f) Merced County Association of Governments 2014 RTP/SCS[15], (g) San Joaquin Council of Governments (COG) 2014 RTP/SCS[16]; (h) Stanislaus Council of Governments (COG) 2014 RTP/SCS[17]; and (i) Tulare County Association of Governments 2014 RTP/SCS[18]

2.2 Performance Evaluation of Projects & Programs

The development and application of performance measures enable agencies to gauge system condition and use, evaluate transportation programs and projects, and help decision-makers allocate limited resources more effectively than would otherwise be possible.

Performance measures are typically applied for the following general purposes:

- **Linking Actions to Goals.** Performance measures can be developed and applied to help link plans and actions to state and federal goals and objectives;
- **Prioritizing Projects.** Performance measures can provide information needed to invest in projects and programs that provide the greatest benefits;
- **Managing Performance.** Applying performance measures can improve the management and delivery of programs, projects, and services. The right performance measures can highlight the technical, administrative, and financial issues critical to governing the fundamentals of any program or project;
- **Communicating Results.** Performance measures can help communicate the value of public investments in transportation. They can provide a concrete way for stakeholders to see how transportation investments contribute to transportation system performance; and
- **Strengthening Accountability.** Performance measures can promote accountability with respect to the use of taxpayer resources. They reveal whether transportation investments are providing the expected benefit or demonstrate need for improvement.

[13] http://www.kingscog.org/vertical/sites/ percent7BC427AE30-9936-4733-B9D4-140709AD3BBF percent7D/uploads/Chap_3_-_Policy_Element_-_2014_Final_RTP.pdf (last accessed on May 11, 2016)

[14] http://www.maderactc.org/wp-content/uploads/2014/07/MCTC-2014-Final-RTP-SCS.pdf (last accessed on May 11, 2016)

[15] http://www.mcagov.org/DocumentCenter/View/314 (last accessed on May 11, 2016)

[16] http://www.sjcog.org/DocumentCenter/View/484 (last accessed on May 11, 2016)

[17] http://www.stancog.org/pdf/rtp/chapter-6-transportation-plan-and-policies.pdf (last accessed on May 11, 2016)

[18] http://www.tularecog.org/wp-content/uploads/2015/06/Final-2014-Regional-Transportation-Plan-Sustainable-Communities-Strategy-FULL-DOCUMENT.pdf (last accessed on May 11, 2016)

In this report, performance measures primarily serve as a prioritization tool.

As part of this Task, a preliminary list of performance measures was developed and shared with technical advisory committee and freight stakeholders. Due to the complexity and scale of the project and program list, the final list of performance criteria, shown in Table 2.3 below, includes both quantitative and qualitative measures. These measures were selected in order to determine the impact of selected projects and programs on:

- Critical safety hot spots;
- Critical congestion hot spots;
- Reliable and accessible movement of goods;
- Air quality;
- Commercial vehicle regulation compliance, including hours of service and scale bypass rates; and
- Efficiency, including fuel efficiency and truck parking availability

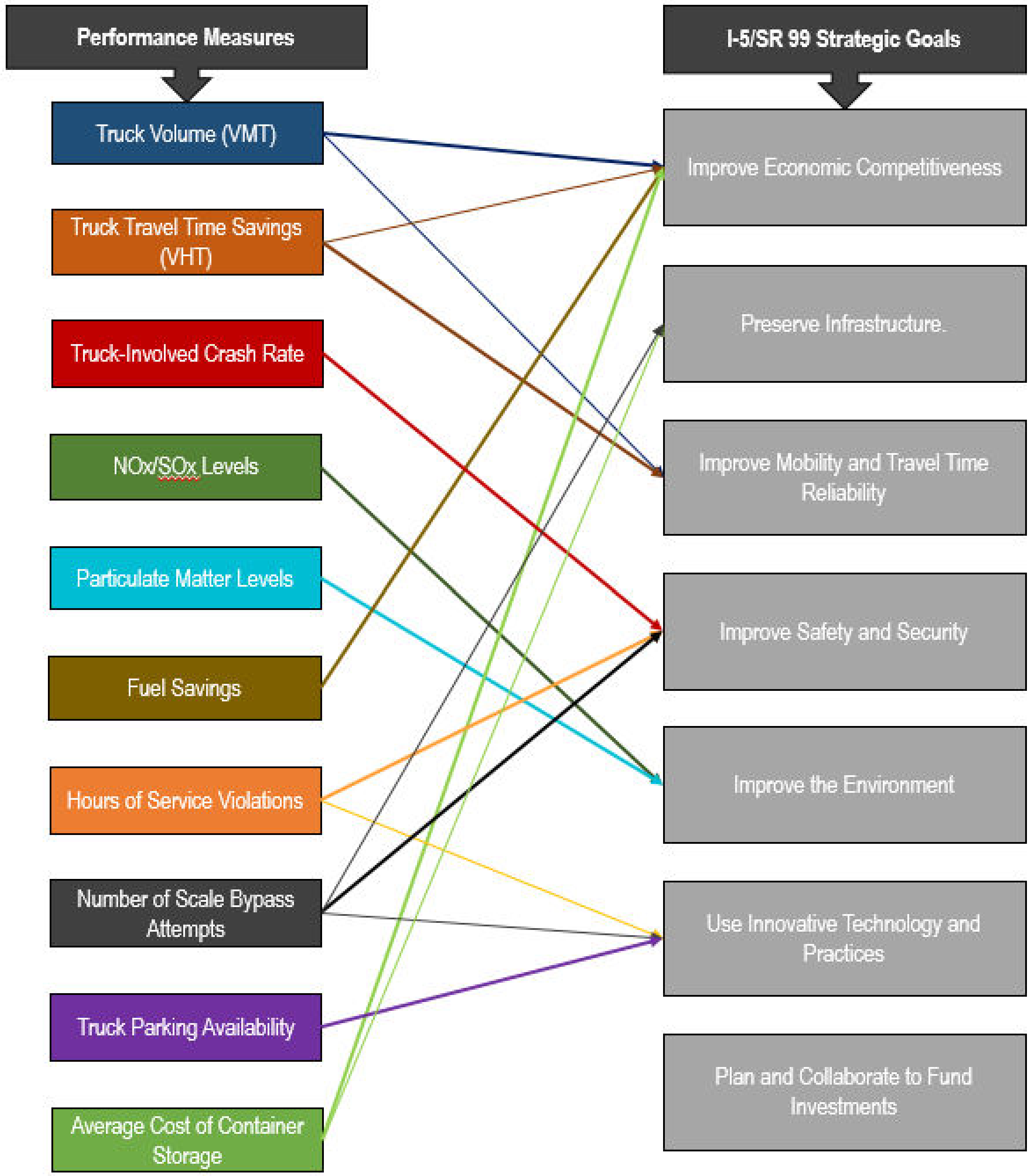
Table 2.3 I-5/SR 99 Goods Movement Corridor Study Performance Measures

Targeted Metric	Performance Measure	Source	Quantitative or Qualitative
Reliability and Accessibility/Critical congestion hot spots	Truck Volume (VMT) Crash Rates	Valleywide model HERE Data	Quantitative
Reliability and Accessibility/Critical congestion hot spots	Truck Travel Time Savings (VHT)	Caltrans/Valleywide model	Quantitative
Reliability/Critical safety hot spots	Reliability Truck-involved crash rate (per miles traveled). Truck-involved crashes within X miles of an identified "hot" spot	Frequency of crashes and info about VHT related to crashes California TIMS	Qualitative Quantitative
Air Quality	Nox/Sox	Statewide model	Quantitative
Air Quality	PM	Statewide model	Quantitative
Efficiency	Fuel savings	Statewide model	Quantitative
Commercial vehicle regulation compliance	Hours of Service (HOS) compliance (percent OOS for HOS by # miles driven in CA)	CHP, FMCSA, ATRI	Qualitative Quantitative
Commercial vehicle regulation compliance	Minimize truck scale avoidance Number of scale bypass attempts	Ramp counts; local input	Quantitative Qualitative
Efficiency	Truck parking availability	Caltrans, private truck service providers	Quantitative if data collected

Targeted Metric	Performance Measure	Source	Quantitative or Qualitative
Efficiency	Access to equipment for exports; reduced costs for storing and accessing equipment	TBD	Qualitative

These performance measures are tied to the I-5/SR 99 strategic goals. With the exception of "plan and collaborate to fund investments," every strategic goal can be measured using one or more of the performance measures. The relationship between performance measures and strategic goals is shown in Figure 2-1 below. In this Figure, bolded lines represent the strategic goal that is most directly impacts by each performance measure.

Figure 2-1 I-5/SR 99 Goods Movement Corridor Study Performance Measures Relationship to Strategic Goals



2.3 Shifting Trucks from I-5 to SR 99: Enhanced Connector Scenarios

Across San Joaquin Valley, I-5 has more capacity to provide safe and efficient goods movements for through traffic than SR 99 because:

- SR 99 passes through several major urban areas (Bakersfield, Fresno and Modesto)
- SR 99 was not originally designed to the same standards as an interstate and carry large volume of heavy duty trucks
- SR 99 is not as direct of a route to most urban areas in Northern California, Bay Area and Oregon/Washington

In order to reduce congestion and encourage regional truck traffic to travel on I-5 and reserve the capacity of SR 99 for local traffic, some of the corridors between I-5 and SR 99 could be improved to provide accessibility and travel time reliability between freight generators in the region. To understand the dynamics of goods movement in the Valley and evaluate different scenarios, we used these available tools and data sources:

- Statewide Freight Forecasting Model (CSFFM), base year 2012
- Freight Analysis Framework (FAF 4.3 year 2012)
- Truck GPS sample data
- Local origin-destination surveys
- An enhanced database of classification counts (2012-2015)

There are limitations and constraints associated with each of the above that we considered in providing a reliable analysis. The FAF database is the main data source used to generate the origin-destination (OD) of commodities. It is based on establishment level commodity flow survey data. FAF zones are very large in California (6 zones) and do not provide sufficient detail for corridor-level analysis **(**

Figure 2-2). The CSSFM 2.0 provides information about commodity flows and freight truck movement between counties, sub-counties, state gateways, and major intermodal facilities in the state. The structure of the model in the Valley is:

- 11 zones (two zones each in Kern, Fresno, and San Joaquin counties; and, one zone in each other county in the Valley)
- Two import/export gateways (Fresno Yosemite International Airport and Port of Stockton)
- Three rail/truck intermodal facilities (Stockton, Lathrop, and Fresno terminals)

CSFFM provides adequate information about regional goods movement; however, given the aggregate structure of the model, there are high intra-zonal trips associated with each zone that will not be assigned to the model network. GPS data provided an understanding of local truck movement patterns. While GPS sample data provides information about truck routing, it does not provide any information about truck cargo or characteristics of trucks. The sample might also be biased toward certain truck categories or trip types. Our experience shows that small owner operator trucks are underrepresented in available GPS truck samples. Long distance truck trips (longer than 500 hours) are also hard to identify since the truck driver must take a break after reaching Hours of Service or may stop for fuel or short breaks. Differentiating intermediate stops from the true origin and destination of the truck from GPS truck trajectories is challenging. Where available, local OD survey data was utilized in order to overcome the shortcomings of GPS data.

Table 2.4 shows the sum of all commodities shipped between the six FAF regions in California by truck in 2012. **Table** 2.5 shows estimated full truck load trips between these regions. It is not possible to distinguish less-than-full trucks from full truckloads in FAF. With the flows between FAF regions, the location of major freight generators in each region, and GPS data of truck OD distribution, we can understand the big picture of goods movement in San Joaquin Valley via I-5 and SR 99.

It is important to note that FAF does not cover total truck traffic. It only includes trucks that carry commodities (freight trucks). Total truck traffic includes the following beside:

- Empty trucks
- Local delivery trucks between other than for-hire trucks
- Postal service trucks (FedEx, UPS, USPS, and others)
- Non-freight trucks (moving trucks, utility trucks, landscaping, municipality trucks, maintenance trucks, tow trucks, construction trucks)
- According to Weigh-in-Motion (WIM)[19] data, up to 30 percent of truck traffic with three or more axles on major state facilities are empty trucks. The Traffic Activity Monitoring System (TAMS)[20] shows that non-freight truck traffic can contribute up to 50 percent of total truck traffic (including 2-axle pickup trucks) on state facilities near urban areas and up to 25 percent in rural areas. The current version of the CSFFM covers only freight trucks[21].

The target of analysis in this study is regional freight trucks on the I-5 and SR 99 corridor from SR 58 in Kern County to I-4 in San Joaquin County. To understand the overall truck traffic, we used a

[19] http://www.dot.ca.gov/trafficops/wim/datawim.html

[20] http://freight.its.uci.edu/tams/index.jsp

[21] Detail analysis of WIM data is presented in Existing Conditions Report for I-5/ SR-99 Study, Cambridge Systematics, 2016.

large set of recent classification count databases provided by to MPOs in the Valley to post-process the model results and estimate total truck traffic as needed.

Figure 2-2 FAF 4 (Year 2012) Regions

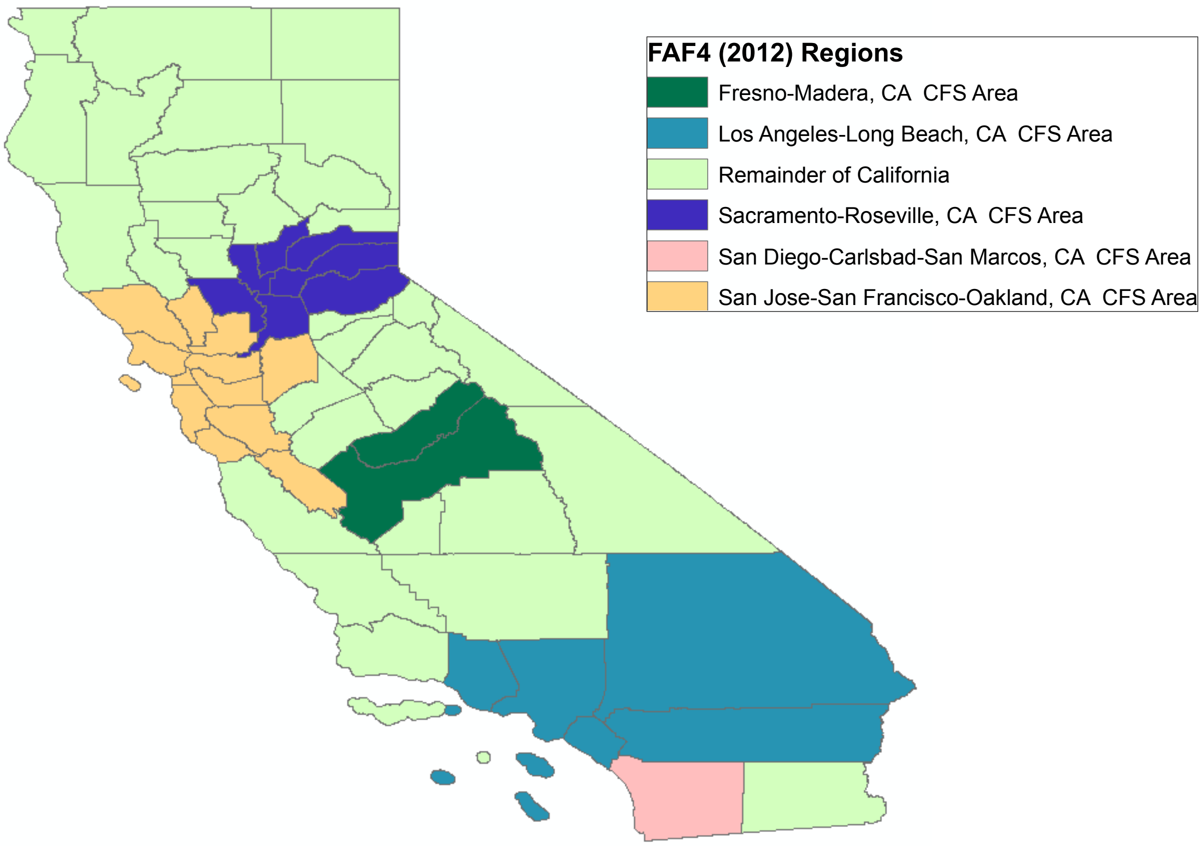


Table 2.4 Annual K-tons of Commodities Transported between FAF 4.3 Regions by Truck in 2012

From \ To	Fresno	Los Angeles	Rest of CA	Sacramento	San Diego	San Francisco	Arizona	Nevada	Oregon	Washington	Other States	Total
Fresno CA	20,398	1,426	10,656	383	136	3,204	247	151	148	302	1,576	38,627
Los Angeles	2,548	316,793	10,158	2,294	12,664	8,344	6,850	4,437	1,523	2,570	28,539	396,722
Rest of CA	13,571	15,357	108,755	6,672	1,211	11,324	1,177	2,794	1,380	1,141	5,883	169,265
Sacramento	1,140	1,000	7,174	34,396	179	8,825	123	734	292	310	1,254	55,428
San Diego	167	3,693	578	170	33,787	1,353	232	165	52	182	2,257	42,636
San Francisco	2,638	6,745	16,316	8,231	1,326	132,809	996	1,541	1,196	1,958	12,678	186,435
Arizona	104	4,353	775	146	402	774						6,553
Nevada	534	2,378	1,241	775	175	1,049						6,151
Oregon	295	1,849	1,482	774	84	1,456						5,941
Washington	131	1,969	428	359	267	1,635						4,790
Other States	2,052	39,187	4,660	2,083	2,190	10,453						60,623
Grand Total	43,578	394,750	162,224	56,283	52,420	181,227	9,625	9,822	4,591	6,463	52,186	973,169

Source: (FAF4, FHWA)

Table 2.5 Approximate Number of Daily Truck Loads between FAF 4.3 Regions in 2012

From \ To	Fresno	Los Angeles	Rest of CA	Sacramento	San Diego	San Francisco	Arizona	Nevada	Oregon	Washington	Other States	Total
Fresno CA	3,908	273	2,042	73	26	614	47	29	28	58	302	7,401
Los Angeles	488	60,700	1,946	440	2,427	1,599	1,313	850	292	492	5,468	76,015
Rest of CA	2,600	2,942	20,838	1,278	232	2,170	226	535	264	219	1,127	32,432
Sacramento	219	192	1,375	6,591	34	1,691	24	141	56	59	240	10,620
San Diego	32	708	111	33	6,474	259	44	32	10	35	432	8,169
San Francisco	505	1,292	3,126	1,577	254	25,447	191	295	229	375	2,429	35,722
Arizona	20	834	148	28	77	148	-	-	-	-	-	1,256
Nevada	102	456	238	148	33	201	-	-	-	-	-	1,178
Oregon	56	354	284	148	16	279	-	-	-	-	-	1,138
Washington	25	377	82	69	51	313	-	-	-	-	-	918
Other States	393	7,509	893	399	420	2,003	-	-	-	-	-	11,616
Grand Total	8,350	75,637	31,083	10,784	10,044	34,724	1,844	1,882	880	1,238	9,999	186,467

*Assuming 307 days per year and average payload of 17 tons per truck
Source: Derived from (FAF4, FHWA)

2.3.1 Through Trips and Local Trips in the Valley

To develop the big picture of goods movement patterns in the Valley, truck traffic was categorized based on the origin and destination of the trips:

- 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 Internal-External: 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

A combination of GPS data and CSFFM truck assignments provided an estimate of the distribution of trips on different segments of I-5 and SR 99. The data is aggregated to the regions shown in **Figure 2-3**. Overall, 50 percent of all freight trips in the Valley are type I-I, 35 percent are I-X or X-I and 15 percent are X-X.

As expected, the majority of truck trips (40-60 percent) on SR 99 are I-I trips representing less than 150 miles. Approximately 35 to 55 percent of heavy duty truck traffic on SR 99 are categorized as I-X or X-I trips, and approximately 5 percent of trips are X-X trips **(Figure 2-4)**.

The share of X-X trips on northbound SR 99 is higher than southbound. The major origin-destinations of X-X trips on SR 99 fall into one of two categories, including:

- From Arizona/Nevada to Sacramento Valley/Bay Area
- From Los Angeles to Sacramento

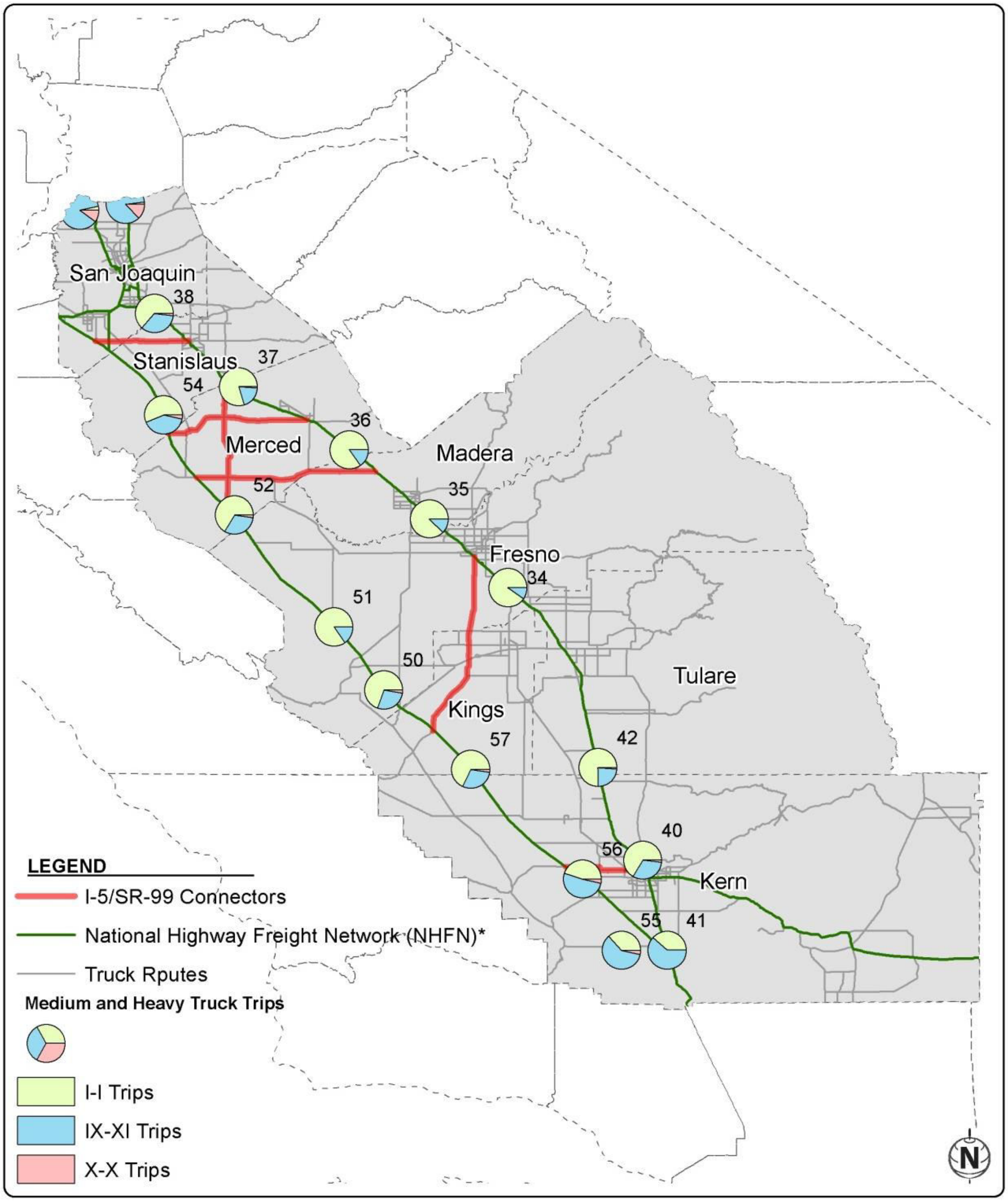
The above distribution is different for the portion of SR 99 in Bakersfield that is shared with SR 58. The share of through trips on this segment is up to 25 percent. Understanding the origin and destination of trips is important to this study in order to identify the maximum potential traffic shift from SR 99 to I-5 under each scenario for the I-5/SR 99 connectors.

Table 2.6 shows the average daily medium and heavy duty truck flows between different zones, based on FAF 4, 2012 data and CSFFM 2.0 model assignment.

Figure 2-3 Regions Boundaries for Goods Movement OD analysis

Source: FHWA, Cambridge Systematics

Figure 2-4 Existing I-5/SR 99 Segment Truck Trip Characteristics



Source: FHWA, California Statewide Freight Forecasting Model, StreetLight, Fehr and Peers

Table 2.6 Average Daily Medium and Heavy Duty Truck Flow for California Origin-Destination Pairs

Region	Bay Area (North)	Bay Area (South)	Central Coast (North)	Central Coast (South)	Northern California	Sacramento Valley	Sierras	Sacramento County	Fresno County	Kern County	Kings County	Madera County	Merced County	Stanislaus County	San Joaquin County	Tulare County	Los Angeles County	Orange County	Riverside County	Ventura County	San Bernardino County	Imperial County	San Diego County	Out of State	Grand Total
Bay Area (North)	4,320	430	10		60	150		90					10	10	80									160	**5,320**
Bay Area (South)	420	19,710	230		20	80		70	30	20	10	10	80	90	420									1,080	**22,270**
Central Coast (North)	10	210	3,070	70		10			10	40			40	10	10									80	**3,560**
Central Coast (South)			50	1,980					10	60	10						40		10	80	10			60	**2,310**
Northern California	60	20			4,360	290		60	10				10	20	70									3,640	**8,540**
Sacramento Valley	160	100	10		300	3,750	20	790	10	10		10	30	40	200									1,940	**7,370**
Sierras						20	710			20		10	10	20	20						30			350	**1,190**
Sacramento County	100	80			50	740		3,770	10	10		10	20	40	260									350	**5,440**
Fresno County		30	10	10	10	10		10	3,880	180	180	190	190	60	60	310	30				20			20	**5,200**
Kern County		20	30	50	10	10	20	10	180	6,610	80	20	90	40	50	240	460	20	50	20	340		10	130	**8,490**
Kings County		10		10					180	70	590		20	10	10	110	10								**1,020**
Madera County		10				10	10	10	190	20	10	420	90	30	30	40								10	**880**
Merced County	10	90	40		20	40	10	20	190	80	20	90	1,210	260	150	30	20				10			40	**2,330**
Stanislaus County	10	90	10		20	50	20	40	60	30	10	30	260	1,660	420	20								40	**2,770**
San Joaquin County	70	390	20		80	210	20	260	70	40	10	40	140	440	3,880	20	10							300	**6,000**
Tulare County									290	270	100	30	30	20	20	2,200	40				30			20	**3,050**
Los Angeles County				40					40	480	10		20	10	10	40	33,810	1,170	570	360	1,620	10	110	540	**38,840**
Orange County										10							1,170	8,340	270	10	290		110	90	**10,290**
Riverside County				10						50							570	260	7,630	20	1,580	80	190	3,890	**14,280**
Ventura County				80						20							350	10	20	2,340	50			50	**2,920**
San Bernardino County				10			20		20	300	10		10			30	1,650	320	1,650	50	12,200	20	120	7,420	**23,830**
Imperial County																	10		70		20	970	40	1,150	**2,260**
San Diego County										10							110	110	220		100	40	9,050	670	**10,310**
Out of state	160	1010	70	50	3550	2050	410	380	20	50		10	30	50	300	20	680	90	3860	50	7420	980	290	xxx	**22,030**
Grand Total	**5,320**	**22,200**	**3,550**	**2,310**	**8,480**	**7,420**	**1,240**	**5,510**	**5,200**	**8,380**	**1,040**	**870**	**2,290**	**2,810**	**5,990**	**3,060**	**38,960**	**10,320**	**14,350**	**2,930**	**23,720**	**2,100**	**9,920**	**22,530**	xxx

Source: California Statewide Freight Forecasting Model, StreetLight Fehr and Peers

Notes: Origin-Destination pairs with less than 10 trucks per day are shown as blank. Light duty trucks and small trucks (less than five axles) are not included

This table does not include trips with an origin and/or destination outside of California (IX-XI and X-X flows) – See below for more details

2.4 I-5/SR 99 connectors Scenarios

Based on truck GPS OD data and existing truck traffic, the following corridors were selected for this study. Except the Wes Beltway, These corridors have existing count data, although the future alignment of some of them might be different in future **(Figure** 2-5**)**. These connectors are selected to cover north, center and southern part of the valley:

1. Kern County:
2. SR 58
3. West Beltway
4. Fresno/King County:
5. SR 41
6. Merced County:
7. SR 140
8. SR 152
9. SR 165
10. Stanislaus/San Joaquin County
11. SR 132
12.

The West Beltway connector from SR 99 north of Bakersfield to I-5, would provide a bypass around city of Bakersfield and thus relief to SR 99 and provide an important link across the Kern River from southwest Bakersfield to the Westside Parkway. Since this project proposed a complete new alignment, existing data is not available.

2.4.1 Performance Measures

We investigated the following variables to evaluate the minimum requirements and improvements for each of these corridors in order to provide desirable option for truckers. The following performance metrics were evaluated for each scenario:

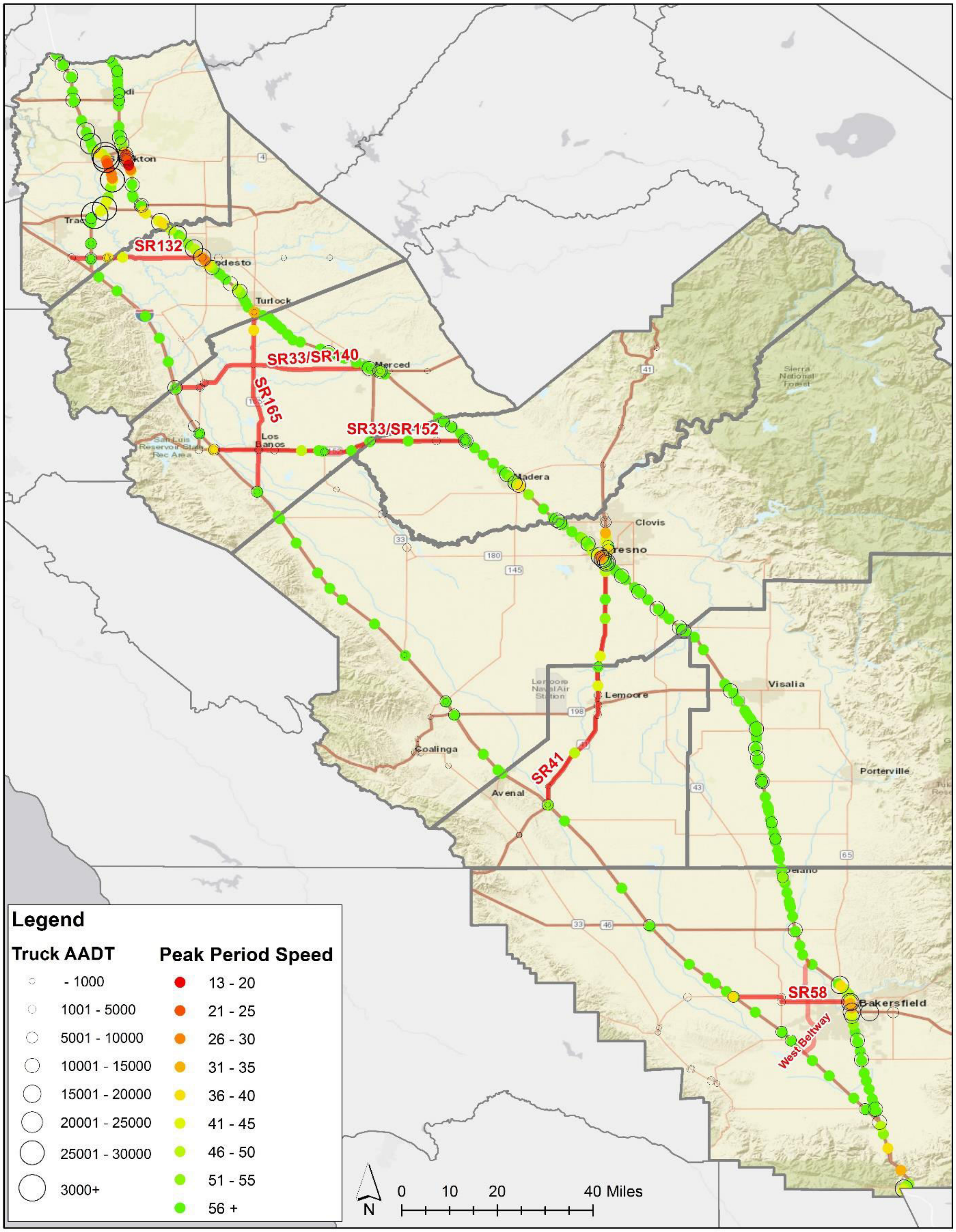
- Truck volume shifted between SR 99 and I-5
- Truck vehicle miles traveled (VMT)/vehicle hours traveled (VHT) change
- Truck average emission (CO_2, NOx) reduction

The feasibility and other impacts of each scenario were also taken into account, including:

- Travel time reliability /(congested Speed)
- Safety
- Economic
- Environmental

Figure 2-5 shows the congested speed (the minimum speed during AM or PM peak period) along SR 99, I-5, and the considered connectors.

Figure 2-5 Peak Period Congested Speeds and I-5/ SR 99 Connectors



Source: NPMRDS travel time data (October 2015) and HPMS classification count data (2015-16)

The change in trip routing patterns, annual VMT and number of trucks shifting from SR 99 to I-5 were initially estimated using the California statewide model. The model results were then adjusted using GPS truck routing trajectories and truck origin-destination surveys.

EMFAC2014 (v1.0.7) weighted average emission rates for CO2 and NOx (based on VMT in the air basin) for vehicle classes of T6 (Medium Heavy Duty Trucks-MHDT) and T7 (Heavy Heavy Duty Trucks – HHDT) in San Joaquin Valley air basin were used for this high-level analysis **(Figure** 2-6, **Figure** 2-7**)**.

Figure 2-6 Carbon Dioxide Rates for Heavy Duty Trucks

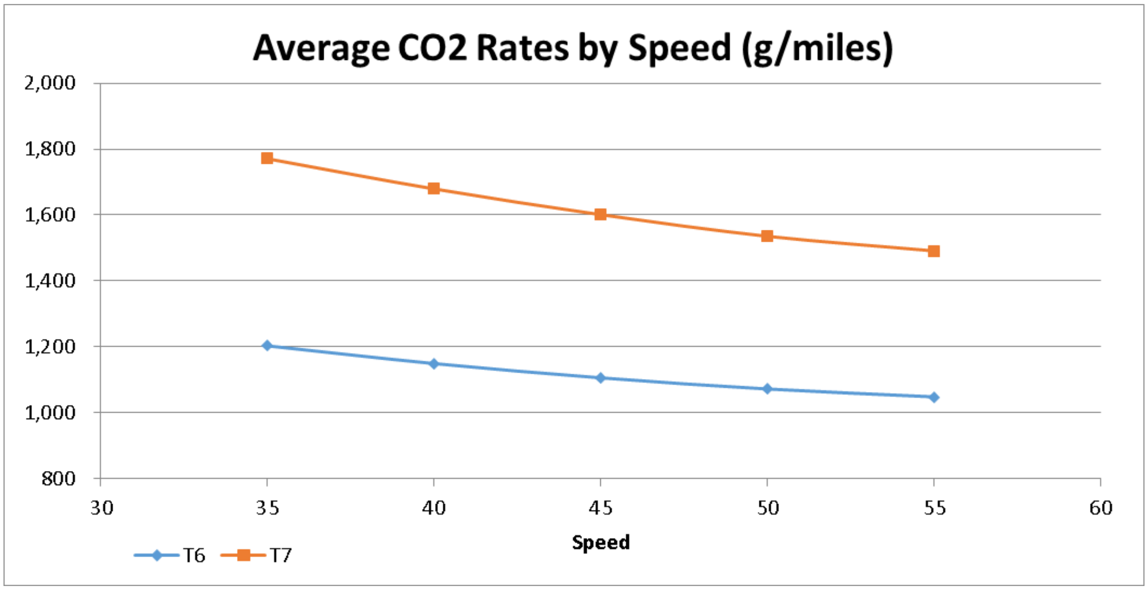
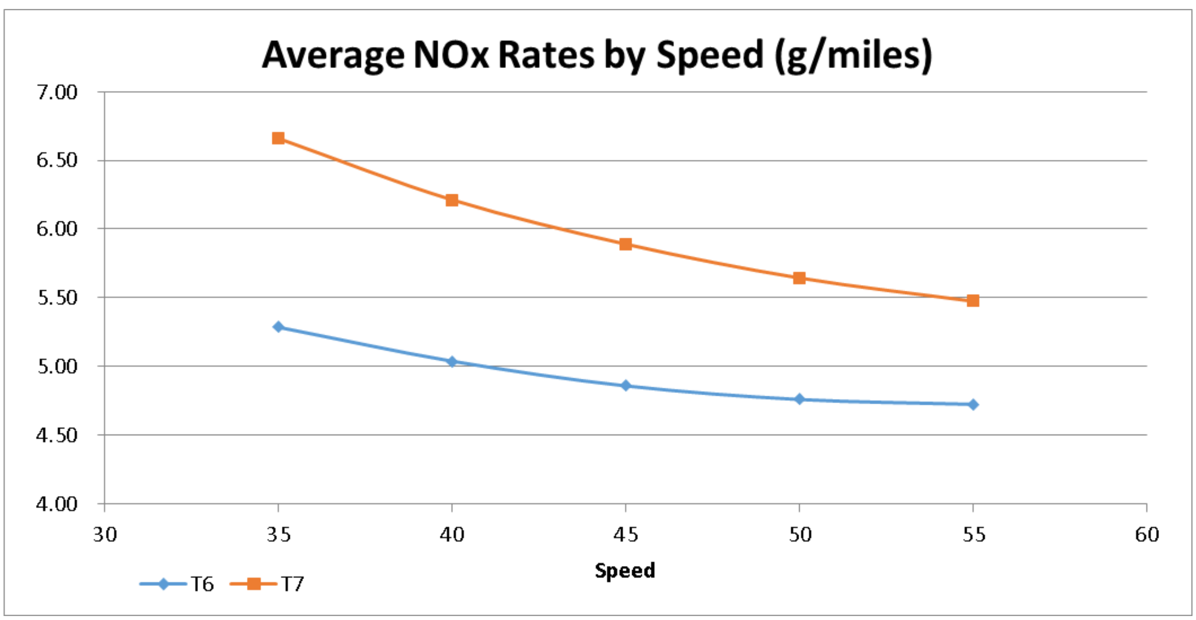


Figure 2-7 Nitrogen Oxide Rates for Heavy Duty Trucks



Source: EMFAC2014 annual rates for San Joaquin air basin for year 2015

2.4.2 State Route 58 (Kern County)

Scenario Setting

The objective of this scenario is to improve the travel time on SR 58 so that, truckers are encouraged to shift their route from SR 99 to I-5 as possible. This is a high level analysis aiming to estimate the maximum potential traffic reduction on SR 99 under SR 58 improvement scenario. These improvements include reducing delay at all at grade intersections and increasing capacity to maintain free flow speed across the corridor. The most congested segment of SR 58 is between SR 58/Rosedale Hwy West and SR 58 Freeway East. As part of improvements under this scenario, the east and west side of SR 58 is connected with a separate right of way from SR 99. This project is currently approved and funded and known as "Centennial corridor" project.

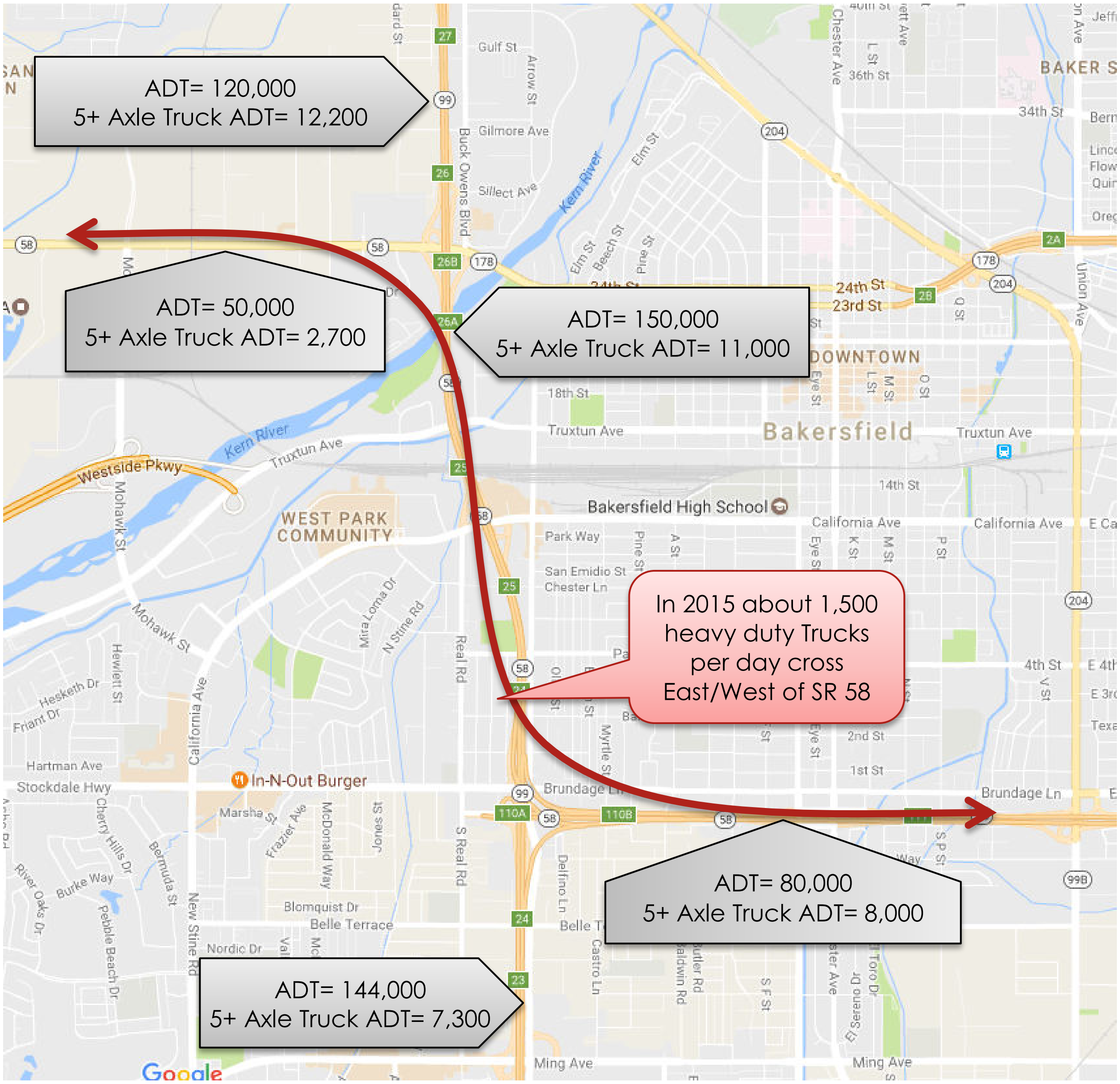
Existing Conditions

The SR 58 corridor between I-5 and SR 99 is approximately 20 miles long and serves many trucking-based industries along the route, especially near Bakersfield. In addition, the corridor is also central of three primary routes between oil fields west of I-5 and the Bakersfield metropolitan area with over ½ million people. SR 58 has different combination of users than other SR 99/I-5 connectors that were analyzed in this study, due to a significantly higher share of out of state trips. The truck traffic pattern on SR 58 is shown in **Figure** 2-8.

The California Department of Transportation, in cooperation with the City of Bakersfield, proposed the construction of the Centennial Corridor as a new east-west transportation corridor for State Route 58. Centennial Corridor would provide route continuity for State Route 58 by building a new freeway segment linking State Route 58 (East) with Interstate 5. To accommodate the new freeway segment, improvements on State Route 99 would also be constructed. The final EIR/EIS of the proposed project was published in December 2015 on Caltrans Website. With the existing alignment of SR 58, about two miles of this route has shared right-of-way with SR 99. This is one of the highly congested segments of SR 99, with a history of high collision volume.

Figure 2-8 highlights the congestion on a segment of SR 99 that is shared with SR 58 traffic; this is the busiest segment of SR 99 in the valley. There are three high volume interchanges located on this 2-mile stretch of SR 99, resulting in significant weaving movements. Once the Centennial Corridor project is completed, the eastern section of SR 58 (east of SR 99) and the western part (west of I-5) will be connected with new right-of-way. It will be slightly longer than the existing alignment.

Figure 2-8 Existing Truck traffic Pattern on SR 58 East and West Segment



Source: HPMS counts for year 2014(Gray Boxes), Fehr and Peers OD analysis (Red Boxes)

Feasibility and Impact Assessment

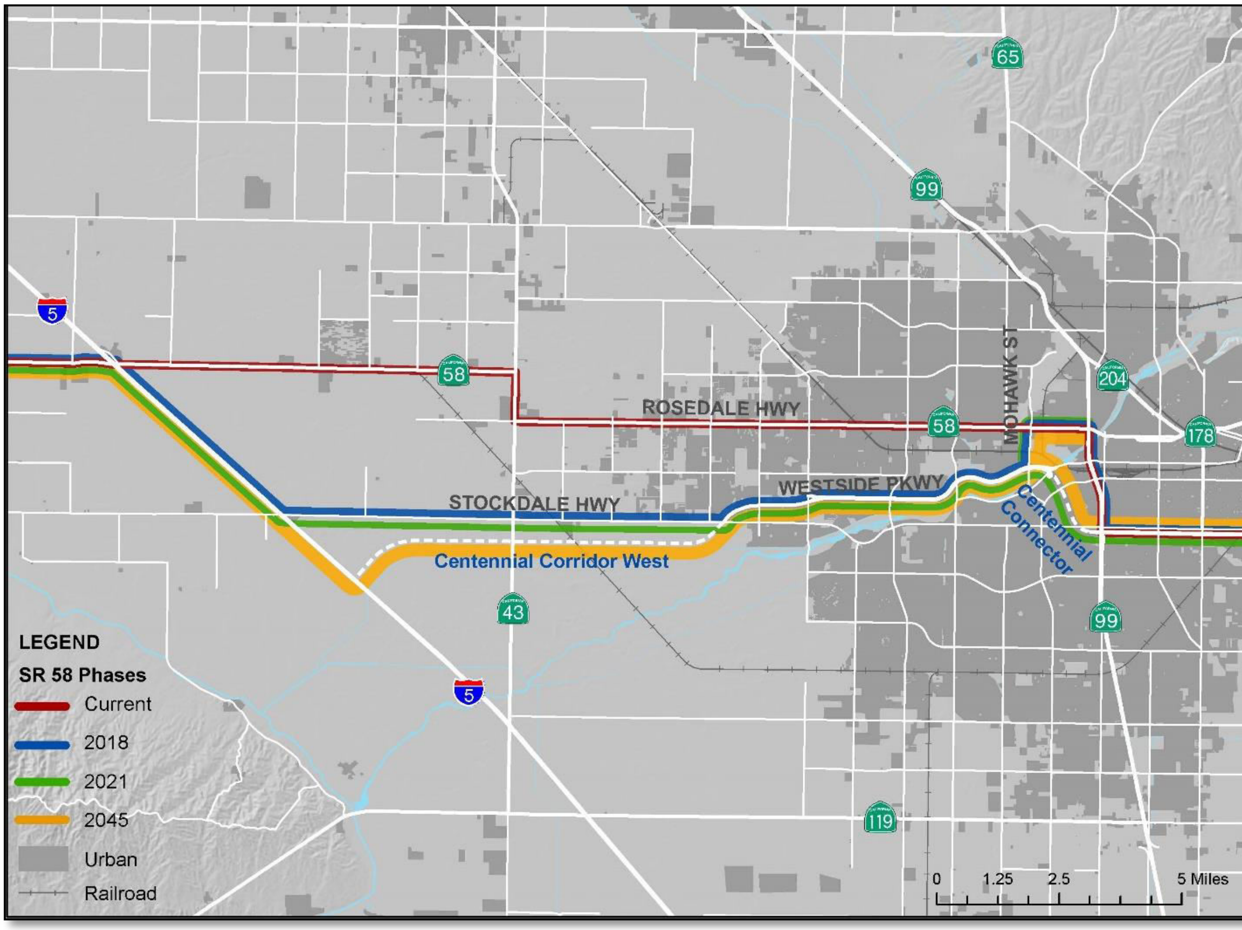
Approximately half of the route is a two-lane undivided rural highway with a 55 mph speed limit. From SR 99 west, approximately 9 miles of the route through west Bakersfield and Rosedale is heavily-populated and intersections are often signalized. About 5.8 miles of the road closest to SR 99 is four-to six lanes wide with a center median. The two lane segment connecting to I-5 is surrounded almost exclusively by agricultural-industrial land use. There is an active railroad right-of-way adjacent to SR 58 for approximately 6 miles heading east from I-5 to approximately Mayer Avenue, and there is one at-grade crossing less than one mile west of SR 99. Both ends of the connector are served by truck stops and there are gas stations at mid-points, such as near the intersection with SR 43.

Three projects are currently planned that affect this portion of SR 58 in the near-term. One phase of the "Centennial Corridor" project will extend the grade-separated portion of SR 58 that is east of SR 99 across to the west and connect to Westside Parkway. Presently, SR 58 is north-south along SR 99 for about two miles. Another near-term project will widen SR 58 between SR 43 and Allen Road near Rosedale.[22] The third widens SR 58 from I-5 to SR 43, including the 1-mile north-south segment that overlaps SR 43. In addition, a long-range plan to complete the "Centennial Corridor" project would extend SR 58 to I-5 along a different alignment to the south of Stockdale Highway. These projects are assumed under the SR 58 Improved Scenario, however they are not reflected in existing conditions and would not be comparable to the current route alignment; therefore, for this analysis the existing alignment of SR 58 represents the baseline condition.

Figure 2-9 illustrates planned changes in the future SR 58 alignment between SR 99 and I-5. The first phase was the Westside Parkway Freeway, a 7-mile, four- to eight-lane freeway completed in April 2015 that connects the existing SR 58 to SR 99 via Mohawk Street on the East end, and to I-5 via Stockdale Highway to the West. Since 2015, this corridor improvement has resulted in a shift of local traffic from SR 58 to Westside Parkway freeway. In 2018, Caltrans is scheduled to re-designate this route as SR 58. Today, through travel is being directed to use Westside Parkway by the online Google Maps application. In 2021, construction which has already began on the Centennial Connector phase, is scheduled to be complete. This segment will replace the remaining designation of SR 58 between I-5 and SR 99. The completion of this phase will eliminate all signalized intersections between I-5 and SR 99 except for one, and will likely become the preferred route of I-40 trucks destined for the Bay Area, North San Joaquin Valley, and Sacramento.

[22] State Route 58 (Rosedale Highway) Widening Project, Initial Study with Mitigated Negative Declaration/Environmental Assessment with Finding of No Significant Impact. Prepared by the State of California Department of Transportation and City of Bakersfield, 2012.

Figure 2-9 SR 58 Future Phases



Source: KernCOG

The current SR 58 alignment faces some challenges as a through-route for trucks between SR 99 and I-5. A large portion of the route passes through the community of Rosedale. This segment features primarily residential and commercial-retail land use and includes schools. Despite this, the speed limit is relatively high (often 50 mph), the road is divided by a center median and left turns are often restricted or channelized through this segment. Improvements have been made to the route as part of the planned transfer of the right-of-way to the City and County.

Approximately 40,100 people live in Census block groups close to SR 58; however, the state route serves as the West gateway to the metropolitan area. Between 2009 and 2013, this corridor experienced 326 vehicle collisions, of which 17 involved trucks (approximately 5 percent). By far the most common crash types were rear-end collisions. These occur largely from Rosedale east to SR 99 and become heavily concentrated approaching SR 99. Rear-end crashes are commonly associated with abrupt changes in speed due to signals or traffic delays. A summary of crashes on this segment of SR 58 is shown in **Table 2.7.**

Table 2.7 Summary of Collisions on SR 58

Corridor	All Collisions			Truck Involved Collisions			Population Adjacent to Corridor
	All	Fatal	Severely Injured	All	Fatal	Severely Injured	
SR 58	326	6	20	17	0	3	40,110
SR 99/SR 58	181	3	9	24	1	3	

Source: TIMS database, 2009-2013

Performance Measures

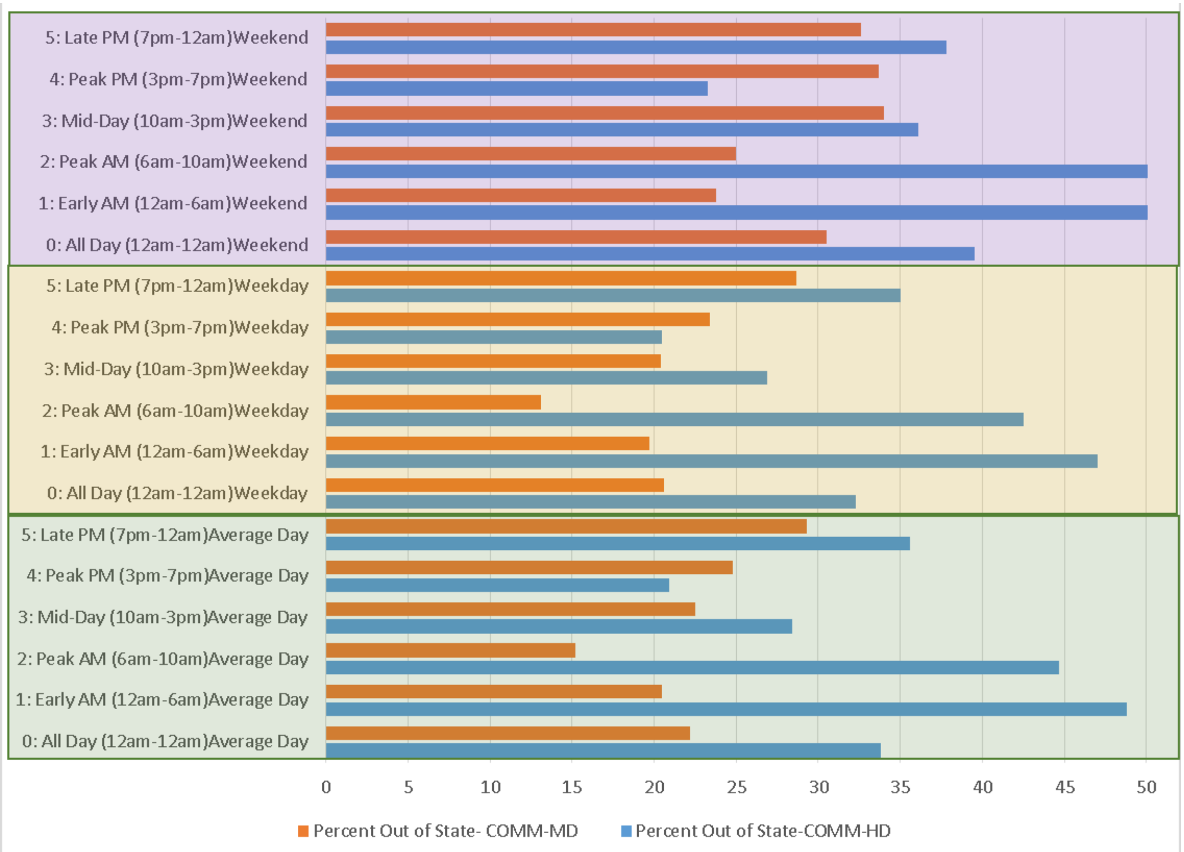
Truck ADT, speed, percentage change in VMT, and percentage change in emission for the SR 58 Scenario is presented in this section. The OD matrix from the California Statewide Freight Forecasting model (2012 model run), truck route selection patterns from StreetLight truck GPS data and intercept survey[23], and 2014 truck classification counts were used to forecast the shifted volume from SR 99. The GPS data significantly underestimated the share of long distance trips on SR 58 from other states. This was determined by comparing the GPS data with the 2008 origin-destination survey results, which stopped and surveyed nearly all of the trucks at rest stops over two 48-hour periods. KernCOG staff indicated that the 2008 survey data was more accurate. Therefore, we requested Streetlight to modify their algorithm to better estimate the true origin and destination of long distance truck trips[24].

Figure 2-10 shows the percent share of out of state (trips with either origin or destination out of California) Commercial Medium Heavy (MD) and Heavy (HD) Heavy duty trucks on SR 58 based on modified GPS data. This distribution is very close to the 2008 survey. A sample of 160,000 trips for HD and 60,000 trips for MD over six months from September 2015 to February 2016 were analyzed. There is a distinct pattern between weekdays and weekends and different times of day. The percent of out of state trucks on SR 58 are higher on weekends and generally higher in the AM than PM peak periods. On average, 34 percent of HD and 22 percent of MD trucks on SR 58 began or ended outside of California.

[23] KOA, 2008

[24] In the original algorithm, if a truck does not move for more than one mile in five minutes, it is assumed that a new trip is started. Therefore, the "true" origin and destination of the trip was convoluted when the truck has to stop to rest or get fuel or reached the Hours of Service.

Figure 2-10 SR 58 Share of out of State Trucks by Time of Day and Day of Week



Source: StreetLight GPS Data

Surveys identified that the truck traffic percentages on existing SR 58 West (Rosedale Highway), which is built as a local roadway, is as high as 16 percent of total traffic in the urban core of Bakersfield. Users currently experience delays from stop- and signal-controlled local streets. This is especially true on the 12-mile segment between State Route 43 and State Route 99, which has 18 signalized or 4-way stop controlled intersections, of which 16 operated at level of service D (25 to 35 seconds of delay) or worse during AM, PM or both peak hour periods. The projected level of service indicates that delay will worsen in the future due to estimated urban growth in the area [Centennial Corridor EIR/EIS, 2015].

There is also heavy traffic congestion on the shared portion of SR 58 and SR 99. The close spacing between interchanges of two segments of SR 58 (east and west) and California Avenue along a 2-mile stretch of SR 99 creates merge/diverge conflicts that result in a very high rate of collisions on this segment – the busiest segment of SR-99 South of Sacramento.

Although over 60 percent of the truck trips on the existing SR 58 corridor are intra-Kern county trips, it also serves as the main connection for trucks coming from other states via I-15 and I-40 to I-5 and heading to the Bay Area, Tracy/Patterson distribution center, and the Central Coast. The distribution of trucks on the segment of SR 58 between Fresno and Kings County is shown in **Figure 2-11**. We estimated the share of trucks on SR 58 from major origin-destination's flows using model route assignment and survey data. It is important to note that this analysis does not cover passenger trips and induced demand. These OD pairs are:

- Other States ←→ San Joaquin Valley, Bay area
- Los Angeles, Orange, Ventura County ←→ Kern County

The Centennial Corridor EIR/EIS report provided detailed analysis of VMT, greenhouse gas and federal criteria pollutant emissions for the proposed project. The Centennial Corridor is expected to improve local east-west circulation; facilitate congestion management; and, reduce commercial and regional commute time through a major freight corridor. Implementation of the project would help to reduce regional greenhouse gas and regional criteria pollutant emissions by promoting vehicle operational efficiency through reduced congestion and shorter vehicle trips, as well as reduced vehicle travel time by offering more direct roadway connections through the corridor.

For out of state trucks, the SR 58/I-5 route will provide a 12-mile shorter access to the Bay Area and Tracy/Patterson compared to SR 99 and is roughly equal in travel time with less local congestion to Lathrop, Stockton and Sacramento **(Figure 2-12)**. According to the analysis, the majority of these trucks (about 85 percent) are already using SR 58 as a dominant route to connect from I-15 and I-40 to I-5 and the Bay Area. It is estimated that about 100 Heavy duty trucks per day will shift their route from SR 99 to SR 58/I-5. **Figure 2-12** shows the Kern COG staff analysis of travel times using Google Maps that indicates more than half of the through Valley and North Valley O/D truck trips will be diverted to I-5 based on faster travel time with the completion of the next phase of the Centennial Corridor project scheduled for 2021. This would also reduce through truck traffic filtering on SR-58, SR-46, SR-198, SR 152 and SR-4. Based on the Centennial Corridor EIR/EIS, by 2038, about 8,000 trucks per day will travel via SR 58.

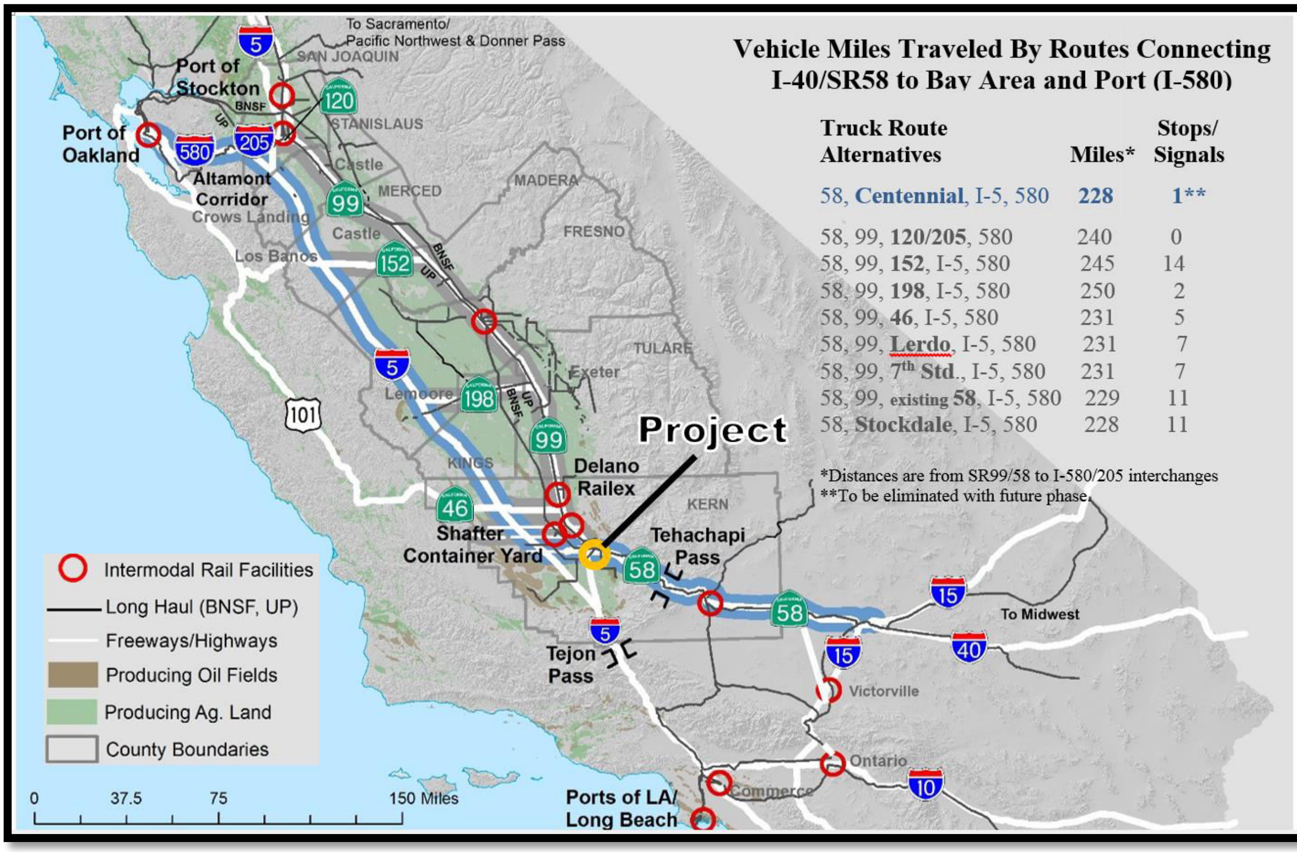
SR 58 Conditions under Existing and Improved Scenario Truck ADT and Speed

Scenario	Existing		Improved Scenario	
Segment	SR 58 west of SR 99	SR 58 east of SR 99	SR 58 west of SR 99	SR 58 east of SR 99
Truck ADT	2,700	8,000	3,000	8,000
Number of Lanes	4	6	6	6
Congested Speed (mph)	<40	<45	55	55

Figure 2-11 Origin-Destination of Trucks under SR 58 Scenario

Source, Fehr and Peers, 2016

Figure 2-12 Centennial Project Travel Time Impacts



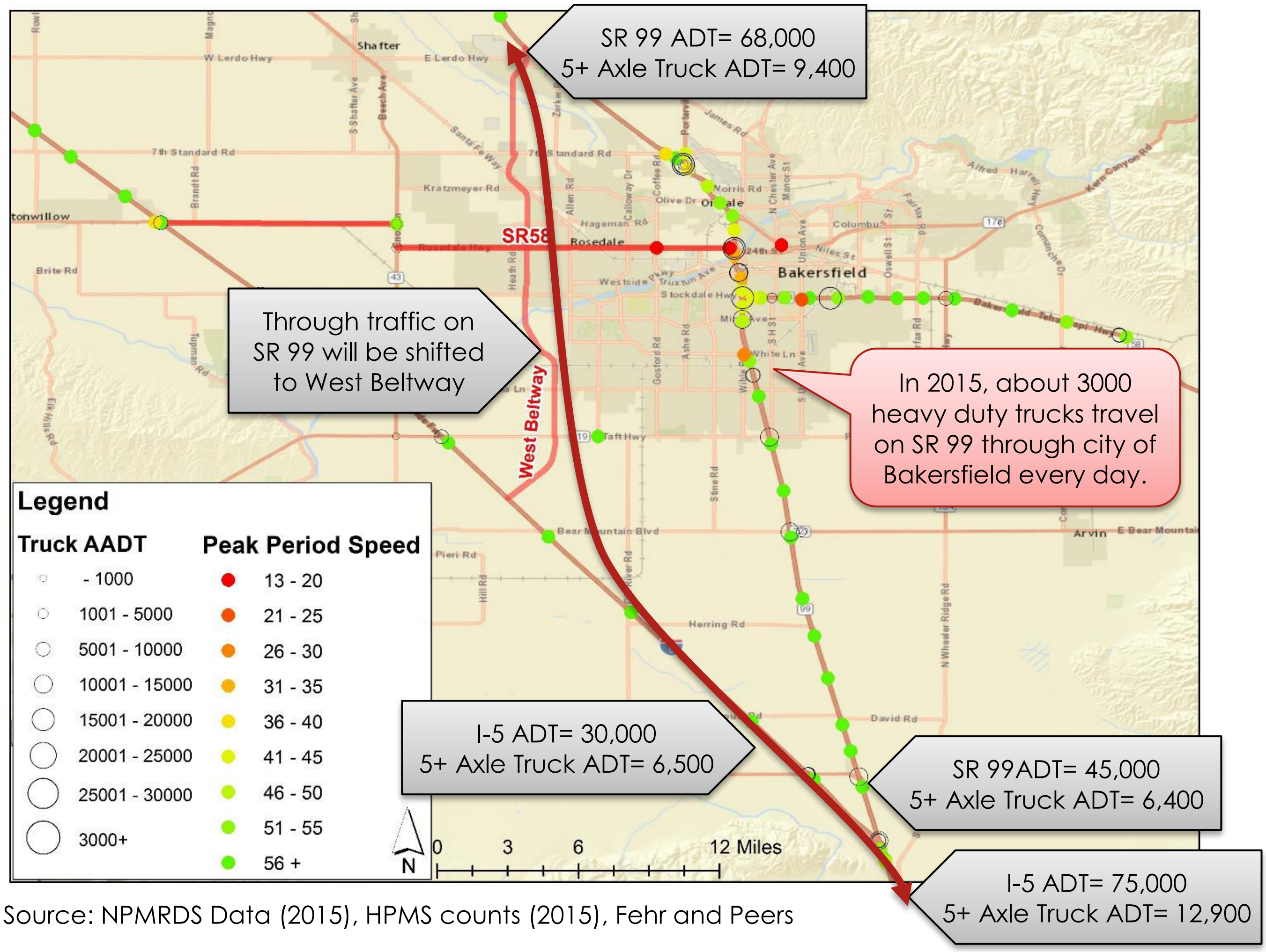
Source: KernCOG

2.4.1 West Bakersfield Beltway connector

Scenario Setting

The West Beltway would link SR 99 from north Bakersfield with Interstate 5 at the South Beltway, passing through the western portion of metropolitan Bakersfield. The County has adopted portions of the alignment for the West Beltway as a Specific Plan Line. This freeway would provide a bypass and thus relief to SR 99, and it would also provide an important link across the Kern River from southwest Bakersfield to the Westside Parkway. **Figure 2-13** shows an estimated traffic pattern on SR 99 and the potential shift of heavy duty trucks from SR 99 to the West Beltway.

Figure 2-13 Heavy Duty Truck Traffic Pattern near West Beltway corridor



Source: NPMRDS Data (2015), HPMS counts (2015), Fehr and Peers

The 10-mile stretch of SR 99 from White Lane to 7th Standard Road has the highest ADT and percent of heavy duty trucks along the corridor. This connector will significantly reduce traffic on this segment by diverting through traffic to the new West Beltway connector. Under existing conditions, about 3,000 heavy duty trucks (combined both directions) will be shifted from SR 99. The most important impact of this connector congestion reduction resulting in lower emissions and a lower risk of severe and fatal collisions along this critical artery in the City of Bakersfield. Based on initial modeling results, this connector may increase the truck traffic on the segments of SR 99 north of 7th Standard Road due to induced demand, which could reduce the overall travel time from the Sacramento Valley and the northern region of the San Joaquin Valley to freight clusters in Kern County and Southern California.

2.4.2 State Route 41 (Fresno County)

Scenario Setting

The objective of this scenario is to improve the travel time on SR 41 so that truckers are encouraged to shift their route from SR 99 to I-5 when possible. This is a high level analysis to estimate the maximum potential traffic reduction on SR 99 under an SR 41 improvement scenario. These improvements include reducing delay at all at-grade intersections and increasing capacity to maintain free-flow speed across the corridor. This corridor is the longest I-5/SR 99 connector, evaluated in this study. It provides a comparable route alternative to SR 99 from Southern California to the City of Fresno and other urban areas north of it **(Figure 2-14)**.

Existing Conditions

SR 41 is approximately 53.5 miles long running north-south between I-5 and SR 99. The route connects primarily agricultural and some industrial land uses between I-5 and SR 198. This segment also provides an important north-south route to reach industry in Lemoore and to the east in Hanford via SR 198. There are also major industrial centers at the northern end in and around Fresno, as well as access to SR 99.

Feasibility and Impact Assessment

The route passes through a vast swath of agricultural land, as well as the City of Lemoore and nearby Hanford (via SR 198), both of which have industrial land use clusters that generate truck traffic. At its northern end, the corridor crosses SR 99 and provides direct access to Fresno and the industrial district just east of SR 41 and SR 99 via Van Ness Avenue. SR 41 becomes a limited-access highway with ramps and grade separation north of Central Avenue as it enters the Fresno area, a distance of at least 2.7 miles. The route is also grade-separated approaching SR 198 and Lemoore, a distance of about three miles. There are no at-grade railroad crossings on SR 41 between I-5 and SR 99.

There are several small towns along the corridor, some of which have a greater separation from the through-traffic on SR 41 than others. Kettleman City at the southern end of the corridor is compact, but SR 41 is the main thoroughfare with 2-way stops for all of the city streets; a nearby school and park could cause serious safety concerns for residents living on the east side of SR 41 should traffic volumes increase. The community of Stratford is also located immediately adjacent to SR 41, although most of the community is located on the east side of the route. There may be fewer pedestrian conflicts, but in both examples, left-turning traffic to and from the community may be at risk and would likely experience increased delay from regular volumes of through trucks without the addition of signals or roundabouts.

The City of Lemoore is developing on both sides of SR 41, but the highway is grade-separated through this area, including its junction with SR 198. Approaching Easton, SR 41 transitions to grade-separated again. In the at-grade segments, the route is infrequently crossed by major east-west roads, and those crossings are commonly 2-way stops. Some intersections should be considered for improvement or some form of traffic control in order to reduce the risk of crashes and minimize delay for turning traffic.

Figure 2-14 SR 41 Scenario- Distance comparison

There is one project programmed for SR 41 in the next 15 years that will widen the road to four lanes between I-5 and SR 198. This segment is exclusively at-grade presently. There are amenities available to truck drivers at either end of the route, although facilities are sparse in between. There are a limited number of truck-serving facilities near SR 41 in Lemoore, including fuel and convenience stores at the Bush Street off-ramp. Additional facilities distributed along the route and/or added capacity near Lemoore for rest stops, fuel, and food options would improve the viability of this route.

Increasing heavy truck traffic on this route would have an impact on approximately 28,400 people who live in census block groups adjacent to SR 41. About half of those residents live in Fresno County and half in Kings County. In the period from 2009 and 2013, there were 455 collisions along the route. Trucks were involved in 63 of those collisions (14 percent). The two most common categories for crash type were rear-end and broadside collisions, which often occur clustered near intersections. Although collisions are dispersed across the entire corridor, there does appear to be a pattern of clustering near intersections, including minor roads where through traffic on SR 41 need not stop.

Table 2.8 Summary of Collisions on SR 41

Corridor	All Collisions			Truck Involved Collisions			Population Adjacent to Corridor
	All	Fatal	Severely Injured	All	Fatal	Severely Injured	
SR 41	»	29	40	69	9	9	28,460

Source: TIMS database, 2009-2013

Figure 2-15 Origin-Destination of Trucks on SR 41 under Improved Scenario

Source, Fehr and Peers, 2016

Performance Measures

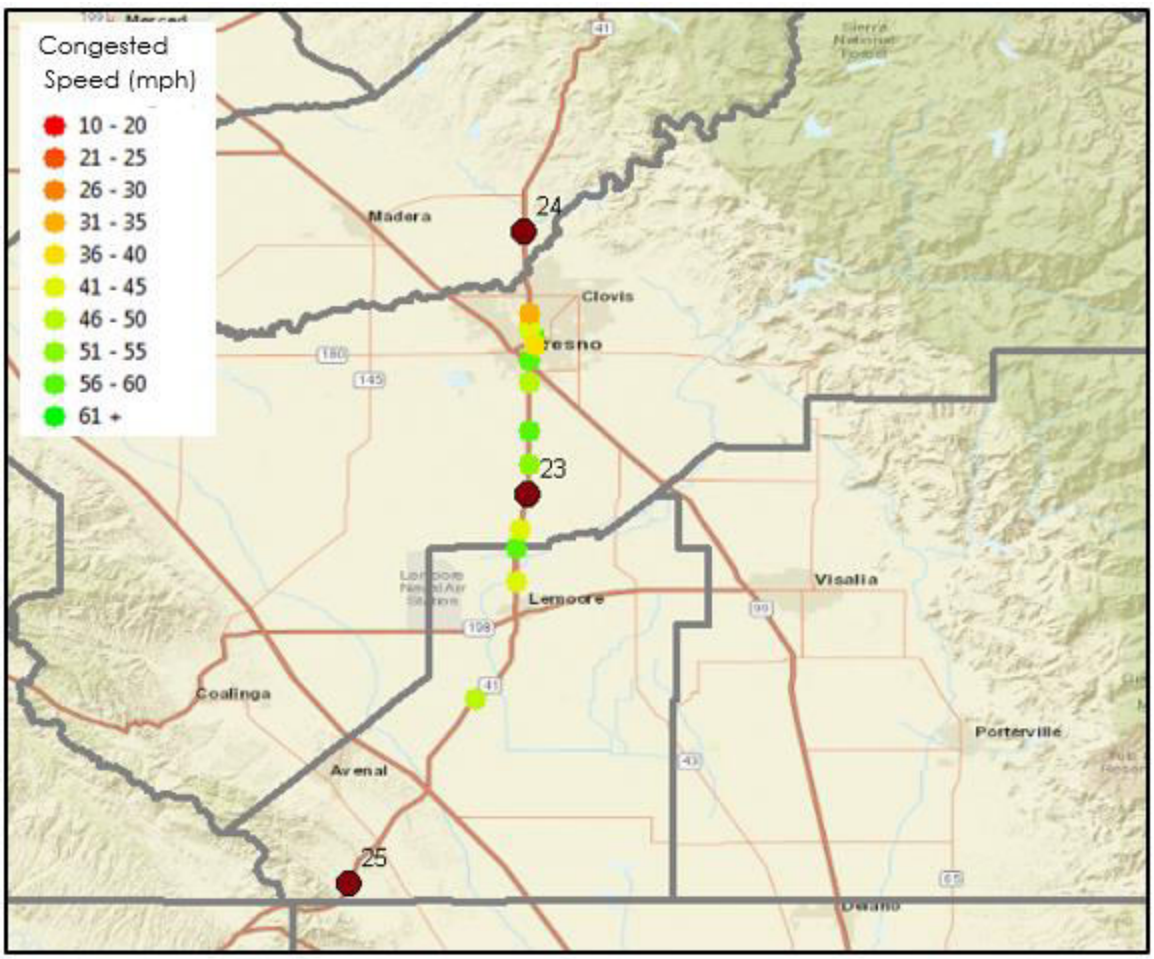
Truck average daily traffic (ADT), travel time reliability, percentage change in VMT, and percentage change in emissions for the SR 41 Scenario are presented in this section. To forecast a shift in volume from SR 99 (to I-5) we used the OD matrix from the California Statewide Freight Forecasting model (2012 model run), truck route selection patterns from StreetLight truck GPS data, and 2014 truck classification counts. The distribution of trucks on the segment of SR 41 between

Fresno and Kings County is shown in **Figure** 2-15. We estimated the share of trucks on SR 41 from major origin-destination's flows using model route assignment and GPS truck trajectory data. These OD pairs are:

- Fresno, Madera, Merced, San Joaquin County ←→ Southern California
- Fresno, Madera, Merced, Stanislaus, San Joaquin County ←→ Kern County

Figure 2-16 and **Table** 2.9 show the existing congested speed, capacity and improved scenario capacity, and posted speed.

Figure 2-16 Existing SR 41 Congested Speeds at Analyzed Locations



Source: NPMRDS, October 2015

Table 2.9 SR 41 Conditions under Existing and Improved Scenarios

Scenario	Existing			Improved Scenario		
Segment	SR 41-Kings	SR 41 Fresno	SR 41 Madera	SR 41-Kings	SR 41 Fresno	SR 41 Madera
Truck ADT	950	2,500	870	950	2900	1000
Number of Lanes	2	2	4	4	4	4
Congested Speed (mph)	<45	<35	<50	55	55	55

Source: NPMRDS data, Caltrans classification counts, 2014

These results are expected if another lane were added to each direction and the average speed of the through route increased to 55 mph. This analysis does not cover passenger trips and induced demand; it is expected that adding another lane to the SR 41 corridor would shift a significant number of passenger trips from SR 99.

Table 2.10 shows the expected changes to Truck VMT and emissions under the proposed scenario. Given the existing alignment of SR 41 for the above OD pairs, Route 41 is about 10 miles longer than SR 99. However, with the congestion on SR 99, it is expected that the travel time of this alternative would be not only shorter than SR 99, but also more reliable. With the improvement of SR 41, up to 400 freight trucks per day could be shifted from SR 99 to I-5. The trucks would travel a slightly longer distance; therefore, the VMT would increase. However, the higher rate of speed would result in fuel efficiency savings so less CO_2 would be generated. Reducing truck congestion on SR 99 would improve the safety and travel time reliability for the remaining users of SR 99.

These results are expected if another lane were added to each direction and the average speed of the through route increased to 55 mph. This analysis does not cover passenger trips and induced demand; it is expected that adding another lane to the SR 41 corridor would shift a significant number of passenger trips from SR 99.

Table 2.10 SR 41 Improved Scenario –VMT and emission change

Metric	Value
Average truck VMT	• 10 extra miles per trip • About extra $1.2*10^6$ VMT per year
Average truck VHT	• 11 min saving per peak hour trips • About 1000 hours saving per year
CO_2 reduction (during peak period)	• 8.6 million gallons reduction per each HHDT trip • 2.1 million gallons reduction per each MHDT trip • Total of 386 million gallons reduction per year reduction
NOx reduction (during peak period)	• 0.038 million gallons reduction per each HHDT trip • No significant reduction for MHDT trip during peak period • Total of 1.6 million gallons per year reduction

Notes:

1. 307 days of freight activity are assumed in a year.
2. The change in VMT is only calculated for regional goods movement. Local deliveries, service trucks and small trucks are not included in this analysis as they are not the target of the analyzed scenario. On average, 12% of truck VMT in the Valley is related to Medium Heavy duty trucks and 88% is related to HHDT.
3. VHT is calculated assuming 40% of trips are traveling during the peak periods under congested travel times.

2.4.3 State Route 140 (Merced County)

Scenario Setting

The objective of this scenario is to improve the travel time on SR 140 so that truckers are encouraged to shift their route from SR 99 to I-5 when possible. This is a high level analysis to estimate the maximum potential traffic reduction on SR 99 under an SR 140 improvement scenario. These improvements include reducing delay at all at-grade intersections and increasing capacity to maintain free-flow speed across the corridor.

Existing Conditions

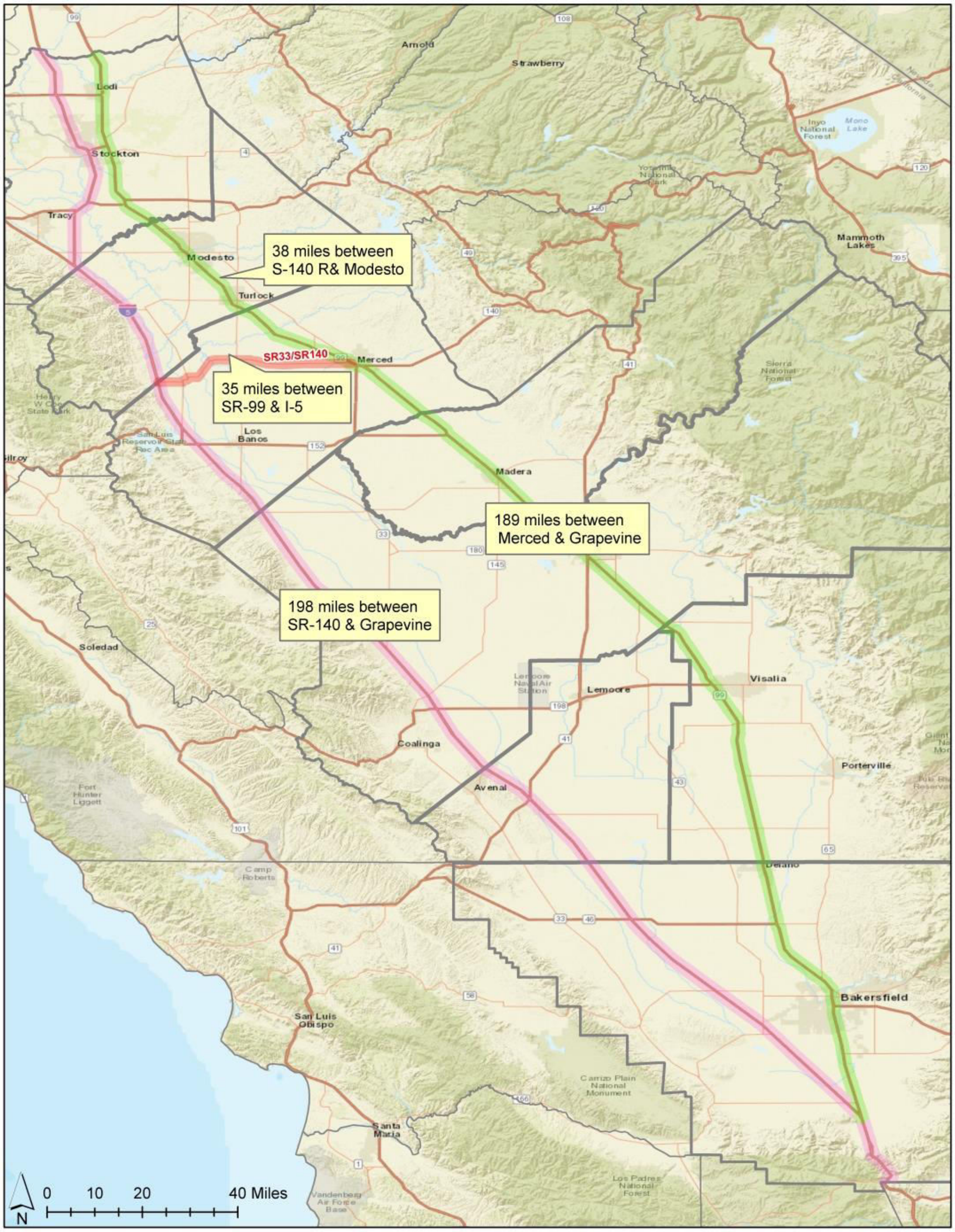
SR 140 between I-5 and SR 99 is a primarily east-west corridor of approximately 35 miles with heavy emphasis on agricultural traffic. The route provides connections mainly to agricultural-industrial land uses along its path as well as access to the Merced Regional Airport just north of SR 99. It is an important access route to Yosemite National Park, east on SR 99. For the cities of Gustine and Merced, it serves as a local commuter route. From Merced to Yosemite National Park, the primary use is for interregional travel with an emphasis on recreational and commuter traffic. In 2002, Caltrans staff prepared a Transportation Concept Report (TCR) for SR 140 to identify improvement priorities and planning strategies for this corridor.

Feasibility assessment

There are no improvement projects currently planned for SR 140. The TCR identified that the Ultimate Transportation Corridor (UTC) for this segment is a 4-lane conventional highway. Currently, the route is almost exclusively an at-grade, undivided 2-lane rural highway. It passes primarily through agricultural areas although it also traverses the residential community of Gustine concurrent with SR 33. At the eastern end nearing the City of Merced, there is some residential development on the north side of the road and an elementary school on the south side. From post mile 35.79 through 43.70, the Atchinson, Topeka and Santa Fe Railroad tracks run parallel to this highway; thereby complicating the ability to acquire right-of-way for any expansion.

As the route is exclusively at-grade, there are several all-way, stop-controlled intersections, including the junction with SR 165 and Applegate Road. Some of these intersections could be reconstructed as truck-compatible roundabouts to improve safety for turning and cross traffic while reducing the need for through trucks to come to a complete stop. The route includes a number of turns and lower speed limits through the City of Gustine, including a stop-controlled intersection less than 150 feet from an active at-grade railroad crossing. Grade-separation for either the road or the double-tracked railroad could be difficult and prohibitively expensive. An alternative could be to route SR 140 down East Avenue to South Avenue instead of its present alignment. This would better separate the truck traffic from the center of town, and it would also provide a location to more safely cross the railroad by eliminating the left and right turns near the crossing. There are no other at-grade railroad crossings on the route.

Figure 2-17 SR 140 Scenario Route Alternatives



Trucks contribute to up to 13 percent of the traffic volumes. Amenities for truck operators are relatively sparse along this route. There are some gas stations at the intersection of I-5 and SR 140, limited services in Gustine, and services in Merced. However, there is little or nothing in the way of parking, fuel, or services along the route otherwise.

Increasing heavy truck traffic on SR 140 would have an impact on approximately 28,600 people who live in census block groups immediately adjacent to the route. There were 93 traffic collisions between 2009 and 2013, of which eight involved trucks. Collisions were generally distributed across crash types with concentrations of rear-end, broadside, and hitting fixed objects. There were no collisions in the northeast-southwest segment between Santa Fe Grade Road and Keaton Road, a section adjacent to a state park and completely devoid of development and cross-streets.

Table 2.11 Summary of Collisions on SR 140

	All Collisions			Truck Involved Collisions			
Corridor	All	Fatal	Severely Injured	All	Fatal	Severely Injured	Population Adjacent to Corridor
SR 140	»	2	11	8	1	2	28,616

Source: TIMS database, 2009-2013

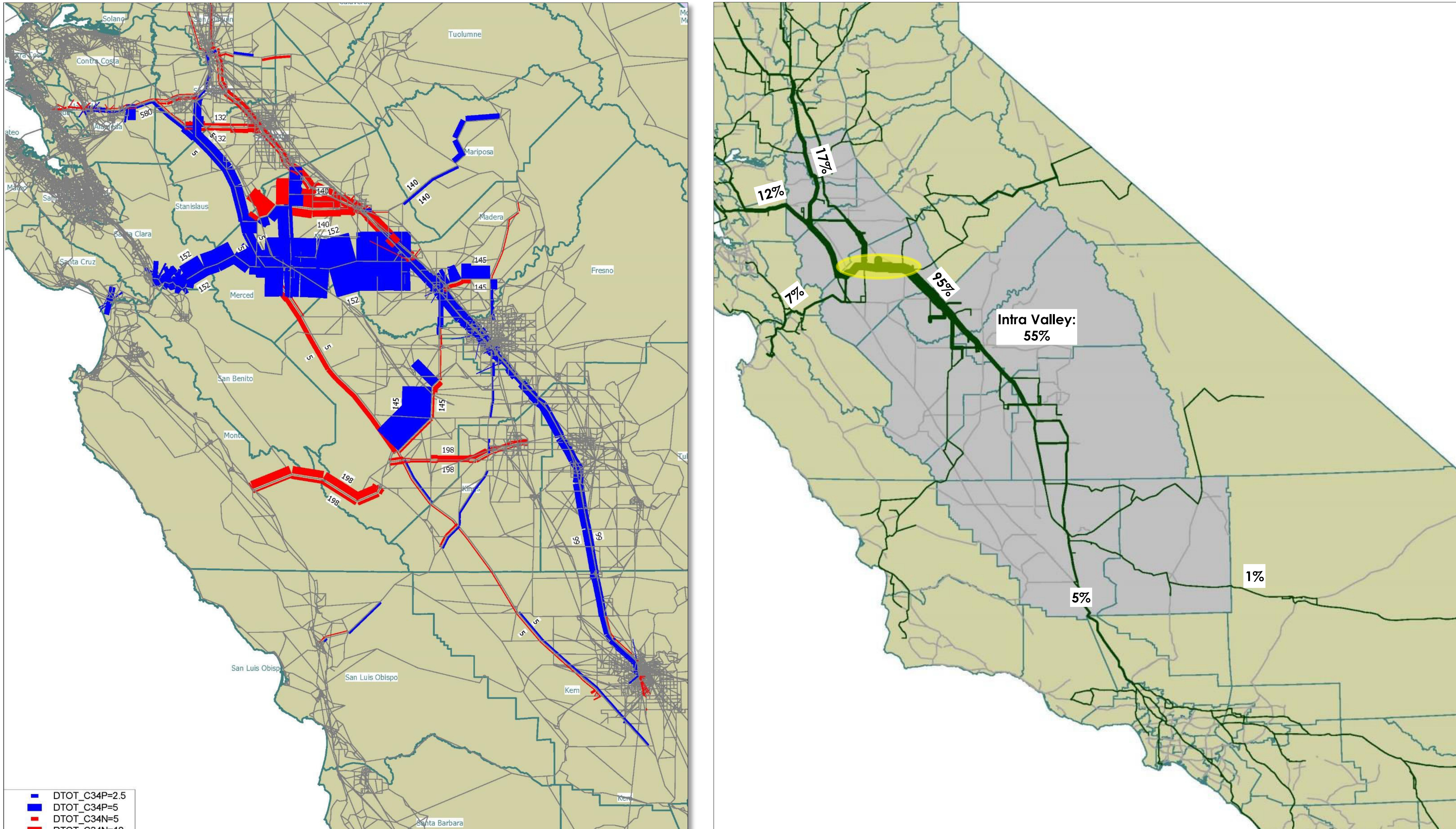
Performance Measures

Truck ADT, speed, percentage change in VMT, and percentage change in emissions for the SR 140 Scenario is presented in this section. **Table 2.12** shows existing and projected Truck ADT and speed for SR 140 in Merced County.

The Caltrans study in 2002 reported LOS D or worse for segments of SR 140 near the City of Merced. Truck ADT, travel time reliability, change in VMT, and change in emissions for the SR 140 Scenario is presented in this section. To forecast the shifted volume from SR 99 (to I-5), we used the origin destination matrix from California Statewide Freight Forecasting model (2012 model run), truck route selection patterns from StreetLight truck GPS data and 2014 truck classification counts. The distribution of trucks on the segment of SR 140 between Fresno and Kings County is shown in **Figure** 2-18**.** We estimated the share of SR 140 from major origin-destination's flows using model route assignment and GPS truck trajectory data. These OD pairs are:

- Madera, Merced County ←→ Bay Area, Central Coast, Northern California
- Madera, Fresno, Tulare County ←→ Bay Area, Central Coast, Northern California, Stanislaus, San Joaquin County

Figure 2-18 Percent Difference (Red:-, Blue: +) Plot between SR 140 and Baseline (left) - Origin-Destination of Trucks on SR 140 (right)



Source: CSFFM 2.0, 2012

The distribution of trucks on the segment of SR 140 based on the above pairings is shown in **Figure 2-18**. For OD pairs with one end in Southern California, I-5 /SR 140 is about 30 to 40 miles longer than SR 99; therefore, it is not a desirable route. However, for OD pairs with one end in the Bay Area, SR 140 can be a viable option with a distance similar to SR 99. If 85 percent of trucks between the above OD pairs that currently use SR 99 shifted their route to SR 41, this would result in 75 fewer trucks per day on SR 99. This result is expected with the addition of another lane in each direction and an average speed of 55 mph. This analysis does not cover passenger trips and induced demand; it is expected that adding another lane to SR 140 corridor would shift a significant number of passenger trips from SR 99.

Table 2.12 SR 140 Conditions under Existing & Improved Conditions

Scenario	Existing	Improved Scenario
Segment	SR 140 East of SR 165	
Truck ADT	400	600
Number of Lanes	2	4
Congested Speed (mph)	<45	55

Table 2.13 SR 140 Improved Scenario Changes in VMT and Emissions

Metric	Value
Average truck VMT	• Similar distance for potential trips
Average truck VHT	• 15 min saving per peak hour trips to bay area • About 1000 hours saving per year
CO_2 reduction (during peak period)	• 12,000 gallons reduction per each HHDT trip to bay area • 6,000 gallons reduction per each MHDT trip to bay area • Total of 70 million gallons reduction per year reduction
NOx reduction (during peak period)	• 50 gallons reduction per each HHDT trip to bay area • 22 gallons reduction per each MHDT trip to bay area • Total of 3,000 gallons per year reduction

Notes:

- 307 days of freight activity are assumed in a year.
- The change in VMT is only calculated for regional goods movement. Local deliveries, service trucks and small trucks are not included in this analysis as they are not the target of the analyzed scenario. On average, 12 percent of truck VMT in the Valley is related to Medium Heavy duty trucks and 88 percent is related to HHDT.
- VHT is calculated assuming 40 percent of trips are traveling during the peak periods under congested travel times.

Table 2.13 shows the expected changes to Truck VMT and emissions under the proposed scenario. The truck volume and VMT information in this table is estimated based on post processed forecasts of Statewide Freight Forecasting Model for year 2012 to reflect the conditions in year 2015. As explained before the volume of CO_2 and NO_x are estimated using EMFAC average factors for each speed bin and truck classes and respective VMT change across the San Joaquin Valley. SR 140 improvement will change the trucks routing patterns in the valley.

2.4.4 State Route 152 (Merced County)

Scenario Setting

The objective of this scenario is to improve the travel time on SR 152 so that truckers are encouraged to shift their route from SR 99 to I-5 when possible. This is a high level analysis aiming to estimate the maximum potential traffic reduction on SR 99 under SR 152 improvement scenario. These improvements include reducing delay at all at-grade intersections and increasing capacity to maintain free-flow speed across the corridor.

Existing Conditions

SR 152 constitutes a major east-west route corridor in Northern California connecting SR 1 near the coast with SR 99 in the San Joaquin Valley. This route is one of three major highway connections between the Bay Area and I-5. District 4 identified SR 152 between I-5 and US 101 as a major trade corridor and has short-term and long-term plans to improve the capacity and operation of the route. In San Joaquin Valley, SR 152 (partially concurrent with SR 33) is an approximately 42-mile corridor from I-5 to SR 99 – roughly midway between Madera and Merced, and just south of Chowchilla.

From Fresno/Madera to the Bay Area, the SR 152/ I-5 route is slightly longer than the SR 99/SR 120 route **(Figure 2-19)**. The route provides access to industrial land use in the City of Los Banos and agricultural areas along its entire length. There are no major industrial clusters directly on either end of the route. Nearby industrial clusters are located a few miles north of the SR 152/SR 99 interchange in Chowchilla, and nine miles to the south near the Madera Municipal Airport.

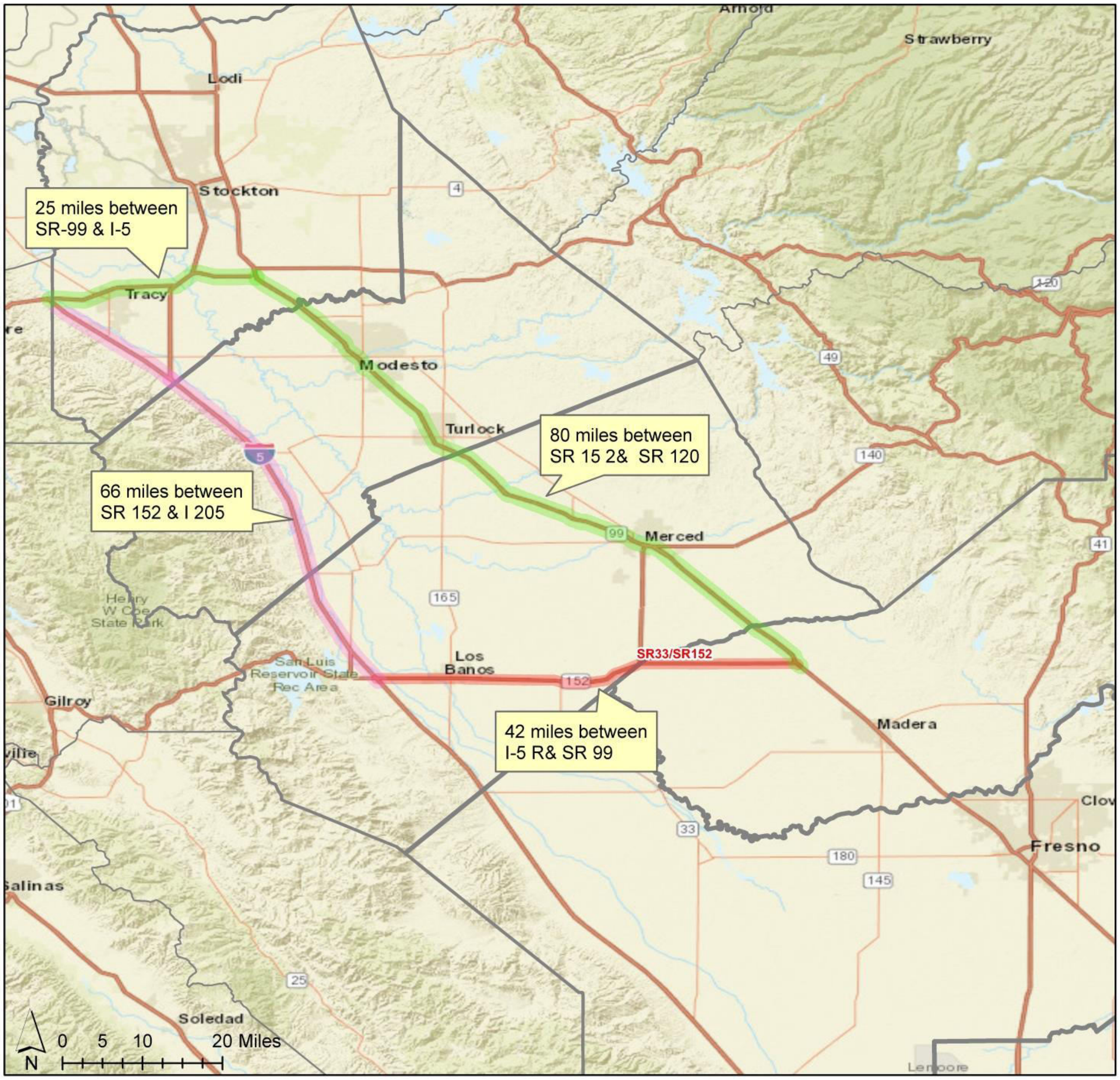
Feasibility assessment

The entire corridor is a divided 4-lane highway that is often at-grade with grade separation at major intersections and junctions with other state routes, such as 33, 59, and 233. Access between SR 152 and SR 99 is limited to the southbound direction. The route passes primarily through agricultural-industrial land uses with the exception of the City of Los Banos. The approximately 4-mile stretch through the City abuts residential and commercial land uses. There are numerous signalized intersections and driveway cuts, a 2-way left-turn lane separates the road, and turning access is generally unrestricted. There are no railroad crossings along SR 152.

For eastbound trips heading north to Chowchilla or points on SR 99, trucks must use local routes like SR 233 or Road 16. SR 233 passes through the center of Chowchilla as a 4-lane arterial road surrounded by retail and residential land uses with parks and schools nearby. Road 16 is not a state highway but could provide an alternative truck route that avoids most residential areas and connects directly to the Chowchilla industrial cluster. Access to SR 99 northbound is available via Avenue 24.

There are some services available to trucks in the Los Banos area, and one truck stop located just east of SR 59. No other services are found immediately along the route.

Figure 2-19 SR 152 Scenario Distance comparison



Several projects are identified for SR 152. In the near-term, programmed improvements along the route include: traffic operation improvements on SR 152 in the City of Los Banos, widening the route between US 101 and the Merced-Fresno county line across I-5. Further in the future, a bypass around Los Banos is planned in two segments.

Approximately 36,200 people living in census block groups along SR 152 could be affected by an increase in truck traffic. The vast majority of these residents, about 30,200, live in Merced County while the remaining 6,000 reside in Madera County. Between 2009 and 2013, there were 334 collisions and 49 involved trucks, or about 10 percent. Total collisions were generally distributed evenly across the entire corridor except for the concentration in Los Banos. The most frequent type of crashes were rear-end collisions, which cluster in the area of Los Banos due to more conflict points that likely result in speed fluctuations as vehicles enter or exit the roadway more frequently.

Table 2.14 Summary of Collisions on SR 152

Corridor	All collisions			Truck involved collisions			Exposed Population
	All	Fatal	Severely injured	All	Fatal	Severely injured	
SR 152	334	15	27	49	4	8	36,268

*source: TIMS database 2009-2013

Performance Measures

Truck ADT, travel time reliability, change in VMT, and change in emissions for the SR 152 Scenario are presented in this section. To forecast the volume shifted from SR 99, the OD matrix from the California Statewide Freight Forecasting model (2012 model run), truck route selection patterns from StreetLight truck GPS data and 2014 truck classification counts were used. Model results were adjusted to match 2014 truck counts. The distribution of trucks on the segment of SR 152 between Fresno and Kings County is shown in **Figure** 2-21. We estimated the share of SR 152 from major origin-destination's flows using model route assignment and GPS truck trajectory data. These OD pairs are:

- Central parts of San Joaquin Valley ←→ Bay Area /Central Coast
- Madera, Merced, Stanislaus ←→ Southern California

SR 152 is a not a popular route to access Southern California from cities along SR 99, such as Modesto, Turlock, or Merced. The SR 152/I-5 route is about 50 miles longer than SR 99, and it has many at-grade intersections in the City of Los Banos, which may cause extra delays. Therefore, it is not anticipated that trucks between these OD pairs would shift their route from SR 99.

On the other hand, SR 152 is a popular route to access the Bay Area from the Fresno and Madera areas. For these OD pairs, the SR 152/I-5 route is about the same distance as the SR 99/I-205 route **(Figure 2-19)**. Under the SR 152 Improvement Scenario, the heavy duty truck traffic on this corridor would be up to 2.5 times higher than existing traffic. Our analysis indicates that some out-of-state trucks using SR 198 and SR 140 would be inclined to use SR 152 instead.

This analysis does not cover passenger trips and induced demand. It is possible that adding another lane to the SR 152 corridor would also shift a significant number of passenger trips from SR 99.

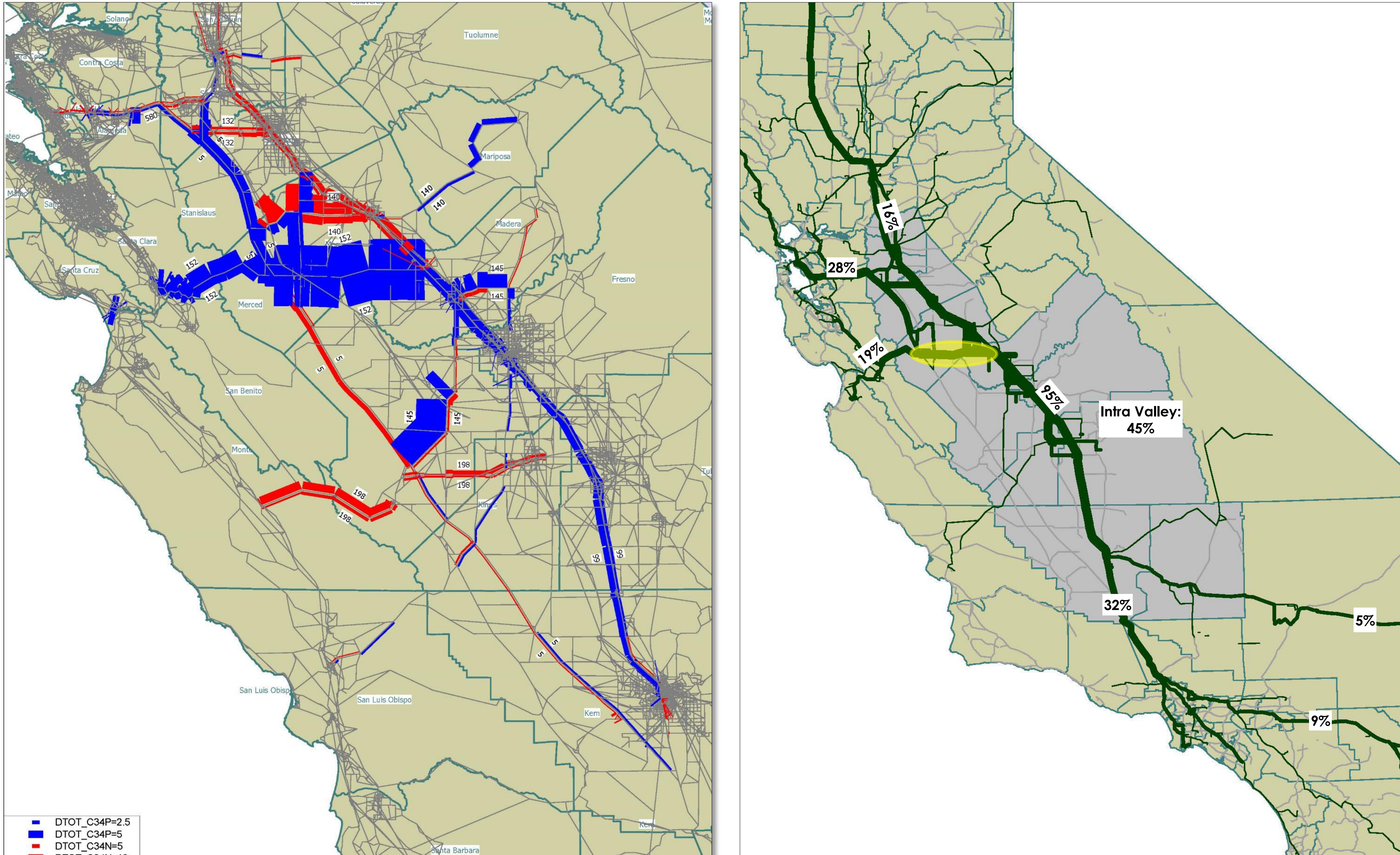
Figure 2-20 SR 152 Travel Speeds at Analyzed Locations

Source: NPMRDS, October 2015

Table 2.15 SR 152 conditions under Existing and Improved Scenario

Segment	SR 152 East of SR 165	
Scenario	Existing	Improved
Truck ADT	2,100	4,500
Number of Lanes	4	6
Congested Speed (mph)	<45	55

Figure 2-21 Percent Difference (Red:-, Blue: +) plot between SR 152 and Baseline (left) - Origin-Destination of Trucks on SR 152 (right)



Source: CSFFM 2.0, 2012

Table 2.16 SR 152 VMT and Emission change under Existing Conditions

Metric	Value
Average truck VMT	• 5 miles longer trips from Central parts of San Joaquin Valley to Bay Area
Average truck VHT	• 15 min saving per peak hour trips to bay area • About 4000 hours saving per year
CO_2 reduction (during peak period)	• 12 million gallons reduction per each HHDT trip to bay area • 6 million gallons reduction per each MHDT trip to bay area • Total of 71 million gallons reduction per year reduction
NOx reduction (during peak period)	• 0.05 million gallons reduction per each HHDT trip • 0.02 million gallons reduction per each HHDT trip • Total of 0.27 million gallons per year reduction

Notes:

- 307 days are assumed in a year.
- The change in VMT is only calculated for regional goods movement. Local deliveries, service trucks and small trucks are not included in this analysis as they are not the target of the analyzed scenario. On average, 12 percent of truck VMT in the Valley is related to Medium Heavy duty trucks and 88 percent is related to HHDT.
- VHT is calculated assuming 40 percent of trips are traveling during the peak periods under congested travel times.

2.4.5 State Route 165 (Merced County)

Scenario Setting

The objective of this scenario is to improve the travel time on SR 165 so that truckers are encouraged to shift their route from SR 99 to I-5 when possible. This is a high level analysis to estimate the maximum potential traffic reduction on SR 99 under SR 165 improvement scenario. These improvements include reducing delay at all at-grade intersections and increasing capacity to maintain free-flow speed across the corridor.

Existing Conditions

SR 165 is approximately 38 miles long, making a north-south connection between I-5 and SR 99 near the City of Turlock. The route provides alternative north-south access to I-5 for industrial clusters near Turlock, as well as agricultural and industrial sites along SR 165. There are also many destinations around the area of Hilmar and Los Banos.

Feasibility Assessment

The route is almost exclusively a 2-lane, undivided rural highway passing through agricultural land uses. The route also passes through the center of the City of Los Banos, where it widens periodically at major intersections and includes a 2-way left-turn lane. SR 165 also passes through the center of Hilmar, a distance of approximately 1.3 miles, where it is surrounded by homes, commercial development, and schools. Major intersections in both communities are signalized with generally unrestricted left-turn access for driveways along SR 165. Outside of these communities, there are long stretches of the route that are uninterrupted by cross streets. 4-way stop-controlled intersections occur at both state routes and major local roads. There are no railroad crossings on SR 165.

Services for truck drivers are available in both of those communities, as well as limited options near the junctions with SR 99 and I-5. In between, there are two long stretches of possibly as many as 21 miles with no services or parking opportunities. Much of this corridor passes through a large state park, which may present challenges if the highway were considered for widening. There are presently no projects planned for SR 165 between I-5 and SR 99, although a by-pass project for the east-west SR 152 around Los Banos would create a new connection to SR 165.

Because much of the corridor allows for uninterrupted travel with relatively few conflicts from cross-traffic, the greatest value of improvements may come from converting all-way, stop-controlled intersections into truck-compatible roundabouts. Roundabouts reduce the risk of collision with turning vehicles and are beneficial for trucks, which would no longer have to come to a complete stop. While the all-way, stop-controlled intersections are relatively few given the length of the corridor, these locations interrupt through traffic and reduce the average speed and travel time for trucks.

The population of approximately 43,200 living along SR 165 includes 38,660 in Merced County and 4,600 in Stanislaus County. There were 259 collisions along SR 165 between 2009 and 2013, and 29 involved trucks (about 12 percent). Collisions were heavily clustered in the area of Los Banos and Hilmar where speeds are lower and there is a greater volume of traffic entering and exiting the roadway. There are substantially fewer collisions per mile in the central segment between Los Banos and SR 140, which is mostly undeveloped state parklands with no cross-streets. There is a notable small cluster of crashes where the road makes a curve near the intersection of Wolfsen Road. Safety warning and visibility improvements may reduce the risk of collisions with turning and entering vehicles on this curve.

Table 2.17 Summary of Collisions on SR 165

Corridor	All Collisions			Truck Involved Collisions			Population Adjacent to Corridor
	All	Fatal	Severely Injured	All	Fatal	Severely Injured	
SR 165	»	13	27	29	5	7	43,251

Source: TIMS database, 2009-2013

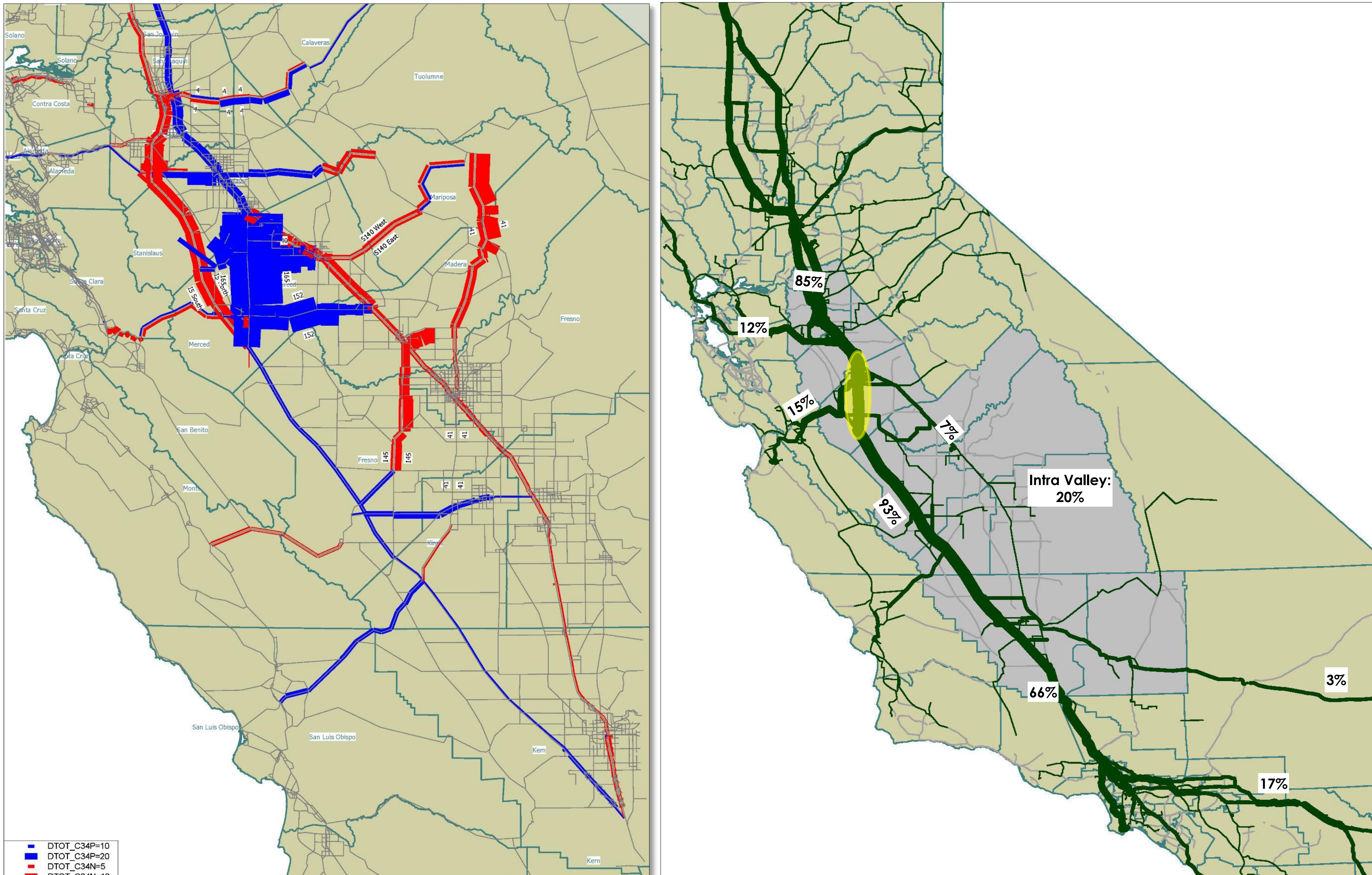
Performance Measures

Truck ADT, travel time reliability, change in VMT, and change in emission for the SR 165 Scenario are presented in this section. To forecast the volume shifted from SR 99, the OD matrix from the California Statewide Freight Forecasting model (2012 model run), truck route selection patterns from StreetLight truck GPS data and 2014 truck classification counts were used. Model results were adjusted to match 2014 truck counts. The distribution of trucks on the segment of SR 165 in Merced County south of SR 140 is shown in **Figure** 2-22. We estimated the share of SR 165 from major origin-destination's flows using model route assignment and GPS truck trajectory data. These OD pairs are:

- Madera, Merced, Stanislaus, San Joaquin County ←→ Southern California
- Other States, San Joaquin Valley ←→ Bay area / Sacramento Valley

Relative to SR 152 or SR 132, SR 165 provides better access for trips from/to southern California. Given the significantly higher frequency of trips from/to southern California, any network improvements that affect truck's routing from/to southern California would have higher impact on truck traffic shift. The existing SR 165/I-5 route has similar distance as SR 99 from northern San Joaquin valley to southern California. However, it has a lot of at-grade intersections in the City of Los Banos, which may cause extra delays. Under SR 165 improvement scenario the heavy truck traffic on SR 165 is almost doubled (104% increase on northbound and 50% increase on South bound, in **Figure** 2-22). Under this Scenario truck traffic on SR 99 between I-5 split and SR 165 in Kern, Tulare, Fresno and Madera County will be decreased by 3 to 10 percent; however, based on the model stochastic traffic assignment results **(Figure 2-22)** the truck traffic on SR 99 north of SR 165 might be increased due to a shift of some of the I-5 traffic. I-5 and SR 99 in San Joaquin County are almost parallel, which makes the traffic assignment algorithm overly sensitive to small changes. This connector would also provide a bypass for major congested urban areas across SR 99, such as Fresno and Bakersfield.

Figure 2-22 Percent Difference (Red:-, Blue: +) plot between SR 165 and Baseline (left) - Origin-Destination of Trucks on SR 165 (right)



Source: CSFFM 2.0, 2012

This result is expected with the addition of another lane in each direction and an increase in the average speed to 55 mph. This analysis does not cover passenger trips and induced demand. It is possible that adding another lane to the SR 165 corridor would shift a significant number of passenger trips from SR 99.

Table 2.18 SR 165 Conditions under Existing and Improved Scenario *Truck ADT and Speed*

Scenario	Existing	Improved Scenario
Truck ADT	600	1,100
Number of Lanes	2	4
Congested Speed (mph)	<40	55

The origin-destination matrix from the California Statewide Freight Forecasting model (2012 model run), truck route selection patterns from StreetLight truck GPS data and 2014 truck classification counts were used to forecast the shifted volume from SR 99. Model results were adjusted to match 2014 truck counts. **Table 2.19** shows the expected changes to Truck VMT and emissions under the proposed scenario.

Table 2.19 SR 165 Conditions under Existing and Improved Scenario *Truck VMT and Emission Changes*

Metric	Value
Average truck VMT	• I-5/SR 165 route is about 7 miles shorter than SR 99 (between I-5/SR 99 split and Turlock)
Average truck VHT	• 15 min saving per peak hour trips to So-Cal* • About 1000 hours saving per year
CO_2 reduction (during peak period)	• 16,000 gallons reduction per each HHDT trip to So-Cal • 5,000 gallons reduction per each MHDT trip to So-Cal • Total of 90 million gallons reduction per year reduction
NOx reduction (during peak period)	• 62 gallons reduction per each HHDT trip to So-Cal • 40 gallons reduction per each MHDT trip to So-Cal • Total of 3,600 gallons per year reduction

* So-Cal: Southern California

Notes:

- 307 days are assumed in a year.
- The change in VMT is only calculated for regional goods movement. Local deliveries, service trucks and small trucks are not included in this analysis as they are not the target of the analyzed scenario. On average, 12 percent of truck VMT in the Valley is related to Medium Heavy duty trucks and 88 percent is related to HHDT.
- VHT is calculated assuming 40 percent of trips are traveling during the peak periods under congested travel times.

2.4.6 State Route 132 (Merced County)

Scenario Setting

The objective of this scenario is to improve the travel time on SR 132 so that truckers are encouraged to shift their route from SR 99 to I-5 when possible. This is a high level analysis aiming to estimate the maximum potential traffic reduction on SR 99 under an SR 132 improvement scenario. These improvements include reducing delay at all at-grade intersections and increasing capacity to maintain free-flow speed across the corridor.

Existing Conditions

SR 132 connects I-580, I-5 and SR 99 at the City of Modesto. The corridor between I-5 and SR 99 is 18.5 miles long with posted speeds ranging between 25 mph and 50 mph. It is located at the northern side of the San Joaquin Valley. Most of the route is an undivided, two-lane highway with at-grade crossings, although a few intersections, primarily near I-5, are grade separated. There are no railroad crossings along the route. SR 132 passes through almost entirely agricultural land and no communities except for the eastern most 1.5 miles in Modesto. Most intersections with cross-streets are two-way stop-controlled, but several locations have all-way stops. SR 132 becomes a grade-separated expressway approaching I-5 near I-580.

Feasibility assessment

SR 132 provides an important east-west connection south of Stockton and connects with freight clusters in the Modesto area that are accessible from SR 99. There are agricultural sites along the route, but no other significant freight clusters. Services are very sparse and concentrated in Modesto, although there is a truck-serving gas station at the intersection with Hart Road.

Several projects have been identified for SR 132, although there may be some overlap between them. As a long range program, there are plans for widening the route between I-580 and SR 99. A more near term plan is the State Route 132 West Project to improve the connections with SR 99 and realign and widen the route for about a 3.5-mile stretch west of SR 99 by 2028. The purpose of the project is to improve regional and interregional circulation, relieve traffic congestion along existing State SR 132/Maze Boulevard, and improve operations for the transportation network in the area by creating a four-lane freeway/expressway on a new alignment.

There are approximately 14,000 people living in census block groups immediately adjacent to the corridor, including more than 11,000 in Stanislaus County and the rest in San Joaquin County. Between 2009 and 2013, 122 collisions occurred on SR 132 between I-580 and SR 99. About 17 percent of those collisions, or 21 incidents, involved trucks. The most prevalent type of crash was a broadside collision, which occurred most commonly at intersections and especially at two-way, stop-controlled intersections.

Table 2.20 Summary of Collisions on SR 132

Corridor	All Collisions			Truck Involved Collisions			Population Adjacent to Corridor
	All	Fatal	Severely Injured	All	Fatal	Severely Injured	
	»						
SR 132		4	21	21	2	5	14,097

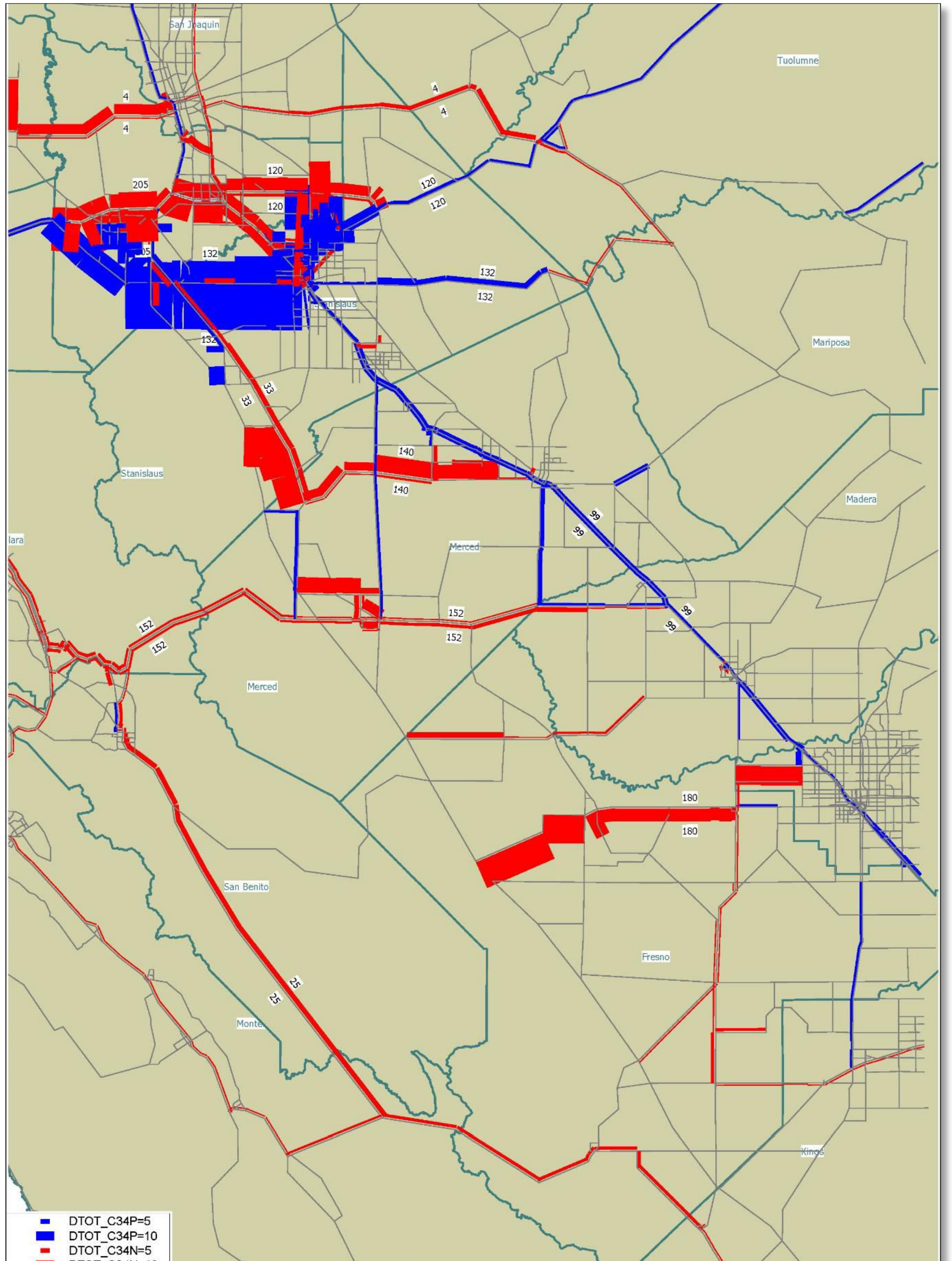
Source: TIMS database, 2009-2013

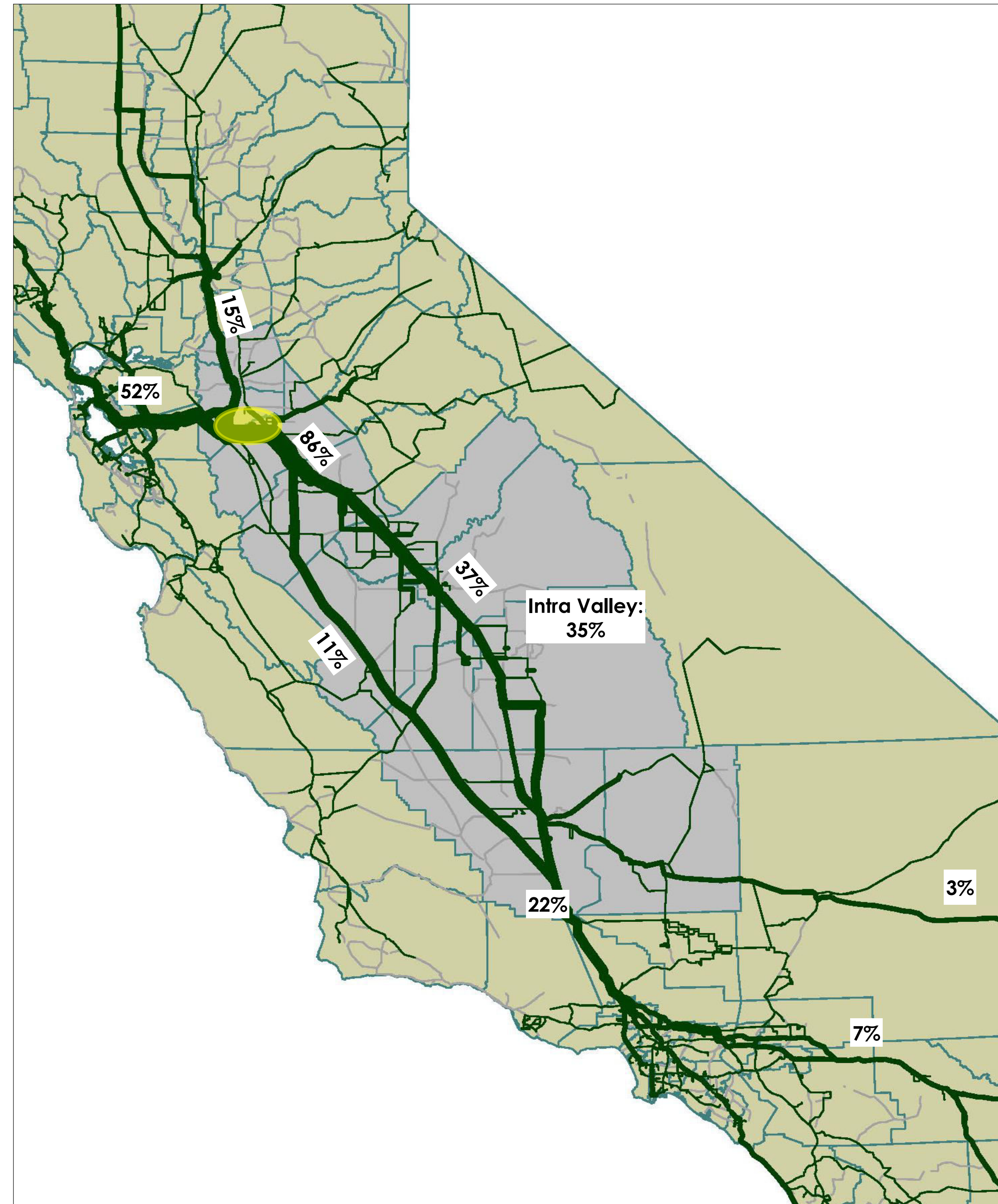
Performance Measures

The segment of SR 99 between Ripon and Manteca is heavily congested and has a high number of recorded severe and fatal collisions. This scenario would enhance parallel access to SR-120/I-205 and improve the operation of the SR 99 and SR-120 interchange. This route is also three miles shorted than SR-120/I-205 to the Bay Area. For the most part, the route traverses rural areas with low traffic. The only hindrances include the connection with SR 99 and the segment between North Dakota Street and SR 99.

SR 132 is a popular alternate route to SR 205 for accessing the Bay Area from the Fresno and Madera areas. SR 132 is a less a popular route for accessing Southern California from the Modesto, Salida, Ripon freight clusters. The SR 132/I-5 route is approximately 25 miles longer than SR 99; however, during the peak period it is anticipated that the travel time savings will attract trucks to this route (as well as passenger vehicles).

Figure 2-23 Percent Difference (Red:-, Blue: +) plot between SR 132 and Baseline (left) - Origin-Destination of Trucks on SR 132 (right)





Source: CSFFM 2.0, 2012

Truck ADT, travel time reliability, change in VMT, and change in emissions for the SR 132 Scenario is presented in this section. To forecast the shifted volume from SR 99, origin destination matrix from California Statewide Freight Forecasting model (2012 model run), truck route selection patterns from StreetLight truck GPS data and 2014 truck classification counts are used. Model results are adjusted to match 2014 truck counts. The distribution of trucks on the segment of SR 132 in Stanislaus County east of SR 33 is shown in **Figure 2-23**. We estimated the share of SR 132 from major origin-destination's flows using model route assignment and GPS truck trajectory data. These OD pairs are:

- Other States, San Joaquin Valley ←→ Bay area
- South of San Joaquin County, Stanislaus County ←→ Southern California

As show in **Figure** 2-23 under the SR 132 Improvement Scenario, the heavy duty truck traffic on this corridor would expect to increase by 11 percent. The reduction is more significant for eastbound than westbound. This improvement would result in a 10 percent reduction of heavy truck traffic on an 18 mile stretch of SR 99 between Modesto and SR-120/I-205. The heavy heavy duty truck ADT (5+ axels) on this segment of SR 99 is about 7,000. This result is expected with the addition of another lane in each direction and an increase in the average speed along the route to 55 mph. This analysis does not cover passenger trips and induced demand, it is possible that adding another lane to SR 152 corridor will shift significant number of passenger trips from SR 99.

Figure 2-24 shows existing truck speeds at select locations and **Table 2.21** show existing and projected Truck ADT and speed for segments in Merced County and Madera County.

Table 2.21 SR 132 Conditions under Existing and Improved Scenario Truck ADT and Speed

Scenario	Existing	Improved Scenario
Heavy Duty Truck ADT	1500	1650
Number of Lanes	mostly 2	4
Congested Speed (mph)	<40	55

Figure 2-24 SR 132 Travel Speeds at Analyzed Locations

Source: NPMRDS, October 2015

The OD matrix from the California Statewide Freight Forecasting model (2012 model run), truck route selection patterns from StreetLight truck GPS data, and 2014 truck classification counts were used to forecast the shifted volume from SR 99. Model results were adjusted to match 2014 truck counts.

Table 2.22 SR 165 Improved Scenario –VMT and emission change

Metric	Value
Average truck VMT	• Similar distance for potential trips
Average truck VHT	• 10 min saving per peak hour trips to bay area • About 3,000 hours saving per year
CO_2 reduction (during peak period)	• 2,000 gallons reduction per each HHDT trip to bay area • 600 gallons reduction per each MHDT trip to bay area • Total of 33 million gallons reduction per year reduction
NOx reduction (during peak period)	• 12 gallons reduction per each HHDT trip • Total of 0.2 million gallons per year reduction

Notes:

- 307 days are assumed in a year.
- The change in VMT is only calculated for regional goods movement. Local deliveries, service trucks and small trucks are not included in this analysis as they are not the target of the analyzed scenario. On average, 12 percent of truck VMT in the Valley is related to Medium Heavy duty trucks and 88 percent is related to HHDT.

- VHT is calculated assuming 40 percent of trips are traveling during the peak periods under congested travel times.

2.4.7 Conclusion and Final Recommendations

The average daily truck traffic volume (5+ axles) on SR 99 in the Valley varies from 5,000 to 13,000 (5-21 percent of the AADT). Overall, the truck volume increases from north to south with the highest volumes occurring in Kern and Fresno Counties. The objective of this section is to evaluate various network improvements that could provide reasonable alternative truck routes to SR 99 thus reducing truck traffic congestion on SR 99. In addition to reducing congestion and improving safety and travel time reliability, these improvements would also improve resiliency and access.

The characteristics of truck traffic (Origin-Destination pattern and volume) on different segments of SR 99 vary. The unique characteristics of each segment make it difficult to compare them to one another as shown in **Table 2.23**.

Table 2.23 Summary of I-5/SR 99 Connector Scenarios

Connector	Primary Purpose	Length (miles)	*Number of Interchanges
SR 58/ Centennial Corridor	• Separate SR 99 and SR 58 traffic • Accommodate out-of-state traffic to Bay Area and Central Coast	30	8
West Beltway	• Rerouting SR 99 through traffic to reduce congestion in Bakersfield	19	10
SR 41	• Alternative route from Southern California to Fresno and other urban areas north of it along SR 99	54	22
SR 140	• Alternative route to connect Merced and other urban areas north of Merced to SR 99	35	10 (bypass at Gustine)
SR 152	• Alternative route for Bay Area and Central Coast • Connect cities between Madera and Merced to I- 5	42	6 (bypass Los Banos)
SR 165	• Alternative route to connect Turlock, Modesto, and other cities in northern San Joaquin Valley to I-5	38	9 (bypass Los Banos and Hilmar)
SR 132	• Alternative to SR 120/ I-205 • Reduce congestion on SR 99 between Modesto and Manteca	20	7

*This is a very high level estimate

This is high level analysis focusing on the regional distribution and origin-destination of heavy heavy duty freight trucks (+5 axles). The local short haul trips of smaller trucks (trips less than 50 miles, trucks with less than 5 axles) are less likely to change their route under these analyzed scenarios. We acknowledge that the passenger trip behavior is not included in this analysis, and there might be significant change due to induced demand. **Table 2.24** shows the relative comparison of analyzed scenarios.

The West Beltway Scenario is by far the most beneficial scenario. Given the high volume of truck traffic between Southern California and the Central Valley and heavy congestion on SR 99 through the City of Bakersfield, this connector has the potential to save significant hours of delay by both reducing congestion and by also decreasing fatal and severe collisions that result in significant non-recurrent delay.

In central parts of San Joaquin Valley, the SR 152 improvements could provide the most benefit. This route continues to the Central Coast and provides and alternate route for I-205 to the Bay Area for trips originating in the southern parts of the Valley.

In the northern parts of San Joaquin Valley, the SR 132 Scenario is a close parallel alternative route to I-205/SR 120; therefore, it does not reduce much of the traffic on SR 99. However, it would provide significant congestion relief for SR 120.

Table 2.24 Summary of I-5/SR 99 Connectors Improvements Impacts

Project	Daily HDT Volume		Annual Reductions			
	Existing	Proposed Scenario	CO2	NOx	Delay	SR 99 VMT
SR 58	2700	3000			4.3	5.5
West Beltway	-	3000	-	-	70.1	32.2
SR 41	2500	2900	386	1.6	27.5	1.2
SR 140	400	600	71	0.3	1.4	-
SR 152	2100	4500	214	0.8	4.2	0.2
SR 165	600	1100	938	3.6	42.1	1.1
SR 132	1500	1650	33	0.2	3.2	-

*Million tons of CO2/ NOx, 1,000 hours of delay, million truck miles of VMT.

2.5 Opportunities for Increasing the Use of Rail

There is continuing interest in opportunities to shift highway trips to rail, centering on container drayage to and from the Ports of Oakland, Los Angeles, and Long Beach. While the project team knows of no detailed, active proposals for rail intermodal service between the ports and points in the San Joaquin Valley, some recent developments may be considered steps in that direction and may hold the potential of reducing truck VMT even without a modal shift.

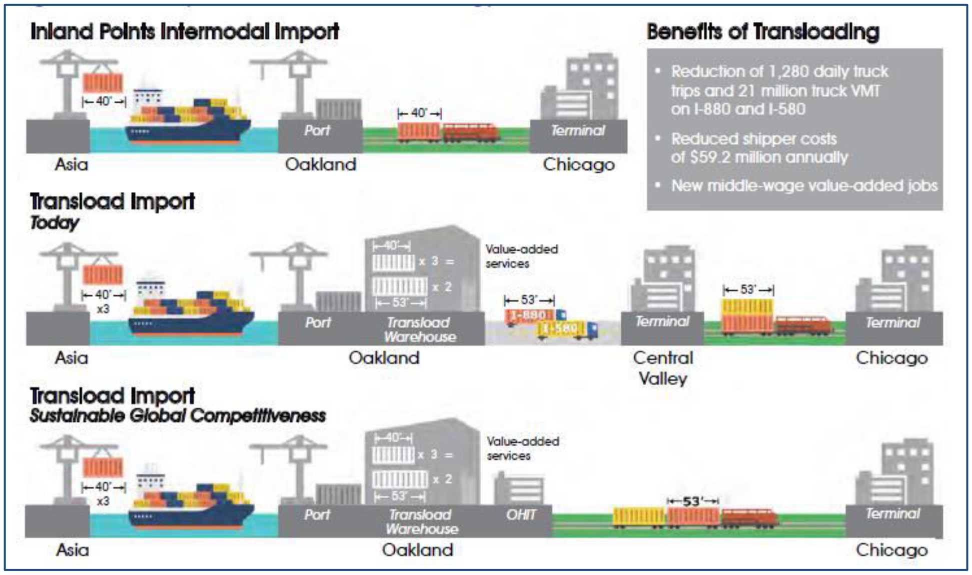
Port of Oakland Developments

There are three relevant logistics projects in progress at or near the Port of Oakland:

- Construction on the Prologis Oakland Global Trade and Logistics Center began in late 2016. The first phase of 250,000 SF building is targeted for completion in mid-2017 with second and third phases to follow. The completed development is expected to have 979,000 SF of warehousing and distribution space.
- CenterPoint, in partnership with the Port of Oakland, is expected to break ground on the first 440,000-SF phase of its Seaport Logistics Complex in late 2017.
- The Port's Cool Port refrigerated warehouse (283,000 SF) is expected to start construction in March, 2017.

The Prologis and CenterPoint projects were cited in the 2016 San Francisco Bay Area Goods Movement Plan as having a significant potential to attract international cargo transloading **(Figure 2-25)** and reduce VMT on I-580. To the extent that this potential is realized, truck trips between Oakland and the San Joaquin Valley with cargo previously/subsequently moving to/from inland rail points would be replaced by direct rail from Oakland. The CoolPort project will be served by rail, and could divert some long-haul truck trips from refrigerated export sources outside California.

Figure 2-25 Oakland Logistics Transload Strategies

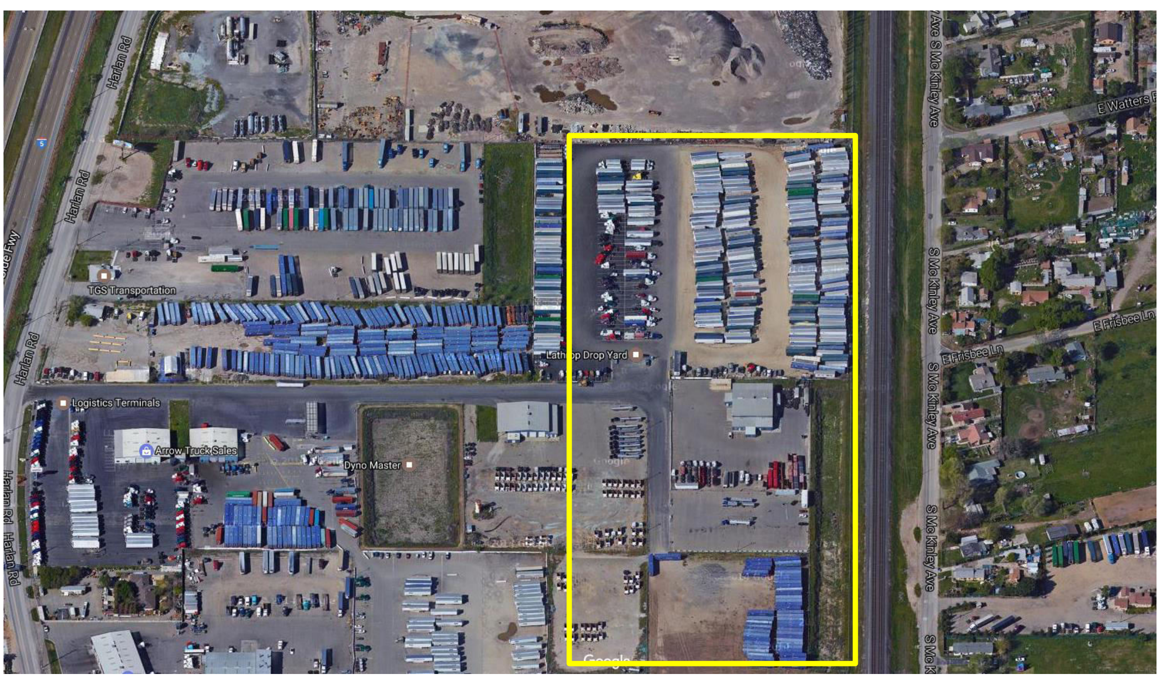


Source: 2016 2016 San Francisco Bay Area Goods Movement Plan

Lathrop Developments

Shipper's Transport Express, Lathrop. Shipper's Transport Express (STE) has established an inland container depot and staging area at Lathrop **(Figure 2-26)**. STE drays containers between the depot and the Oakland International Container Terminal (OICT, operated by STE sister company SSA), with inland customers picking up or dropping off containers at Lathrop.

Figure 2-26 STE Lathrop Staging Yard



The Shipper's Transport Express (STE) depot at Lathrop (and the proposed depot at Shafter) will have three functions:

- It will serve as a remote staging lot for the SSA terminal at Oakland. STE will dray loaded import containers to Lathrop instead of having drayage firms pick them up in Oakland. STE will also dray loaded export containers to Oakland.
- It will function as an inland container depot, accepting empty import containers and providing empty containers for exports.
- It will function as a chassis pooling location. Chassis are now provided and billed separately from containers.

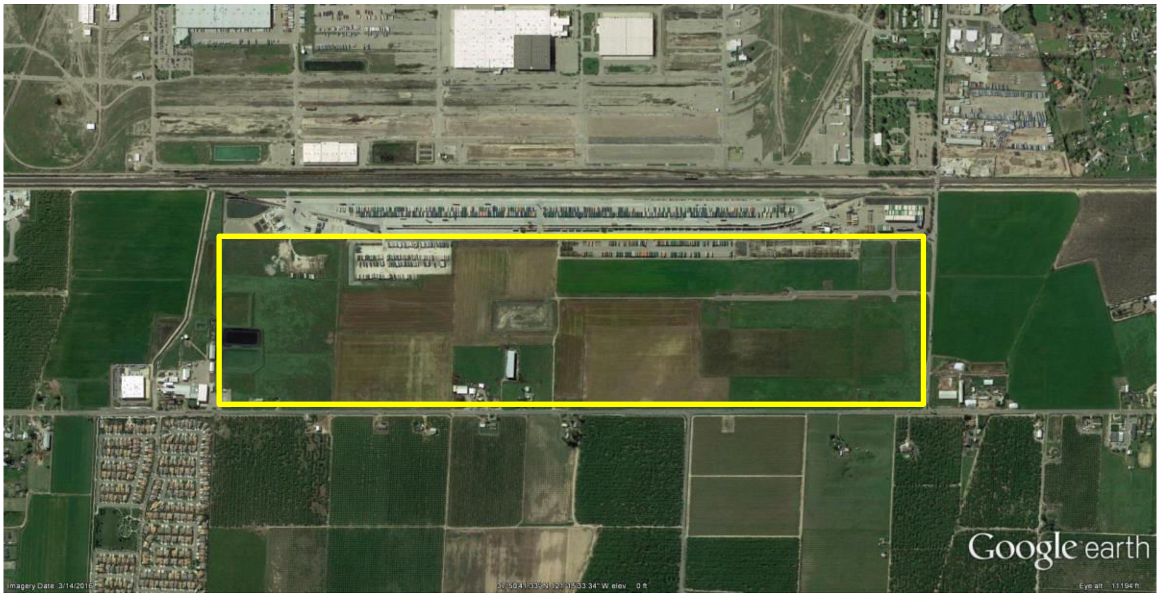
The STE initiative should yield multiple benefits.

- Reduced empty container movements on I880/I238/I580/I205 between Oakland and Lathrop. While there will still be a need to periodically reposition empty containers to address imbalances, STE envisions that most Oakland-Lathrop trips will be loaded.
- Improved SJV empty container supply. To the extent that SSA client ocean carriers permit an inventory of empty containers to develop at Lathrop (and eventually at Shafter) export customers of those carriers will have the option to source containers locally.

The effectiveness of these strategies will depend on institutional factors as well as on the geographic and seasonal pattern of imports and exports. Ocean carriers must agree to the arrangements, including the use of inland points as satellite staging yards for loaded containers and the designation of those depots as container termination and supply points. Customers must also be willing to go along with the arrangements, including having STE perform the drayage between Oakland and Lathrop. Many importers and exporters have preferred drayage firms. The intermediate staging at Lathrop could also delay some high-priority import or export movements.

CenterPoint Manteca. CenterPoint Intermodal Center (CIC Manteca) is a proposed 190-acre logistics center east of the UP Lathrop intermodal terminal bounded by Roth Road, Airport Way, and Lathrop Road **(Figure 2-27)**. The site can have up to 3.1 million square feet of warehousing/DC space. The site is designed with direct access to the UP facility over private roads to minimize drayage costs.

Figure 2-27 CenterPoint Manteca (approximate site)



A with the Shafter developments discussed below, these initiatives may move the region closer to a short-haul intermodal service in two respects:

- Development of additional distribution center capacity immediately adjacent to intermodal rail facilities minimizes container drayage within the Valley for potential intermodal services.
- Development of Valley container depots and staging areas may encourage hub-and-spoke operations and facilitate reuse of import container for export loads to improve round-trip rail economics.

Shafter Developments

Shafter STE Staging Yard and Container Depot. STE is in the process of establishing an inland staging yard and container depot at Shafter, similar to the STE operation at Lathrop.

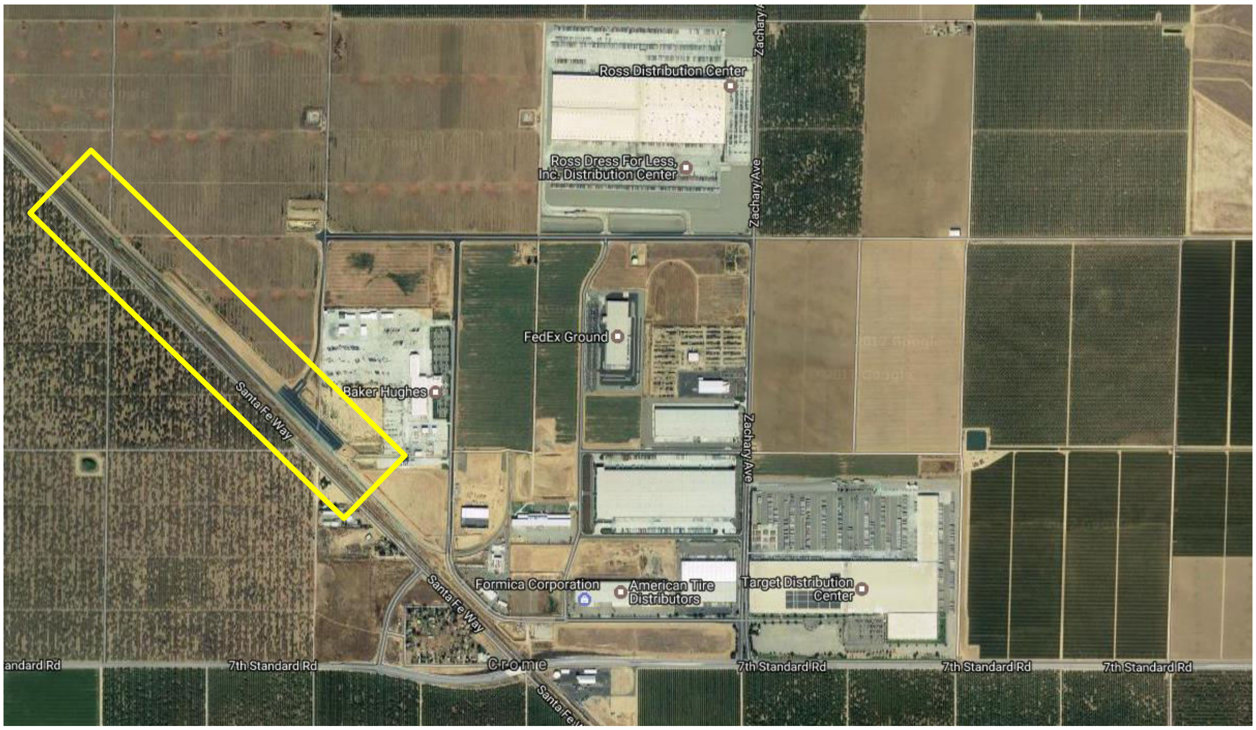
STE has proposed an incentive program for load matching based on potential GHG reductions, with public funds from the incentive to be used for capital improvements, or to support a rail service if a railroad chooses to participate.

As with the STE development at Lathrop, this initiative might be considered a step toward establishment of a rail intermodal service.

Shafter Rail Intermodal. There is a long-standing initiative to establish rail intermodal container service between the Ports of Los Angeles and Long Beach (LALB) and a site or sites at Shafter. Port rail shuttle interest, volume, and cost issues were addressed in a 2003 survey study conducted by Cambridge for SJCOG; a 2003 feasibility study conducted for SJCOG by Tioga and Railroad Industries: a 2006 study conducted by Tioga, Cambridge, and Railroad Industries for SJCOG; a 2008 feasibility study conducted for SCAG by Tioga, Railroad Industries, and Iteris; a 2008 study by WZI for the City of Shafter; and a 2009 study conducted by Moffat & Nichol for the City of Shafter.

The principal site of interest is at the Wonderful Industrial Park (former Paramount development) off 7th Standard Road **(Figure 2-28)**. This site is adjacent to several distribution centers and other facilities, and is connected to the BNSF main line.

Figure 2-28 Shafter Terminal Site (BNSF Railway)

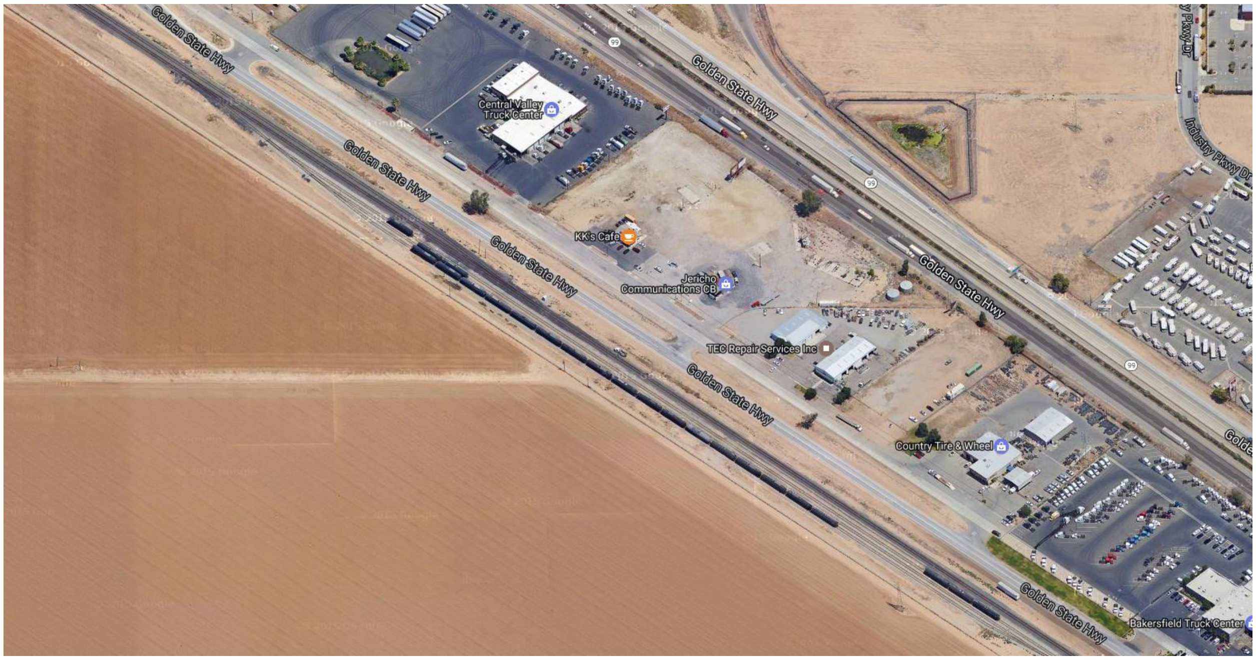


Source: Google Maps 2017

The BNSF site has been partially paved for use as a depot and staging facility by STE. As **Figure 2-28** shows, the BNSF site is adjacent to recent distribution center developments, minimizing potential drayage costs.

There is a second potential site located on the UP main line about 7 miles east **(Figure 2-29)**. KernCOG reports that UP has preliminary plans for an intermodal facility there.

Figure 2-29 Second Shafter Site (UP Railroad – exact site not verified)



Source: Google Maps

The LALB-Shafter intermodal service concept has been advanced as a means of reducing VMT and emissions from port container drayage. This analysis addresses the VMT reduction potential. A detailed emissions analysis is beyond the scope of this study. (The 2008 WZI study undertook a more extensive emissions analysis based on the proposal at that time.)

Proposed Shafter intermodal services face a significant economic challenges, as noted in previous studies. This analysis updates the available information on underlying costs to re-examine the rail-truck tradeoff. At the short length of haul, the terminal and drayage costs of rail intermodal service tend to outweigh the line-haul advantages, raising the underlying cost above the all-truck alternative. There are a very few short-haul intermodal services operating in the U.S. These include:

- CSX "Queen City Express", Port of Wilmington, NC to Charlotte, 228 miles
- Northwest Container Services, Portland-Tacoma-Seattle, 142-183 miles
- Heart of Georgia/Georgia Central, Savannah to Cordele, 210 miles
- NS, Savannah to Greer, 260 miles
- NS, Front Royal (VIP) to Port of Virginia, 210 miles

Other services are expected to begin operation in the near future:

- CSX Wilmington-Raleigh, NC, 199 miles, expected 2020
- CSX Savannah-Chatsworth, 350 miles, expected 2018

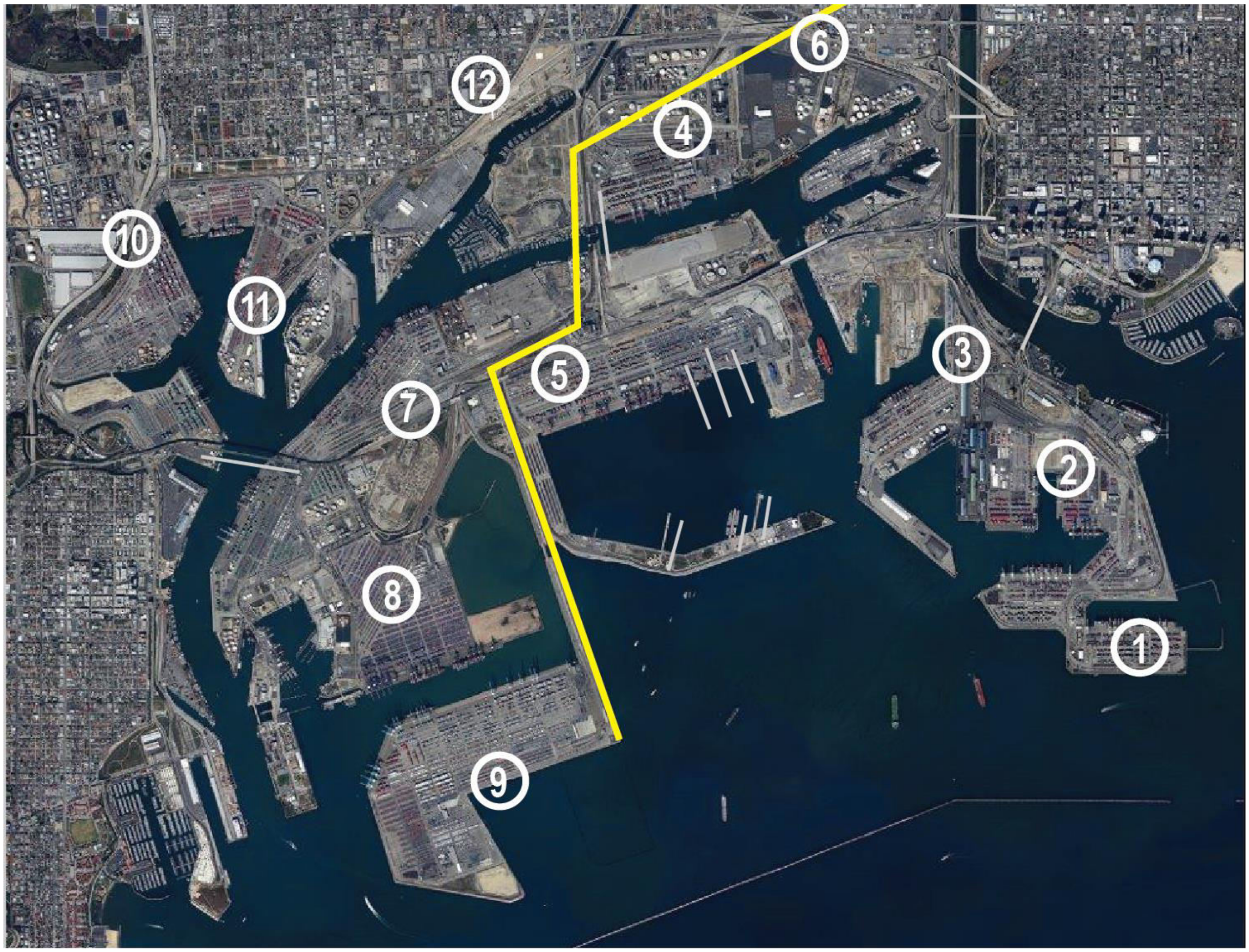
All of the existing short-haul intermodal services reviewed are, or will be, subsidized in the sense of not recovering their full costs from operating revenue. In many cases, the intermodal facilities in use were built with port funds or public funding, so the service does not need to recover those costs. In other cases, there may be operating subsidies, exemptions from some costs, or other arrangements to bring combined rail-truck intermodal rates below over-the-road drayage rates. The Northwest Container Services operation, for example, is subsidized by the ocean carriers who pay the rail switching and transfer costs at Tacoma and the costs of repositioning empty containers. Some CSX and NS services are reportedly incremental additions to existing trains and terminals rather than separate train operations.

2.5.1 Operational Context

To analyze the economics of a rail intermodal service between the Ports of Los Angeles/Long Beach and Shafter it is first necessary to establish the operational and commercial context.

The Ports of Los Angeles and Long Beach together have 15 marine container terminals, 14 of them served by on-dock rail facilities **(Figure 2-30)**.

Figure 2-30 On-Dock and Support Rail Yards in San Pedro Bay



Legend

1 – Pier J On-Dock	7 – TICTF Shared On-Dock
2 – Pier G On-Dock	8 – Pier 300 On-Dock
3 – Pier E On-Dock (MHT)	9 – Pier 400 On-Dock
4 – Pier A On-Dock	10 – WBICTF On-Dock
5 – Pier T On-Dock	11 – WB-East (TraPac) On-Dock
6 – Pier B Rail Yard	12 – B200 Support Rail Yard (PHL Base)

Source: Parsons, 2011.

An import container destined for a San Joaquin Valley customer could arrive at any one of these terminals. The two ports together had 2,122 container vessel calls in 2015, an average of 41 per week. Because all major container shipping companies operate as parts of alliances and share vessel capacity, the containers of one carrier do not always arrive at the same terminal. The imported containers to be moved via rail to Shafter may therefore be scattered over multiple terminals.

Rail service to the port terminals and the on-dock rail transfers is provided by Pacific Harbor Lines (PHL). PHL receives trains from BNSF and UP and switches the cars into on-dock working tracks. PHL then repositions cars if needed for loading with import containers and reassembles the loaded cars into trains for BNSF and UP.

There are also two off-dock rail intermodal terminals used primarily for international containers. UP's near-dock International Container Transfer Facility (ICTF) is roughly five miles from port terminals. BNSF's off-dock Hobart facility is about 20 miles from port terminals. The Southern California Intermodal Gateway (SCIG), BNSF's proposed near-dock intermodal rail yard, would add capacity of 1.5 million lifts annually. However, this project, to date, has failed to obtain environmental clearance to proceed and is currently on hold. In addition to these primary intermodal yards in Los Angeles County, UP also handles intermodal containers at three additional yards, including the Los Angeles Transportation Center (LATC) Intermodal Rail Yard, the East Los Angeles (ELA) Intermodal Yard, and the Industry Intermodal Rail Yard **(Figure 2-31)**. In addition (not shown on the map), UP's San Bernardino Intermodal Yard provides additional capacity. Estimates of the existing capacities of near-dock and off-dock yards are shown in **Table 2.25**.

Table 2.25 Existing Capacities of Off-Dock Rail Yards

Union Pacific	Lifts per Year
• **East Los Angeles Yard**	• 650,000
• **Los Angeles Transportation Center (LATC)**	• 340,000
• **Intermodal Container Transfer Facility (ICTF)**	• 822,000
• **City of Industry Yard**	• 235,000
• **BNSF**	•
• **Hobart Yard**	• 1,700,00
• **San Bernardino Intermodal Yard**	• 660,000

Source: I-710 Technical Memorandum – I-710 Railroad Goods Movement Study, 2009.

Figure 2-31 Major Rail Yards in Los Angeles County

Source: Cambridge Systematics, Inc.

BNSF and UP operate separately, and a given import customer or ocean carrier may have business relationships with either or both. The potential rail intermodal facility site at the Wonderful Business Park at Shafter is served by BNSF; UP does not have access. KernCOG, however, reports that UP has prepared plans for a facility on their line adjacent to SR 99.

2.5.2 VMT Impacts

Table 2.26 displays estimated one-way VMT changes for diversion of highway drayage to rail intermodal/drayage combinations between the Ports of LA/LB and selected SJV destinations from Lebec to Visalia (points north of Visalia tend to be dominated by the Port of Oakland).

Table 2.26 Impact of Rail Service to Shafter on Truck Miles Traveled between the Ports of LA/LB and SJV Destinations

Importer or Exporter	VF Outdoor Distribution	Walmart	Sears	Target	Men's Warehouse	IKEA	
City	Visalia	Porterville	Delano	Shafter	Bakersfield	Lebec	Average
From Ports of LALB Via Highway							
Truck VMT	**208**	**204**	**166**	**147**	**133**	**109**	
I710	19	19	19	19	19	19	
I5 South of Kern Co.	74	74	74	74	74	74	
I5 Total	90	90	90	90	90	89	
I5 in SJV Study Area	**16**	**16**	**16**	**16**	**16**	**15**	
SR99	**97**	**77**	**55**	**31**	**20**	**0**	
Other	2	18	2	7	4	1	
From Ports of LALB Via Shafter Intermodal Terminal							
Truck VMT	**69**	**50**	**27**	**1**	**18**	**41**	
I710	0	0	0	0	0	0	
I5 South of Kern Co.	0	0	0	0	0	0	
I5 in SJV Study Area	**0**	**0**	**0**	**0**	**0**	**1**	
SR99	**59**	**0**	**16**	**0**	**9**	**32**	
Other	10	50	11	1	9	8	
VMT Change							
Truck VMT	**-139**	**-154**	**-139**	**-146**	**-115**	**-68**	
I710	**-19**	**-19**	**-19**	**-19**	**-19**	**-19**	
I5 South of Kern Co.	-74	-74	-74	-74	-74	-74	
I5 in SJV Study Area	**-16**	**-16**	**-16**	**-16**	**-16**	**-14**	
SR99	**-38**	**-77**	**-39**	**-31**	**-11**	**32**	
Other	**8**	**32**	**9**	**-6**	**5**	**7**	
I5/SR99 Corridor Net	**-54**	**-93**	**-55**	**-47**	**-27**	**18**	**-43**
Non-Corridor	**-85**	**-61**	**-84**	**-99**	**-88**	**-86**	**-84**
Total	-139	-154	-139	-146	-115	-68	-127

As **Table 2.26** indicates, using the Target distribution center (DC) at Shafter as an example, a rail intermodal service could offset up to 146 drayage truck miles on each one-way trip, the full distance from the ports to Shafter. Of this reduction, 47 miles would be eliminated on the I-5/SR 99 study corridors and 99 miles from outside of the study area, mostly on the I-710 and on I-5 corridors in Los Angeles County.

Points east, west, or south of Shafter have lower VMT reductions because an over-the-road truck may take a more direct route while the rail intermodal option must include drayage from Shafter. The VMT reduction for a Bakersfield destination (e.g. the Men's Warehouse DC) is estimated at 88 miles, 27 of which would be on the I-5 and SR 99 corridors within the Valley **(Table 2.26)**. Total VMT reduction can be estimated from the trip-by-trip reductions shown in and estimates of total annual trips.

2.5.3 VMT Impacts

The 2009 Moffat & Nichol report noted that customers in the Shafter/Tejon Ranch area received about 48,000 annual import containers, mostly trucked from the Ports of LA/LB. In 2015, the combined Ports of LA/LB import container volume was 28.5 percent higher than in 2009; and, the amount of throughput utilizing the on-dock rail facilities has grown by 1.6 percent.

Table 2.27 San Pedro Bay Ports On-Dock Rail Volume Growth (Containers)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
On-Dock	1,630,472	2,112,162	2,002,981	1,889,566	1,613,251	1,840,321	1,880,498	1,963,343	2,009,797	2,257,775	2,227,203
% On-Dock*	20.7 %	24.1 %	23.0 %	23.7 %	24.6 %	23.5 %	24.2 %	25.0 %	24.8 %	26.9 %	26.2 %
Near-/Off-Dock	1,539,578	1,634,898	1,602,158	1,472,364	1,002,043	912,306	771,687	879,381	850,234	814,919	692,974
% Near -/ Off-Dock*	19.5 %	18.7 %	18.4 %	18.5 %	15.3 %	11.7 %	9.9 %	11.2 %	10.5 %	9.7 %	8.2 %
TOTAL	3,170,050	3,747,060	3,605,139	3,361,930	2,615,294	2,752,627	2,652,185	2,842,724	2,860,031	3,072,694	2,920,177
% TOTAL*	40.2 %	42.8 %	41.4 %	42.2 %	39.8 %	35.2 %	34.1 %	36.2 %	35.3 %	36.6 %	34.4 %
SPB Total Throughput**	7,885,801	8,755,677	8,704,169	7,964,100	6,564,773	7,830,778	7,778,664	7,846,320	8,110,642	8,400,448	8,495,592

*%ages based on total SPB Ports throughput.

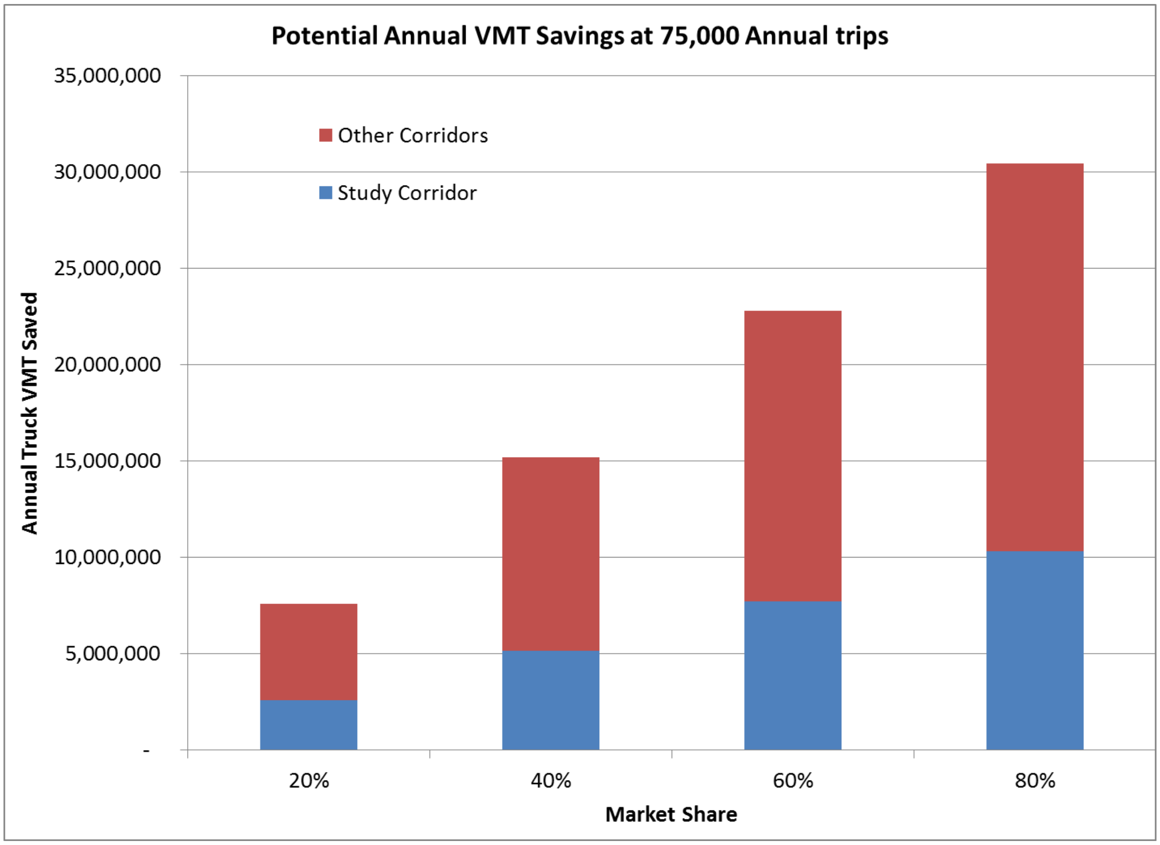
**Total SPB Ports container throughput calculated by dividing TEUs by 1.80 TEUs/container.

Source: Port of Long Beach

There has been substantial recent growth in Shafter-area distribution activity. Current local agency estimates indicate that the Shafter area importers are receiving approximately 300 containers per day (communication from KernCOG), which is reasonably consistent with a margin of growth beyond the pro-rated estimate of 247 per day derived above. An average of 300 per day over a 250-day year would yield an annual total of 75,000.

Given the variability of customer requirements and the pricing flexibility of motor carriers, a rail intermodal service could not be expected to attract the entire volume. **Figure 2-32** uses the 75,000 annual container estimate, and intermodal market shares ranging from 20 to 80 percent to display corresponding annual round-trip VMT savings at a one-way average of 43 VMT in the corridor and 84 VMT outside the corridor.

Figure 2-32 Conceptual Annual Round Trip VMT Savings from Shafter Intermodal Service



The totals range from 7.6 million total VMT avoided at a 20 percent market share to 30.4 million VMT reduction at an 80 percent share. About 34 percent of the VMT saved would be in the Valley.

A more detailed estimate of VMT savings would require:

- A detailed market study to establish potential volumes
- A detailed location study to establish the distribution of VMT savings per trip

Rail intermodal economics, addressed in the next section, will be a key factor in the ability of a rail intermodal service to attract a significant market share.

2.5.4 Cost Elements

Long-run economics are determined by the costs that operators and other participants incur and that form the basis for negotiated rates customers ultimately pay. This analysis of Shafter intermodal service costs focuses on these underlying costs for multiple reasons:

- There is little reliable information on actual rates. Most rates are contained in confidential agreements

- Participants have considerable latitude in the profit margins they seek over costs and the degree to which they attempt to recover a share of overhead or capital costs

The estimates below draw on cost estimates provided in earlier studies, costs available in public sources, and estimates provided in response to stakeholder contacts.

- Rail line haul cost factors have declined, particularly fuel costs, and productivity has increased. The 2008 cost estimates were adjusted to 2016 cost levels using the ratio of the Rail Cost Adjustment Factors for each year: 0.436 for 2008 and 0.356 for 2016.

- Over-the-road trucking costs have risen, although the increases have been tempered by decreased fuel costs. The analysis uses the 2016 American Transportation Research Institute estimates for over-the-road truckload costs in California of $1.593 per mile.

Rail intermodal service is a multi-step process by its nature, and each step has cost and service aspects.

- **Marine terminal operations.** Import containers are transferred from the vessel to the terminal container yard. This step is common to all intermodal service scenarios and is performed at the ocean carrier's expense, so the analysis does not include this cost.

- **On-dock rail transfer.** The marine terminal operator (MTO) charges to load rail cars on-dock, typically $130–150 per container at the Ports of Long Beach or Los Angeles. This cost could be billed to either the ocean carrier or the railroad, depending on the business relationship.

- **Port rail switching.** Pacific Harbor Lines (PHL) performs port-area rail switching and train breakup/assembly. The cost could be billed to BNSF or UP. The estimated cost of switching is currently about $10.89.

- **Rail line-haul.** A LA/LB ports-Shafter rail service would be about 190 miles via UP or 300 miles via BNSF (due to BNSF's routing through Barstow). Alternatively, the rail line haul could be about 185 miles from the ICTF or 280 miles from Hobart. The rail line-haul cost is the most difficult to estimate. The actual marginal cost depends on the number and type of cars and locomotives used. The average cost or full allocated cost also includes a share of track, maintenance, and overhead costs. There are strong economies of scale in train size. The 2008 SCAG study estimated the rail line-haul rate at $1.31 per container mile for a 100-container shuttle train and a 1.5 revenue to cost ratio. This estimate is equivalent to a cost-only estimate of $0.71 per container mile in 2016.

- **Intermodal terminal and lift.** Intermodal terminals are usually owned and maintained by the railroad and operated by contractors. The railroad bears the facility capital and maintenance costs, and the contractor charges the railroad a per-container lift fee. These costs are ordinarily part of the railroad's rate to the customer. There are economies of scale in intermodal terminal operations, with cost per lift declining from about $50 per container at small facilities to $40 at large ones.

- **Truck drayage.** Truck drayage costs include time spent at marine or rail terminals as well as the time spent driving. The time spent at the ultimate customer destination (e.g. an import distribution center) is the same for all scenarios. The truck-only scenario includes marine terminal time and driving time to the customer. The intermodal scenario may include drayage between the marine terminal and an off-dock rail terminal and a second drayage trip between the Shafter terminal and the customer. The analysis uses the ATRI 2016 cost estimate of $1.593 per mile and $65 per hour for waiting time at terminals (typical of trucking company charges for excess terminal time).

- **Chassis cost.** Current chassis pool rates are about $20 per day. The analysis allows one day of rental for each one-way highway trip, and a half-day of rental for each one-way intermodal trip.

2.5.5 Over-the-Road Trucking Option

The highway distance from Terminal Island between the Ports of LA/LB to Shafter is about 145 miles. The analysis allows for a 15-mile trip beyond the Shafter terminal to access a broader market and to remain comparable to a rail intermodal trip with drayage from Shafter to final destination, a total of 160 miles for the truck option. The truck option also includes waiting time at the marine terminal.

2.5.6 Intermodal Service Scenarios

Port to Rail Transfer

There are multiple ways to move an import container from a marine terminal onto a railcar and onto a train for Shafter. As indicated below these different strategies have implications for both cost and service.

On-dock rail transfer. On-dock transfer is typically the preferred strategy for loading and assembling trains of international containers. Efficient on-dock transfer ordinarily requires a large volume of containers for the same destination (e.g. Chicago) or at least for the same train (e.g. cars that will be sorted later at a rail block-swapping yard). Otherwise the cars must sit for multiple days and occupy valuable trackage while they are filled or smaller lots of cars must be switched and combined from multiple terminals.

It would be unlikely for the container volumes envisioned for a Shafter inland port to fill a train at a single marine terminal on a single day. Most likely, use of on-dock loading would entail switching cars from multiple terminals and assembling them on PHL trackage elsewhere.

Use of on-dock transfer would entail marine terminal operator transfer fees of $130 (minimum of range) per container lift and the Alameda Corridor fee of $46.52 per 40’ container.

The minimum cost of an on-dock transfer strategy would therefore be $176.52 ($130.00+$46.52) per container.

An on-dock strategy would also affect transit time and/or service frequency. On average under current conditions, containers experience a two-day dwell time on the marine terminal before being loaded on rail cars. The need to switch and assemble cars from multiple terminals would add at least a day to the time between the ports and Shafter. Another option would be to alternate ports or terminals. The NWCS service to Portland alternates between Seattle and Tacoma, which means next-day service alternates with second-day service. At San Pedro Bay, however, there are 14 on-dock rail terminals, so maintaining multiple weekly departures from each would still require some switching and assembly. The time between vessel arrival and train departure for Shafter under current conditions would therefore be 2 to 4 days to allow for both on-terminal dwell and switching and assembly.

Off-terminal drayage. Import containers could be drayed to the ICTF or Hobart and loaded on Shafter trains there. The major components of drayage cost are miles traveled and turn time at port and rail terminals. According to the most recent ATRI estimates, operating costs average about $1.59 per mile. Drayage firms have recently been charging about $65 per hour for excess driver time at marine terminals so that figure was used as an estimate for the hourly cost of turn time. Typical turn times are about 1.5 hours at marine terminals and 0.5 hours at rail terminals.

The ICTF is about five miles from the ports, so one-way drayage costs would be about $137.95. BNSF's Hobart facility is about 20 miles from the ports, so underlying drayage costs to Hobart would be about $161.80. Note that most of the drayage cost is actually in the terminal turn times.

The existing Shafter terminal site served by BNSF would not be accessible via the UP at ICTF so Hobart would be the off-terminal drayage option. The lift cost at either facility is about $40, which would be included in the rail rate.

The impact on service would depend on how promptly containers were drayed from the marine terminal after they became available. The drayage trip may not add to the overall time, as the container would be at the rail terminal for an evening or night cut off the same day it was pulled from the marine terminal. If the container were drayed during the day shift at the marine terminal, however, it would be subject to the Traffic Mitigation Fee ("PierPASS" fee) of $140.98 per container. Avoiding this fee would require draying containers after 6 p.m., which could jeopardize same day train departures.

Rail Line-Haul Options

Intermodal "Shuttle" Trains. Most discussions of short-haul rail intermodal service to inland ports envision short, dedicated "shuttle" trains that move back and forth between the inland port and the marine terminals. The Shafter rail shuttle concept calls for 300 containers per ship[25] headed for the inland port equivalent to a train consisting of 30 five-platform double-stack cars, with a total length of 9,000 feet if the full volume moved on a single train. The 2008 Shafter emissions study envisioned two such trains daily. Rather than what is commonly envisioned as "shuttle" trains, these

[25] Inland Container Yard Concept presentation, 9/6/16.

would be full-length double-stack trains requiring 5–6 locomotives each on the steep grades exiting the LA basin.

The assumption of 300 containers per vessel call going to Shafter may be optimistic. As of 2015 the average vessel at LA and LB unloaded about 2,000 import containers, so Shafter would have to receive 15 % of all imports to reach 300 containers per vessel.

One concept that could change this convention is a shorthaul rail option that considers scheduled, daily trains of only 1,500-2,000 feet in length from each on-dock rail facility. These trains would be assembled on a designated working track within each terminal. In order for a service like this to be fully considered, an inland port capable of handling that type of volume would need to be identified. The ideal location would: provide access to both Class I railroads; allow for one crew to deliver the train and return to the ports in a single shift; serve an inland market; and, result in a total reduction in truck VMT (meaning, cargo moved by train to an inland port would not be back-hauled to warehouses or distribution centers near the ports).

Existing Intermodal or Manifest Train Service. Another option would be to add Shafter-bound rail cars to existing UP or BNSF trains moving north from the ports rather than running separate shuttle trains. These trains could be either other intermodal trains or manifest trains (trains of mixed car types). In this scenario PHL would pull loaded Shafter cars from marine terminals and interchange them to UP and/or BNSF. UP or BNSF would then move the cars through their system as they would any other freight car and deliver them to Shafter.

This option would add 1–3 days of delay and incur switching costs, but would avoid a separate "train start" for a Shafter shuttle train and obviate any volume minimums. This strategy might also be considered as a start-up approach until volumes justified separate shuttle trains.

Rail Costs. In the 2008 SCAG study, rail line haul cost for moderate-sized 100 container trains was estimated at $146.27 for the 112 mile round trip between the ports and Ontario via UP, with a revenue/cost ratio of 1.5. This estimate is equivalent to a per-container cost of $0.87 per mile at 2008 cost levels. Rail costs have actually declined since 2008. The AAR Rail Cost Adjustment Factor for 2008 was .436, while by 2016 it had declined to .356. The $0.87 per mile in 2008 would therefore be equivalent to about $0.71 per mile in 2016.

2.5.7 Cost Comparisons

The cost estimates in **Table 2.28** can best be interpreted as the marginal costs of adding Shafter trips to existing operations. Both truck and rail operators would seek rates that provided a profit margin above these costs.

Table 2.28 Truck-Intermodal One-Way Cost Comparisons

Shafter Truck-Intermodal One-Way Cost Comparison			Highway Truck Drayage	BNSF On-Dock	BNSF Hobart	UP On-Dock	UP ICTF
		Rail Miles	0	300	280	185	190
		Truck Miles	160	15	35	15	20
Cost Factor	**Cost**	**Per**					
Alameda Corridor Fee - 40' bo:	$ 46.52	Unit		$ 46.52		$ 46.52	
Rail Intermodal Lift - Shafter	$ 50.00	Unit		$ 50.00	$ 50.00	$ 50.00	$ 50.00
Rail Intermodal Lift - Off-dock	$ 40.00	Unit			$ 40.00		$ 40.00
Rail Intermodal Lift - On-Dock	$ 130.00	Unit		$ 130.00		$130.00	
Truck Operating Cost	$ 1.59	Mile	$ 254.88	$ 23.90	$ 55.76	$ 23.90	$ 31.86
Truck Driver Terminal Time	$ 65.00	Hour					
Truck Turn Time at Port	1.5	Hour	$ 97.50		$ 97.50		$ 97.50
Truck Turn Time at Rail	0.5	Hour		$ 32.50	$ 65.00	$ 32.50	$ 65.00
Chassis Rental Cost	$20.00	Day	$20.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
Port Rail Switching Cost	$ 10.89	Unit		$ 10.89		$ 10.89	
Rail Line Haul Cost	$ 0.71	Mile		$ 213.27	$ 199.05	$131.52	$135.07
Underlying Cost Total			**$ 372.38**	**$ 517.08**	**$ 517.31**	**$435.32**	**$429.43**

As other studies have observed, the rail movement itself is relatively economical, although BNSF's circuitous route through Barstow adds substantial cost. The major cost difference between rail intermodal and truck options lies in the terminal, switching, and drayage costs at the end points.

2.5.8 Next Steps

Although the barriers to shorthaul rail continue to lessen, trucking to the Valley continues to be the preferred mode of transport to locations within 500 miles of California's ports due to costs and flexibility. The Valley should continue to monitor the development of inland port concepts and analyses, as well as railroad operating changes, port policies, shipper needs, and terminal operator business practices as they relate to shorthaul rail opportunities.

2.6 Strategic Program Performance Assessment

In addition to the above projects, a qualitative assessment was conducted on the strategic programs identified in Task 2 and 3 to enhance the qualitative assessment conducted in that document.

Table 2.29 I-5/SR 99 Goods Movement Corridor Study Strategic Programs Assessment

Strategic Program	Capital Cost	% Truck VMT Reduced	Public Funding Situation	Strategic Goal Addressed
I-5/SR 99 Roadway Pavement and Bridge Maintenance	» Mostly Low, Sometimes Medium	Not Applicable	Mostly Funded	Infrastructure
Overweight/ oversize policy to allow heavier/longer trucks on I-	Unknown; potential need to add dedicated lanes, reinforce bridges	High	Not Applicable	Economic Competitiveness, Environment

Strategic Program	Capital Cost	% Truck VMT Reduced	Public Funding Situation	Strategic Goal Addressed
5 in both directions between San Joaquin County boundary to Kern County boundary (exact boundaries of this project can be identified during future project development)	and lanes to carry heavier loads, and add ITS			
Truck only Toll Lanes on I-5 between I-5 and I-205 junction in San Joaquin County and I-5 and SR 99 junction in Kern County	High	Not Applicable	Unfunded	Mobility/Reliability, Environment, Innovative Technology and Practices
Truck climbing lanes at steep locations such as Altamont Pass, Pacheco Pass and Tehachapi Passes (Grapevine area and SR 58 Eastbound).	Medium	Not Applicable	Unfunded	Mobility/Reliability, Safety/ Security
I-5/SR 99 Capital Projects for Bottlenecks Congestion Relief	Mostly Medium	Not Applicable	Partially Funded	Mobility/Reliability
I-5/SR 99 Operational Projects for Bottlenecks Congestion Relief	Mostly Low	Not Applicable	Partially Funded	Mobility/Reliability
I-5 to SR 99 Connector Capital and Operational Projects for Improved Accessibility	Mostly Medium	Not Applicable	Partially Funded	Mobility/Reliability, Economic Competitiveness
I-5/SR 99 Interchanges Reconfiguration Program for Key Freight Access Interchanges with Inadequate Design	Mostly High, Sometimes Medium	Not Applicable	Partially Funded	Mobility/Reliability,
I-5/SR 99 Capital Projects for Safety Hotspots Alleviation	Mostly Medium	Not Applicable	Partially Funded	Safety/Security, Mobility/Reliability
I-5/SR 99 Operational Projects for Safety Hotspots Alleviation	Mostly Low	Not Applicable	Partially Funded	Safety/Security
Container depot service near Stockton for Port of Oakland and in Shafter for Ports of Long Beach and Los Angeles service	Not Applicable	Low	Unfunded	Economic Competitiveness
Short-haul rail service	High (if new rail	High for mid-SJV	Unfunded	Economic

Strategic Program	Capital Cost	% Truck VMT Reduced	Public Funding Situation	Strategic Goal Addressed
between SJV region and Port of Oakland	intermodal facility is built), otherwise Low (mostly relating to Rolling Stock for Rail Shuttle)	locations, Low otherwise		Competitiveness, Environment
Short-haul rail service between SJV region and Ports of Long Beach/Los Angeles	High (if new rail intermodal facility is built), otherwise Low (mostly relating to Rolling Stock for Rail Shuttle)	High for mid-SJV locations, Low otherwise	Unfunded	Economic Competitiveness, Environment
Caltrans' Truck Parking Information System on I-5	Medium	Not Applicable	Partially Funded	Safety/Security, Innovative Technology and Practices
Truck Platooning	Medium	Not Applicable	Not Applicable	Safety/Security, Mobility/Reliability, Innovative Technology and Practices

Source: (a) CalSTA and Caltrans, 2014 California Freight Mobility Plan[26]; (b) Fresno Council of Governments (COG) 2014 Regional Transportation Plan (RTP)[27]; (c) Kern Council of Governments (COG) 2014 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)[28]; (d) Kings County Association of Governments (CAG) 2014 Regional Transportation Improvement Program (RTIP)[29], (e) Madera County Transportation Commission 2014 RTP/SCS[30], (f) Merced County Association of Governments 2014 RTP/SCS[31], (g) San Joaquin Council of Governments (COG) 2014 RTP/SCS[32]; (h) Stanislaus Council of Governments (COG) 2014 RTP/SCS[33]; and (i) Tulare County Association of Governments 2014 RTP/SCS[34]

[26] http://www.dot.ca.gov/hq/tpp/offices/ogm/ CFMP/Web/Display_VisionGoalsObj_ARCH_E_36x48.pdf#zoom=85 (last accessed on May 11, 2016)

[27] http://www.fresnocog.org/sites/default/files/publications/RTP/Final_RTP/2014_RTP_Chapter_Six_Final.pdf (last accessed on May 11, 2016)

[28] http://www.kerncog.org/images/docs/rtp/2014_RTP.pdf (last accessed on May 11, 2016)

[29] http://www.kingscog.org/vertical/sites/ percent7BC427AE30-9936-4733-B9D4-140709AD3BBF percent7D/uploads/Chap_3_-_Policy_Element_-_2014_Final_RTP.pdf (last accessed on May 11, 2016)

[30] http://www.maderactc.org/wp-content/uploads/2014/07/MCTC-2014-Final-RTP-SCS.pdf (last accessed on May 11, 2016)

[31] http://www.mcagov.org/DocumentCenter/View/314 (last accessed on May 11, 2016)

[32] http://www.sjcog.org/DocumentCenter/View/484 (last accessed on May 11, 2016)

[33] http://www.stancog.org/pdf/rtp/chapter-6-transportation-plan-and-policies.pdf (last accessed on May 11, 2016)

[34] http://www.tularecog.org/wp-content/uploads/2015/06/Final-2014-Regional-Transportation-Plan-Sustainable-Communities-Strategy-FULL-DOCUMENT.pdf (last accessed on May 11, 2016)

3.0 Project Implementation

This section discusses a number of topics related to project implementation. First, the section identifies potential funding sources at the federal, State, regional, and local level that can be directed to the identified projects and strategic programs. Next, it describes potential barriers to project or program implementation.

3.1 Funding Availability

3.1.1 Federal Funding

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

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

The first set of FASTLANE Grant awards totaling nearly $760 million was announced in July 2016. Out of the 212 applications asking for nearly $9.8 billion, the only project in California awarded funding was for construction of a one mile portion of SR 11 and southbound connectors for SR 905, 125, and 11 in Otay Mesa, CA.[35] Projects in the study region that sought funding included[36]:

- SR 99 Tagus 6-Lane Widening Project (TCAG;

[35] Awarded $49.3 million. https://www.transportation.gov/buildamerica/FASTLANEgrants

[36] http://www.dot.ca.gov/hq/transprog/map21/implementation/fastlane-2016-pjt-app-submittals.pdf

- SR 99 Widening from 4 to 6 Lanes (MCTC); and
- SR58/SR99 Centennial Corridor Freight Corridor Improvements Project (City of Bakersfield)

Applications for a second round of FASTLANE Grants were announced in October 2016 with applications for the approximately $850 million due in December, 2016. It is anticipated that the majority of submissions for the second round of funding will be projects that did not receive an award in the first round.

The second potential funding source for I-5/SR 99 projects is the National Highway Freight Program (NHFP). The NHFP will provide $582.4 million to California over the next five years, with apportionment to states by formula based on the number of Primary Highway Freight Network miles in the state.[37] The Primary Highway Freight Network is one of four components of the National Highway Freight Network (NHFN). The other three components include:

- The remainder of the Interstate System not included in the Primary Highway Freight Network;
- Critical Urban Freight Corridors; and
- Critical Rural Freight Corridors

The entirety of I-5 and SR 99 in the study region part of the Primary Highway Freight System and thus are included as part of the NHFN. This means that projects on these roads are eligible for federal freight formula funds.

"Innovation" is another key theme found throughout the FAST Act. The FAST Act provides new funding for ITS projects such as vehicle-to-vehicle and vehicle-to-infrastructure technology as well as infrastructure maintenance systems, alternative charging systems, and information sharing systems that could involve a freight component. The bill also explicitly makes ITS-related projects eligible for funding under several formula programs including the NHFP and FASTLANE Program.

One new funding program in the Innovation Section is the Advanced Transportation and Congestion Management Technologies Deployment Program. This competitive grant program will focus on the development of pilot projects and model deployment sites for the installation and operation of advanced transportation technology such as truck parking management systems or truck-only tolls lanes—both of which are under consideration as part of this project.

Finally, the Transportation Investment Generating Economic Recovery (TIGER) grant program is still active. The latest round of funding, awarded in July 2016, included four projects in California. None

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

directly address conditions on I-5/SR 99 in the SJV region[38] but one of the four was a grade separation project targeted to freight needs.

3.1.2 State Funding

The Trade Corridor Improvement Fund (TCIF) was the last statewide freight investment program approved in California. Passed in November 2006 as part of the Proposition 1B bond package, it provided a total of $2.5 billion for infrastructure improvements along federally designated "Trade Corridors of National Significance" in California or other corridors with a high volume of freight movement. Most of the original TCIF funding has been allocated by the California Transportation Commission, with only small amounts available from project savings in the original allocations.

In 2014, the State passed a bill allowing the program to continue allocating funds transferred in from other programs.[39] The California Transportation Commission also amended the program in March 2016 to extend the allocation deadline from June 2016 to June 2019 and the deadline to begin construction from December 2016 to December 2019 for new TCIF projects.[40] Neither provided the TCIF with a significant, sustainable new funding source.

The state legislature and the governor continue to look for a comprehensive approach to meeting funding needs for the state's transportation system for the future that looks beyond current funding programs. Various funding proposals for TCIF have been included in the discussions, but at this time, no state action has been taken to renew TCIF funding.

One possible route forward for new state funding is through the use of money from California's Cap and Trade program, administered by the California Air Resources Board. Approximately 40 percent of the revenue from this source is unallocated. To receive funding from the legislature, projects will need to reduce greenhouse gas emissions and improve the environment. The two short-haul rail strategic programs that would help divert goods from truck to rail and thereby reduce emissions may be good candidates for this unallocated revenue, should the legislature elect to spend the money on transportation projects. Other strategic programs such as truck climbing lanes and truck platooning may also be eligible. Alternatively, this funding could help provide seed money for programs in the region that reduce greenhouse gas emissions from trucks such as anti-idling technology, truck stop electrification, or partial/full zero emissions vehicles.

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

[38] A project in Live Oaks will improve and expand a one-mile stretch of SR 99. https://www.transportation.gov/sites/dot.gov/files/docs/TIGER percent20Fact percent20Sheets percent20-percent207-28.pdf

[39] http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201320140SB1228

[40] http://www.catc.ca.gov/meetings/agenda/2016Agenda/2016-03/59-4.15.pdf

funding and a forecasted revenue reduction through 2020-21, the Draft 2016 ITIP[41] does not include any new programming. Other projects, specifically those addressing safety hot spots may be eligible for non-freight specific funding sources such as the Highway Safety Improvement Program (HSIP) since they would likely improve safety for all road users.

3.1.3 Regional and Local Funding

Regional and local freight transportation funding in the Central California Coast region is sparse. The largest local source of money for transportation projects comes through local sales tax measures passed at the county level. The Self-Help Counties Coalition (SHCC) is an organization representing the 20 local transportation agencies in counties where such a tax has passed. Table 3.1 below identifies counties in the study area that are members and relevant tax and revenue information.

Table 3.1 Local Sales Tax Measures for California SHCC Members

County	Sales Tax Name	Amount	Time Covered	Revenue	Funding Allocation (if known)
San Joaquin	Measure K	Half-cent	Renewed in 2006 for 30 years	$2.552 billion	Local Street Repairs/Safety (35%), Congestion Relief (32.5%), Rail Crossing Safety (2.5 %), Passenger, Rail, Bus, Bicycles (30%)
Madera	Measure T	Half-cent	Passed in 2006 for 20 years	$197 million	Commute Corridors/Farm to Market Program (51 %), Safe Routes to Schools and Jobs (44 %), Transit (2 %), Environmental Enhancements (2 %), Admin/Planning (1 %)
Fresno	Measure C	Half-cent	Renewed in 2007 for 20 years	$1.3 billion ($3.4 billion if leveraged for state/ federal funds)	Local Transportation Programs ($593.6 million), Regional Transportation Programs ($520.8 million) Public Transit ($412 million), Alternative Transportation ($102.5 million), Environmental Enhancement ($59.8 million), Admin/Planning ($25.6 million)
Tulare	Measure R	Half-cent	Passed in 2006 for 30 years	$652 million	Local Programs (35 %), Regional Projects (50 %), Transit/Bike/Environmental (14 %), Admin/Planning (1 %)

Source: http://www.selfhelpcounties.org/members.html and component Council of Governments.

This money could be used on local roads connecting to I-5 and SR 99 in support of interchange/intersection needs.

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

3.2 Barriers to Implementation

The largest barrier to achieving the projects identified in this study is funding. As discussed in Section 3.1, the inclusion of dedicated freight funding in the FAST Act provides some certainty for freight projects moving into the future. However, the I-5/SR 99 corridor is mainly rural and lacks the major congestion issues seen in California's more populated regions. Because of this, projects to expand I-5 and SR 99 are likely to struggle to attract significant funding. The Valley's position as a leading agricultural area adds to this need. The US Department of Agriculture projects agricultural exports from the U.S. to rise by $4.3 billion in 2017 over 2016 figures.[42]

However, changing national priorities following the 2016 election of Donald Trump may also have an impact on goods movement in the Valley. Numerous statements from Trump indicate that infrastructure spending will be a key focus in his administration.[43] Although the FAST Act is funded through 2020, additional funding or a change in priorities for grant programs may make additional funding available to road projects.

Additional barriers to implementation include a lack of community support for projects, which often relates closely with environmental impacts, such as traffic, noise, and air quality associated with building major infrastructure improvements.

[42] http://www.usda.gov/wps/portal/usda/usdahome?contentid=2016/11/0252.xml&contentidonly=true

[43] http://www.pbs.org/newshour/bb/trump-promises-make-infrastructure-major-focus/

4.0 Conclusions and Further Work

This final section provides recommendations for next steps. First, this section begins by providing a list of projects that are anticipated for implementation in the next five years. This was determined through review of the STIP or from information provided by the counties. Two leading project readiness determinants include environmental review and funding allocations. Second, this section considers longer term major improvement corridor-to-corridor connector projects. Lastly, this project points to road-to-rail mode shift and technological advancement opportunities that should be closely monitored. Please note that the SR 58 and Centennial Corridor improvements are included in sections 4.1 and 4.2.

4.1 Ready-To-Go Projects

Table 4.1 below lists projects identified in Section 2 with a timeline of 0-5 years. The projects are segregated by county. For each of these projects, the table lists the estimated project cost, whether or not the project is included in the California State Transportation Improvement Program (STIP), the status of any required environmental review, and the overall project status or phase.

Table 4.1 I-5/SR 99 Goods Movement Corridor Study Projects: 5 Year Time Frame

County	Study ID	Project ID	Route or Facility ID	Title and Description	Total Project Cost (thousands)	Included in STIP?	Environmental Review Status?	Phase/Status
Fresno	FRE-03	FRE500766	SR 99	California High-Speed Rail Project-SR 99 Re-Alignment	$ 189,500	No		
Fresno	FRE-11	FRE500404	SR 99	Mountain View and SR 99 Overcrossing: Widen Overcrossing and Improve Ramps	$ 45,000	No		
Fresno	FRE-12	FRE500143	SR 99	NB SR 99 Herndon Off Ramp: Signalize & Widen Ramp	$ 1,000	No		
Fresno	FRE-21	15d	I-5	Widen I-5 between Kings County and Merced County lines	$ 198,000	No		
Fresno	FRE-26	99e	SR 99	Widen SR 99 from 6 to 8 lanes from Central Ave to Bullard Ave.	$ 283,000	No		
Kern	KER-02	KER08RTP020	SR 58	Centennial Corridor	$ 698,000	No		
Kern	KER-03	51 / KER08RTP114	Centennial Connector	Centennial Connector - SR 58/Cottonwood Rd to Westside	$ 698,000	Yes	ROD issued for Alternative B*	Programmed for $33 million

County	Study ID	Project ID	Route or Facility ID	Title and Description	Total Project Cost (thousands)	Included in STIP?	Environmental Review Status?	Phase/Status
				Parkway				in FY 18-19
Kern	KER-51	KER14RTP001	SR 46	Brown Material Rd to I-5 - interchange upgrade at 1-5 - Phase 4A	$ 27,000	Yes		
Madera	MAD-01	MAD417004	SR 99	SR 99: 4-Lane Freeway to 6-Lane Freeway Ave 12 to Ave 17	$ 91,010	No		
Madera	MAD-05	5335	SR 99	Madera – Widen to 6 Lanes from Ave. 12 to Ave. 17	Unknown	Yes	Anticipated ND/FONSI	Programmed for $1.545 million in FY 19-20
Madera	MAD-06	MAD417001	SR 99	Reconstruct Interchange	$ 68,000	No		
Madera	MAD-07	6297	SR 99	South Madera - Widen to 6 Lanes from .7 miles north of Ave. 7 to Ave. 12	Unknown	No	Anticipated ND/FONSI	$1.5 million in FY 16-17 deleted
Madera	MAD-08	MAD418002	SR 99	Widen SR 99: In Fresno & Madera Counties, from south of Grantland Ave UC to north of Avenue 7	$ 54,000	No		
Merced	MER-03	0161A	SR 99	Highway 99: Livingston Widening Northbound	$ 42,870	No		
Merced	MER-04	0161B	SR 99	Highway 99: Livingston Widening Southbound	$ 38,950	No		
Merced	MER-10	19	SR 152	Widen SR 152 between SR 99 and US 101 (in Merced County)	N/A	No		
San Joaquin	SJ-11	SJ07-2005	I-5	I-5 at Louise Avenue Interchange	$ 33,000	No		
San Joaquin	SJ-13	SJ11-3066	I-5	I-5 at Roth Road Interchange	$ 16,800	No		
San Joaquin	SJ-14	15b	I-5	Widen I-5 between SR 120 and I-205	$ 207,970	No		
San Joaquin	SJ-15	15a	I-5	Widen I-5 from 1 mile north of SR-12 to SR-120	$ 91,000	No		
San Joaquin	SJ-24	99a	SR 99	Widen SR 99 from French Camp Rd to Mariposa Rd 6 to 8 lanes, with new	$ 100,000	No		

County	Study ID	Project ID	Route or Facility ID	Title and Description	Total Project Cost (thousands)	Included in STIP?	Environmental Review Status?	Phase/Status
				interchange				
San Joaquin	SJ-26b	SJ11-2023	SR 99	SR 99 at Austin Road Interchange	$ 3,000	No		
San Joaquin	SJ-30	SJ11-2002	SR 99	SR 99 at Eight Mile Road Interchange	$ 65,900	No		
San Joaquin	SJ-31	SJ11-2008	SR 99	SR 99 at Gateway Boulevard Interchange	$ 9,930	No		
San Joaquin	SJ-33	SJ07-2015	SJ07-2015	SR 99 at Main Street/UPRR Interchange (Ripon)	$ 10,000	No		
San Joaquin	SJ-34	SJ11-2001	SJ11-2001	SR 99 at Morada Interchange	$ 69,800	No		
San Joaquin	SJ-35	SJ 14-2001	SJ 14-2001	SR 99 at Raymus Expressway Interchange	$ 3,000	No		
San Joaquin	SJ-38	3045	3045	Turner Road Interchange Operational Improvements	$ 3,061	No		$3.061 million in FY 17-18 deleted
San Joaquin	SJ-25	26	26	Widen SR 12 between I-5 and SR 99	$ 60,000	No		
San Joaquin	SJ-26a	16	16	Widen SR 120 between I-5 and SR 99, with new interchange at SR 99	$ 115,191	No		
Stanislaus	STA-16	TIER II	SR 99	Interchange Ramp and Auxiliary Lane Improvements	$ 27,685	No		
Stanislaus	STA-17	SC02	SR 99	SR 99 & Hammett Rd	$ 95,524	No		
Stanislaus	STA-20	M15	SR 99	SR 99 & Briggsmore Interchange	$ 12,668	No		
Stanislaus	STA-23	T01	SR 99	Reconstruct Interchange at Fulkerth Road	$ 12,667	No		
Stanislaus	STA-26	M17	SR 99	Reconstruct to 8-lane Interchange - Phase II	$ 5,835	No		
Stanislaus	STA-29	P02	I-5	I-5 to Rogers Road: Interchange Improvements and Widen Sperry Ave	$ 17,505	No		
Stanislaus	STA-37	M02	SR 99	Widen from 6 to 8 lanes	$ 50,671	No		
Stanislaus	STA-40	99b	SR 99	Widen SR 99 from 6 to 8 lanes in	$ 473,000	No		

County	Study ID	Project ID	Route or Facility ID	Title and Description	Total Project Cost (thousands)	Included in STIP?	Environmental Review Status?	Phase/Status
				Stanislaus County				
Stanislaus	STA-39	17	SR 132	Widen SR 132 connecting SR 99 and I-580	$ 100,000	No		
Tulare	TUL-16		SR 99	State Route 99/Betty Drive Interchange	$ 66,720	Yes		Programmed for $16.720 "Prior"

Source: http://www.catc.ca.gov/programs/STIP/2016_STIP/2016_STIP_Staff_Recommendations_042216.pdf Staff recommendations were adopted with changes (none that impact proposed projects above) in May 2016 per:
http://www.catc.ca.gov/programs/STIP/2016_STIP/2016_STIP_Adoption_with_Changes_051816.pdf
*ROD online at: http://www.bakersfieldcity.us/civicax/filebank/blobdload.aspx?BlobID=29683

4.2 I-5 to SR 99 Connector Projects

Section 2 provided a detailed analysis of connector corridors. The results of this analysis were based on the following assumptions:

- Cross traffic conflict would be eliminated through the replacement of at-grade intersections with grade-separated interchanges
- Additional capacity would be added (typically one additional travel lane in each direction) in order to facilitate average travel speeds of 55 miles per hour along the full extent of the connector
- Each connector was analyzed individually to measure the full potential of each corridor

The following provides an overview of the anticipated benefits and the recommended next steps that should be considered.

4.2.1 Benefits of Enhanced Connectors

The results of the analysis shown in **Table 4.2** provides the maximum benefits anticipated for each corridor under existing conditions. Future growth is not assumed so the benefits below provide a conservative estimate of benefits. Also, this analysis only considered benefits to freight, and specifically, benefits associated with shifting heavy duty trucks from SR 99 to I-5. This analysis did not include potential benefits associated with shifting other traffic from SR 99 to I-5.

Table 4.2 Summary of I-5/SR 99 Connectors Improvements Impacts

Project	Length (Miles)	Number of Intersections	Major Urban Area	Daily Truck Change	Annual VHT (1,000s)	Annual SR 99 VMT (millions)	Annual CO2 (million tons)*	Annual NOx (million tons)*
SR 58	30	8	Bakersfield	300	-13.1	-5.5	-	-
West Beltway	19	10	Bakersfield	3,000	-70.1	-32.2	-	-
SR 41	54	22	-	400	-27.5	-1.2	-386	-1.6
SR 140	35	10	Gustine	200	-1.4	-	-71	-0.3
SR 152	42	6	Los Banos	2,400	-4.2	-0.2	-214	-0.8
SR 165	38	9	Los Banos , Hilmar	500	-42.1	-1.1	-938	-3.6
SR 132	20	7	-	150	-3.2	-	-33	-0.2

*Emissions savings only calculated based on trucks shifted from SR 99. Additional benefits of reduced congestion on SR 99 are not included in the calculation.

Due to significant differences in costs associated with freeway widening and interchange improvements, it was not possible to perform even a high-level estimate of costs. For this study, we considered costs of widening projects contained in the STIPs and RTPs; however, the cost estimates can range from $5 – 20 million per mile for a new travel lane and from $50 – 140 million for a new interchanges.

4.2.2 Next Steps

First, a more comprehensive analysis of the purpose and need of these corridors should be conducted. The analysis should include the following components:

1. Full traffic analysis that considers all potential traffic shift
2. Analysis of future demand and associated benefits on the connector, I-5 and SR 99
3. Additional connectivity and access benefits that support local and regional land use development and planning efforts

Should the outcomes of these analyses support further consideration of one or more of the alignments, the next step would involve the development of alternatives along with high-level cost estimates.

Lastly, in order to ensure the most cost effective implementation of a corridor selected for improvement, the State, County and cities should incorporate the enhanced corridor into future plans and identify mechanisms for acquiring land and funding the project. This is especially important in rural areas where development has not yet occurred. Acquiring land in advance would minimize community impacts and overall project costs.

4.3 Funding Strategies

Projects in the I-5/SR 99 corridor are eligible for federal freight funding through the FAST Act but they will need to compete with other State and national priorities. In order to do so most effectively, it may be beneficial to seek funding for a group of projects at the same time in order to maximize the potential benefits and increase the benefit-cost ratio (BCR) of the set of projects. This is a key consideration if FASTLANE Grant funding is sought, as the BCR is a key component in the application.

4.3.1 Highway Infrastructure and Congestion Relief Bundle

Kern County has successfully sought significant amounts of federal funding to improve SR 58 through the City of Bakersfield. From a Valley-wide perspective, a group of SR 99 widening projects could be combined to create a highway infrastructure safety and congestion relief bundle, similar to what the I-95 Coalition successfully submitted for FASTLANE funding in 2016. The key to developing such a bundle is close collaboration between the counties, the selection of projects that have obtained, or are close to obtaining, environmental approval, are included in the STIP, and can begin construction within 24 months.

4.3.2 ITS – Technology Bundle

These projects and programs would focus on upgrading the ITS capabilities of the corridor in order to improve efficiency, capacity, and safety. Projects and programs include;

- Ramp metering at various locations in Kern County – Project KER-45)
- Caltrans' Truck Parking Information System on I-5 and SR 99 – Strategic Program
- Truck Platooning – Strategic Program

In addition to competing for freight formula funding or FASTLANE Grants, the technology focus of these projects allows them to seek additional funding sources. The Advanced Transportation and Congestion Management Technologies Deployment Program is one federal source of funding.[44] Traveler information systems, autonomous vehicle technology, and advanced transportation management technologies are all included as eligible activities. Eight projects received a grant in 2016 including $3 million for the Freight Advanced Traveler Information System (FRATIS) which uses automated optimized dispatching and traffic signal-vehicle speed coordination to reduce truck congestion and fuel usage in the Los Angeles area.[45] Denver, CO also received $6 million for a freight-focused project to improve travel time reliability along City arterials.

Additionally, the truck parking information system and truck platooning programs could seek funding from the private sector as both could include a revenue generating effect that would provide justification for private involvement.

4.3.3 Environmental Improvement Bundle

Projects could be eligible for money through the California Air Resources Board, as well as through the California Energy Commission. The Valley could also receive CMAQ funding (though most of the interchange projects and some of the widening projects might qualify for this also) for the following projects:

- SR 99 Re-Alignment (California High-Speed Rail Project)– Project FRE-03;
- Truck climbing lanes (Grapevine area and SR 58 Eastbound) – Strategic Program;
- Short-haul rail service between SJV region and Port of Oakland – Strategic Program; and
- Short-haul rail service between SJV region and Ports of Long Beach/Los Angeles – Strategic Program

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[44] https://www.fhwa.dot.gov/fastact/factsheets/advtranscongmgmtfs.cfm

[45] https://www.transportation.gov/sites/dot.gov/files/docs/ATCMTD_One_Pager.pdf

These projects require continued monitoring, and in the case of the rail concepts, continued communication and collaboration with the rail operators, beneficial cargo owners, ports, and regulatory agencies.

4.3.4 Safety Improvement Bundle

Projects in this bundle are focused on improving safety in the Critical Safety Segments identified in Task 2 of this Study. Projects related to safety can seek funding from numerous additional sources such as the Highway Safety Improvement Program (HSIP) federal funds.

Table 4.3 identifies critical safety segments in each county and lists projects that would improve safety in those segments.

Table 4.3 I-5/SR 99 Projects to Address Critical Safety Segments

County	Critical Safety Segment	Project Description	Project Number	Timeframe
Fresno	SR 99 from SR 41 to Fresno/Madera County Line	Herndon Ave. off-ramp. Signalize and widen ramp.	FRE-12	0-5
Kern	SR 99 from I-5 to Ming Ave. Ming Ave. to SR 199 focal area	Ming Ave. Interchange project	KER-45e	16-24
Merced	SR 152 and Badger Flat Road	Los Banos Bypass Project Segment 1	5707A	6-15
		Los Banos Bypass Project Segment 2	5707B	25 +
		Los Banos Bypass Project Segment 3		25 +
San Joaquin	SR 99 from SR 12 to Galt/County Line	Widen SR 99 from Lodi to Sacramento County Line	3045	0-5
	I-5 from SR 4 to Stockton/ Monte Diablo Ave			
	I-5 from I-205 to SR 120	Widen I-5 between SR 120 and I-205	15b	0-5
	SR 99 from SR 120 to Stanislaus County Line			
	I-205 from I-5 to SR 580			
Stanislaus	SR 99 from SR 132 to San Joaquin County Line. Carpenter and Beckwith Road intersections.	Widen SR 99 from Carpenter Road to San Joaquin County Line to 8 lanes	ST06	25 +
		Widen SR 99 from Carpenter Road to Kansas Ave. to 8 lanes	ST05	25 +
Tulare	SR 99 from Kern County border to Visalia	Widen SR 99 from Avenue 200 to 1.2 mi. south of Avenue 280	99f	6-15
		Widen SR 99 from Kern County border to Avenue 200	99g	25 +

Source: Source text here.

4.4 Continuing Partnerships and Collaborations

All of the projects identified in **Table 4.1** are fairly standard infrastructure improvements to highways, local roads, and intersections/interchanges. Caltrans and partner Councils of Governments in the San Joaquin Valley need to continue to work together to ensure that these priority projects remain regional freight priorities and to monitor their status as final design and construction begin.

The priority strategic programs are more varied than the projects and include a number of components or approaches that will require collaboration outside of those needed to advance standard infrastructure projects, as well as further analysis. For example, increasing truck parking and introducing ITS resources may work best as a public-private partnership. In a public-private partnership, the public and private sectors work cooperatively in the planning, financing, and construction of development projects adjacent to and integrated with transportation facilities. Public-private partnerships require financial buy-in from both sectors. The first step in obtaining buy in from the private sector is communication between the parties and ensuring business needs and concerns are heard and addressed. Truck parking includes a potential revenue-generator which is needed to attract private partners—truck stops with embedded ITS may attract more drivers due to the certainty of finding a space and thus drive revenue.

As for the corridor-to-corridor connector projects, many of these serve growing urban areas and have more utility than freight alone. It's important to understand which ones are most likely to be enhanced in order to ensure eligibility for freight funding through inclusion in the State's freight network.