Kern Area Regional Goods-Movement Operations

Sustainability Study Phase I: Integrated Circulation Study

Final Report

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Existing Conditions

This report was prepared for Task Two of the **Kern Area Regional Goods Movement Operation (KARGO)** study. The objective of this task is to present a complete understanding of existing conditions as well as project future circulation conditions in the study area (**Figure 1**). We attempted to keep this report brief and relevant with enhanced graphics for effective communication.

A review of the latest regional plans, general plans, circulation plans, list of projects, existing and future land use projections, available data for traffic counts, origin-destination data, congestion and speed data, and collision history data is provided.

The public and industry stakeholders were consulted to get information about existing issues and needs related to traffic circulation, along with anticipated projects and programs that might address these issues or exacerbate current conditions.

Both existing and future circulation conditions are assessed to identify transportation needs in the study area. A summary of these transportation circulation needs is presented in the last section.

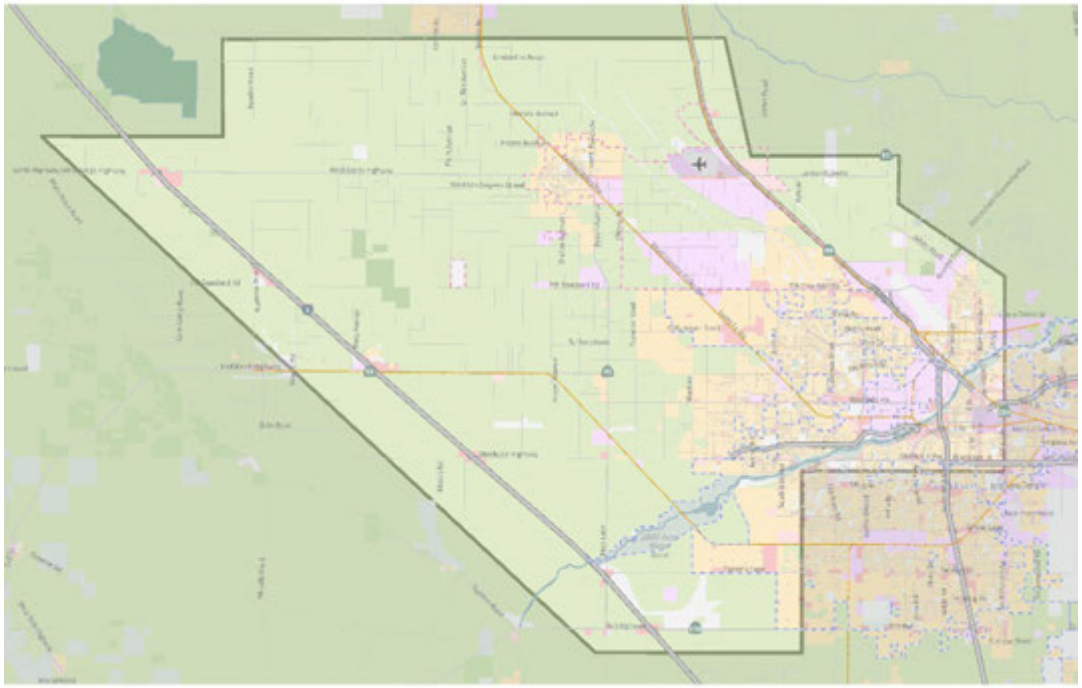


Figure 1. Study Area

Literature Review

Thomas Roads Improvement Program (TRIP) (2005)

The program aims to construct $1 billion in transportation projects under the cooperative effort between the City of Bakersfield, County of Kern, Caltrans and the Kern Council of Governments. The projects are considered necessary to maintain the well-being of the rapidpopulation growth, interregional travel, and freight movement.

City of Shafter General Plan, Transportation Program (2005)

Highlights

- The plan discusses important ties between land use and circulation, general goals, and objectives. To improve circulation, it is recommended to build future intensive truck usage infrastructure near State Route (SR) 99 and to promote the development of rail-served industrial centers and warehouses. Building an intermodal-cargo facility is also recommended.

Goals

- To maintain a Level of Service “C” on a daily and peak hour basis on city roadways, except in the vicinity of freeway interchanges where Level of Service “D” is acceptable; and
- To balance the need to move vehicles with the need to protect environmental and aesthetic resources along with the City’s quality of life.

Issues/Needs

- The plan did not identify any specificissues or needs.

Policies

- Facilitate meeting the City’s roadway performance objective through implementation of the circulation plan.
- Work with the UP and BNSF railroads to construct grade separations ,where rail lines cross principal arterials and arterial highways.
- Promote the design of roadways to optimize safe traffic flow within established roadway configurations by minimizing driveways/intersections, uncontrolled access to adjacent parcels, on-street parking, and frequent stops.
- Provide adequate capacity at intersections to accommodate future traffic volumes by installing intersection traffic improvements and traffic control devices, as needed during development.
- Facilitate the synchronization of traffic signals.
- Where needed, provide acceleration and deceleration lanes for commercial access drives and major industrial users.
- Provide reciprocal access and parking agreements between adjacent land uses, facilitating off-street vehicular

movement between adjacent commercial and other nonresidential uses.

The circulation element is available on the Kern County webpage[1].

Bakersfield Metropolitan Area General Plan (2002, partially updated in 2016)

Highlights

- City of Bakersfield Planning Department anticipated a 20% population growth from 2002 to 2020.
- The built-out land use plan will add significantly to the area's population and employment base: 154,000 households and 244,000 jobs. Existing areas of the City will increase in land use intensity, and to a larger extent, the City will experience geographic expansion to the southwest, northwest, and northeast. This will lead to an accompanying increase in travel and double the traffic volume. Daily vehicle trips will increase from 1.6 million to a total of 2.6 million.

Goals

- Provide a safe and efficient street system that links all parts of the area for movement of people and goods.
- Provide for safe and efficient motorized, non-motorized, and pedestrian traffic movement.
- Minimize the impact of truck traffic on circulation and on noise sensitive land uses.
- Provide a street system that creates a positive image of Bakersfield and contributes to residents' quality of life.
- Provide a system of freeways which maintains adequate travel times in and around the metropolitan area.
- Provide a local street network that contributes to the quality and safety of residential neighborhoods and commercial districts.
- Develop and maintain a circulation system that supports the land use plan shown in the general plan.

Issues/Needs

- In general, the existing street system operates smoothly. Points of congestion appear, however, as a result of two phenomena: 1) the City is increasing in population and geographical area, thereby placing greater demands on the street system; and 2) physical barriers have disrupted the grid of arterial streets and the freeway system, leading to discontinuities. Physical barriers include: the Kern River, canals, railroad tracks, and (in the case of freeways) established residential neighborhoods.
- Congestion occurs on numerous streets where they cross SR 99, including: Olive Drive, Rosedale Highway, California Avenue, Stockdale Highway, Ming Avenue, Planz Road, and White Lane. Freeway interchanges with LOS C congestion or other problems include: Golden State/SR 99/Airport Drive, 178/Mt. Vernon, 178/Oswell, SR 99/Rosedale, SR 99/California, SR 99/White and 58/Union Avenue. Other parts of the circulation system where volume is approaching capacity include the following:
    - Rosedale Highway near SR 99
    - Highway 178 from SR 99 to M Street

[1] https://kernplanning.com/planning/planning-documents/general-plans-elements/

    - Oak Street from California Avenue to 24th Street
    - SR 99 between Rosedale Highway and California Avenue
    - Stockdale Highway near California Avenue
    - Ming Avenue from New Stine Road to Valley Plaza
    - California Avenue around SR 99
    - Real Road between California Avenue and Ming Avenue
    - Coffee Road across the Kern River
    - Roberts Lane just east of Airport Drive
- Signalized intersections are the primary constraints to capacity on arterials.
- The busiest intersection is the Stockdale Highway/California Avenue intersection, which handles a volume of 63,400 vehicles per day. Other busy intersections are concentrated along Ming Avenue, Oak Street, Chester Avenue, and Union Avenue. Many of these intersections are congested during peak hours. Others have sufficient turn lanes so that traffic does not back up, but cycle lengths are long and most vehicles experience delay. In either case, these intersections represent bottle-necks.

Recommendations/ Proposed Projects

- Crosstown Freeway
- SR 178 near Baker Street to SR 99
- Westside Parkway
- Continuation of Crosstown Freeway to I-5, north of Kern River
- West Beltway
- SR 99 to I-5, north of Bakersfield
- South Beltway
- SR 58 to I-5
- East Beltway
- SR 178 to SR 58
- New alignment for SR 58
- Extension of SR 58 to UP Tracks, to SR 99 to north Seventh Road, then I-5

Bakersfield General Plan, Circulation Element (2009)

Policies

Following is a list of policies recommended to improve traffic circulation in the City:

- Use of traffic signals to minimize vehicular delay.
- Design and locate site access driveways to minimize traffic disruption where possible, considering items such as topography and past parcellation.
- Minimize direct and uncontrolled property access from arterials.
- Limit full access median breaks on arterials to a maximum of three per mile and include left-turn lanes at each median break.
- Consider the construction of grade separations for intersections unable to meet minimum level of service (LOS) standards.
- Design local streets to conform to topography. Allow for deviation from "grid" system on local streets in cases where they do not interfere with other traffic policies and flows.
- Design local collector street systems to minimize through-traffic movements and include short block lengths to discourage excessive speeds.
- Route traffic around, rather than through, pedestrian-oriented areas.

- Provide new transportation facilities as needed based on existing usage and future demand.
- Require new development and expansion of existing development, in incorporated areas, to fully provide for on-site transportation facilities such as: streets, curbs, and traffic control devices. Within unincorporated areas, street improvements will be determined by County Ordinances.
- Prevent streets and intersections from degrading below Level of Service "C" where possible due to physical constraints (as defined in a LOS Standard). In cases where the existing Level of Service is below "C," prevent possible degradation due to new development or expansion of existing development with a three part mitigation program: 1) adjacent right-of-way dedication, 2) access improvements, and/or 3) an area-wide impact fee. The area-wide impact fee would be used where the physical changes for mitigation are infeasible due to existing development and/or the mitigation measure is part of a larger project, which will be built at a later date (e.g. freeways).
- Require new development and expansion of existing development to pay for necessary access improvements such as: street extensions, widenings, turn lanes, and signals (potential project requirements identified in the transportation impact report).
- Exempt the downtown Bakersfield redevelopment area along with small infill projects from the LOS Standard to facilitate redevelopment, recognizing that higher traffic levels are inherent to a vital central core.
- Require new development and expansion of existing development to pay or participate in its pro rata share of costs related to area-wide transportation facility and service growth (which they necessitate). .

Issues/Needs

- Kern River, freeways, and railways decrease connectivity.
- Congestion is caused by:
    - Increase in population and demand
    - Different street design specifications between Bakersfield and Kern County
- Major chokepoints on the roadway system are:
    - The Kern River - separates downtown Bakersfield from the growing suburbs to the north
    - SR 99 - traffic moving east to west is concentrated at a limited number of state route crossings
    - The Railway system – trains disrupt traffic at at-grade crossings

The circulation element is available on the Kern County webpage[2].

Recommendations/ Proposed Projects

- The California Department of Transportation (Caltrans) released the SR 99 Corridor Enhancement Master Plan in 2004 that includes plans for improvements on the SR 99 corridor in Bakersfield.
- The construction or expansion of numerous freeways in the area has also been proposed, including the connection of SR 99 to SR 58 along the Golden State Boulevard corridor

[2] https://kernplanning.com/planning/planning-documents/general-plans-elements/

and the connection of SR 178 to Interstate 5, as well as many other smaller freeway construction projects.

- The expansion of many existing arterials into expressways has also been proposed, including Taft Highway and 7th Standard Road.
- TRIP is providing for numerous roadway improvement projects in the Metropolitan Bakersfield area, including:
    - The construction of a beltway around Metropolitan Bakersfield, to be completed as three projects:
        - North Beltway Project – Widening of 7th Standard Road between SR 43 and SR 99.
        - North Beltway Project – Grade-separation of intersections and railroad crossings.
        - West Beltway Project – Construction of a six-lane north-south freeway from SR 119 to 7th Standard Road. However, due to funding constraints of the Centennial Corridor connection, construction of the West Beltway Project may not occur in the foreseeable future.
    - The Westside Parkway Project, a proposed east-west freeway from east of Mohawk Street to Heath Road. The length of the freeway is approximately eight miles and would be built in phases, beginning at the east end of the project. Initial phases would include interchanges at Mohawk Street, Coffee Road and Calloway Drive, and terminate at Calloway Drive. This project also includes the construction of a new north-south connection between Rosedale Highway and Truxtun Avenue along Mohawk Street. The length of the Mohawk Street section is approximately 1.2 miles with three lanes in each direction and a raised median.
    - The Centennial Corridor Project, a proposed connection from SR 58 to I-5 via the Westside Parkway Project.
    - The widening of:
        - SR 178 between Vineland to Miramonte from two lanes to four lanes.
        - 24th Street between Oak Street and D Street from five lanes (with center turning lane) to six lanes.
        - Rosedale Highway between Allen Road and SR 99 from four lanes to six lanes in some locations.
    - The construction of the following interchanges:
        - SR 178 at Fairfax Road, which is already under construction and nearing completion.
        - SR 178 at Morning Drive.
        - Oak Street at 24th Street.
        - SR 99 at 7th Standard Road/Merle Haggard Drive with grade separation at the Union Pacific Railroad.
        - A flyover of SR 99 that will connect Hageman Road west of SR 99 to Golden State Avenue.

Bakersfield Transit System Long-Range Plan (2012)

Goals

- Support transit use at the local and regional levels.
- Focus development and infrastructure on key cores and corridors.

- Design streets and new developments to foster street activity and encourage transit use.

Policies

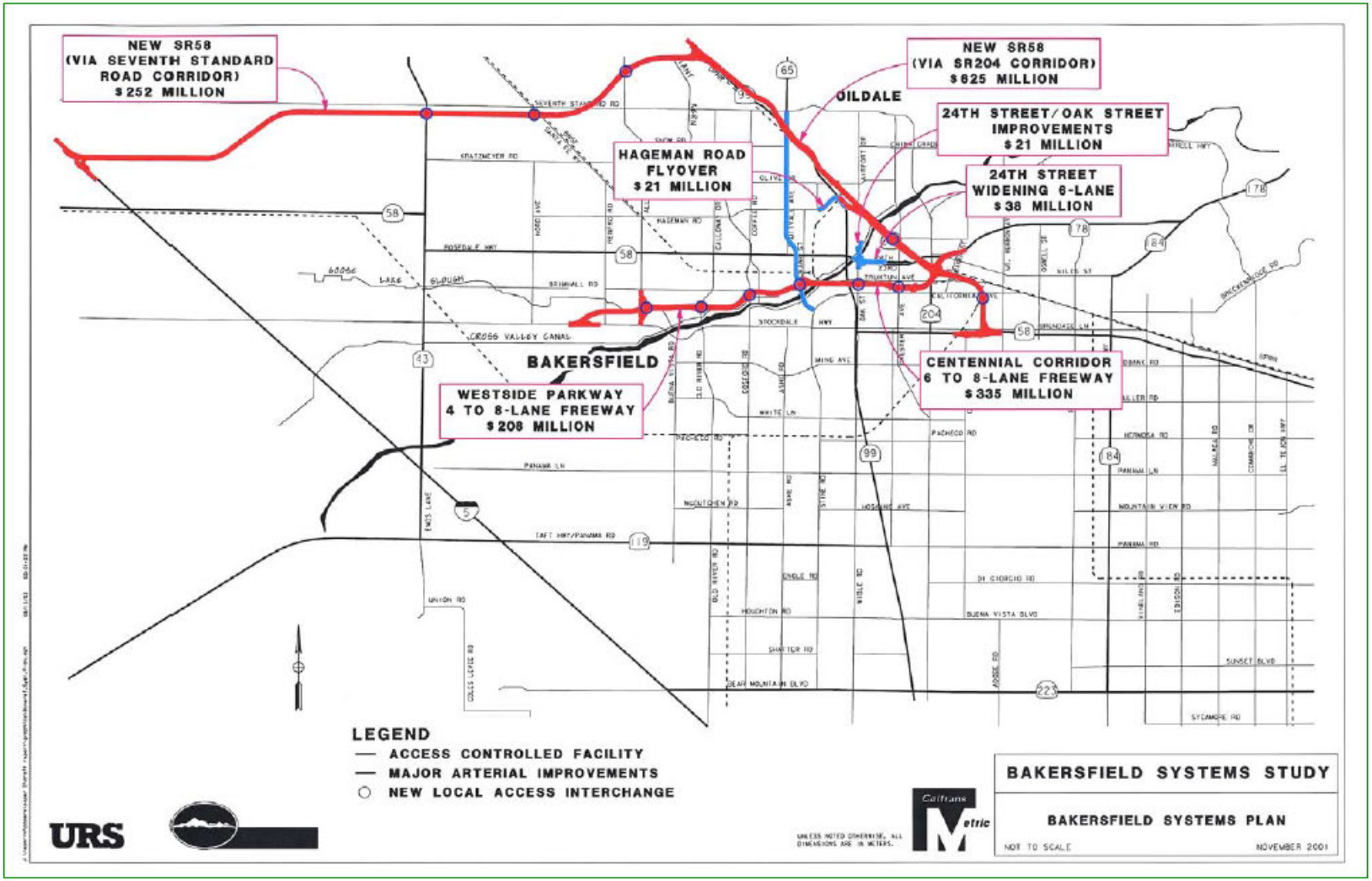
- Land Use
  - Land uses should be mixed both horizontally and vertically. Support and enhance major activity centers.
  - Land use intensities should be at levels that will encourage use of transit and support pedestrian and bicycle activity.
  - Parking requirements (and parking provisions) should be compatible with compact, pedestrian-oriented, and transit-supportive design and development.
- Circulation and Connectivity
  - The transportation and circulation framework should define compact districts and corridors.
  - New residential developments should include streets that provide connectivity.
  - Transit improvement projects should be targeted at areas with transit-supportive land uses.
- Urban Design
  - Streets should be designed to support use by multiple modes.
  - Buildings should be human-scaled.
  - The impact of parking on the public realm should be minimized.

Bakersfield Systems Study (2002)

It is important to note that most of the study elements morphed into other projects through the process of the TRIP program and are no longer valid or applicable.

- Projected Growth:
  - 404,000 in 2000 to 876,500 in 2030, more than doubling in those 30 years.
  - A review of 88 sample roadway segments showed that 83% of these segments would operate below LOS D in the year 2030 under the no-build scenario.
- Preferred Alternative
  - Westside Parkway – Four- to eight-lane local parkway from Heath Road to SR 99, estimated at $208 million.
  - Centennial Corridor – Six- to eight-lane freeway from SR 99 to SR 178 joining SR 178 near Beale Avenue, estimated at $335 million.
  - Hageman Road Flyover – Four- to six-lane extension of Hageman Road from its current terminus near Knudsen Drive to SR 204, via flyover structures passing over SR 99, estimated at $21 million.
  - 24th Street Widening - Six-lane arterial from Oak Street to D Street, estimated at $38 million.
  - 24th Street/Oak Street Intersection Improvements – A new grade-separated interchange estimated at $21 million.
  - SR 58 Realignment – Four- to eight-lane freeway connecting existing SR 58 near Washington Street to I-5, passing through the downtown area via a parallel route to the SR 204 corridor and continuing west via the 7th Standard Road corridor, estimated at $877 million.
- Implementation
  - Total Cost - $1.5 billion in 2001 dollars.

BAKERSFIELD SYSTEMS PLAN



Cost data based upon Funding and Phasing Plan in Section 4.2. Costs are estimated in year 2001 dollars.

Figure 2. Bakersfield System Study - Preferred Alternative

Figure 3. Funding and Phasing Plan development by ad hoc Kern COG committee based upon information during development of Bakersfield System Study

Source: Bakersfield Systems Study (2002)

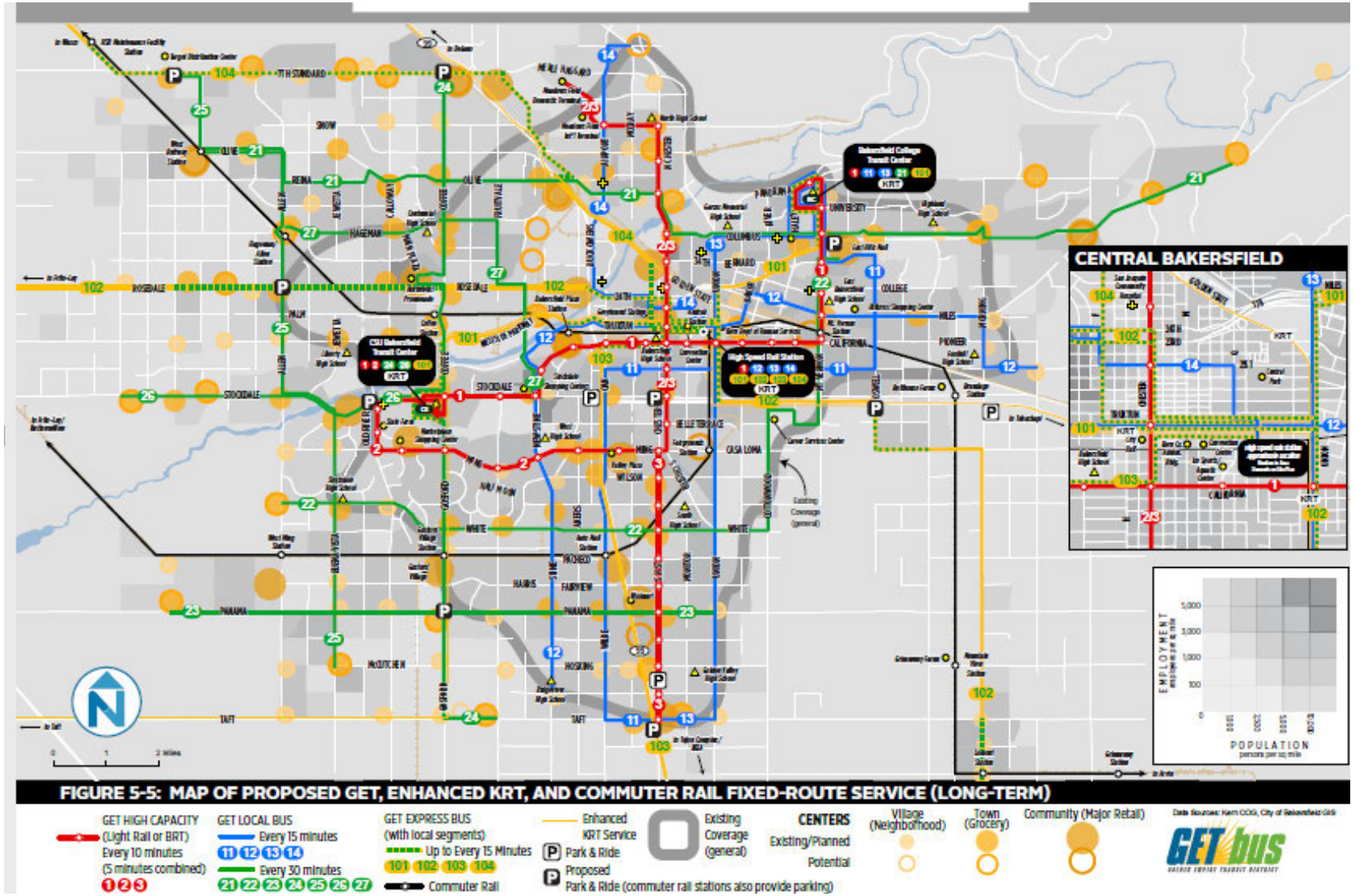


Figure 4. Bakersfield Long-term Transit Plan

Source: Bakersfield Transit System Long-Range Plan (2012)

Kern County General Plan, Circulation Element (2009)

Goals

- Ensure that transportation facilities needed to support development are available, and encourage timely development of these facilities to avoid traffic degradation.
- Provide plans for circulation infrastructure in support of the Land Use, Open Space, and Conservation Element.
- Plan for transportation modes available to all segments of the population, including people with restricted mobility.
- Plan for a reduction of environmental impacts without accepting a lower quality of life in the process.
- Maintain a minimum LOS- "D" for all roads throughout Kern County, unless the roads are part of an adopted Community Plan or Specific Plan that utilizes Smart Growth policies encouraging efficient multimodal movements (See Section 1.10.8 of the General Plan).
- Coordinate with Caltrans regarding various transportation developments within Kern County.
- Provide for Kern County's heavy truck transportation in the safest way possible.
- Reduce the number of potentially overweight trucks.
- Use State Highway System improvements to prevent truck traffic in neighborhoods.

Policies (Related to Trucking)

- California Department of Transportation (Caltrans) should be made aware of the heavy truck activity on Kern County's roads.
- Start a program that monitors truck traffic operations.
- Promote a monitoring program of truck lane pavement conditions.
- Caltrans should site a weigh station on SR 46 near Keck's Corner.
- Caltrans should site a weigh station on SR 166 near City of Maricopa.
- Improvements to the State Highway System must move ahead in a timely fashion.

Recommendations/ Proposed Projects

- Caltrans should further detail the need for pavement conditions improvement on the State Highway System. This would encourage Caltrans implementation of the above policies.

Kern County Goods Movement Strategy (2012)

General

- SR 58 is used as a primary route for shipments, usually to eastern areas such as San Bernardino and Riverside Counties. It is also used as an alternative to I-5 over the Grapevine during storms, and as a preferred alternative to I-10 and I-210 for shipments to eastern Los Angeles County when traffic congestion slows the Los Angeles County east-bound routes. Between SR 99 and I-15, truck traffic constitutes a relatively large percentage of total traffic. Vehicle classification count results indicate that the truck percentages of total vehicle volumes range between 30% and 40%, depending on the segment. This is likely due to overall lower passenger vehicle volume within this portion of the corridor, but also due to the relatively high volume of freight truck trips between the Central Valley and areas to the east (including national destinations/origins). Truck trips using SR 58 are almost always part of a through trip to or from somewhere else, usually far away. There are very few

trips that originate or terminate within five miles of SR 58. There are few customer locations on SR 58 itself to pick up or deliver shipments, due to the limited population and industrial base.

- SR 65 serves local freight customers between Bakersfield (and points beyond) and Porterville. The highest volumes of trucks were located between 7th Standard Road and Lerdo Highway. Any through traffic to and/or from points north of Porterville tend to use the parallel route of SR 99.
- Other east-west routes (SR 223, 166, 119, 46): These routes carry through truck traffic, with relatively few on-route customers. They can be used as discretionary alternatives to SR 58, which is the primary east-west route through Bakersfield. The local customers are primarily agricultural in nature. SR 46 and SR 166 are used to access coastal regions to the west of Kern County. In particular, SR 46 serves Monterey and San Luis Obispo Counties and SR 166 serves portions of San Luis Obispo and Santa Barbara Counties. A large proportion of trucks on these routes are refrigerated trucks due to the nature of the commodities that originate within these counties. Many of the refrigerated trucks operate either empty or with dry freight heading westbound. Many of these trucks will operate on continuous trips through the night and on the weekends due to the distances involved. This pattern also has to do with the urgency associated with refrigerated shipments.
- Good Movement Trends:
    - 2.8% projected growth rate of interstate freight flows between 2010-2040.
    - Growth potential for commodity shipments is averaging 1.8% between 2010 and2040.
    - Online shopping has increased Less-Than-Truckload (LTL) trucks, along with air delivery.
    - California Department of Finance (CDOF) forecasts 3.9% near-term annual job growth in Kern County, versus 3.7% for the state and 2.6% for the nation. After 2012, Kern County is expected to lag as compared to the state, but still grow faster than the U.S. as a whole.
- The projections suggest the following:
    - A recovery of lost construction jobs by 2015, with slight growth thereafter.
    - Growing employment in the wholesale and retail trade sector.
    - Stable employment levels in farming and manufacturing.
    - A range of 2.3% to 3.1% is reasonable growth for Kern County truck and overall goods movement.

Recommendations/ Proposed Projects

- Regional Planned Improvements
    - A total of 55 identified projects – on the I-5, SR 46, SR 58, SR 65, SR 99, SR 119, SR 155, SR 178, SR 184, and SR 223 facilities – were identified by segment, based on an inventory of all planned highway and freeway capacity improvement projects.
    - The Thomas Roads Improvement Program (TRIP) incorporates a multi-stage program that would address the key goods movement issues in the SR 58 corridor. Phase 2 of the Westside Parkway project will create a high-capacity route between the Mohawk Street Extension (part of Phase 1) and Allen Road. The development of the Westside

Parkway into an alternative truck route between SR 99 and I-5 will require connections at both ends.

- Project Ranking Results
    - The results indicate the following two projects should be considered for priority implementation, with the high ranking (five points) resulting from the analysis summarized in the matrix:
        - SR 58 – From I-5 / SR 58 junction to 0.3 miles west of Allen Road
        - SR 58 – From Union Avenue to Cottonwood Road
- The following improvements were also provided a ranking of "high," based on the evaluation matrix, but with an overall value of four points:
    - One improvement project on SR 178
    - Two other improvement projects on SR 58
    - Five improvement projects on SR 119
    - One improvement project on I-5
    - Two improvement projects on SR 99
    - Two improvement projects on SR 184

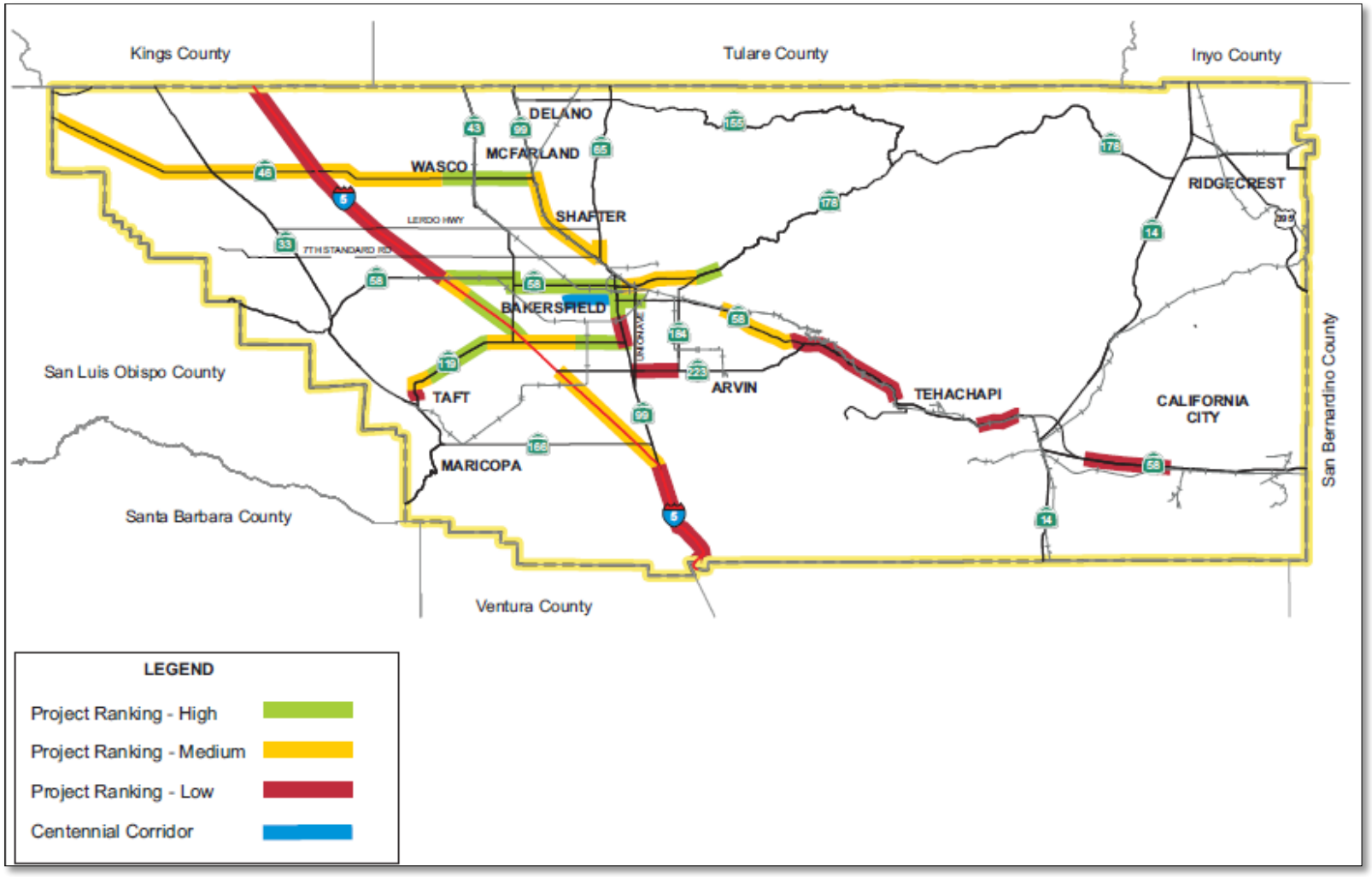


Figure 5. Kern County Goods Movement project priorities

Source: Kern County Goods Movement Strategy (2012)

KernCOG RTP (2018)

Goals

- Mobility – Improve the mobility of people and freight;
- Accessibility – Improve accessibility to major employment and other regional activity centers;
- Reliability – Improve the reliability and safety of the transportation system;
- Efficiency – Maximize the efficiency of the existing and future transportation system;
- Livability – Promote livable communities;
- Sustainability – Minimize effects on the environment; and
- Equity – Ensure an equitable distribution of the benefits among various demographic and user groups.

Policies *(Freight Related)*

- Policy #21 - Mobility, Accessibility, Efficiency, Livability - Coordinate planning efforts to ensure efficient, economical, and environmentally sound movement of goods. ***Highways, Freight***
    - 21.3 - Encourage coordination and consultation between the public and private sectors to explore innovative and efficient goods movement strategies.
    - 21.4 - Identify opportunities for truck-to-rail and truck-to-intermodal mode shifts, and evaluate the contributions of truck traffic on regional air quality.
    - 21.5 - Encourage the use of rail and air for goods movement to reduce impacts to state and inter-county routes and lessen air quality impacts.
    - 21.6 Oppose higher axle load limits for the trucking industry on general purpose roadways without adequate reinforcement and maintenance.
- Policy #22 - Mobility, Accessibility, Efficiency - Advocate programs and projects for the intermodal linkage of all freight transportation. ***Highways, Freight***
    - 22.1 - Consider constructing truck climbing lanes on eastbound SR 58 from General Beale Road to the Bena Road overcrossing.
    - 22.2 - Program infrastructure improvements such as widening of 7th Standard Road in response to proposed freight movement activities in the area.
    - 22.3 - Widen SR 184 to four lanes to respond to increasing agriculture trucking activity.
    - 22.4 - Widen Wheeler Ridge Road to four lanes as a gap-closure measure to tie I-5 to SR 58 via SR 184.
- Policy #23 - Mobility, Efficiency - Develop an annual freight movement stakeholders' group for coordination and expansion efforts including representatives from disadvantaged communities and air quality advocates. ***Freight***
    - 23.1 - Encourage communication between short-line rail operators, shippers, and economic development agencies.
    - 23.2 - Explore options for potential uses of the southern portion of Arvin Subdivision as identified in the Kern County Rail Study Phase 2.
- Policy #24 - Mobility, Reliability, Efficiency - Explore rail intermodal, transfer facility, and alternative transfer options for the region. Special care should be taken to not impact disadvantaged communities more than the county as a whole and to prioritize safety in these communities. ***Freight, Safety, Environment, & Justice***

    - 24.1 - Continue development and expansion of the Shafter Rail Terminal for intermodal freight transfer and container load matching.
    - 24.2 - Continue development of the Delano Union Pacific Cold Connect Facility for intermodal freight shipping across the United States.
    - 24.3 - Expand rail service to existing distribution centers throughout Kern County when feasible.
- Policy #25 - Mobility, Accessibility, Equity - Maintain liaison with Southern California Association of Governments and all San Joaquin Valley Councils of Government for efficient coordination of freight movement between regions and counties.

  Freight
    - 25.1 - Work with other agencies to create an effective Central Valley-wide truck model to track regional commodity flows and to identify critical economic trends that will drive truck flows on regionally significant truck routes.
- Policy #26 - Mobility, Reliability, Accessibility, Equity - Provide heavy truck access planning guidance, including a review of the current surface transportation act route system, geometric issues, and signaling for all routes identified as major local access routes, along with a development of performance standards.

  Freight, Air Emissions
    - 26.1 - Add “missing links” (streets) to roadway network that reduce out of direction travel: Centennial Corridor will provide a major free flow traffic connector that will improve air quality by reducing stop and go truck travel on local arterials. The Hageman Flyover Project will provide another east/west connection over SR 99 to Downtown Bakersfield Central Business District; Mohawk Street Extension provides an extension from Rosedale Highway south that connects to Truxtun Avenue accessing downtown Bakersfield.

LINKS BETWEEN *DIRECTIONS TO 2050* PRINCIPLES FOR GROWTH AND RTP GOALS	RTP Goals						
	1. Mobility – Improve the mobility of people and freight.	2. Accessibility – Improve accessibility to, and the economic wellbeing of major employment and other regional activity centers.	3. Reliability – Improve the reliability and safety of the transportation system.	4. Efficiency – Maximize the efficiency and cost effectiveness of the existing and future transportation system.	5. Livability – Promote livable communities and satisfaction of consumers with the transportation system.	6. Sustainability – Provide for preservation and expansion of the system while minimizing effects on the environment.	7. Equity – Ensure an equitable distribution of the benefits among various demographic and user groups.
Directions to 2050 Growth Principles							
A. Conserve energy and natural resources, and develop alternatives	♦	♦	♦	♦	♦	♦	♦
B. Provide adequate and equitable public services	♦	♦	♦	♦	♦	♦	♦
C. Enhance economic vitality	♦	♦	♦	♦	♦	♦	♦
D. Provide a variety of housing choices				♦	♦	♦	♦
E. Use and improve existing community assets and infrastructure	♦	♦	♦	♦	♦	♦	♦
F. Use compact, efficient development and/or mixed land uses where appropriate	♦	♦	♦	♦	♦	♦	♦
G. Provide a variety of transportation choices	♦	♦	♦	♦	♦	♦	♦
H. Preserve undeveloped land and spaces				♦	♦	♦	♦
I. Increase civic and public engagement					♦		♦

Figure 6. Directions to 2050 Principles for Growth/RTP Goals Comparison Matrix

Source : KernCOG 2018 RTP Table 2-2

High-Speed Rail (HSR) Study (2017)

The Fresno to Bakersfield segment is approximately 114 miles. This section will provide essential connections between the Central Valley, Silicon Valley, and the Los Angeles Basin with stations in downtown Fresno and downtown Bakersfield. These station locations will help provide new economic opportunities in these downtown areas and provide easy connections to local and regional businesses and academic institutions.[3]

Figure 7. Bakersfield High-Speed Rail Alternatives

The Draft 2020 HSR Business Plan was published in February 2020. It is stated that, in late fall, the HSR Authority issued the Record of Decision for the final 23-mile route between Shafter and Bakersfield. This completes the state's environmental review process between Fresno and Bakersfield, and allows the Authority to move toward project construction into Bakersfield. It was the first major environmental action taken under the State's newly granted federal National Environmental Policy Act (NEPA). Starting in 2020, pre-construction activities can begin, such as right of-way acquisition, third-party agreements and utility relocation, between Shafter and Bakersfield for the Locally Generated Alternative.

[3] https://www.hsr.ca.gov/high_speed_rail/project_sections/fresno_bakersfield.aspx

West Beltway Corridor Study (1990)

- West Beltway Corridor Study arose from the Bakersfield 2010 General Plan and was prepared by the City of Bakersfield in conjunction with Kern County.
- The Beltway will serve as relief for SR 99.
- The study looks at seven alternative alignments.
- Conclusions from the study:
    - The West Beltway will not be needed by 2020 given current land use projections, but it will be needed between 2020 and 2030or if growth in West Bakersfield proceeds faster than anticipated.
    - The best alignment for the West Beltway follows Rudd Road north of the Kern River and transitions to Jenkins Road south of the river. This alignment provides the maximum transportation benefits possible while minimizing adverse impacts on the environment and on land use plans.
    - The process of reserving right-of -way for the West Beltway should begin now.

Amazon Distribution Center at Bakersfield (EIR, 2018)

- The proposed project is the development of a 2.56 million square foot distribution warehouse on approximately 57.26 net acres.
- The proposed project is fronted by the future roadways identified as Wings Way on the west, Petrol Road on the north, and Landings Way on the east.
- The proposed project is forecast to add 2,288 employees, creating an estimated additional 4,756 daily trips.
- Certain intersection improvements will be required for future year with and without project to maintain a reasonable LOS. The intersection improvements include intersections along 7th Standard Rd, Merle Haggard Drive, SR-99 Ramps, Airport Drive, and Wings Way.

Inland Port Feasibility Study (2008)

- The purpose of this project was to determine whether and how inland port concepts could be implemented to reduce truck VMT and generate other public benefits in the SCAG region.
- Two daily round trip intermodal trains could divert a maximum of about 33% of 3,500 daily truck trips.
    - While analytically significant and a net reduction in congestion, such diversions would not be noticeable to the general public.
    - There would be a noticeable increase in truck activity in the immediate vicinity of the inland port terminal.
    - In the Mira Loma area, where the level of truck activity is already objectionable to some community members and is a concern to regional planners, a noticeable concentration of “new” trucking activity would be politically unpalatable.
- The net change in truck VMT within the Inland Empire would be small, as most of the VMT savings would be between the Ports and the Inland Empire.
- The study team was forced to conclude that while an inland port/rail shuttle service had intrinsic merit and would benefit the region, the concept also faced daunting implementation barriers while ranking low on the list of regional priorities. While an inland port/rail shuttle is a good idea, the efforts required to overcome the implementation barriers would not be justified, especially when the region

has other, more pressing needs for goods movement resources.

The Oakland Shafter Inland Port: Assessing the Economic and Fiscal Benefits (2009)

The potential development of the inland port would significantly increase goods movement activities and logistic developments in Kern County.

- The Oakland-Shafter Inland Port would provide integrated logistics resources including intermodal rail transfer and transloading facilities, industrial warehouses, and related logistics services.
- The study's analysis indicates that between 2010 and 2030, the Office of Self-insurance Plans (OSIP) would produce an average of $1.2 billion per year in direct financial benefits for the State of California.
- Costs:
    - Capital Cost -> $833 million
    - State and private entities are expected to make one-time investments of about $18 million per year
- The study's analysis indicates the OSIP would produce and support 31,800 permanent jobs in California by 2030.

Central Valley Inland Port Feasibility Analysis (2019-2020)

- This analysis reviewed the underlying market and operating feasibility for intermodal rail service from the Ports complex in Los Angeles north to the regional markets along SR 99 (including the Sacramento market).
- The market considered all cargo currently moving through LA ports, so there was no assumption of cargo diversion; currently, approximately 74% of all containerized cargo in the Central Valley and the Bay area regions transit through the Ports of LA and LB.
- The Ports of LA and LB have been partners in the project, as has the SJ Valley Air Pollution Control District and the South Coast Air Quality Management District.
- Broadly summarized, the market is quite large, with over 1M twenty-foot equivalent units (TEUs) moving into and out of the market region; with inbound and outbound cargo volumes approximately even.
- In general, the predominant cargo volumes are agribusiness outbound and consumer goods inbound.
- The truck versus rail operating cost model demonstrates that rail service would compete in this logistics lane, with the service performing best in the northern area of the market due to longer distances and greater efficiencies.
- Key constituencies were supportive of the concept largely due to the expectation of cost savings, with notable support from the trucking industry, agriculture growers, food producers, ocean carriers, and third-party logistics (3PLs).

Figure **8** **provides an overview of significant indusrial, commercial facilities and related logistic activites in the study area.**

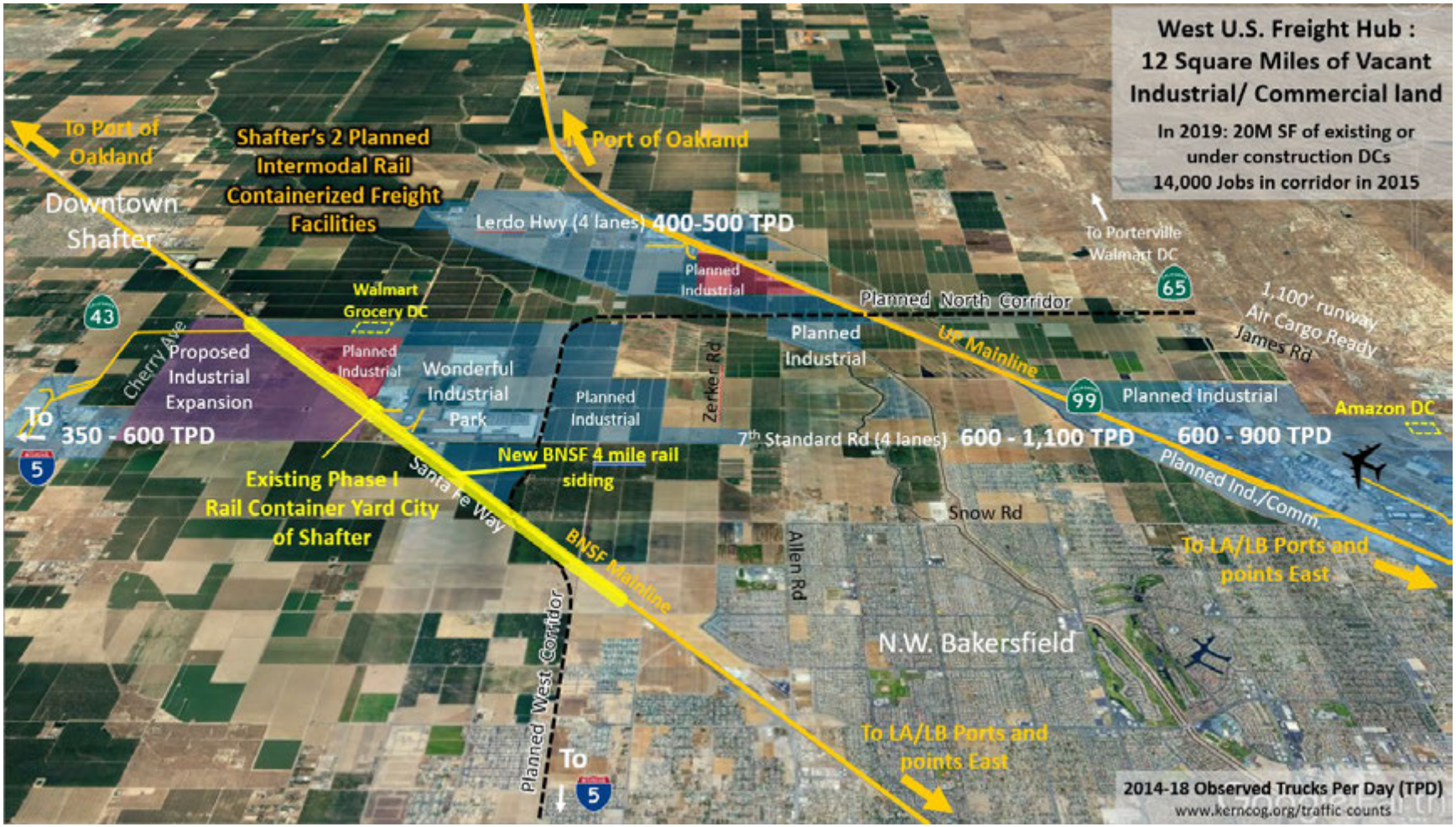


Figure 8. Overview of Existing and planned Industrial and Commercial facilities
Prepaed by KernCOG

Stakeholder Inputs

Kick off Meeting with Local Agencies

City of Shafter, City of Bakersfield, Kern COG staff and Kern County representatives attended the KARGO Kick off Meeting. The following items were highlighted by participants:

- Study area should include West Beltway from I-5 to 7th Standard Road.
- HSR will greatly affect circulation in the study area and should be reviewed.
- SR 178 development cannot move forward due to environmental issues.
- Bakersfield:
    - Significant growth is expected north of Merle Haggard Drive along the eastside of SR-99 and south of Lerdo Highway.
    - SR 99 between 7th Standard Road and East Lerdo Highway has no exits/entrances for the six-mile stretch. Two exists/entrances could be built as the minimum distance allowed between them is two miles.
    - West Beltway needs to be connected to Lerdo Highway to provide a parallel route to SR 99 and reduce congestion on SR 99
- Shafter:
    - HSR will have a great impact on the City of Shafter circulation depending on how gradeseparated access gates are provided.
- Kern County
    - The General plan is currently being updated.

Local Experts Outreach

Kern Economic Development Corporation (EDC)

- There is a lot of construction planned for the next couple of years. Currently, the signage and communication on the roads regarding the construction is not clear, causing confusion and congestion.
- Westside Parkway has a lot of residential commute trips during peak period; it connects west Bakersfield to east Bakersfield, so it is not an optimal truck route.
- Adequate access to 7th Standard Road or SR 119, for trucks, would help reduce truck weaving and mixing with passenger traffic.

California Trucking Association Member

Some concerns include:

- The Walmart and Amazon Distribution Center would increase truck traffic on SR 99 significantly. It is already very congested, even with the widening.
- When possible, shippers try to schedule truck movements at night to avoid congestion.
- Construction on SR 99 North causes significant congestion and the signage for diverting routes are not clear.
- SR 99 from SR 58 to 7th Standard Road – there currently is a fast lane open during construction that allows vehicles to pass the construction and exits leading into Bakersfield. While this is a great alternative for those traveling through Bakersfield, trucks are not using the fast lane because it is the left-most lane (and trucks are typically discouraged from using the left-most lane). There is no signage informing them they can travel in the left-most lane under these conditions.

        - Once the construction is completed, traffic flow is anticipated to improve.
    - The segment between SR 58 and Lost Hills is currently an issue due to construction.
    - SR 43 is a good alternative route for SR 99.
- Currently a large percentage of trucks on SR 99 are repeat trips run typically by owner operator, local business, small business, and LTL trucks.
    - During harvest time, this could cause congestion.
- There is a concern among owner operators regarding Assembly Bill #5:
    - The bill would eliminate owner operator trucking business.
    - It would require owner operators to provide worker's compensation.
    - This would in turn increase the cost of deliveries and therefore the goods themselves.

San Joaquin Refining Company

- San Joaquin Refining Company has both truck and rail operations. Short line rail operation is very important for them to remain competitive in the industry. In response, they formed the Central California Railroad Shippers and Receiver's Association (CCRSRA) to advocate for short line rail operation in the Bakersfield and Fresno areas.
- Truck are used for shorter and in-state trips, while rail is used for cross-continental trips, including Mexico and Canada.
- Weather, equipment malfunction, congestion and construction on the roads are the major concerns of trucking operation. SR 99 would be even more congested once the Amazon Distribution Center is built.
- It is difficult to switch to electric trucks due to the weight limit– the extra 2,000 pound weight limit is insufficient.
- It is too expensive to serve short distances with rail; it is more economical to use trucks.
    - California is particularly expensive to ship via rail due to high taxes.
    - It takes ten days from Bakersfield to the Port of Long Beach via rail, therefore trucks are preferred for this route.
    - To improve rail service, it was recommended that the rail capacity be studied. However, they do not believe additional capacity expansion is possible.

Future Conditions and Needs Assessment

Land Use

In the study area, the industrial designated land use is concentrated in the northwest area of Bakersfield and southeast area of Shafter, particularly near SR 99. There are small patches of designated industrial land use along interchanges on I-5 through the study area.

Figure 9 through 14 indicate the 2018 to 2042 percent change to the distribution of households and employment based on the Kern Regional Model. There will be slight decrease of households in downtown Bakersfield, while the number of households in northern Bakersfield and east of Shafter will increase. Residential growth north of 7th Standard Rd, between SR-43 and SR-99 is significant, due to the major residential projects being developed by the City of Bakersfield and City of Shafter.

The overall employment is, as expected, concentrated in Bakersfield and Shafer. However, there is a dense pocket of freight employment

east of Santa Fe Way at 7th Standard Road, mostly in Shafter with some spilling into Bakersfield just south of 7th Standard Road. The Wonderful Industrial Park, located along the southern boundary of the City of Shafter and northeast of the intersection of 7th Standard and Santa Fe Way, currently contains FedEx Group, Target Distribution Center, and other distribution centers. The freight employment in that area is expected to more than double by 2042, expanding the employment northeast of the Santa Fe Way and 7th Standard Road intersection.

Further east on 7th Standard Road, where it turns into Merle Haggard Drive, the model accounts for the heavy freight employment growth expected to be caused by the Amazon Distribution Center being built. It projects that the generally low employment at the distribution center location will more than double in 2042. According to the EIR, it is estimated that the site, when fully built out in 2035, will produce 2,288 employees. [4]

While Bakersfield has a large concentration of freight employment, most of the freight employment growth will occur in the areas surrounding Shafter.

Sensitive Receptors

Figure 16 illustrates the sensitive receptors in the study area, which includes school and public health facilities, as well as the CalEnviro Screen metrics.

The CalEnviro Screen, or California Communities Environmental Health Screen Tool, "Identifies communities by census tract that are disproportionately burdened by, and vulnerable, to multiple sources of pollution."[5] The score is calculated by looking at the pollution burden, composed of exposures and environmental effects, and the population characteristics (which include sensitive population and socioeconomic factors). The percentages shown relate to the ranking of scores for all census tracts in California. The higher the percent, the higher the score compared to other parts of California. The study area west of Shafter and southeast of downtown Bakersfield are the most affected by the many sources of pollution.

These areas also include many school and public health facilities. In general, the schools and public health facilities are located more toward the denser downtown areas of Shafter and Bakersfield.

[4] Traffic Impact Study for Distribution Warehouse, Parcel Map No. 12115, McIntosh & Associates, 2018

[5] https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30

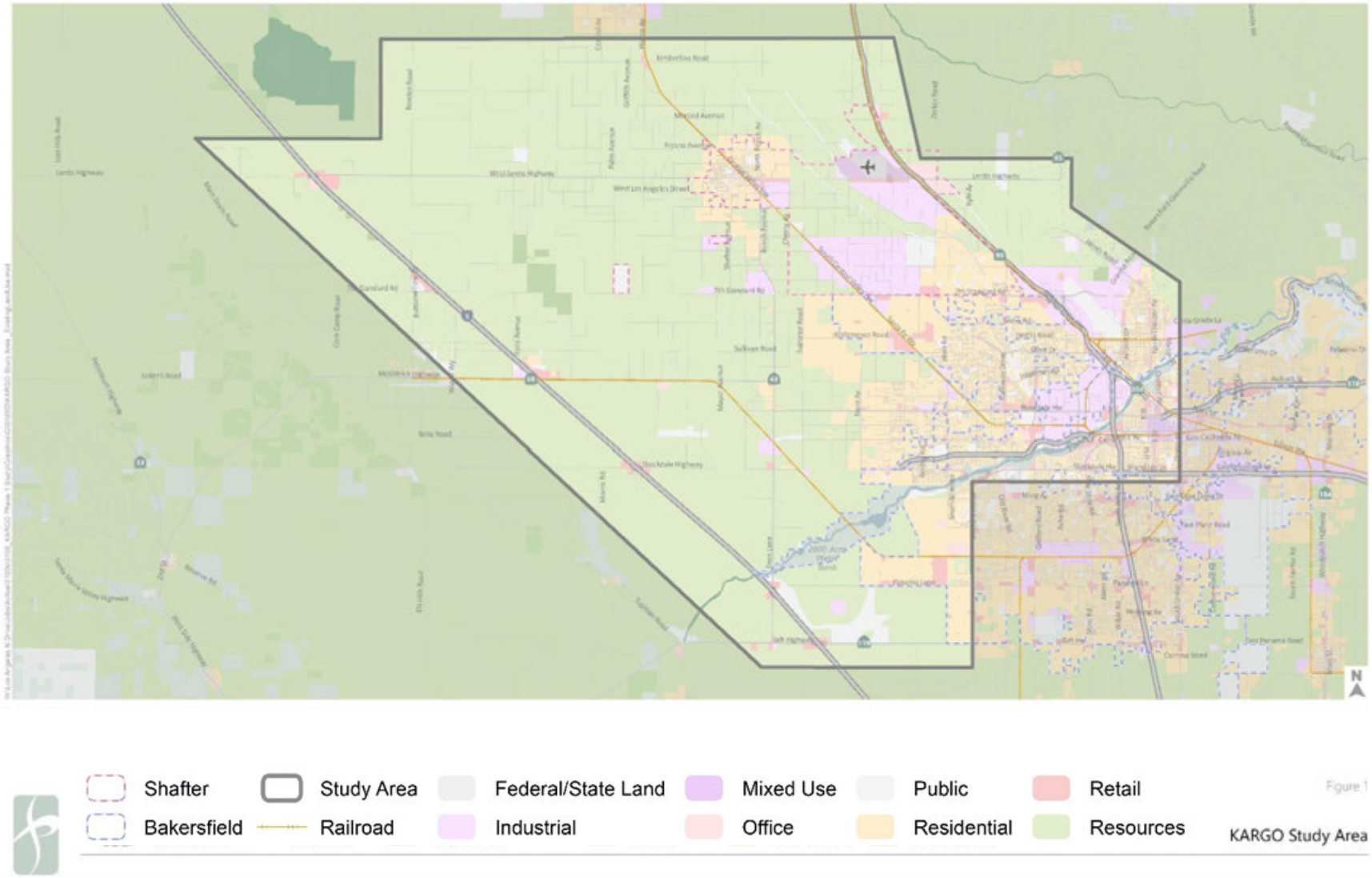


Figure 9. Existing (2018) Land Use Designation
Source: KernCOG

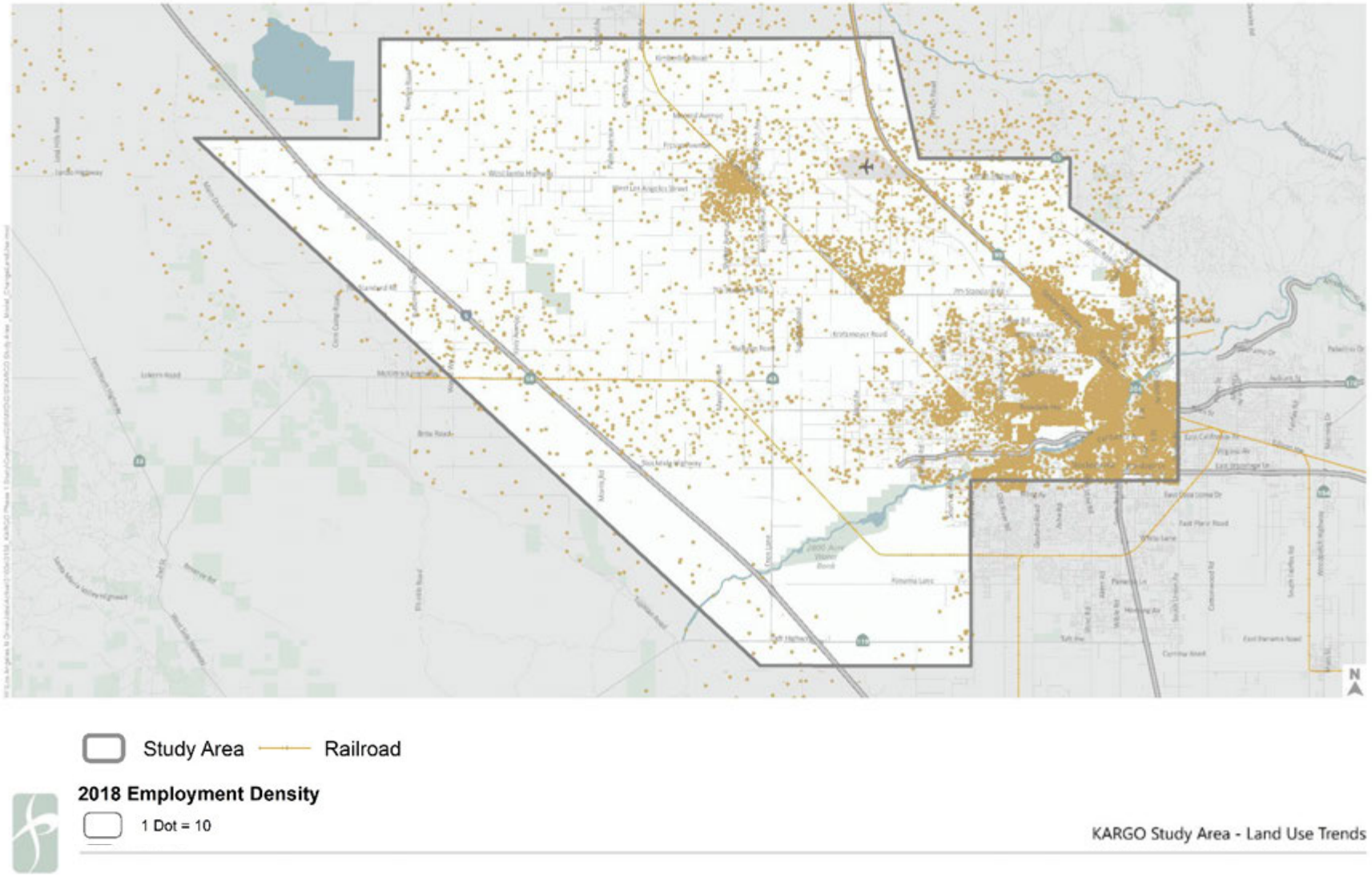


Figure 10. Existing (2018) Employment Distribution
Source: KernCOG Model

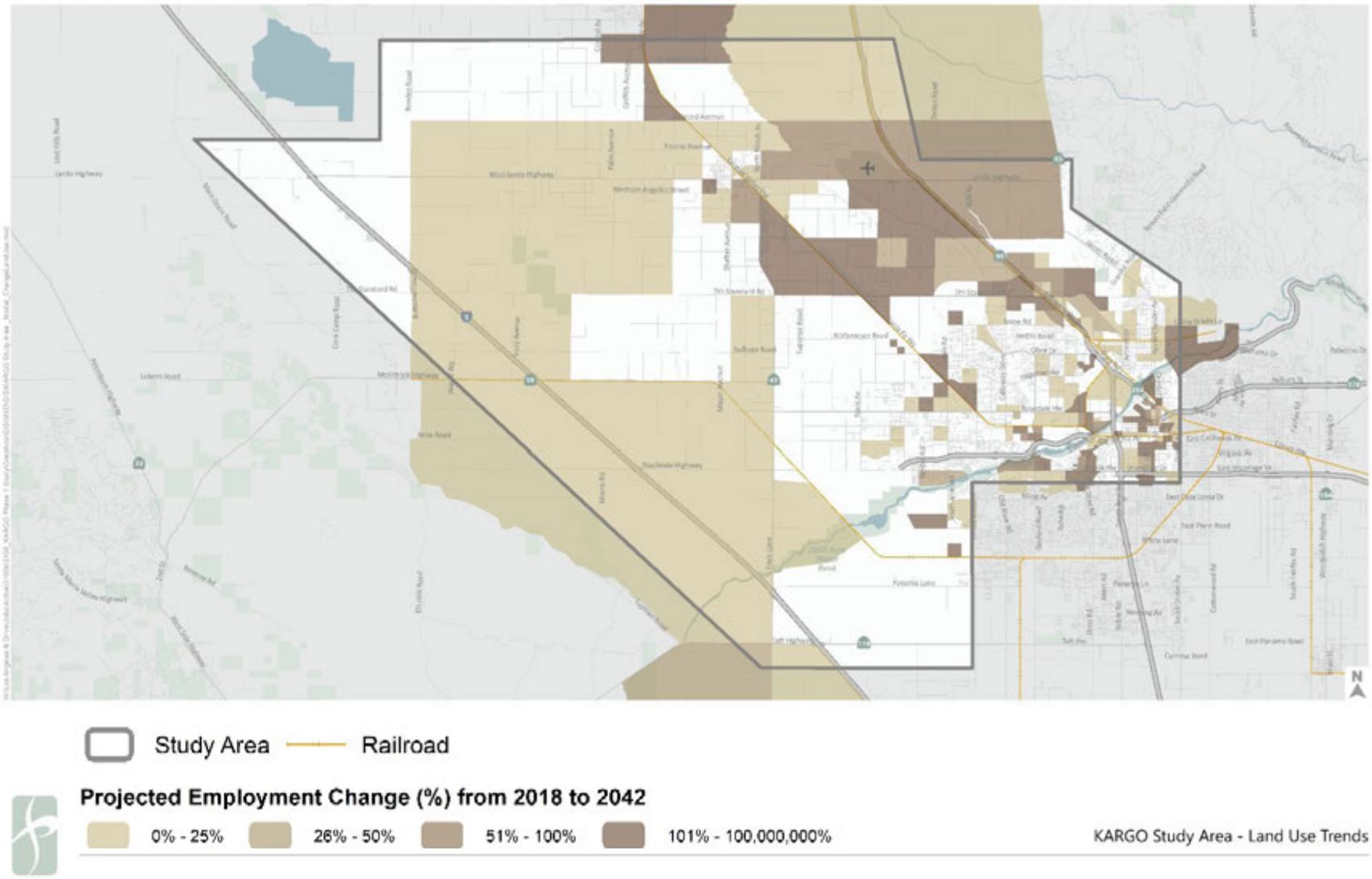
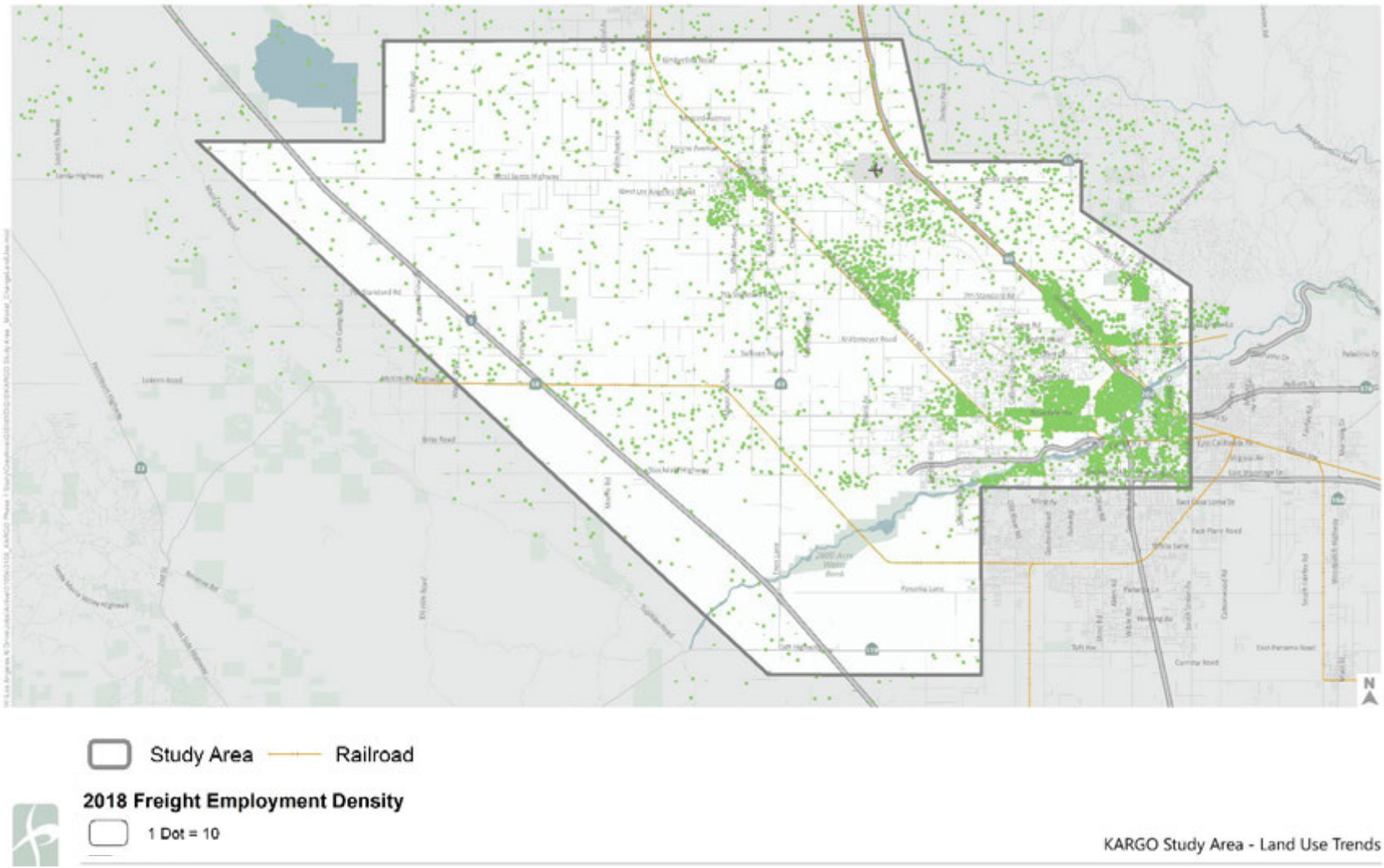
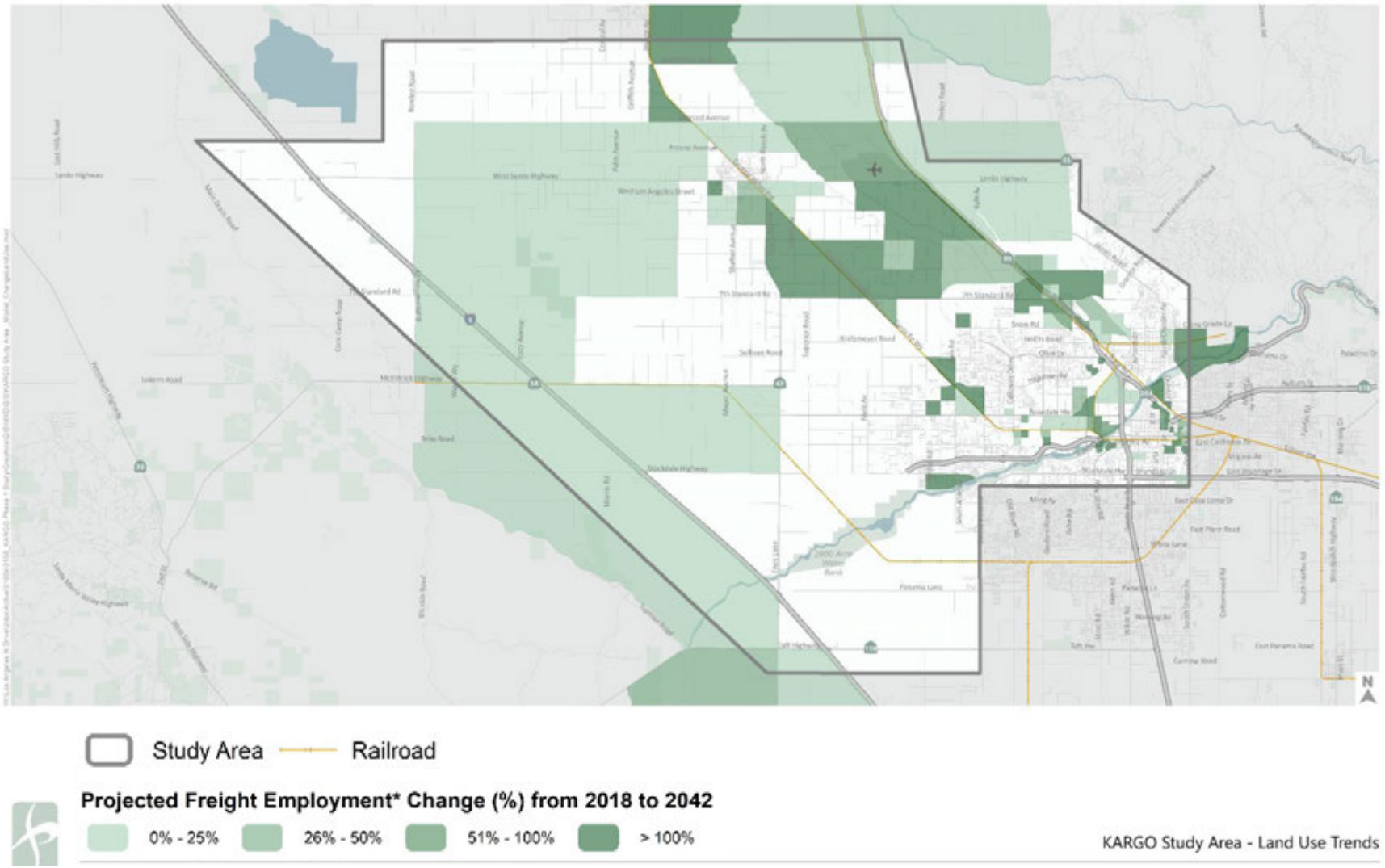


Figure 11. Projected Employment Percent Change (2018-2042)
Source: KernCOG Model



*Freight generating industries include: forestry, fishing and hunting (11), mining, oil and gas extraction (21), utilities(22), construction (23), manufacturing (31-33), whole sale trade (42),retail trade (44-45) transportation and warehouseing (48-49), other services except public administration (81)

Figure 12. Existing (2018) Freight Employment Distribution
Source: KernCOG Model



*Freight generating industries include: forestry, fishing and hunting (11), mining, oil and gas extraction (21), utilities(22), construction (23), manufacturing (31-33), whole sale trade (42),retail trade (44-45) transportation and warehouseing (48-49), other services except public administration (81)

Figure 13. Projected Freight Employment Percent Change (2018-2042)
Source: KernCOG Model

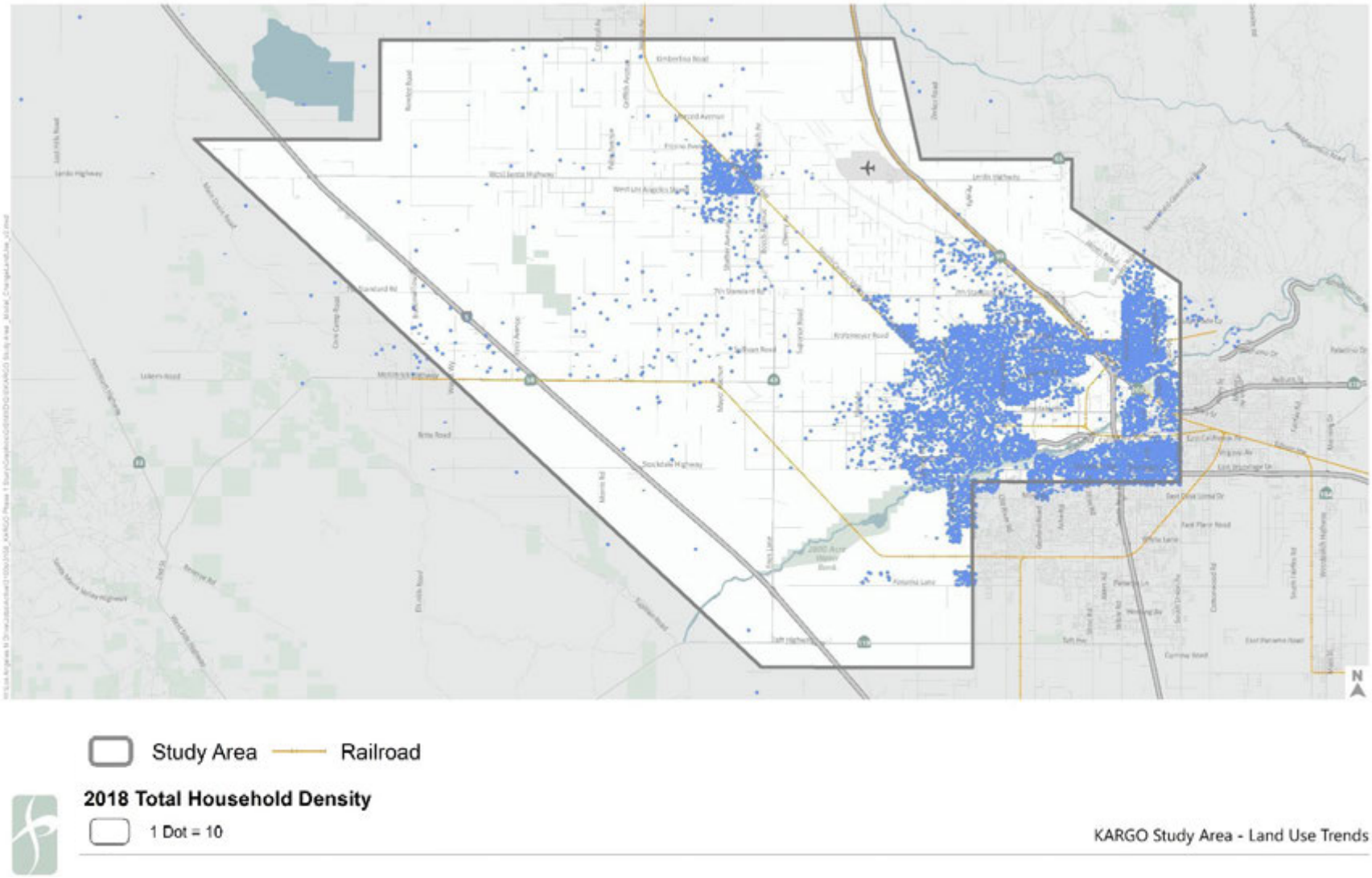


Figure 14. Existing (2018) Household Distribution
Source: KernCOG Model

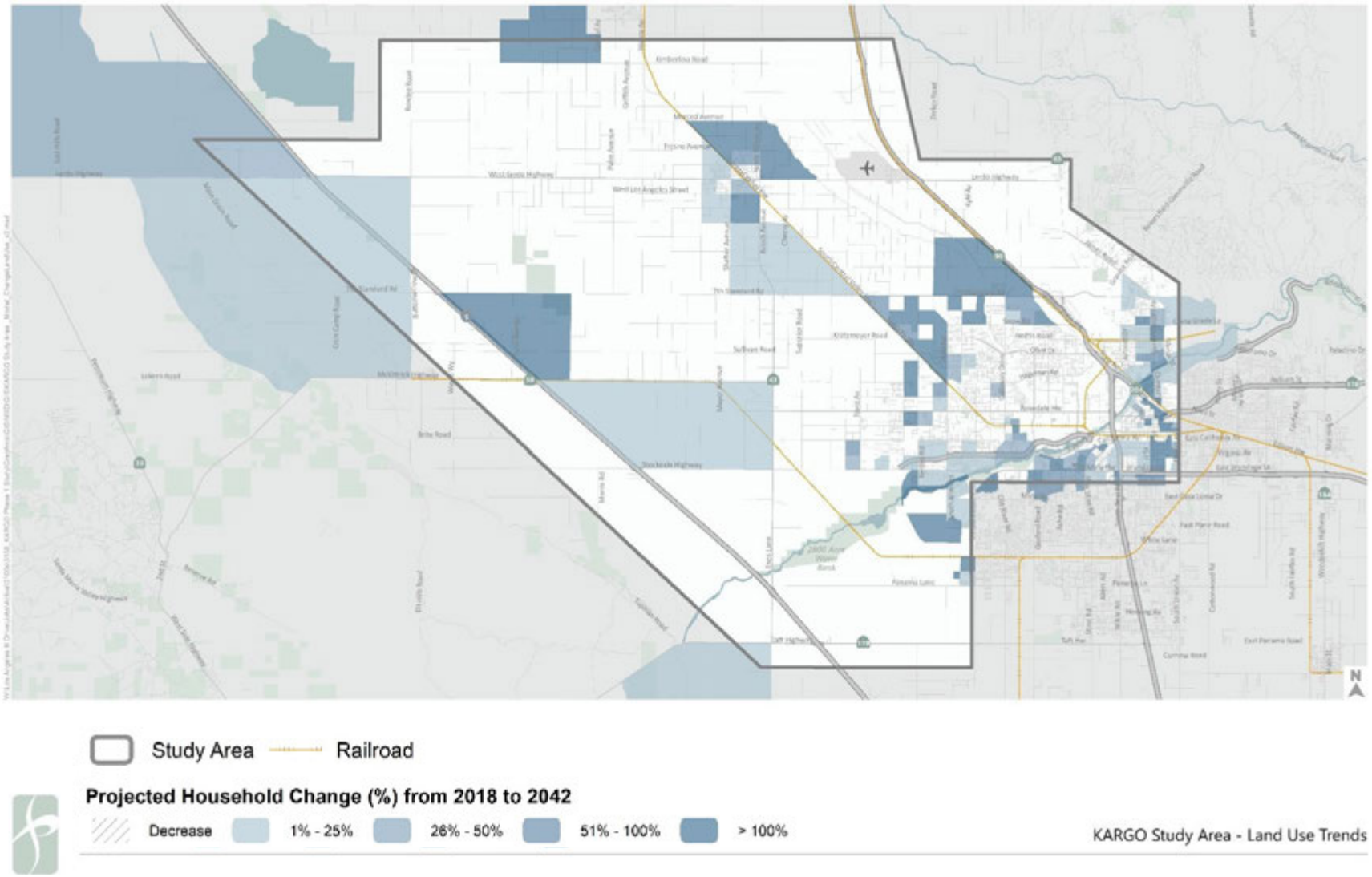


Figure 15. Projected Household Change Percent Change (2018-2042)
Source: KernCOG Model

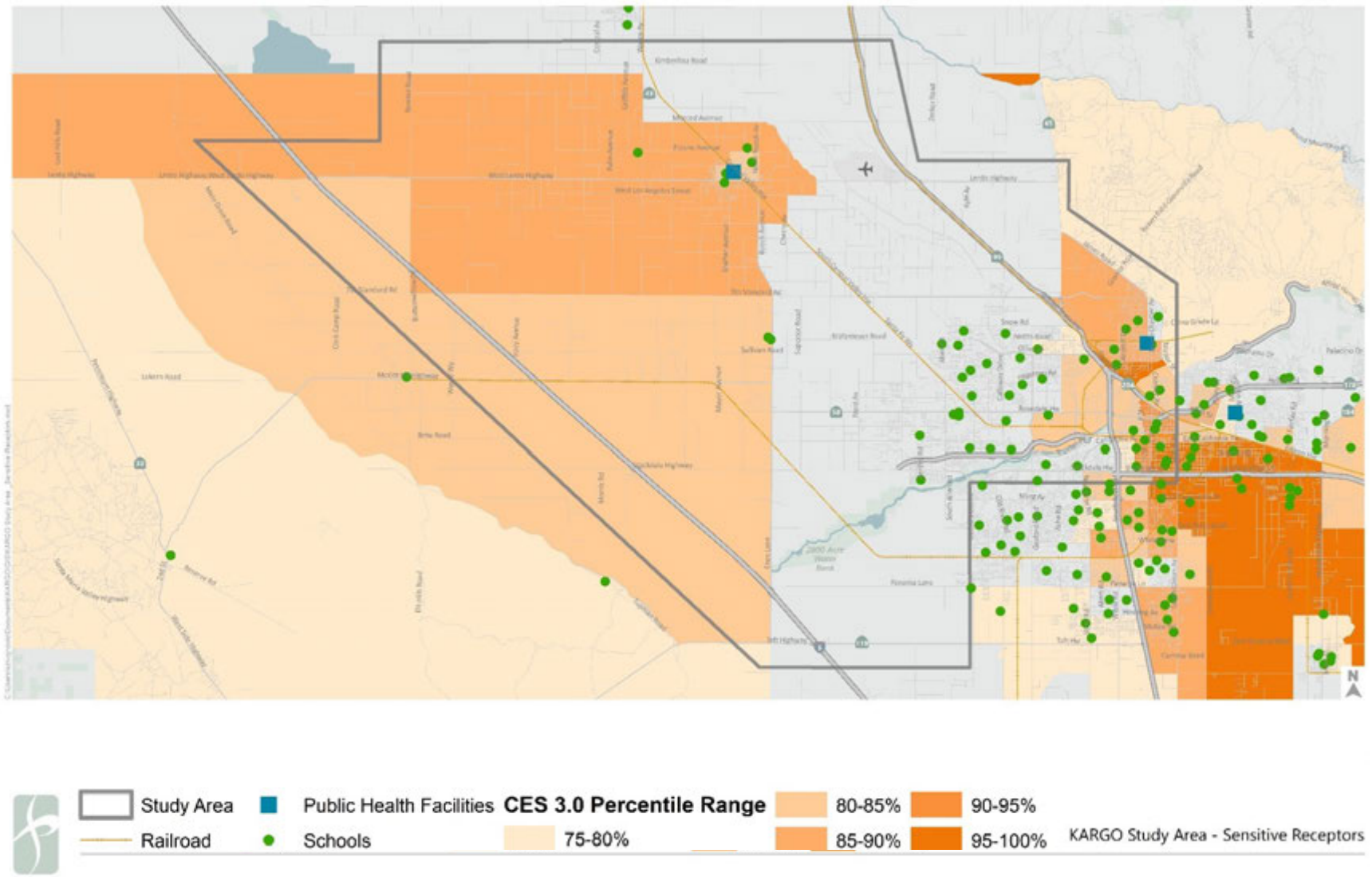


Figure 16. Sensitive Receptors
Source: KernCOG data and CalEnviro Screen 3.0 Data base

Truck Volumes

This section analyzes the current truck traffic volumes on the network, as well as the future projected volumes.

In the northern portion, which includes the City of Shafter, there are only two locations that have truck traffic exceeding 500 truck per day on average, but still fewer than 750 trucks per day on average. The first location is on 7th Street Standard Road between Shafter Avenue and Poplar Avenue. This location is a connection for the heavy freight generators, just east of Santa Fe Way along 7th Standard Road, to I-5. The freight generators in those locations include FedEx Ground, Target Distribution Center, and other distribution centers. The other location with truck traffic exceeding 500 trucks per day is on Lerdo Highway between the Shafter-Minter Field-Mit Airport and SR 99. Once again, the location is major connection between a freight generator, the airport, and a major trucking route, SR 99.

The southern portion of the study area, including Bakersfield, has a handful of point locations with truck traffic greater than 500 daily trucks on average. However, there are only two locations that exceed 750 trucks per day on average. The first one is located west of Bakersfield, just east of Enos Lane on Stockdale Highway. The second one is located, where the current west beltway ends, west of Bakersfield and merges onto Stockdale Highway. Stockdale Highway is a major truck route and acts as a primary connector between Bakersfield and I-5.

Volume growth projections from 2018 to 2042 from the Kern Regional Model suggest that the greatest growth will occur on the Westside Parkway continuing onto Stockdale Highway, along with some east/west links in Bakersfield. However, the east/west links that run parallel to the Westside Parkway are projected to decrease in truck volume, potentially due to the Westside Parkway build-out. Santa Fe Highway from Bakersfield to Shafter will also see increased volume growth. The routes surrounding 7th Standard Road, Santa Fe Way, Zachary Avenue, and Riverside Street will see considerable growth as well, mimicking the growth in employment as discussed in the previous section. 7th Standard Road is not expected to increase in volume as dramatically as expected. The eastern portion is expected to increase more than the western portion.

Truck Origin-Destination Trends

The following maps illustrate the origin-destination (OD) trends in the model area as related to the study area.

Metropolitan Bakersfield Area produces and attracts, by far, the most trips. Just with regard to internal trips, there were 72,800 medium truck and 4,600 heavy truck trips in 2018. These internal trips are projected to grow to about 104,500 and 7,200, respectively. In comparison, the Greater Shafter regions had about 1,800 medium truck and 400 heavy truck internal trips in 2018, expected to almost double by 2042. While the Bakersfield region has greater overall volumes, growth is more pronounced in the Shafter area.

In 2018, it is estimated that there were about 8,000 medium and heavy truck trips traveling between the Greater Shafter and Metropolitan Bakersfield Area, expected to double by 2042. The Bakersfield area has most of its medium and heavy truck traffic traveling west. However, there is a considerable amount of traffic from the Bakersfield area to Greater Arvin and Greater Tehachapi. Between Bakersfield and the Arvin area, there are 4,000 medium and heavy truck daily trips in 2018 that will double by 2042. Between the Greater Shafter area and the Wasco Region, there are

about 1,400 medium and heavy trucks traveling daily. This is projected to grow to 2,200 by 2042.

Figure 26 shows the major gateway locations of the Kern Model and Table 1 summarizes the volumes, for medium and heavy truck, that pass the gateway by trip direction. Most of the heavy trucks are estimated to go south via I-5, and north via SR 99, both under existing and future conditions. About a fifth of the daily heavy truck trips going north (external to the Kern Model Region) are found on I-5. Overall, the growth of these external trips is projected to increase less than 10% across all main access points.

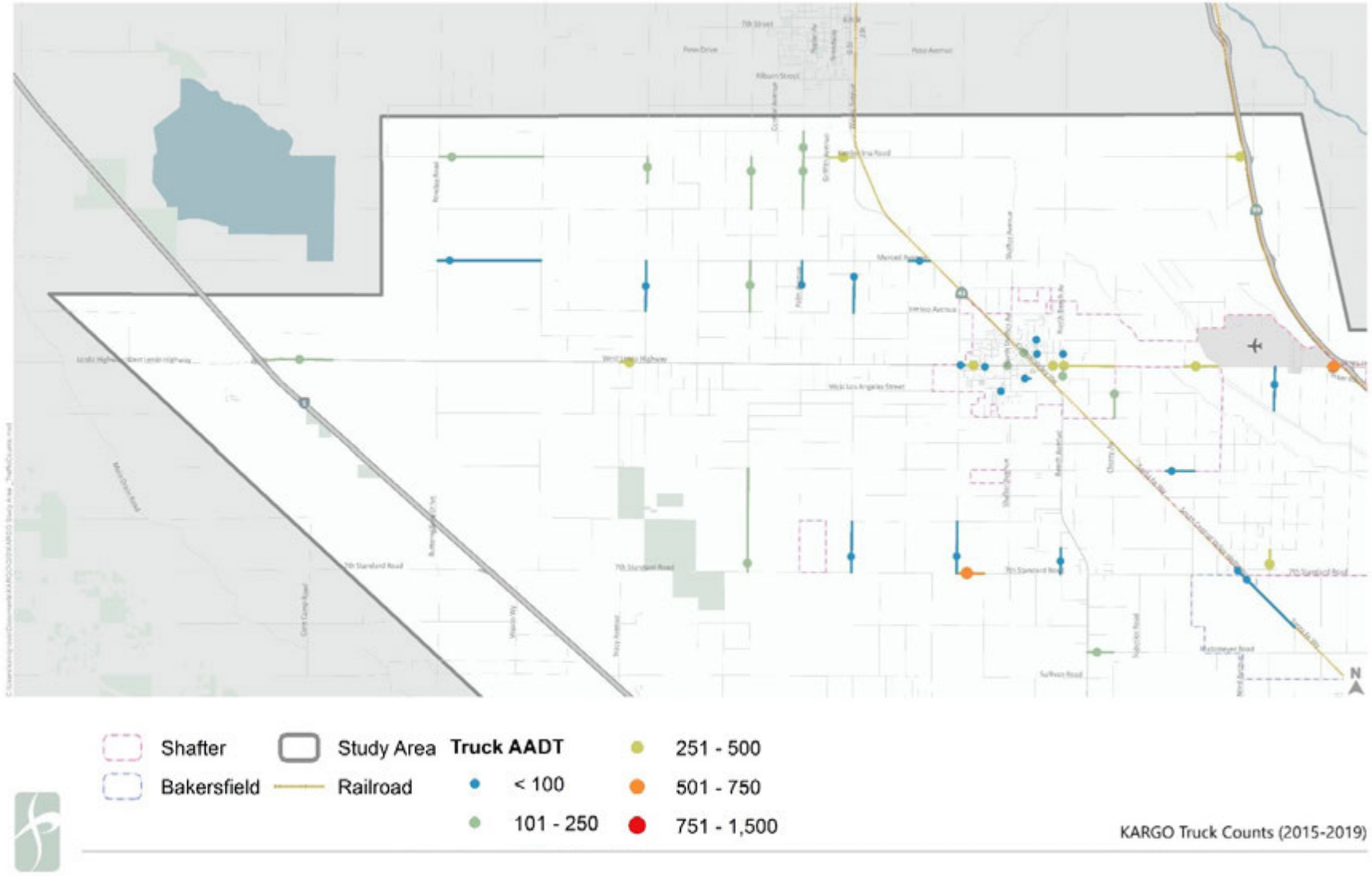


Figure 17. Existing (2015-2019) Truck AADT, Northern Study Area
Source: KernCOG Count database

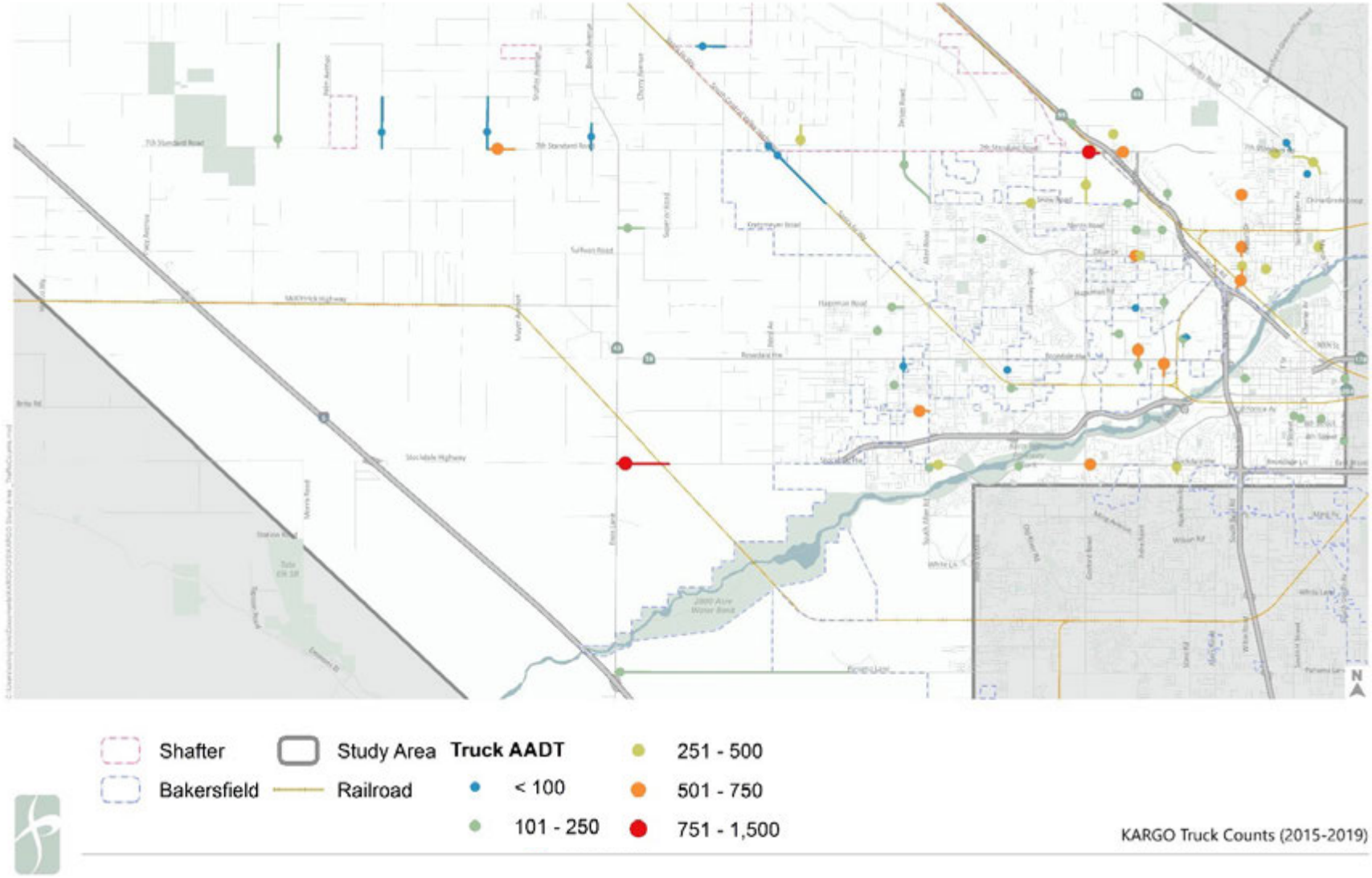


Figure 18. Existing (2015-2019) Truck AADT, Southern Study Area
Source: KernCOG Count database

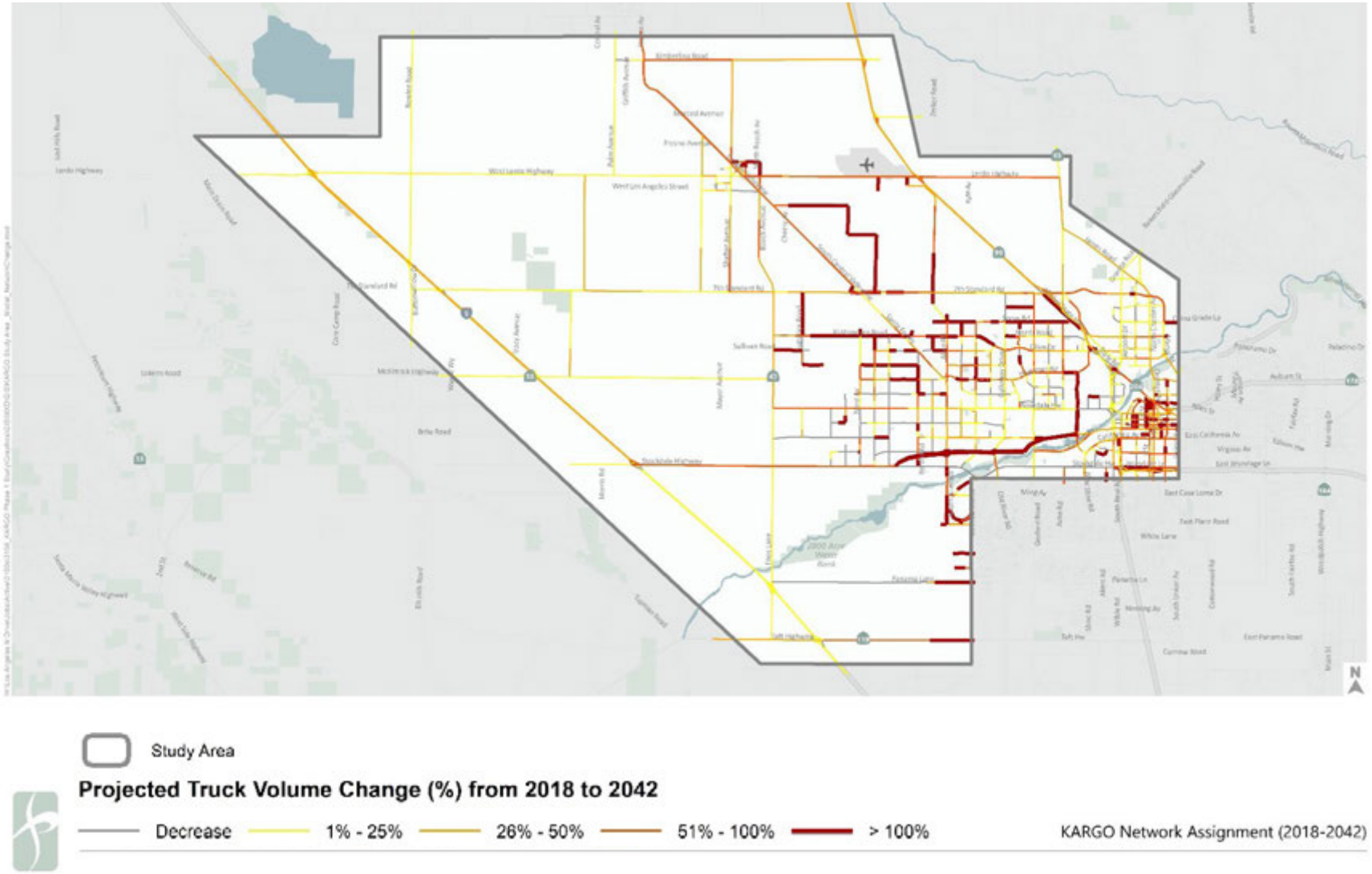


Figure 19. Projected Truck AADT volume Percent change (2018-2042)
Source: KernCOG Model

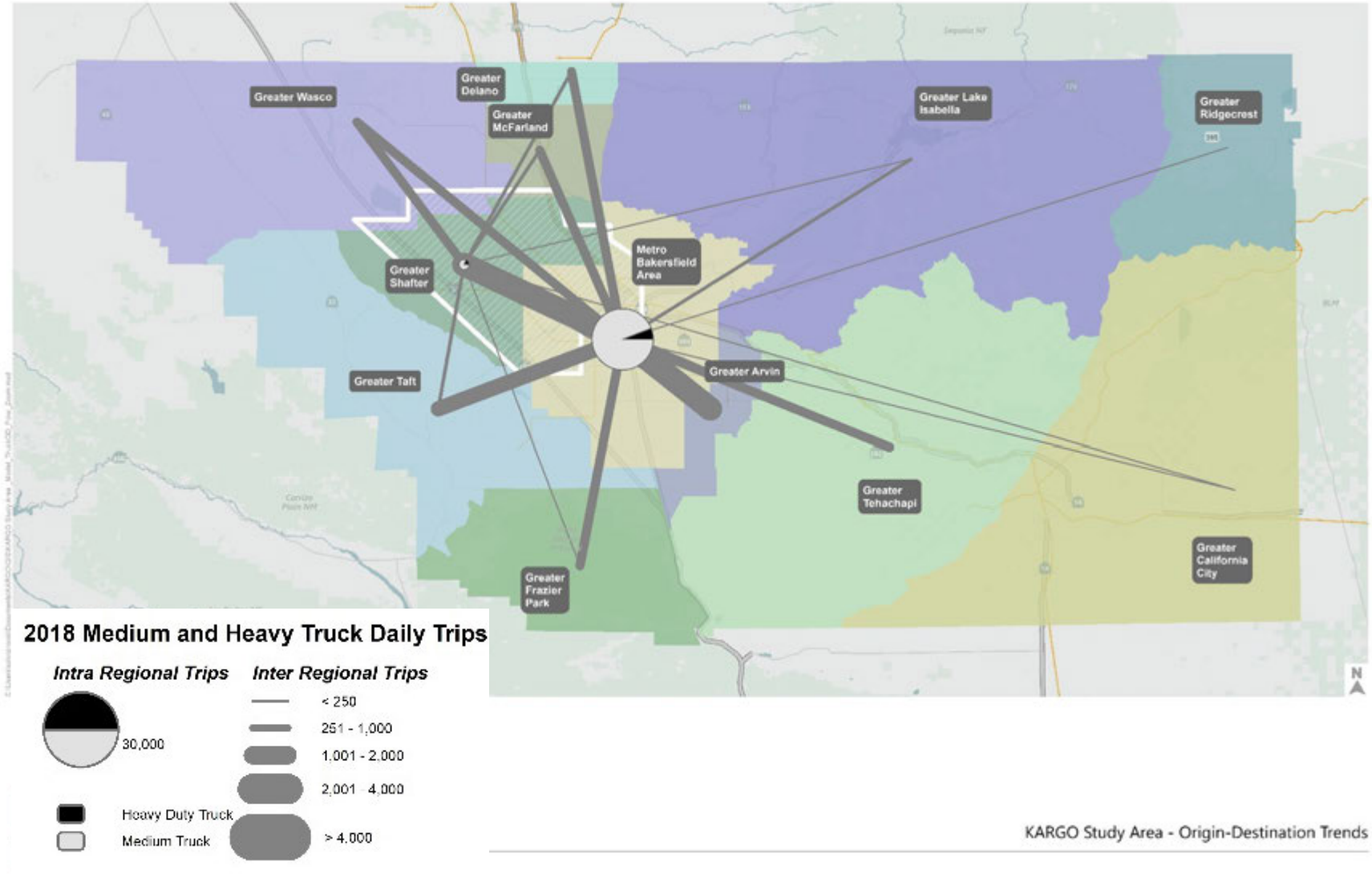


Figure 20. Existing (2018) Origin Destination Trends for Medium and Heavy Duty Trucks in Study area
Source: KernCOG Model

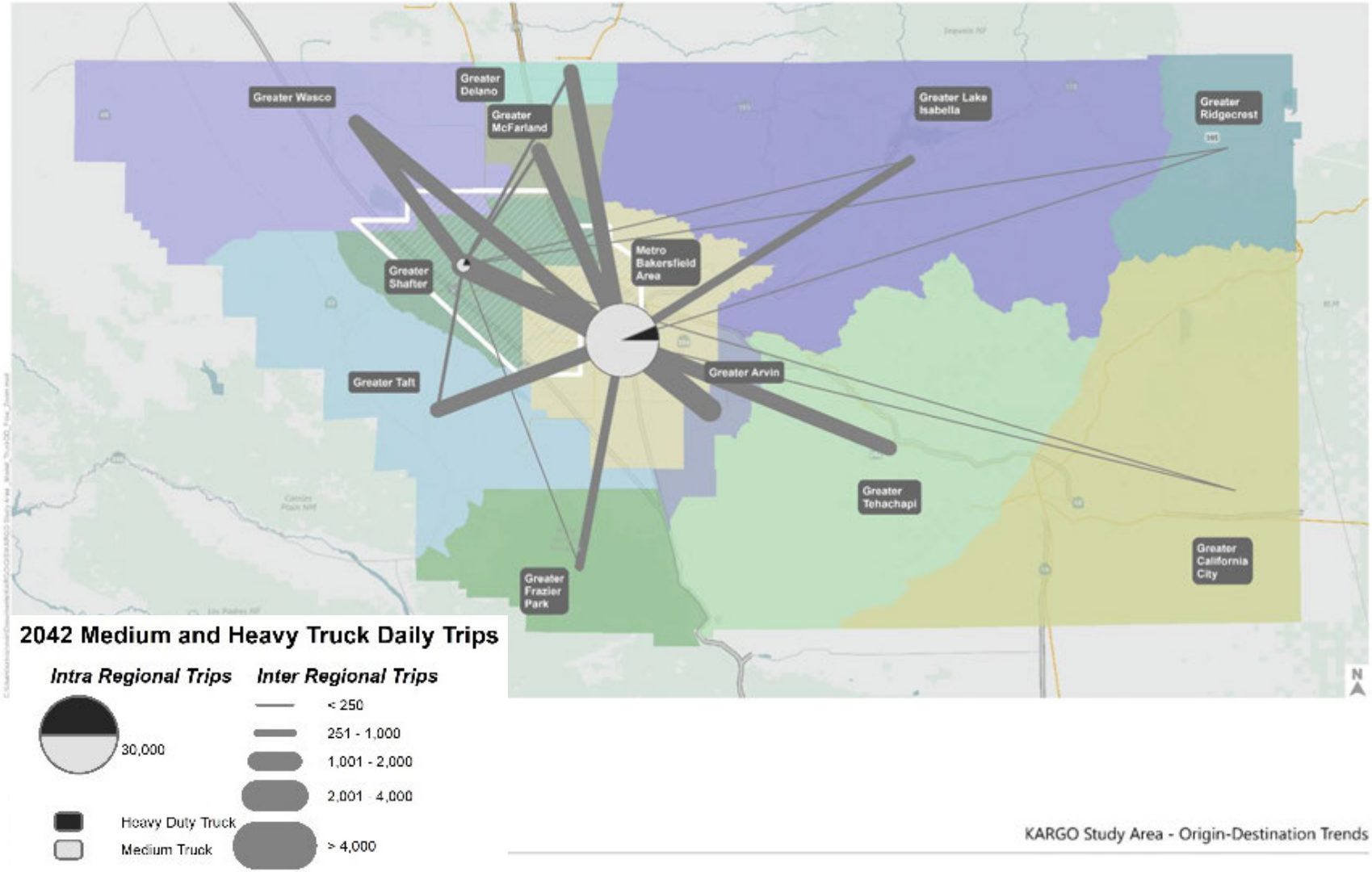


Figure 21. Future (2042) Origin Destination Trends for Medium and Heavy Duty Trucks in Study area
Source: KernCOG Model

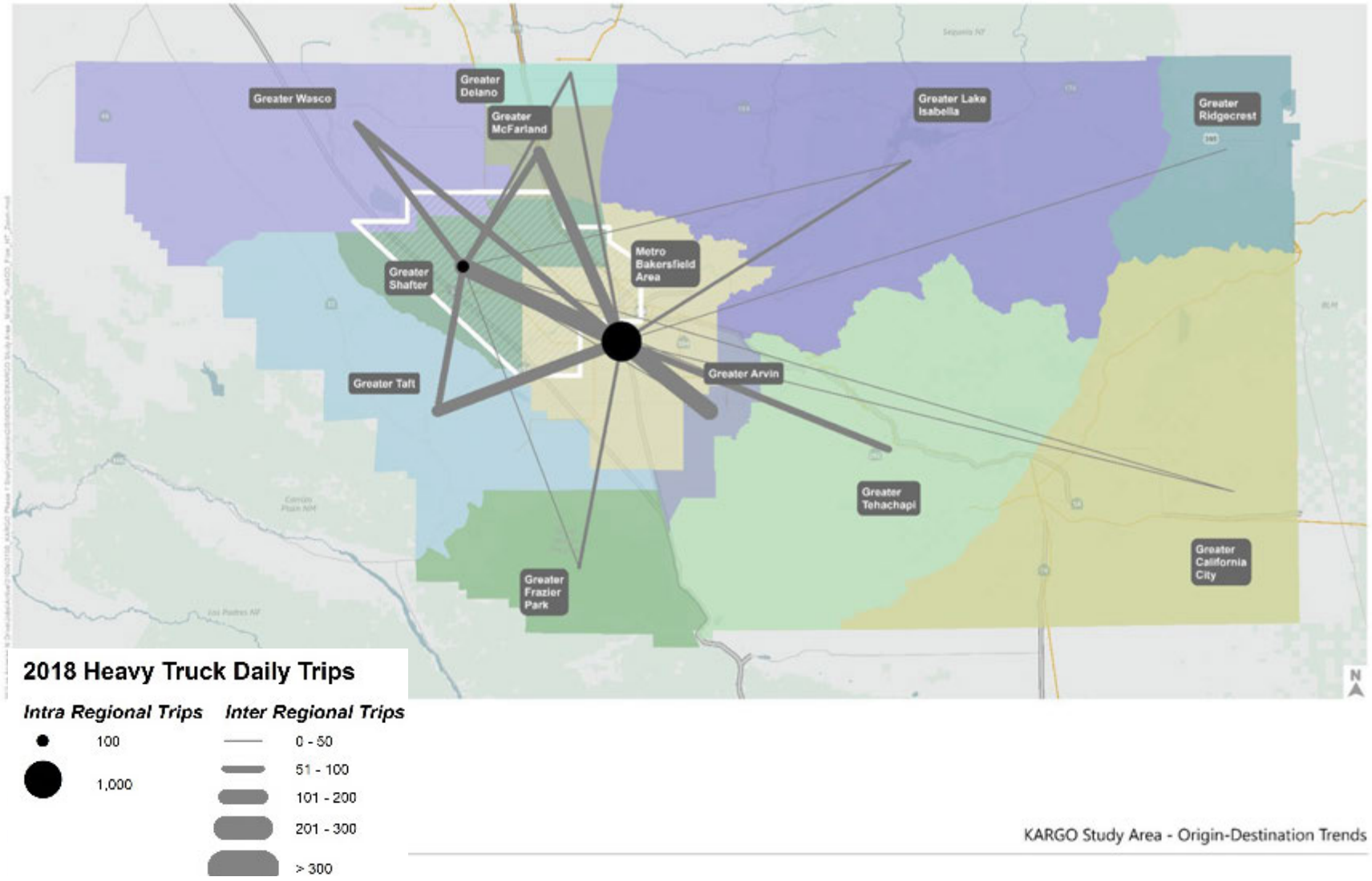


Figure 22. Existing (2018) Origin Destination Trends for Heavy Duty Trucks in Study area
Source: KernCOG Model

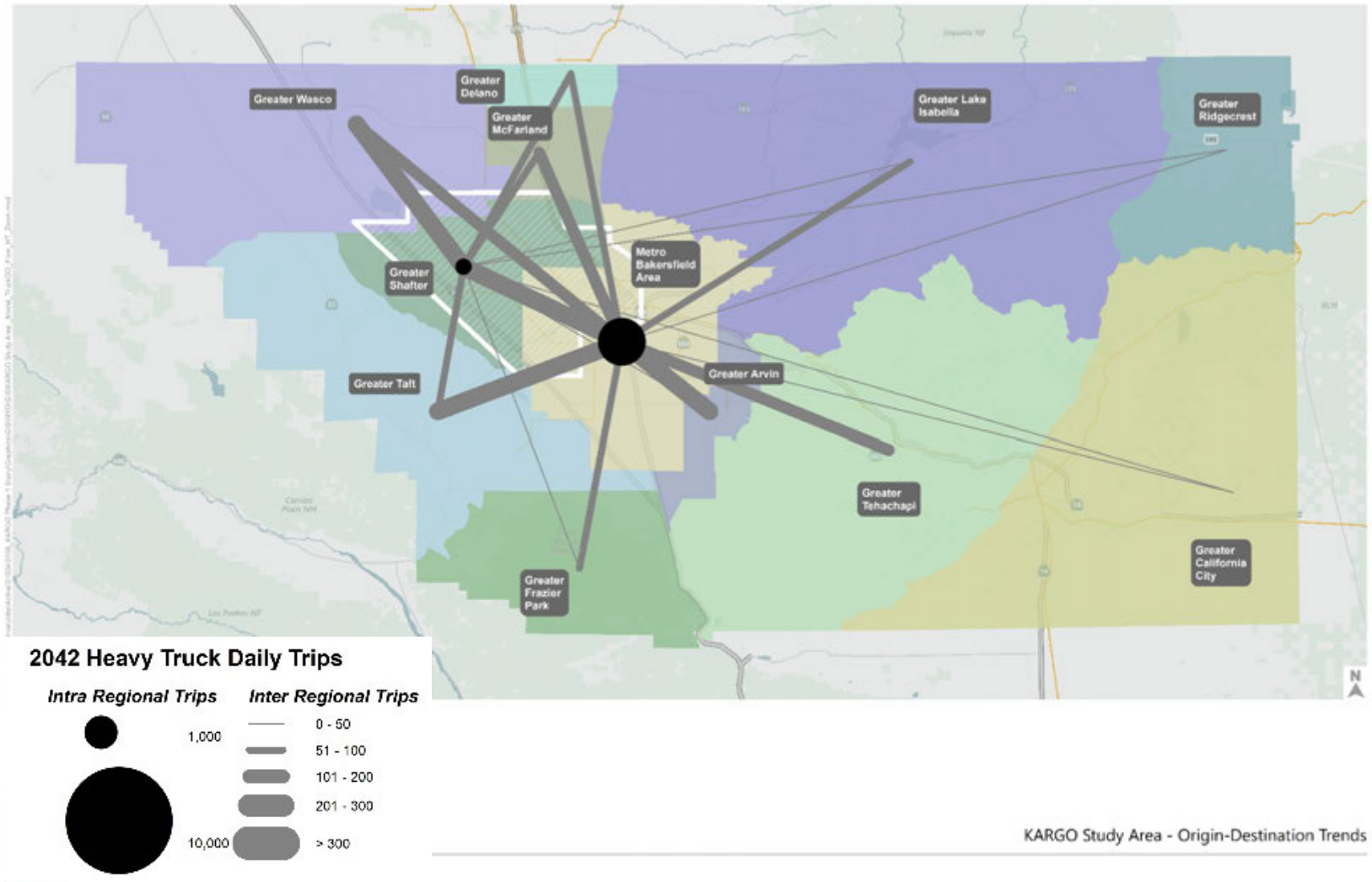


Figure 23. Future (2042) Origin Destination Trends for Heavy Duty Trucks in Study area
Source: KernCOG Model

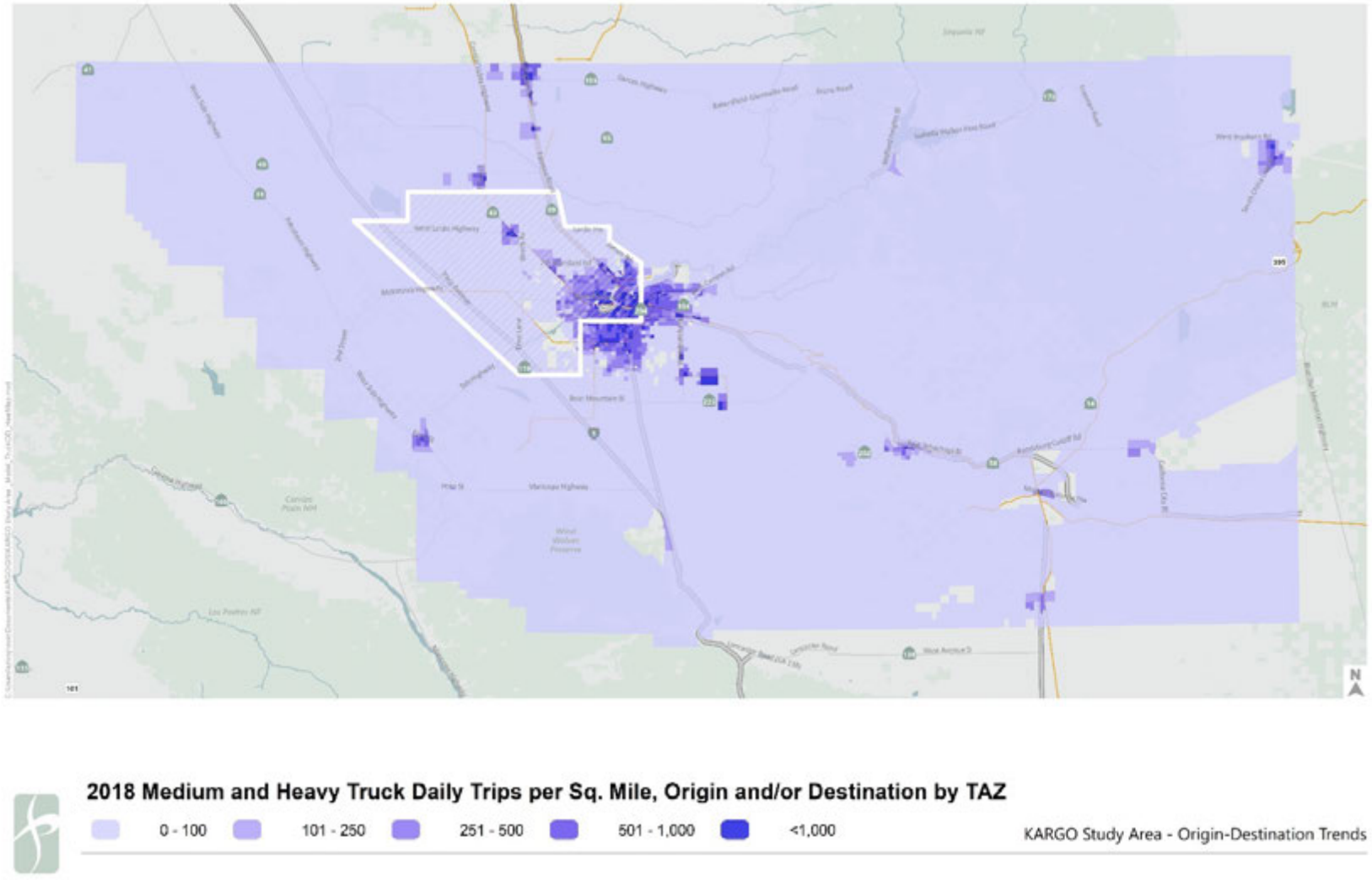


Figure 24. Existing (2018) Medium and Heavy Truck trip generation
Source: KernCOG Model

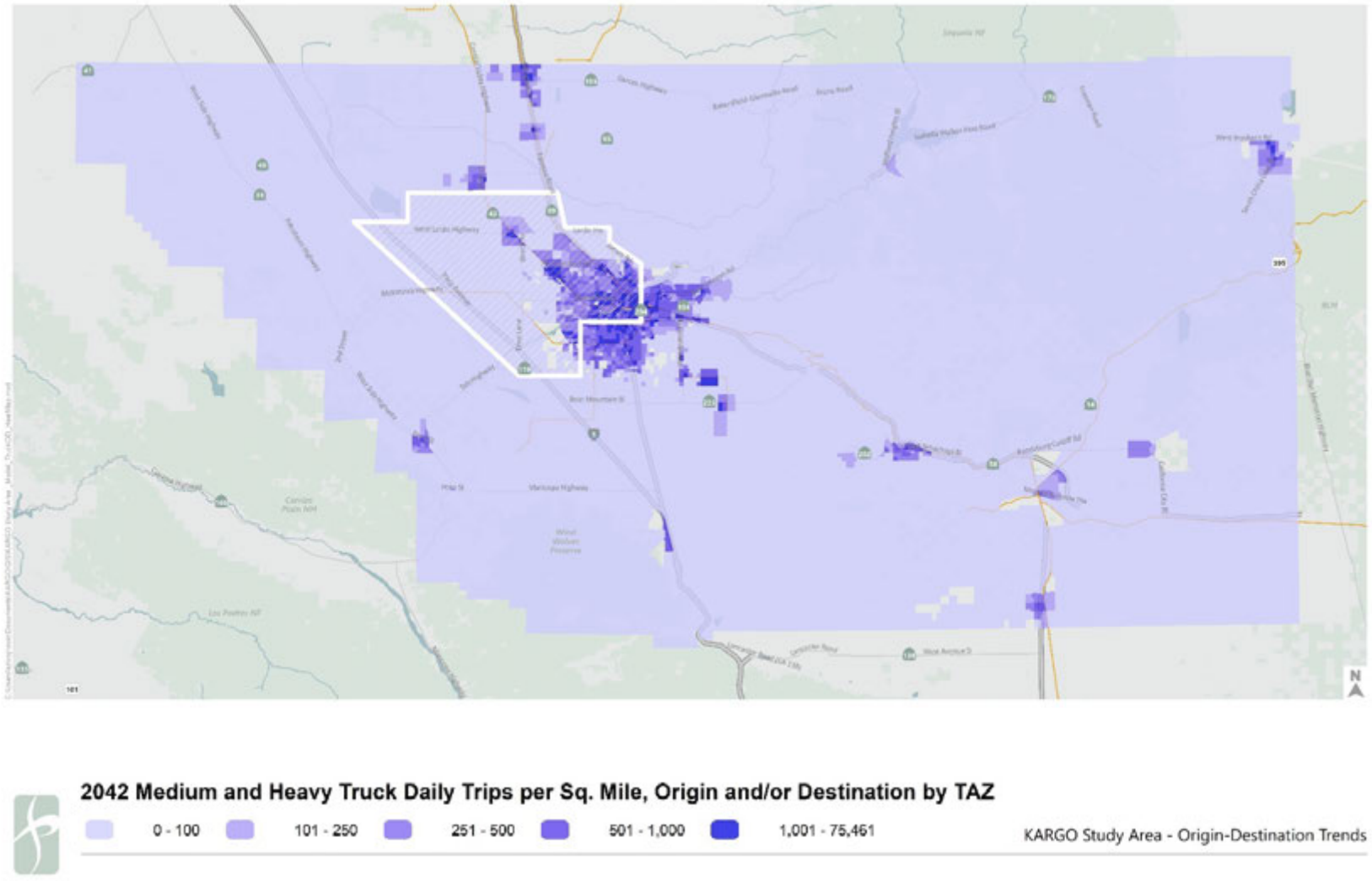


Figure 25. Future (2042) Medium and Heavy Truck trip generation
Source: KernCOG Model

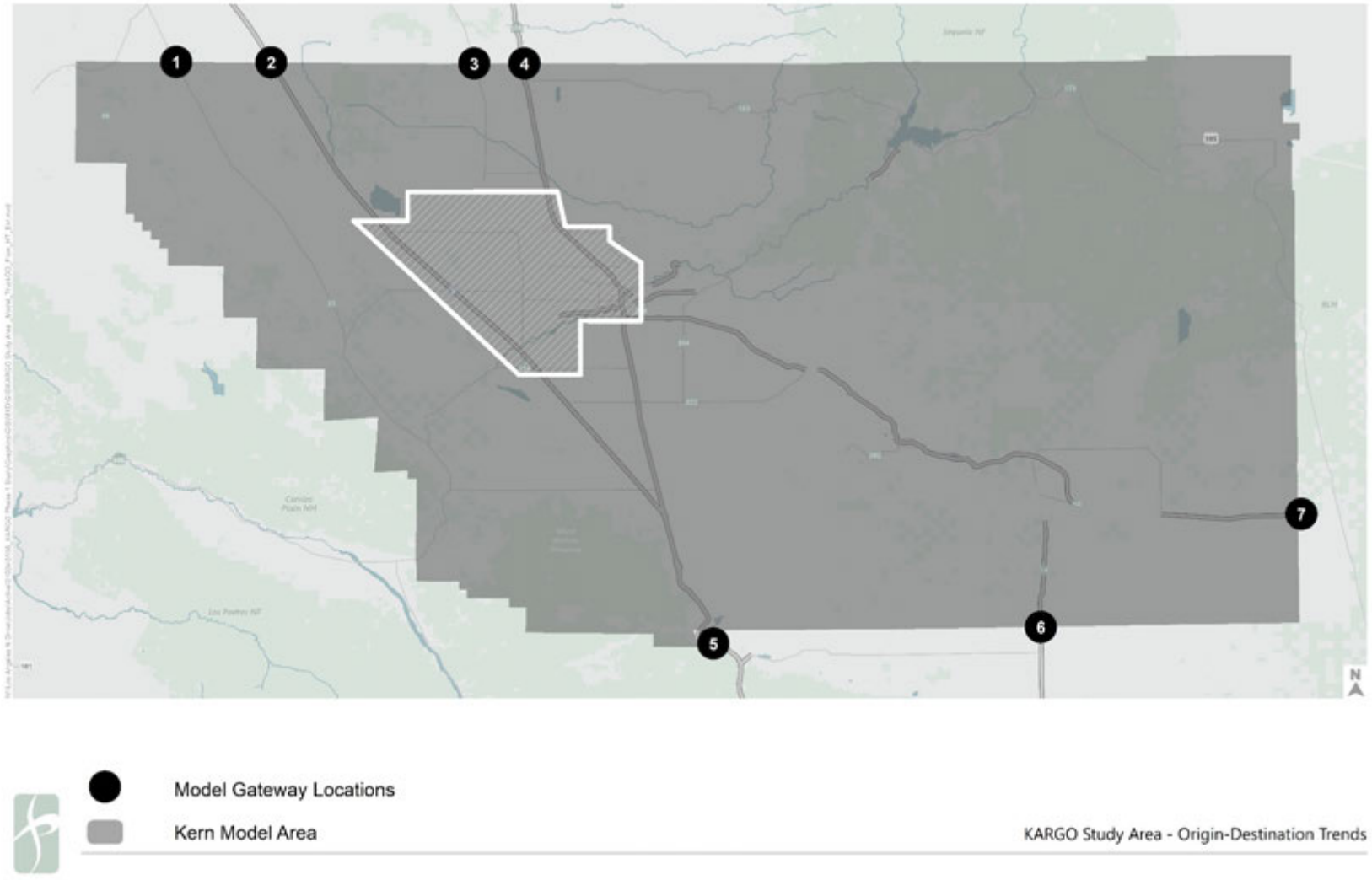


Figure 26. Model Gateway Locations

Table 1 External Truck Model Daily Volumes

2018 Medium Truck DailyVolumes at Key Gateways							
		Entering Model Area			Leaving Model Area		
Gateway ID	Gateway Description	Terminating Within Model Area *(XI)*	Pass Through Volumes *(XX)*	% Remain in Model Area	Originating Within Model Area *(IX)*	Pass Through Volumes *(XX)*	% Remain in Model Area
1	SR 33, Northern Gateway	69	0	100%	69	0	100%
2	I-5, Northern Gateway	14	164	8%	14	164	8%
3	SR 43, Northern Gateway	74	2	98%	74	2	98%
4	SR 99, Northern Gateway	659	464	59%	659	464	59%
5	I-5, Southern Gateway	317	99	76%	317	99	76%
6	SR 14, Southern Gateway	304	21	94%	304	20	94%
7	SR 58, Eastern Gateway	587	729	45%	587	730	45%

2042 Medium Truck Daily Volumes at Key Gateways							
		Entering Model Area			Leaving Model Area		
Gateway ID	Gateway Description	Terminating Within Model Area *(XI)*	Pass Through Volumes *(XX)*	% Remain in Model Area	Originating Within Model Area *(IX)*	Pass Through Volumes *(XX)*	% Remain in Model Area
1	SR 33, Northern Gateway	72	0	100%	72	0	100%
2	I-5, Northern Gateway	14	219	6%	14	219	6%
3	SR 43, Northern Gateway	77	3	97%	77	2	97%
4	SR 99, Northern Gateway	685	645	52%	685	645	52%
5	I-5, Southern Gateway	329	136	71%	329	137	71%
6	SR 14, Southern Gateway	316	24	93%	316	23	93%
7	SR 58, Eastern Gateway	611	1,034	37%	611	1,036	37%

2018 Heavy Truck Daily Volumes at Key Gateways							
		Entering Model Area			Leaving Model Area		
Gateway ID	Gateway Description	Terminating Within Model Area *(XI)*	Pass Through Volumes *(XX)*	% Remain in Model Area	Originating Within Model Area *(IX)*	Pass Through Volumes *(XX)*	% Remain in Model Area
1	SR 33, Northern Gateway	171	2	99%	171	2	99%
2	I-5, Northern Gateway	405	4,310	9%	405	4,323	9%
3	SR 43, Northern Gateway	135	19	88%	135	19	88%
4	SR 99, Northern Gateway	1,437	2,820	34%	1,437	2,829	34%
5	I-5, Southern Gateway	2,216	6,312	26%	2,216	6,288	26%
6	SR 14, Southern Gateway	456	103	82%	456	102	82%
7	SR 58, Eastern Gateway	466	1,492	24%	466	1,493	24%

2042 Heavy Truck Daily Volumes at Key Gateways							
		Entering Model Area			Leaving Model Area		
Gateway ID	Gateway Description	Terminating Within Model Area *(XI)*	Pass Through Volumes *(XX)*	% Remain in Model Area	Originating Within Model Area *(IX)*	Pass Through Volumes *(XX)*	% Remain in Model Area
1	SR 33, Northern Gateway	178	3	98%	178	3	98%
2	I-5, Northern Gateway	421	5,503	7%	421	5,519	7%
3	SR 43, Northern Gateway	141	25	85%	141	25	85%
4	SR 99, Northern Gateway	1,495	3,705	29%	1,495	3,717	29%
5	I-5, Southern Gateway	2,305	8,157	22%	2,305	8,126	22%
6	SR 14, Southern Gateway	474	120	80%	474	120	80%
7	SR 58, Eastern Gateway	484	2,060	19%	484	2,062	19%

Collision Information

Statewide Integrated Traffic Records System (SWITRS) online database was used to analyze truck related collisions over a four-year period from 2013-2017. During this time, there were only three truck related collisions in 2016 and 2017 in the study area. Among those three collisions, there were zero fatalities and only one injury. Two of the collisions were rear-end collisions, while the other was a broadside collision. The broadside collision, in 2017, involved three trucks and caused one injury.

Overall, according to the SWITRS data, there is little to no concern regarding freight movement and safety as the number of collisions on average per year is less than one. However, there may have been collisions that were not reported to local authorities.

Kern County Rail System

The current rail system and proposed High-Speed Rail (HSR) System are shown in the following map. One of the major concerns of HSR is the at-grade rail crossing, due to associated impacts. At-grade rail crossings require vehicle traffic to stop while the train passes. This causes congestion, pollution, and noise pollution. At-grade rail crossings provide more opportunities for collisions, either with vehicles or pedestrians.

For goods from facilities to be transported via rail, they mut first be transported via short line rail to the mainline rail facilities that will later deliver them to their final destinations. Vicki Wood, from San Joaquin Refining Company and member of CCRSRA, discussed how dependent the rail operations of her business are on short line rail-without it they cannot conduct business.

The San Joaquin Valley Railroad (Genesse & Wyoming) is the largest operator of short lines in the U.S. and has several rail lines in Kern County. Within the study area, these lines operate on the airport lead, Oil City Subdivision, Landco Subdivision, and Buttonwillow Subdivision.[6]

Figure 27 shows number of average daily Trains in 2011.

[6] http://www.kerncog.org/wp-content/uploads/2010/03/%20.pdf

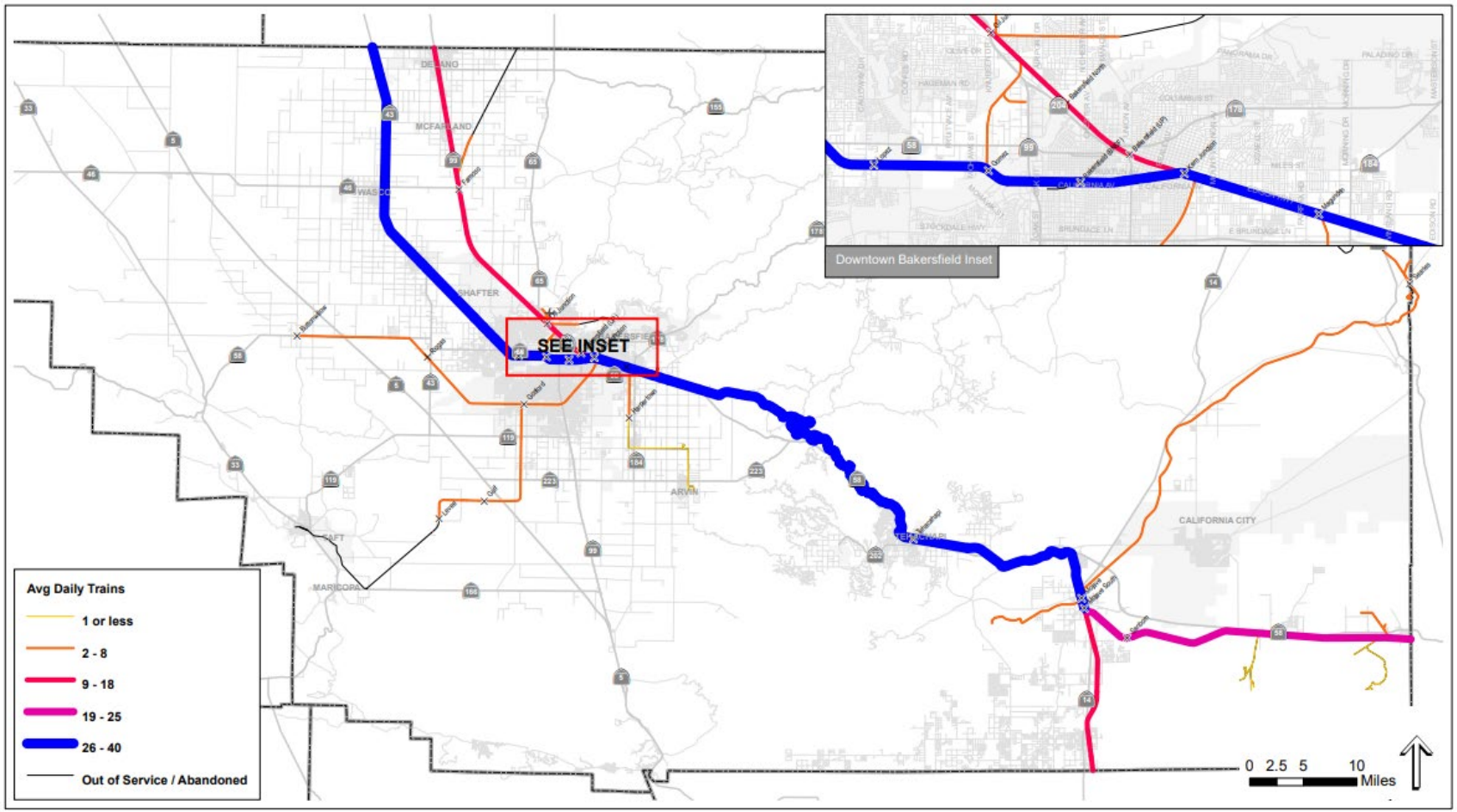


Figure 27. Kern County Train Volumes
Source: http://www.kerncog.org/wp-content/uploads/2010/03/%20.pdf

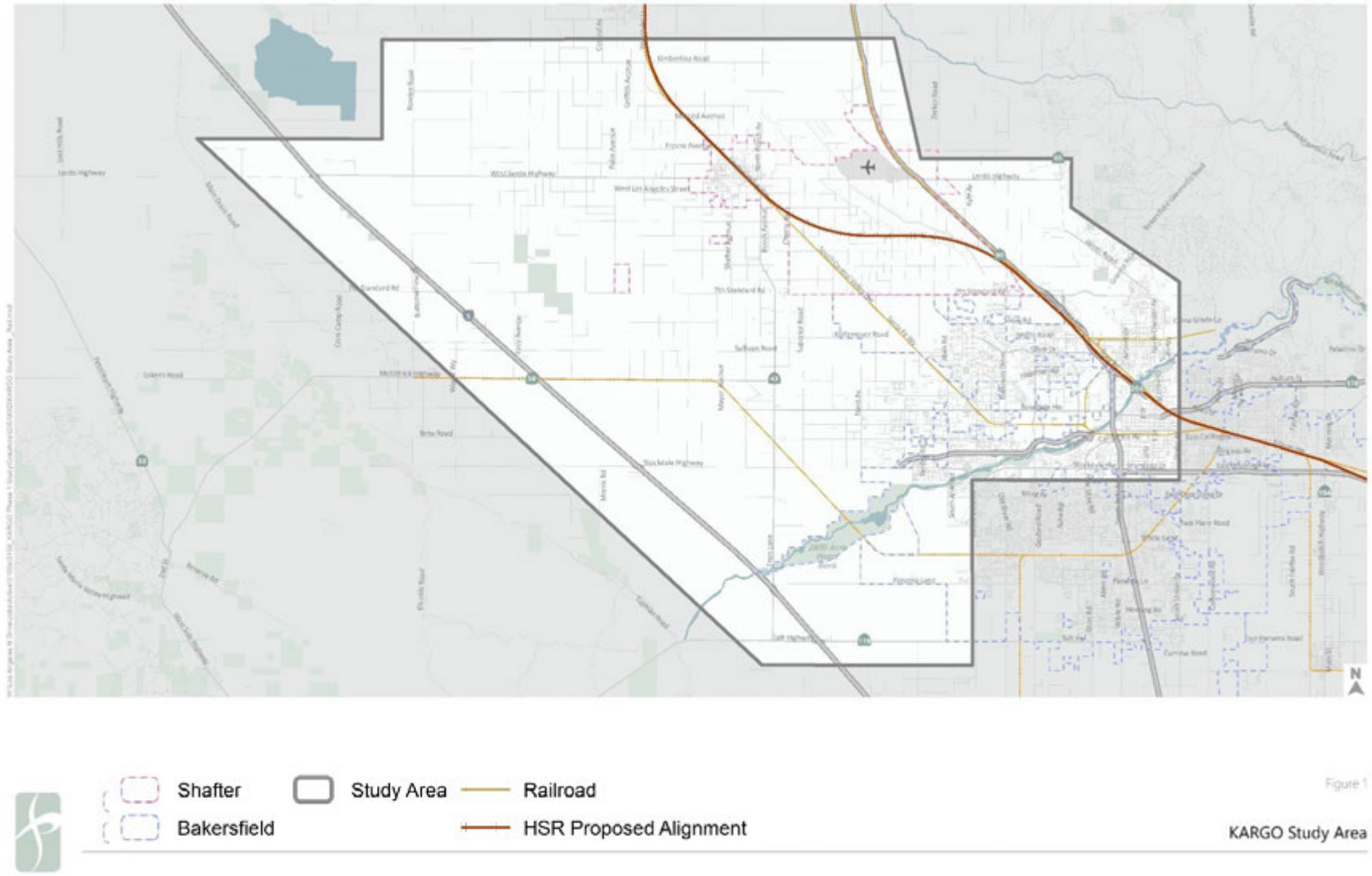


Figure 28 . Kern County Railroads

Planned Projects

Figure 29 and 29 show the planned Non-Widening and Widening projects per the RTP.

Almost all the non-widening projects are planned for the 2030-2042 time frame. The only project planned for an earlier time frame is the West Beltway connection to SR 58, which is planned for the near term, between 2016 and2025. Other projects include constructing new highways from I-5 to SR 65, grade separations, and extending existing freeways.

The widening projects are planned continuously through all time frames. The projects include the following:

- Constructing a new freeway from I-5 to Heath Road at Stockdale Highway (2042)
- Constructing a new facility from Rosedale Highway to Route 119 (2030-2033)
- Widening SR 99 to eight lanes from Route 178 to Lerdo Highway (2033-2042)

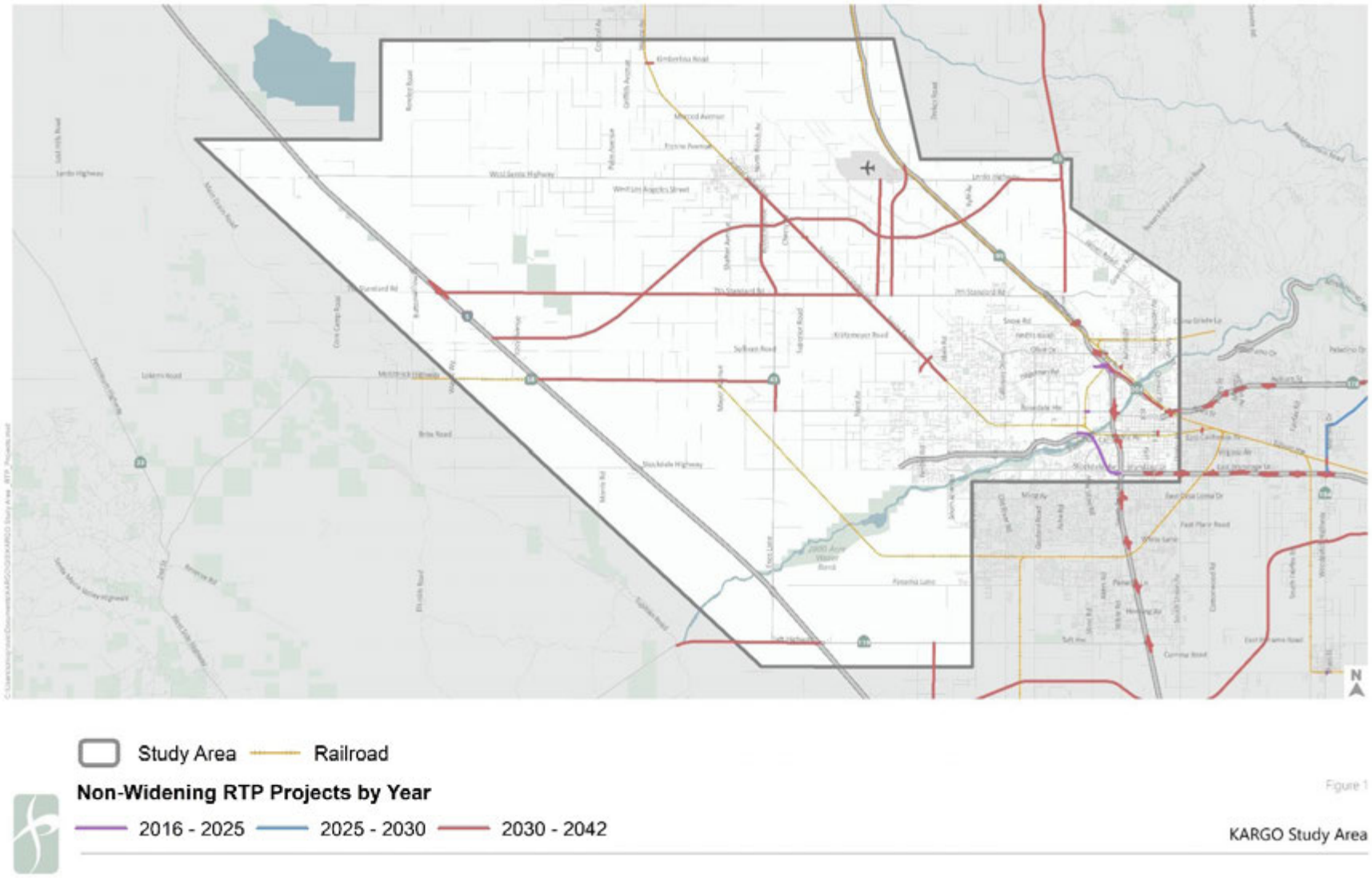


Figure 29. Kern County Non-widening Planned Project

Source: KernCOG RTP, Graphics by F&P

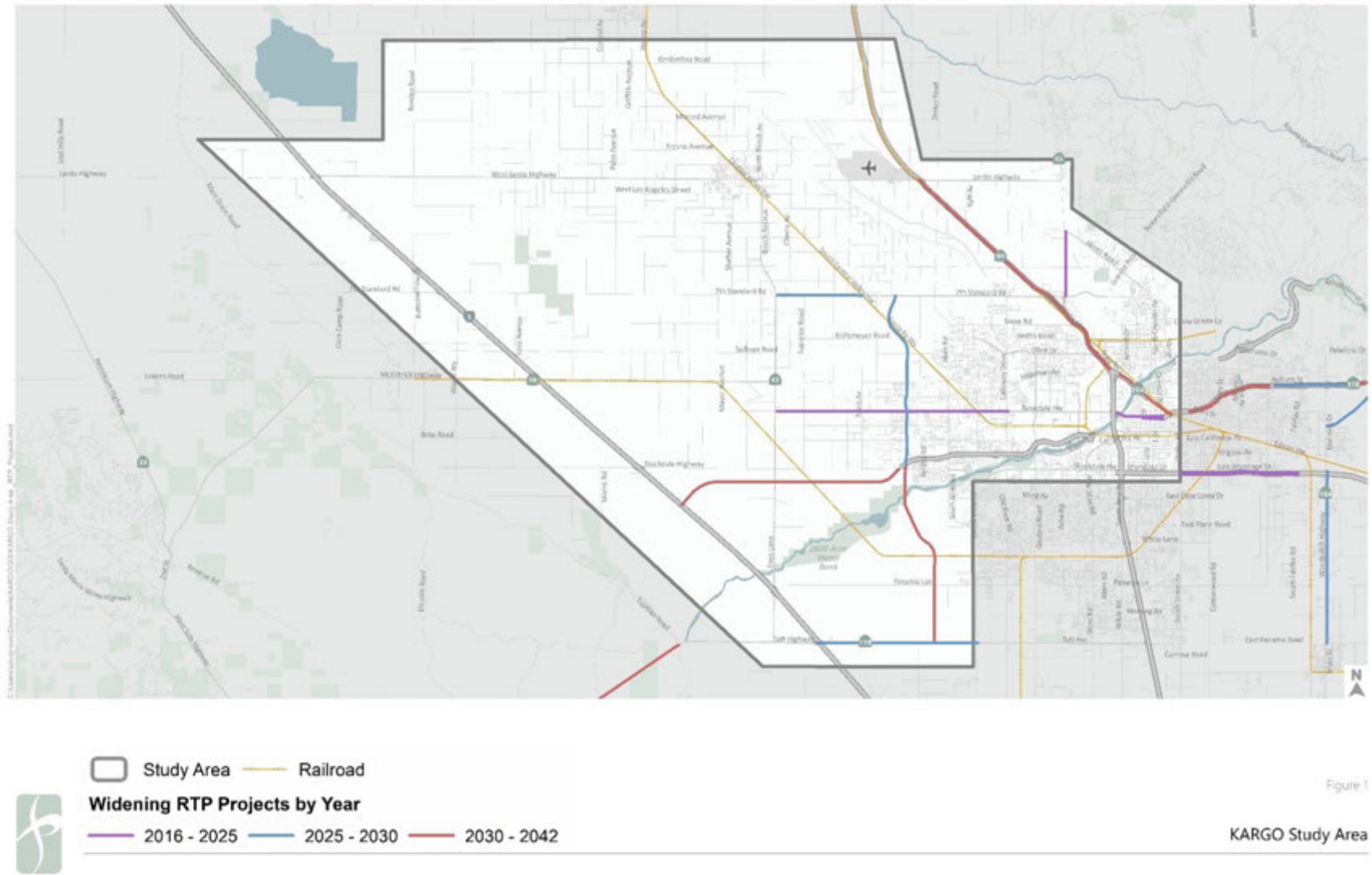


Figure 30. Kern County widening Planned Project

Source: KernCOG RTP, Graphics by F&P

Summary and Conclusion

The study area is expected to have 75% growth in number of households and 55% growth in employment by 2042. This report identifies locations and areas that would need improvements in transportation network to accommodate anticipated growth and minimize impacts to communities. These areas either already have high truck traffic volumes or are projected to grow substantially in the next few years. Overall, seven corridor areas are identified as shown in Figure 31. Some of these corridors are parallel to each other and the goal is to identify the best combination of them in a systematic analysis:

North-South Corridors:

1. SR-99
2. SR-43
3. West Beltway

East-West Corridors:

4. 7th Standard Road
5. Westside Parkway
6. North Beltway
7. Lerdo Highway

The truck volume growth in the northern Bakersfield area is due to regional freight generators, such as major distribution centers in an area between Bakersfield and Shafter along Santa Fe Way on 7th Standard Road (between I-5 and SR 99). Due to the industrial growth of that area, traffic is projected to increase by 25% to 75% on major arterials, including 7th Standard Road and Santa Fe Way. On connector streets, traffic will more than double in the surrounding area. 7th Standard Road/Merle Haggard Drive will also be the main arterials serving the new Amazon Distribution Center and connecting it to SR 99 and I-5.

North of 7th Standard Road, Lerdo Highway is also projected to have a 50% to 80% increase in truck volumes east of Shafter, connecting Shafter to SR 99. In the southern portion of the study area, the growth in traffic is mostly due to the growth in Bakersfield. The Westside Parkway/Stockdale Highway serve, and will continue to serve, as a major connector to I-5. One of the alternatives is to have Westside Parkway/Stockdale Highway as a major passenger connector, and navigate all heavy through traffic trucks to use 7th Standard Road during peak period or at all times. This would minimize weaving movements and increase safety for local communities along west and east sides of Bakersfield.

The next steps include outlining alternative solutions to accommodate the growth and mitigate the impacts on communities. These alternatives will be modeled to identify the most effective ones. Figure 31 shows the overview of corridors and roadway streets that will be evaluated based on travel demand model analysis. The preferred alternatives will be evaluated in more detail for a selected set of intersections/interchanges. A planning-level sketch drawing will be provided to show the footprint needed for future roadway improvements.

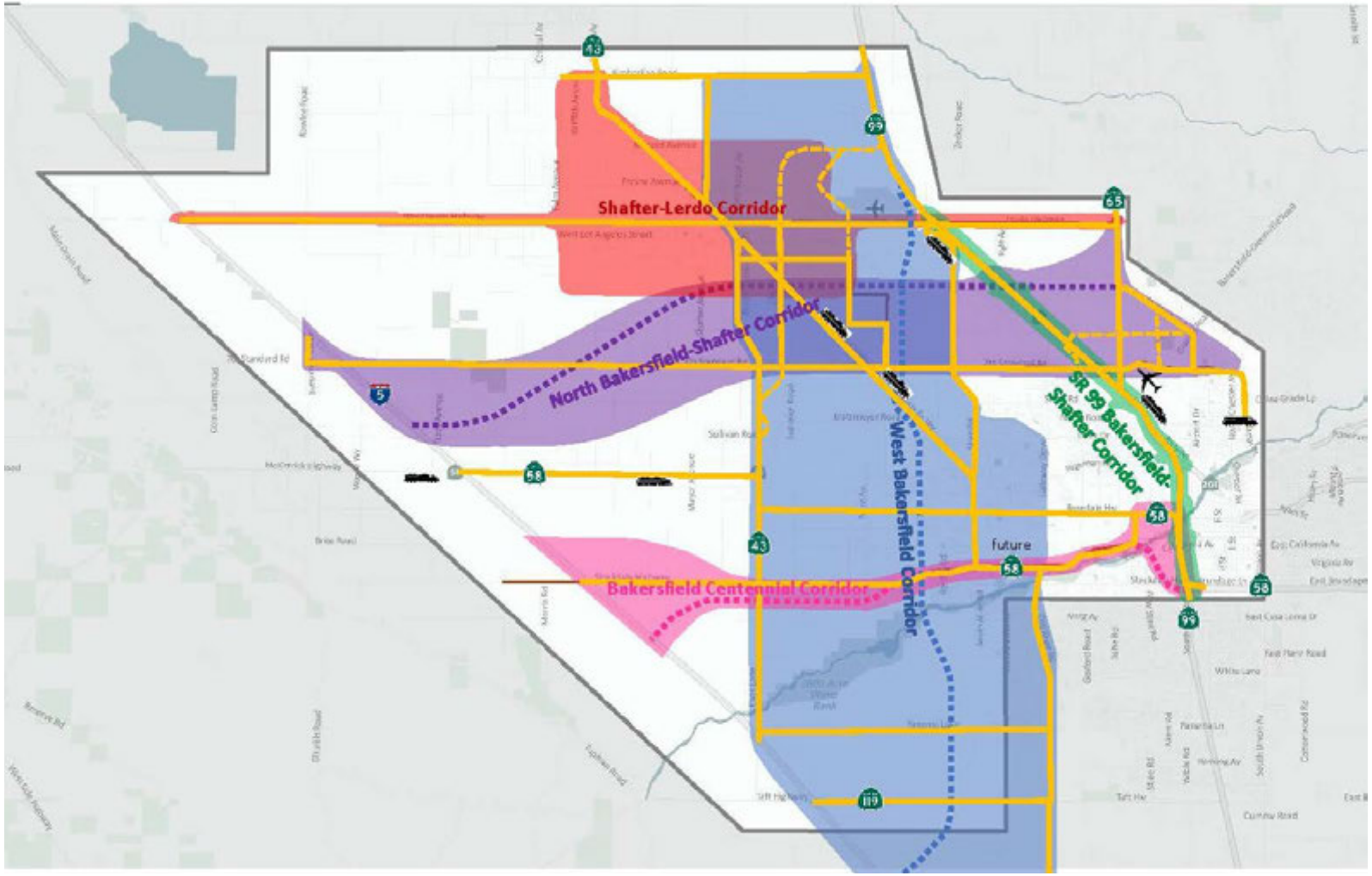


Figure 31. Proposed Corridors for Circulation Improvements

Developing Alternative Scenarios and Performance Measures

Several alternatives are developed to improve the traffic circulation under existing conditions and prepare for future needs. These alternatives are primarily focused on improving traffic circulation and safety in the study area, accommodating new developments, improving accessibility for community and industries, while minimizing environmental and health impacts. The alternatives are evaluated using the Kern COG regional Travel Demand Model[7].

Evaluation Criteria

The alternatives were evaluated using the 2042 Kern COG regional Travel Demand Model. The criteria by which these alternatives were evaluated are outlined in **Table 2.**

These criteria range from analyzing the direct impact to traffic flow, such as change in volume between alternatives, as well the secondary affect it might have on residential/sensitive receptors or industrial land use. "Sensitive receptors" are locations where occupants of certain facilities are more susceptible to adverse health effects from traffic pollution due to age and/or health status. . The South Coast Air Quality Management District (SCAQMD) advises that the following land uses are sites where sensitive receptors are typically located: residences, schools, playgrounds and childcare sites, hospitals, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Detailed land use information is necessary to identify "sensitive receptors." The Kern COG travel demand model does not have this detailed information; therefore, Cal-Environ Screen score and location of schools are used as a proxy.

Table 2 Evaluation Criteria

#	Metric	Detail	Description
1	Traffic Operation	Link level Comparison	Worst LOS between all peak periods
2	Total VMT	Regional	Reduction in Total VMT relative to Future Baseline Scenario (Potentially separate by II and IX+XI VMT)
3	Truck VMT	Regional	Reduction in Truck VMT relative to Future Baseline Scenario (Potentially separate by II and IX+XI VMT)
4	Household Exposure Index	Average TAZ Density	Number of households within 0.5 mile buffer of road * Truck volume
5	Jobs accessibility Index	Average TAZ Density	Number of Jobs (Industrial jobs) within 0.5 mile buffer of road * Truck volume
6	All Vehicles / Truck Volumes	Corridor level comparison	Shift through traffic to I-5 and away from SR-99 congested segments. % change at each link / Volume shift between corridors

[7] Kern COG staff will run the model for each scenario as needed

Alternatives

In step one, six corridor alternatives were identified. These six alternatives cover three main corridor improvements: 7th Standard Road, North Beltway, and West Beltway. These three corridor improvements address directional connectivity issues, specifically connecting SR-99 and I-5 either through an East-West connection or North-South connection. Each of these three corridor improvements have two different alignment options, for a total of 6 corridor alternatives. These 6 corridor alternatives are described in **Table 3** and **Figure 32.**

Table 3 Corridor Alternatives

#	Name	Purpose	High Level Description of Corridor Alignment
1	7SC1	E-W Connection	SR-65|SR-99→ **Burbank St** →**Cherry Ave** → 7th standard Rd →I-5
2	7SC2	E-W Connection	SR-65|SR-99→ E. Lerdo HW→ **Cherry Ave** → 7th standard Rd →I-5
3	NBSC1	E-W Connection	SR-65|SR-99→ **Burbank St** →**Palm Ave** → W. Lerdo HW →I-5
4	NBSC2	E-W Connection	SR-65|SR-99→ 7th standard Rd →SR43 → SR58→I-5
5	WBSC1	N-S Connection	SR-99→ **Merced Ave**→ **Cherry Ave** → 7th standard Rd →SR43→I-5
6	WBSC2	N-S Connection	SR-99→ **Burbank St** → **Cherry Ave** → 7th standard Rd →SR43→I-5

Note: **4 Lane New Alignment;** Adding 2 Lanes – Existing Alignment

In step two, the most promising alternatives are combined to comprehensively improve circulation and access. These System Scenarios are described in **Table 4** and **Figure 33**.

Table 4 System Scenarios

#	High Level Description of Corridor Alignment
7	SR-65|SR-99→ **Burbank St** →**Cherry Ave** → 7th standard Rd→I-5 SR-65→ **Merced Ave**→ **Cherry Ave** → 7th standard Rd →SR43→I-5
8	SR-65|SR-99→ **Burbank St** →**Cherry Ave** → 7th standard Rd →I5 7th standard Rd →SR43→I-5
9	SR-65|SR-99→ **Burbank St** →**Palm Ave** → W. Lerdo HW →I5 **Cherry Ave** → 7th standard Rd →SR43→I-5
10	SR-99→ **Burbank St** →**Cherry Ave** → 7th standard Rd→I-5 SR-99→ **Merced Ave**→ **Cherry Ave** → 7th standard Rd →SR43→SR-58 →I-5

In step three, the final Build-out Scenario for the circulation plan was developed based on results from steps one and two and several discussions held with stakeholders at City of Bakersfield, City of Shafter, Kern County and Kern COG **(Figure 34)**.

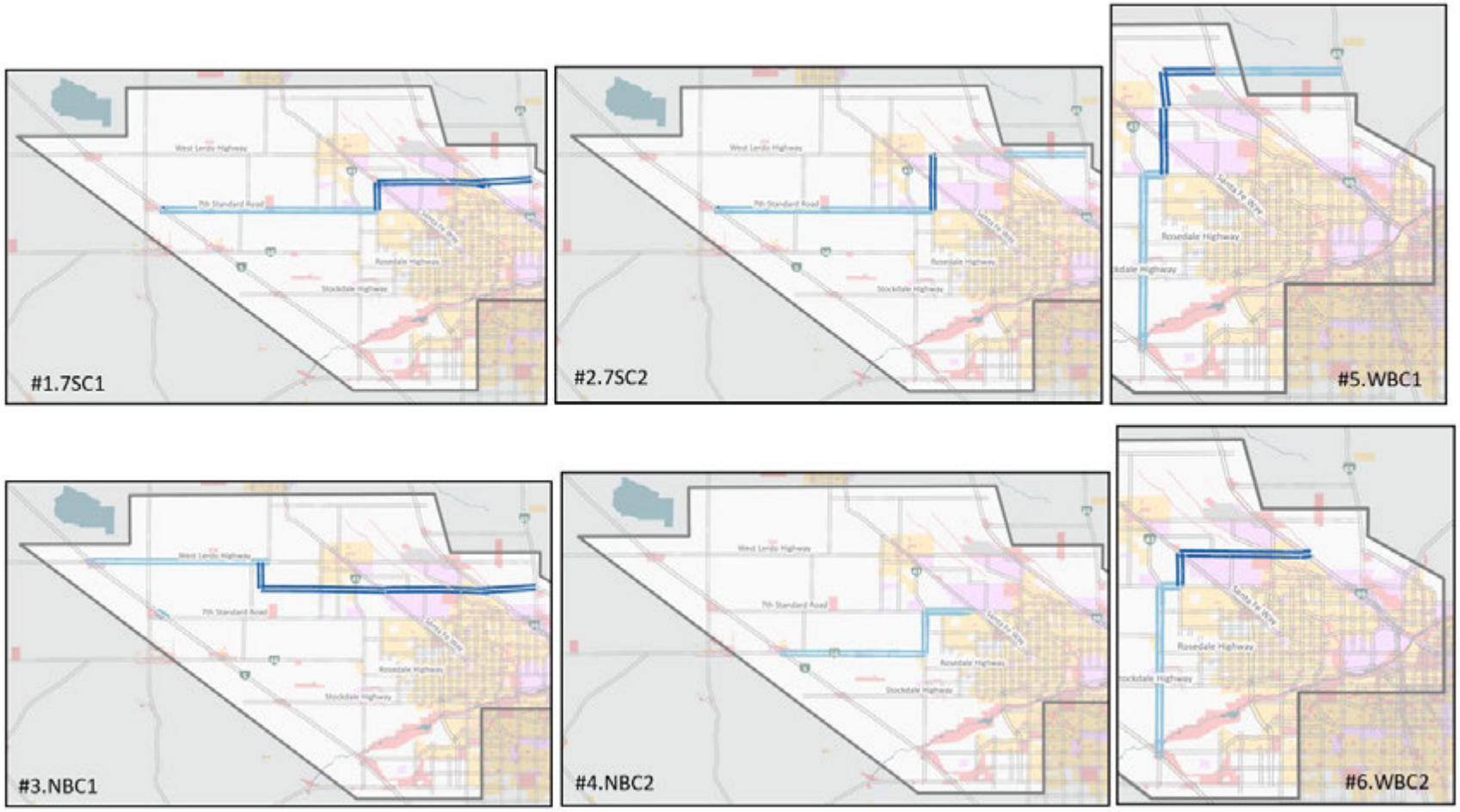


Figure 32. Corridor Alternatives

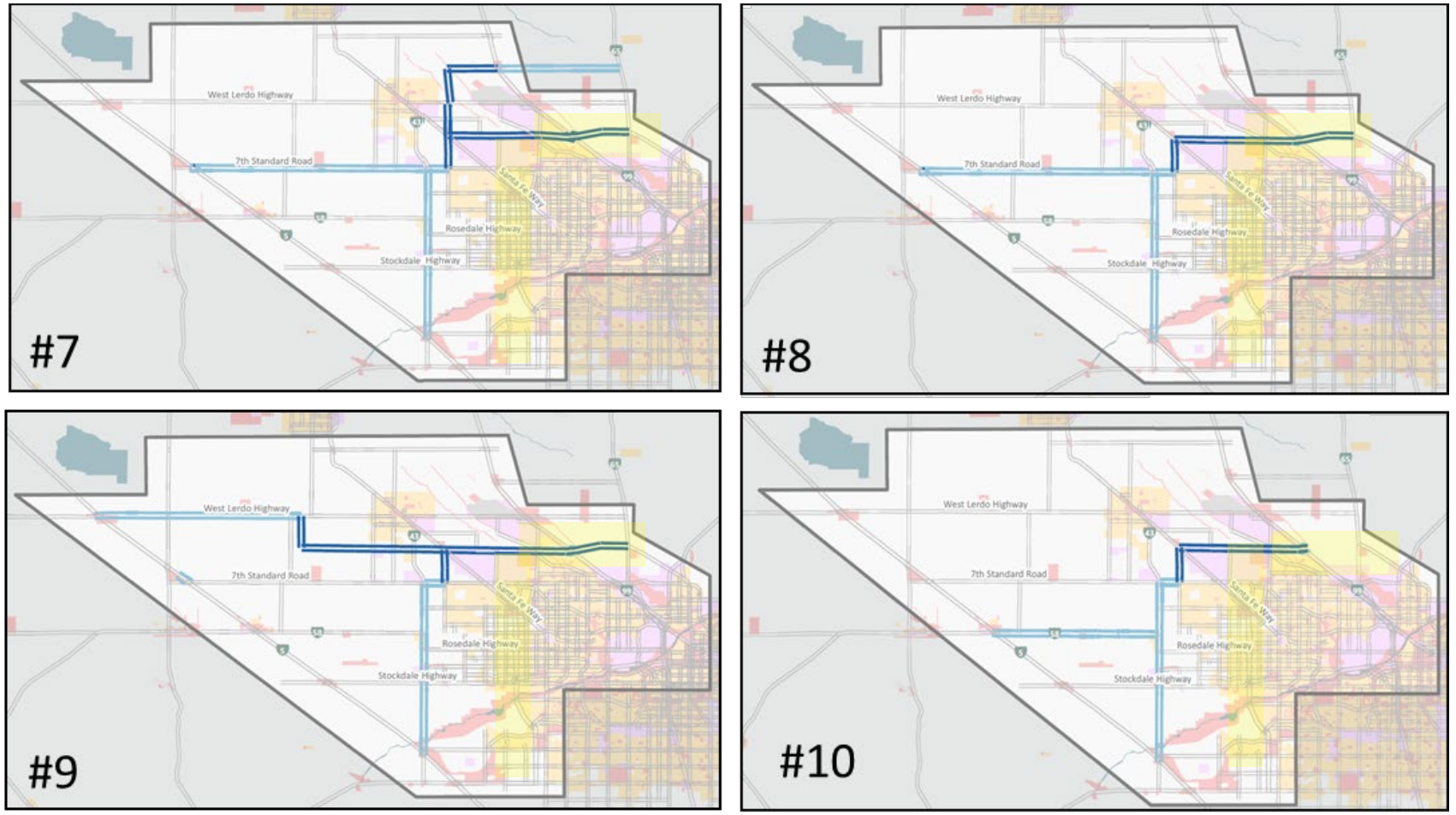


Figure 33. System Scenarios

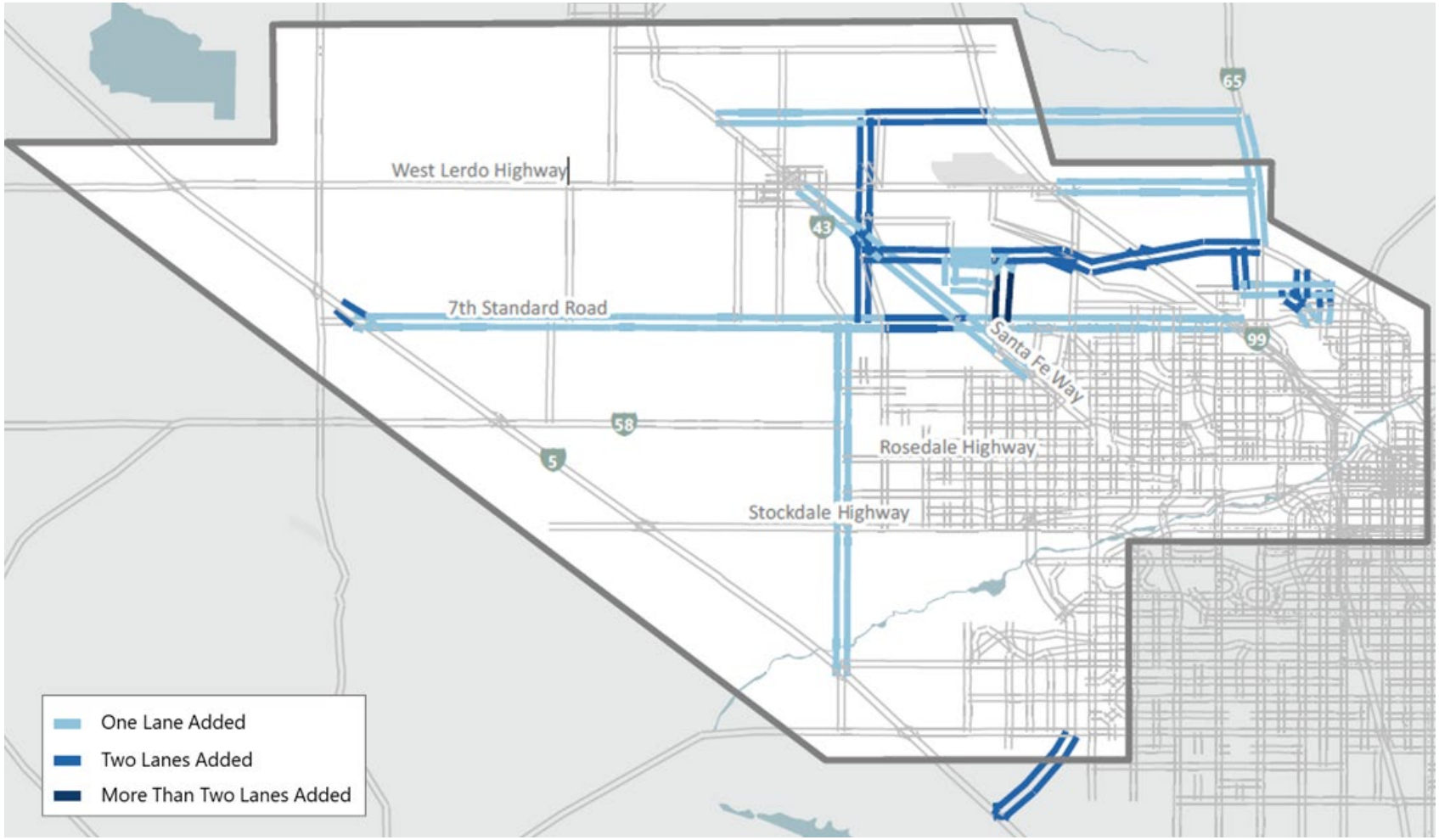


Figure 34. Full Build-out Scenario

Alternatives Evaluation

Each of the six *corridor alternatives* were evaluated based on established criteria. The comparison results are presented in **Table 5**. Since these criteria have different units, and the scores are not additive, a categorical grading is required. For each criteria, the scenario with the highest score was flagged as "High Impact" and the scenario with the lowest score was flagged as "Low Impact." The third scenario was flagged as "Medium Impact." Every High score equals 3 points, while Medium and Low scores equal 2 and 1 points, respectively. Detailed comparison graphics are presented in Appendix A1.

Table 5 Corridor Alternative Ranking

#	Metric	#1 7sc1	#2 7sc2	#3 NBsc1	#4 NBSc2	#5 WBSc1	#6 WBsc2
1	Traffic Operation improvement (Lane miles of roads with improvement in their worst LOS)	H	M	H	L	M	M
2	Total VMT reduction (relative to future baseline)	M	L	M	L	H	H
3	Truck VMT reduction (relative to future baseline)	M	L	M	L	M	H
4	HH Exposure index Improvement	M	L	M	L	H	M
5	Access to Industrial Jobs Index Improvement	M	L	M	L	M	H
6	Shift through traffic to I-5 and away from SR-99 congested segment	L	L	L	M	H	H
	Final score	**12**	**7**	**12**	**7**	**15**	**16**

Notes: H = High, M = Medium, L = Low

- **Corridor Alternative #1:**

This alternative provides access to industrial developments north of Bakersfield, east of Santa Fe Way, while avoiding truck traffic from residential areas in Bakersfield and Shafter. Truck traffic on 7th standard Road, between SR-99 and SR-43, would be shifted to the new Burbank Road alignment. A new interchange at Burbank Street & SR-99 would reduce congestion on 7th Standard Road & SR-99 Interchange and reduce delay on local roads accessing SR-99 interchange. It would also separate truck traffic from the residential and commute traffic in the area. This corridor would attract some of the traffic on West

Lerdo Highway, between Santa Fe Way and SR- 99, and reduce current impacts on sensitive communities residing in Shafter. Given the location and direction of this corridor, it does not affect I-5 and SR-99 traffic significantly.

- **Corridor Alternative #2:**

Alternative 2 is similar to Alternative 1, they are both situated along 7th Standard Road west of Santa Fe Way, but alternative 2 uses Lerdo Highway east of Santa Fe Way to connect I-5 to SR-99. This alternative is less desirable because it does not provide direct access for industrial uses north of Bakersfield. Relative to Alternative 1, it attracts less traffic from 7th Standard Road & SR-99 Interchange, therefore providing less congestion relief on arterials accessing SR-99 interchange.

- **Corridor Alternative #3:**

Alternative 3 is similar to Alternative 1, they are both situated along Burbank Road East of SR-43, but Alternative 3 uses West Lerdo Highway from Palm Avenue. The impact of this Alternative on improving traffic circulation is very similar to Alternative 1 in terms of providing access for industries commercial developments, while minimizing impacts and congestion in residential areas. The overall score of Alternative 1 and 3 are the same

- **Corridor Alternative #4:**

This Alternative improves I-5/SR-99 connectivity by adding capacity on SR-58 between I-5 and SR-43. While this improvement supports shifting out-of-state traffic from SR-99 to I-5 (specially truck traffic from I-40), it does not provide great benefit to other measures, such as: separating truck traffic from residential and commute traffic, reducing congestion on north Bakersfield arterials, and providing more direct access for future industrial and logistic developments in the study area.

- **Corridor Alternative #5:**

Alternative 5 provides north-south access from I-5 to SR-99. This corridor connects southern California with industrial and logistic facilities north of Bakersfield, while minimizing impacts on communities in the greater Bakersfield Metro area. It would also shift truck traffic on SR-99, traveling from San Joaquin Valley to southern California, to I-5 and relief congestion on SR-99 along its most congested segments crossing Bakersfield Metro area.

This alternative was initially aligned on SR-43 between 7th Standard Road and Lerdo Highway, however, during the stakeholder discussion, Cherry Avenue was recommended instead. The Cherry Avenue segment would avoid sensitive receptors in the area, while helping to separate truck traffic from Shafter's residential and commute traffic.

- **Corridor Alternative #6:**

This Alternative had the overall highest score. This alternative is similar to Alternative 5, they are both situated along SR-43/Cherry Avenue, but Alternative 6 uses Burbank Street to access SR-99 instead of Merced Avenue (as shown in Alternative 5). As the results from the Kern COG model shows, this alternative provides better access for industries and commercial developments north of Bakersfield, but it also increases community impacts and may shift slightly less traffic from SR-99 as compared to Alternative 5. This Alternative is the second-best proposed corridor improvement.

The *System scenarios* are developed based on most promising corridor improvement alternatives. The comparison of these scenarios are presented in **Table 6.** Since these criteria have different units, and the scores are not additive, a categorical grading is required. For each criteria, the scenario with the highest score was flagged as "High Impact" and the scenario with the lowest score was flagged as "Low Impact." The third scenario was flagged as "Medium Impact." Every High score equals 3 points, while Medium and Low scores equal 2 and 1 points, respectively. Detailed comparison graphics are presented in Appendix A2.

Note the scores are relative in each set of comparison and results in **Table 5 and Table 6** are in different scales.

All System Scenarios include improvements along: SR-43 from I-5 to 7th Standard Road, Cherry Avenue from 7th Standard Road to Santa Fe Way (north-south), and Burbank Street from Santa Fe Way to SR-99 (east-west).

- **Scenario #7:**

This scenario includes Corridors in Alternatives #1 and #5. It provides an east-west connection along 7th Standard Road on east of Santa Fe Way and two parallel roads on Burbank Street and Merced Avenue, west of Santa Fe Way. It also provides improvements along SR43/Cherry Avenue, similar to Corridor Alternative #5. By adding capacity to both Burbank Street and Merced Avenue and extending them to SR-65, it will provide multiple access points to I-5 and SR-99 for planned major industrial park developments east of Santa Fe Way and north of 7th Standard Road.

- **Scenario #8:**

This scenario is similar to Scenario #7, but it does not include the Merced Avenue improvements. Therefore, the traffic on Burbank Street will be heavier and there will be more congestion on SR-99, north of Burbank Street.

- **Scenario #9**

This is the least favorable scenario. Given the alignment, it does not reduce congestion on SR-99 by shifting through traffic to I-5. There is not much development planned along West Lerdo Highway, therefore, providing improvements along this corridor is less desirable than 7th Standard Road.

- **Scenario #10**

This scenario increases capacity on SR-58, between SR-48 and I-5. According to Kern COG model results, by improving this corridor, This scenario yields the greatest reduction on SR -99 traffic out-of state traffic from I-40 to Bay Area and northern Sacramento will shift to I-5 via this corridor. However, this improvement will also increase traffic crossing the City of Bakersfield along SR-58 and Truxtun Avenue/Westside Parkway, while increasing congestion on SR-99 ramps along California Avenue and Brundage Lane. Traffic routing signage, identifying truck route limitations, and direct access from SR-58 east of SR-99 to Westside parkway might improve the circulation in this area.

Table 6 System Scenario Ranking

#	Metric	#7	#8	#9	#10
1	Traffic operation improvement (Lane.miles of roads with improvement in their worst LOS)	H	H	M	L
2	Total VMT reduction (relative to future baseline)	M	M	L	H
3	Truck VMT reduction (relative to future baseline)	M	M	L	H
4	HH Exposure index Improvement	H	M	M	L
5	Access to Industrial Jobs Index Improvement	H	M	L	M
6	Shift through traffic to I-5 and away from SR-99 congested segment	M	M	L	H
	Final score	**15**	**13**	**9**	**14**

Notes: H = High, M = Medium, L = Low

- **Scenario #11, #12**

These two scenarios were run with Kern COG model but not evaluated in detail. Scenario #11 is similar to Scenario #9, without the extension of Burbank street from SR-99 to SR-65. Scenario #12 is similar to Scenario #10, but it includes the extension of Burbank Street from SR-99 to SR-65. Overall, the benefit of the Burbank Street extension to SR-65 is significant when it is combined with improvements on SR-65 between Merle Haggard Drive and Lerdo Highway. By creating this triangle, the congestion on SR-99 would be reduced and the circulation and access to regional network for existing industrial, manufacturing and logistic facilities north of the airport (as well as significant future planned developments) would be improved.

Circulation plan Scenario

The future demand for transportation network capacity directly relates to land use growth. The scenarios and alternatives reviewed were based on the 2042 RTP land use forecast. Land use encroachment will happen over time, therefore the transportation improvements can be phased accordingly. According to Kern COG Planning Staff and other stakeholders' input, given the available lands and opportunities in the study area, the land use development and growth potentially would continue to 2100. **Figure 35** shows the recommended phasing. Per stakeholder request, two extra improvements were also evaluated and compared with Scenario #7. Scenario #13, adds more local access roads east of SR-99 for new developments to Scenario #7. Scenario #14 adds a connection between the southern end of West- Beltway Corridor to I-5. West Beltway Corridor is an approved north-south corridor in the 2042

RTP. The purpose of these two scenarios is to prepare the full network for the circulation plan in the study area. This circulation plan is shared between City of Bakersfield, City of Shafter and Kern County. **Table 7** shows the comparison of the final list of scenarios.

Table 7 Scenario Evaluation

#ID	Metric	#5 WBSC1	#7 WBC1 & 7SC1	#13 7SC1 & WBC1 with West Beltway Connector to I-5	#14 7SC1 & WBC1 without West Beltway Connector to I-5
1	Traffic Operation improvement (Lane.miles of roads with improvement in their worst LOS)	L	M	H	H
2	Total VMT reduction (relative to future baseline)	M	L	L	H
3	Truck VMT reduction (relative to future baseline)	L	L	M	H
4	HH Exposure index Improvement	H	H	M	M
5	Access to Industrial Jobs Index Improvement	L	M	M	H
	Final score	**8**	**9**	**10**	**14**

Notes: H = High, M = Medium, L = Low

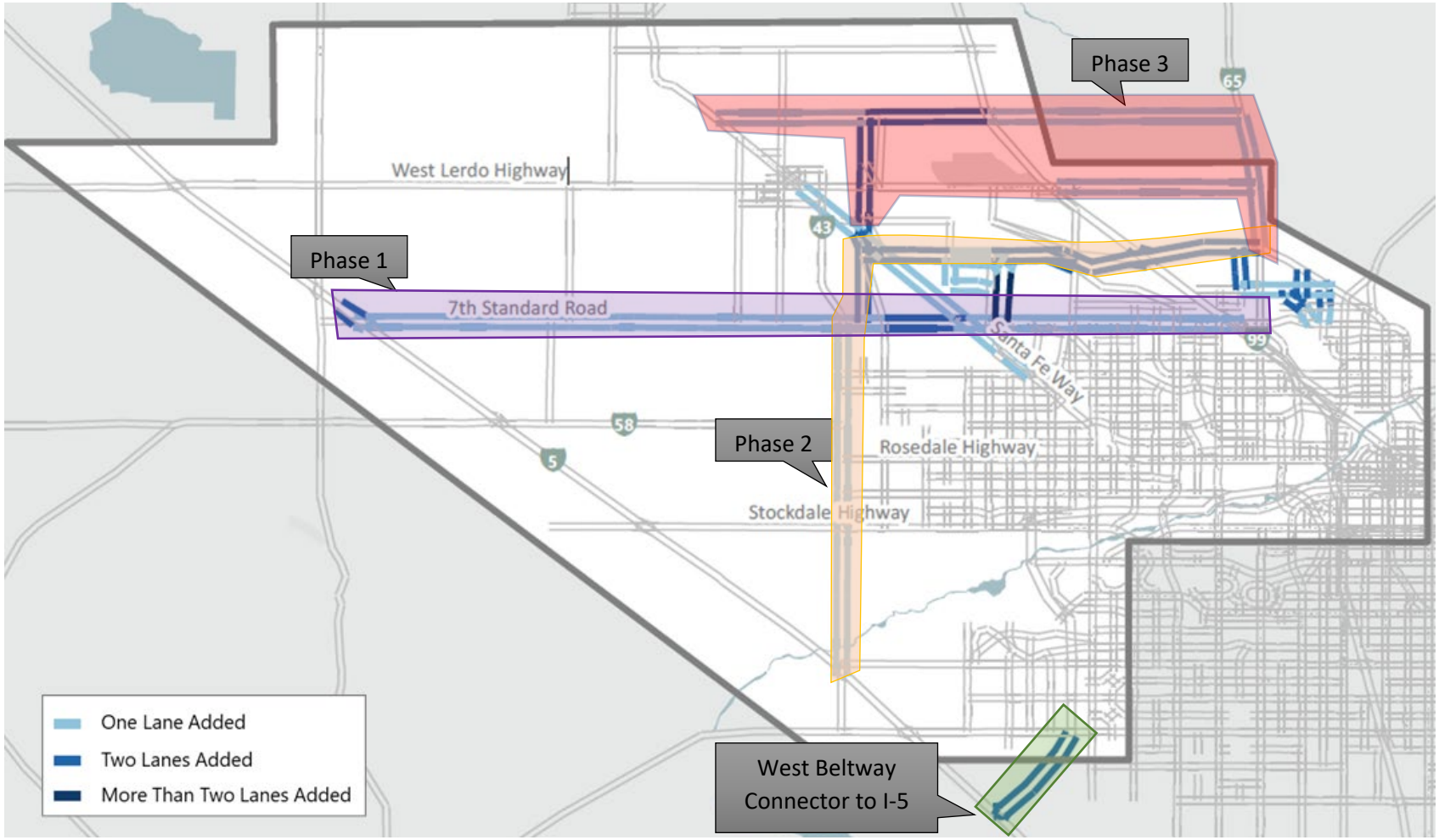


Figure 35. Full Build-out Scenario Phasing

In Scenarios #13 and #14, the extra access road is not coded with truck prohibition, therefore the travel demand model might assign some trucks to these local roads and increase household exposures to heavy duty trucks. Scenario #14 has the lowest total and truck VMT relative to all analyzed scenarios. This reduction in VMT is the main benefit of connecting South end of West-Beltway and I-5. **Table 8** shows the comparison of total VMT and Truck VMT for final selected scenarios.

Table 8 VMT Summary

Scenario	Scenario Name	All Vehicle VMT	Truck VMT
#5	West Bakersfield Option 1	67,980,000	11,717,000
#7	7SC1 & WBC1	68,042,000	11,718,000
#13	7SC1 & WBC1 with West Beltway	68,046,000	11,689,000
#14	7SC1 & WBC1 without West Beltway	67,950,000	11,681,000

Recommendations for Circulation Plan

In collaboration with Kern COG Staff and other jurisdictions, and based on the results of the above analysis, a set of recommendations for a cohesive update of the circulation plan for the study area is prepared and presented in **Appendix B**. In these set of figures:

- Yellow dashed lines represent routes that are recommended to be removed from the current circulation plans
- Green lines represent routes that are proposed to be added to the current circulation plans

These are high level recommendations, and it is at the discretion of respective jurisdictions to adopt them.

Planning Level Footprint Drawings

In collaboration with stakeholders, a set of locations identified for further review and providing footprint drawing. These locations are listed in **Table 9**. This list is a subset of all interchanges, roundabouts and intersections that are required for the circulation element. Given the limited resources, these locations are those with higher projected total and truck volumes, and with available undeveloped land for improvements and critical for the operation of the corridor. This is a high level planning exercise to understand overall circulation and right-of-way needed for new facilities. Detailed survey and data collection is required for design and construction. **Appendix C** shows the sketch drawings for these locations. More detailed footprint drawings based on respective Right-of-Way (ROW) for each facility were also prepared for locations with a strike mark in **Table 9**. These footprint drawings are presented in **Appendix D.** In developing these footprints, the following ROW are assumed based on designation of each facility:

- I-5 ROW is 208 feet
- SR-43 ROW is 146 feet
- SR-99 ROW is 218 feet
- The ROW for all the other local Freeway designated facilities is 210 feet
- The ROW for Expressways and Arterials are 110 feet.
- The ROW for Collectors are 90 feet.

For Caltrans facilities, the ROW are based on Caltrans Transportation Concept Reports[8], For other local facilities, the ROW is based on their current Circulation Element.

Table 9 Selected Locations for Footprint Drawing

ID	Location	Type	Design Considerations/ Stakeholder's feedback
K*	SR-99 & North Beltway/ Burbank St	New grade separated interchange	The Alignment for North Beltway between SR-99 and James road is prepared by Kern County and available in **Appendix F.** SR-99 is shifted away from the railroad enough to provide a freeway to freeway standard branch connection in the south bound direction.
C	I-5 & West Beltway	New grade separated interchange	New alignment proposed for connecting southern end of West Beltway to I-5. This location is proposed by Kern COG as a freeway to freeway connection, but it would not meet the 3 mile interstate interchange spacing standards for a rural area (Section 501.3 of the HDM). This proposal would require consultation with FHWA.
A	*I-5 & 7th Standard Rd*	Improve existing interchange	The frontage road northwest of the interchange may need to be adjusted once the complete design for the interchange is prepared
J	*SR-99 & E Lerdo Hwy*	Improve existing interchange	Access to the existing gas station might be relocated.
I	*SR-99 & Merced Ave*	Improve existing interchange	Considering minimum spacing between two interchanges on Caltrans Freeways.
B	*I-5 & SR-43*	Improve existing interchange	Considering Kern River Parkway Bike Path Western Extension project[9] and traffic related to Kern County Raceway Park located west of I-5.

[8] Available on Caltrans District 6 website at: https://dot.ca.gov/caltrans-near-me/district-6/district-6-programs/d6-transportation-planning/d6-planning-tcrs

[9] https://ceqanet.opr.ca.gov/2017091059/3

ID	Location	Type	Design Considerations/ Stakeholder's feedback
L	*SR-99 & 7th Standard Rd*	Improve existing interchange	Considering future HSR grade separation and closing Quinn Road and 7th Standard Road.
M*	*I-5 & Centennial West Corridor*	New grade separated interchange	This location is proposed by Kern COG as a freeway to freeway connection, but it would not meet the 3 mile interstate interchange spacing standards for a rural area (Section 501.3 of the HDM). This proposal would require consultation with FHWA, assuming the traffic on west accessing I-5 north bound (from Bakersfield and I-40 to Bay Area) has the highest volume.
18*	*SR-43 & Centennial West Corridor*	New grade separated interchange	The ROW for County's preferred alignment includes active oil wells. Per Caltrans Staff recommendations- proposed alignments does not require realignments of SR-43.
Z	*SR-119 & I-5*	Improve existing interchange	Re-alignment of South Corridor to intersect at SR-119 west of West Beltway.
6*	Santa Fe Way & Cherry Ave	New grade separated interchange	Grade separation over BNSF and under HSR.
7*	Burbank St & Santa Fe Way	New grade separated interchange	Grade separation over BNSF (considering Shafter Cemetery east of Santa Fe Way) and a water well west of the railroad. The proposed new alignment of Burbank Street east of Cherry Avenue considers the existing railroad spur south of Burbank Street and minimizes disruption to existing farms.
8*	Burbank St & West Beltway	New grade separated interchange	Burbank Street is designated as an expressway west of West Beltway, then designated as arterial east of West Beltway.
Y	*7th Standard Rd & SR-65.*	Signalized intersection	Coordination with HSR designs is required.
9	Burbank St & *SR-65*	Signalized intersection	Burbank Street., east of SR-99, is designated as an expressway until it reaches Quinn Road. East of Quinn Road, the designation changes to an arterial alignment.
2*	Merced Ave & Cherry Ave	Two lane roundabout	Considering requirements for STAA trucks.

ID	Location	Type	Design Considerations/ Stakeholder's feedback
4*	Lerdo Hwy & Cherry Ave	Two lane roundabout	Considering requirements for STAA trucks.
5*	Lerdo Hwy & *SR-65*	Two lane roundabout	Considering requirements for STAA trucks.
10*	7th Standard Rd & Cherry Ave	Two lane roundabout	Considering requirements for STAA trucks.
***Detailed footprint is provided**			

Sustainable Strategies Recommendations

These strategies are developed to specifically improve the sustainability of growing regional goods movement activity in Kern County. They aim to mitigate any adverse effects on the transportation system and on air quality. Historically mitigation strategies in transportation plans have not adequately addressed freight issues but, rather, have concentrated on overall transportation network issues. Solutions will be holistic and the focus will be on improving connectivity between various modes and not supporting one mode to the detriment of others.

Kern County is a freight mobility and international trade location. Freight, or the movement of goods and commodities, affects the County's economy and its quality of life. From the movement of agricultural products through major seaports and throughout the US to the delivery of imported consumer goods to warehouse and distribution centers, the safe and efficient movement of goods and commodities is critical.

The movement of freight in Kern County is basically a private-sector enterprise, but public policy decisions have major impacts on its development and operations. To a large degree, the system is invisible to most residents, and to most people, the phrase "transportation policy" is usually associated with passenger transportation. Not only is the freight system little known or understood, there is even less understanding of the many links through which policy actions, whether related to transportation or not, can affect the movement of freight.

Heavy-duty diesel trucks carry most of today's freight load and are disproportionate contributors to pollution. Most heavy-duty vehicles are powered by diesel engines that, especially in older models, are the largest contributors to the formation of ozone, greenhouse gas emissions, fine particulate matter (PM2.5), and toxic diesel particulate matter. In California, these trucks are responsible for approximately 80% of smog-forming nitrogen oxide (NO_x) emissions. They also represent about 50% of greenhouse gas emissions when including emissions from fuel production, and more than 95% of toxic diesel particulate matter emissions. Even though California leads the nation in regulating the transition to zero-emission medium-and heavy- duty vehicles, diesel trucks will remain on the highways for the foreseeable future.

These trucks use public roadways in Kern County to reach scattered distribution locations, but this flexibility comes at a cost: congestion, infrastructure deterioration, traffic safety issues, and pollution. Most freight corridors in California are becoming so congested to the point that alternatives, with fewer adverse impacts, need to be developed.

As Kern County has grown and specifically targeted transportation, logistics, warehousing and e- commerce operations for investment, several freight clusters have developed throughout the County. Currently there are over 50 warehouse/distributions operations in the County with four distinctly defined clusters: Bakersfield, Shafter, Tejon Ranch and Delano.

A large and growing segment of this target group are 3PLs, which are firms that provide outsourced (or "third party") logistics services for part of or all of a company's supply chain management functions. Third party logistics providers typically specialize in integrated operations that include warehousing, transportation, and light assembly services. These services can be scaled and customized to customers' needs based on market conditions. Often, these services go beyond logistics and include value-added services related to the

production or procurement of goods, but they are also heavy transport users.

Historically, local governments in California have levied impact fees to help fund the expansion of the infrastructure needed to support new development. These charges support transportation infrastructure as well as other important local services, which many California jurisdictions have struggled to fund. State-imposed policies that restrict local taxes, such as Proposition 13, have left municipalities with limited means of raising revenue for infrastructure. However, the limitation of any impact fee is that revenue depends upon growth and is, therefore, cyclical. Although impact fees provide funding for new capacity, revenue sources for backlogs, operations, and maintenance are not covered by them.

With the advent of large warehouse and e-commerce facilities and the resulting large vehicle traffic, Kern County is facing significantly more pavement and secondary damage to its highways. There is a need for policy options for the local governments to recapture the costs of roadway maintenance as well as limit emissions coming from this truck traffic. A related issue is that the evolutionary switchover to electric vehicles will, over time, lead to significant reductions in fuel tax revenues.

When considering sustainability goods moving strategies for Kern County, the options include:

Targeted Logistics Transportation Fees	Program to Shift From Road to Rail	Utilization of Clean Technologies	Revision to Building Codes

Targeted Logistics/Transportation Fees

To achieve an equitable fee system, it is recommended that all local governments within Kern County participate in a fee program which will establish a forum for local governments to cooperatively plan and fund mobility/transportation. This can result in a more predictable and straight forward approach for local governments, property developers and occupant companies to collaborate. Establishing a common approach ensures that each local government is charging development for its impacts on the transportation system and avoids the use of this fee for tax base competition.

These agreements would specify the partners in adopting the targeted logistics/transportation fees, which could include the County government, local municipalities, and the Kern County COG as the key transportation planning agency. Other partners, such as the Kern County Department of Airports could also be included. Each local government would have full authority to establish, collect, and distribute the fees in accordance with the procedures included in the agreement.

These fee schemes under California law would require a nexus study. The following are some option to consider in assessing potential new fees.

Option #1 Logistics Mitigation Fee

A one-time logistics mitigation fee could be imposed on all new warehouse construction throughout the County, based on facility size, to help pay for specific highway improvements. Fees collected would be used toward transportation improvements, such as auxiliary lanes at on-ramps and off-ramps or widening highways to mitigate the impact of highway truck traffic serving new warehouse facilities in the County.
▪ By CA state law a "nexus study" would be required to validate the amount and the need for new mitigation fees imposed on any new warehouse development. The logistics nexus study would consider forecasted logistics growth and VMT, highway capacity deficiencies attributable to new warehouse development, estimated project costs, and the proposed warehouses' cost share of projects.
▪ Riverside County, California, Transportation Commission https://www.rctc.org/wp-content/uploads/2019/05/2019.NexusStudy-Final.pdf ▪ This fee has not yet been approved, which will require approval by the County government or approval by 75% of the communities.
▪ Reno, Nevada https://www.rtcwashoe.com/engineering-fees/regional-road-impact-fee/ ▪ This fee has been in effect since 1995.

Option #2 Mobility Fee

A mobility fee is a charge on all new development to provide mitigation for its impact on the transportation system. However, a mobility fee is not a substitute for site related improvements for safety, access and internal circulation, which may still be required under local land development regulations. Mobility fee programs and rate schedules should be established on a countywide level.

Usually current transportation impact fees do not cover all costs of transportation needs attributable to new development. A mobility fee that is applied to all new development may result in an increase in funding available for transportation, but funding from this structure would probably only cover a portion of Kern County's transportation needs. Each new development would be charged a mobility fee based upon the transportation service it consumes, treating transportation as a commodity. The working concept for a mobility fee is an impact fee that is modified for sensitivity to vehicle miles traveled.

Although a mobility fee is similar to an impact fee, in that it is a charge on new development for its impacts on transportation

facilities, the mobility fee as proposed in this report would be different from an impact fee in significant ways, including:

- A mobility fee would apply on a countywide basis
- A mobility fee would require a high level of intergovernmental coordination
- A mobility fee would be sensitive to vehicle or person miles traveled
- A mobility fee could be used to fund multi-modal transportation improvements for roadways, as well as transit, bikeway, pedestrian walkways and congestion management improvements/strategies
- A mobility fee could be used to fund improvements related to future autonomous support infrastructure, or an autonomous logistics district
- A mobility fee would be distributed among all the governmental entities responsible for maintaining impacted transportation facilities
- A mobility fee would reduce greenhouse gas emissions by providing incentives to
- promote compact, mixed-use, and energy efficient development

The Mobility Fee would focus on new development and would be used to fund planned multimodal transportation facilities and services. This fee would also be sensitive to the vehicle miles of travel (VMT) generated by new development. Each new development, regardless of type, will pay the fee in proportion to the new travel demand it creates.

- State of Florida http://www.lakesumtermpo.com/pdfs/mobility_fee_methodology.pdf Joint Report on the Mobility Fee Methodology Study
- This authorizing legislation went into effect in 2010 and currently more than 25 counties have instituted a mobility fee.

Freight Modal Shift Program

A freight modal shift program is one that provides incentives to shippers to move their goods to an alternative mode of transportation. This incentive is usually a financial reward for switching the shipping method of choice from truck to rail or water and is provided on the grounds that this shift would generate benefits that offset the cost of the incentives provided. In the case of Kern County, truck-to-rail modal shifts have the greatest overall potential because trucks are the dominant mode in terms of freight tonnage and freight commodity value, while rail serves many of the same routes and uses substantially less energy.

The idea behind modal shift as a policy tool is to reduce GHG emissions, other air contaminants, noise and congestion on highways, while helping decrease traffic collisions resulting in injury or death. Additionally, truck use contributes to the deterioration of the public highway and road system. Heavier vehicles require exponentially higher pavement costs. This shift is based on the fact that railways are more fuel-efficient than trucks on a per ton basis.

When shippers make a mode choice, it involves the consideration of more than just the cost of transporting the cargo. Total logistics costs must also be considered such transit time, warehousing and inventory costs, and safety stock requirements. In general, the higher the value of the goods the more important non-transportation logistics costs are to the choice of the mode. While differences between non-transportation logistics costs typically are greater between truck and rail, there are differences in truck configurations as well that must be considered in an analysis. In promoting a mode shift from truck to rail, rail is efficient at moving heavy or outsized freight over long distances and also for intermodal moves of long-haul containerized freight. In certain markets, short-line railroads can successfully compete with trucks to haul large volumes of dense commodities relatively short distances. Trucks excel in providing time sensitive delivery services for high-value goods being transported over medium and short-haul distances. Raw materials and heavy freight going long distances are likely to continue their journey by rail, or some combination of truck, rail, and water.

Rail's major advantage over truck has historically been its lower costs. A rail service that offers lower costs than trucking, combined with comparable on-time performance and loss/breakage avoidance, can be extremely competitive with trucking, even if transit times are not as fast as trucking. With the future growth in freight, it is anticipated that the railroads will make investments to compete more vigorously with trucks for medium-distance freight traffic (250 miles to 500 miles) and to provide the capacity required to move heavy and long-distance shipments.

There is currently no intermodal service in Kern County, so the creation of the California Inland Port would be an extremely important development for freight movement in Kern County. If the Inland Port were to develop as a three intermodal hub system, then it is likely that one of those hubs would be located in the Bakersfield/Shafter area. This would provide close-proximity access to new intermodal rail service – with a direct connection to the San Pedro seaports. There potentially would be substantial cost benefits to inbound industrial supply chain and retail goods distribution, and also to outbound agriculture and other shippers. In this case, it would be vital to assure that the region's road system plan supported transportation to and from key industrial and distribution source points. In the case that there were only two intermodal hubs, it is possible that the most proximate hub would be near to, but north of the Bakersfield region. In this scenario, the region's road system would need to support truck traffic to this location.

When considering the implementation of a Freight Modal Shift Program, there is a clear need for Kern County to have a systematic assessment of the shift potential and its associated GHG emission reductions and costs. While such a comprehensive assessment does not exist, regional estimates can provide a starting point on how to think about this issue. Market- segmentation methods are frequently used given their simplicity, which is done by analyzing the origin-destination pairs of freight shipments to identify the fraction of shipments that could potentially be transported by each mode. This method is capable of estimating a maximum feasible modal split. In any case Kern County needs to be prepared for resistance from companies to make a change and have the time and patience to see the mode shift occur. This will require the County to forecast carefully and conservatively in implementing the program
• Rail Usage Tax Credit – Tax credit on property taxes for an existing company or a newly located company to move at least 10% of their product cargo on rail.
• Incentive Fund - Create an incentive fund to subsidize the rail freight rate to make it competitive with trucking rates to encourage mode shift. The incentive could be designed to provide support to the railroads to offer competitive rates or an incentive could be paid directly to the company based upon the delta between the rail rate and the truck rate. This could be for a short period of time in recognition of the initial risk for employing a new mode in a company's logistics system.
▪ Victoria, Australia Mode Shift Incentive Scheme (MSIS) https://transport.vic.gov.au/ports-and-freight/key-freight-projects ▪ This program has been in place since 2015 and has just been extended to 2024.
▪ Mode Shift Revenue Support (MSRS) Scheme in the UK https://www.gov.uk/ ▪ This program has been in place since 2010 and has been extended to 2025.

Utilization of Clean Technology on the Highways

Commercial fleets are increasingly considering zero-emissions trucks for their freight hauling operations as new models go into production and upfront purchase prices come down. In fact, product availability is improving rapidly. CALSTART is reporting that in the heavy-duty North American market alone, 19 zero-emission truck models (either battery electric or hydrogen fuel cell), from 14 manufacturers, are expected to be in production within the next three years. This represents an impressive 280% increase in the five Class 8 models commercially available today.

- Overall, there are some common factors that affect the adoption of ZEVs:
    - Upfront purchase costs
    - Technology reliability concerns
    - Range
    - Payload limits or trade-off with range
    - Drivers training
    - Lack of information about new technologies and incentives programs
    - Lack of charging infrastructure and cost
    - Very competitive market that reduces taking risks with new technologies
    - Not many ZEV models on the market

In general, large fleets and companies are the ones experimenting with new technology and implementing pilots, small operators are largely not involved at this point.

Zero-emission trucks have higher upfront costs but have lower operating costs than conventional trucks. Today, the total cost of ownership in California can be comparable to conventional trucks for certain duty cycles without grants or rebates. As battery prices fall and technology continues to improve, the total cost of ownership for ZEV trucks is expected to become more favorable. Incentives are currently available to offset some or all of the higher vehicle capital costs and some of the early infrastructure costs to help fleets begin transitioning to zero-emission vehicles are available now.

Another important part of the conversation is low-carbon liquid fuels that have a strategic role to play in the transition to a climate-neutral economy, particularly in the long-haul freight, shipping, and aviation sectors where no equivalent technological alternatives currently exist. These low-carbon liquid fuels are sustainable fuels from non-petroleum origin with no or very limited CO2 emissions during their production and use. First blended with conventional fuels, these low-carbon fuels will progressively replace fossil-based fuels. Complementary to electrification and hydrogen technologies, low-carbon liquid fuels will be essential throughout the energy transition, ensuring security of supply and providing consumer choice.

Autonomous driving systems in trucks are obviously an important element in the future of goods movement. But in addition to the long-haul freight trucks, there is another dynamic in the automated truck world that could provide a strategy to help remedy the emissions issues that Kern County currently faces. There are a number of companies that are using off-the-shelf vehicle guidance technologies (optical cameras sensors and steering systems) and have adapted these technologies to a new style truck delivery "pod". These pods are ground-up delivery vehicles that are purposely designed to support intra-company inventory management. These systems are meant to support automated transfer of cargo between company warehouse facilities. From our work with some of these companies, we believe that this

technology application can be adapted to support intermodal facility cargo transfers to nearby warehouses. These systems are being actively marketed now, but we expect real-world deployment to begin in the next 2 or 3 years. This may be an opportunity for Kern County to consider how it might catalyze autonomous cargo movement within its industrial district(s) and to/from a future rail intermodal hub.

Appendix E describes a proposed concept for Kern Safe Autonomous Freight Enhanced Testing Environmentally Clean (SAFETEC) logistics zone. This infographic shows how a system of autonomous freight shuttle can connect various logistic hubs in the county.

Incentives for the Use of Clean Technologies on the Highways:
▪ Several funding programs are available to support the use of advanced/clean technologies on California highways administered by CARB, federal agencies, and the San Joaquin Valley Air Pollution Control District. For example, in California, the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project provides point–of-sale rebates to offset the upfront cost of advanced technologies. A partnership between the California Air Resources Board and CALSTART, this program provides incentives for the purchase of cleaner and more efficient trucks and buses in California. These vouchers are intended to reduce about half the incremental costs of purchasing hybrid and zero-emission medium-duty and heavy-duty trucks and buses.
▪ In conjunction with the San Joaquin Valley Air Pollution Control District and the Kern Economic Development Corporation, create a loan program specifically designed for Kern County businesses to purchase clean technology trucks.

Building Codes

Revise commercial/industrial building codes to require supporting electric infrastructure for EVSE in new construction and major renovations.
▪ Electric charging stations could be required in each new warehouse development.
Incentives ▪ The San Joaquin Valley Air Pollution Control District provides incentives for the purchase of new and public Level 2 EV chargers. Businesses and public agencies can receive up to $6,000 per EV charger. Funding per recipient is capped at $50,000 annually. ▪ The California Pollution Control Financing Authority offers loans for the design, development, purchase, and installation of EV charging stations at small business locations in California. The maximum enrolled loan amount is $500,000 per qualified Borrower.
▪ The California Green Building Code of 2016 requires that all new development include pre-wiring for Level 2 charging https://www.sccgov.org/sites/dnz/Documents/Task-1A-EV-Best-Practices- Compendium.pdf

Next-Generation Industrial TradePort District

In many ways, the Kern Council of Governments and its partners throughout Kern County are playing a leading role in blending land-use planning, transportation planning, environmental stewardship and freight planning. This approach can be extended and harnessed into a mobility-enabled economic development product that could be a national model for an automated freight mobility district. There is an opportunity capitalize on Kern's sophisticated approach to transport planning by creating a structured industrial product that could become an economic development model.

Core Concept: Cluster the development of high-volume shipper warehouses around a future rail intermodal and truck mobility complex. Warehouses would be served by a dedicated equipment operating via an automated freight movement system. This would require one or several private partners that would operate the logistics hub-to-warehouse system and careful infrastructure planning to support such an operation over the public road system.

Rail Intermodal - Truck Mobility Complex: *Rail Intermodal:* There is the potential to develop an intermodal asset in Kern County or the southern portion of the Central Valley and this is being developed and tested in the context of the California Inland Port project. This would be a facility where cargo is loaded on and discharged from a through train for onward domestic and international (via seaports) destinations. *Truck Mobility Complex*: Given advances in technology and adaptations of policy, a Truck Mobility Complex would be a facility where automated trucks operating on the highway system would terminate operations and hand-off to a manned truck, which would handle last mile to the loading dock deliveries.

Assumptions: 1) An automated cargo movement system does not necessarily require intersection with a logistics hub, such as a rail intermodal complex, but in combination with the system, could be developed as an integrated business platform with volumes and economies, 2) there are a number of companies that have already built or are building a technology and hardware platform to operate such a system, 3) the requirements for associated public infrastructure are fairly modest, and 4) that such a system would create substantial operating economies which would create expanded economic development interest.

Appendix A- Alternatives Review

Appendix B- Circulation Plan Recommendations

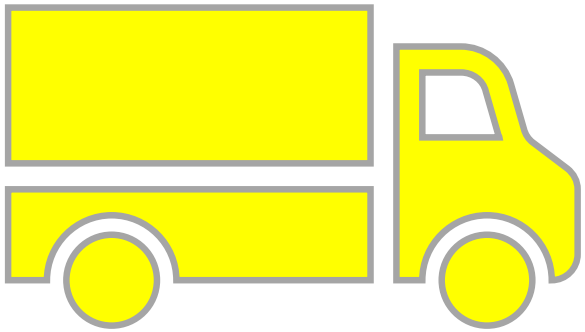
Appendix C- Sketch Drawings

Appendix D- Footprint Drawings

Appendix E- SAFETEC Concept

Appendix F - North Beltway Specific Plan Line

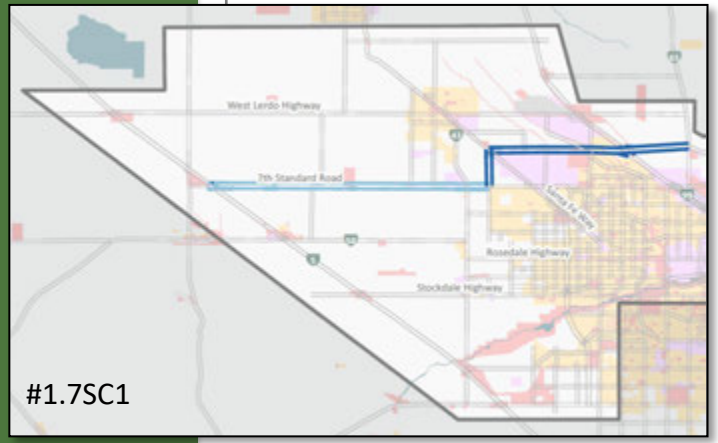
Appendix G - California Inland Port and Kern County



Appendix A: Alternatives' Review

I.Corridor Improvements

Corridor Alternatives



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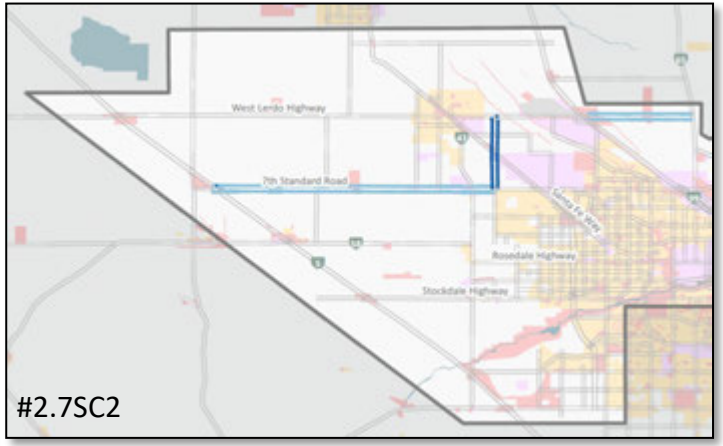

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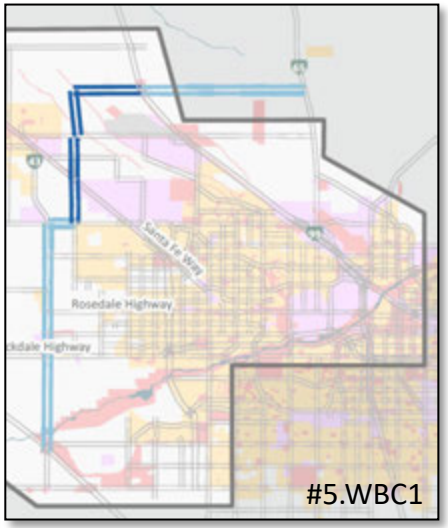

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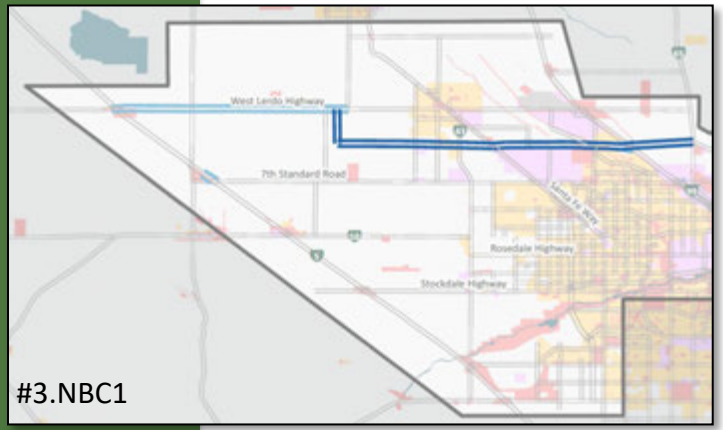

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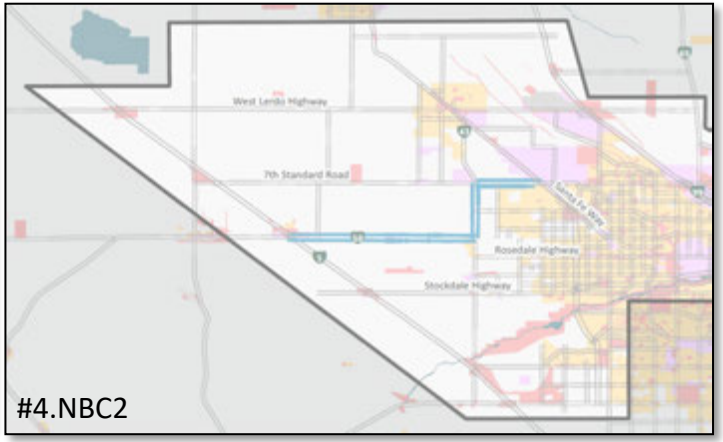

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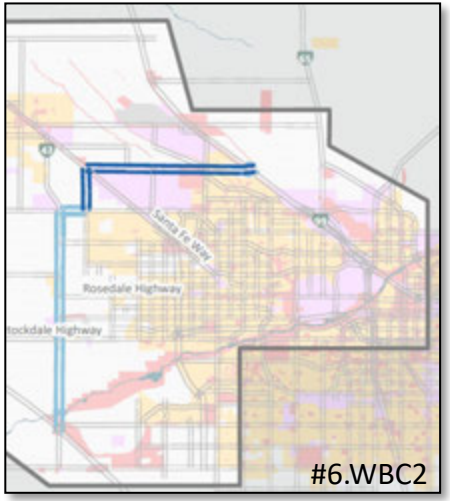

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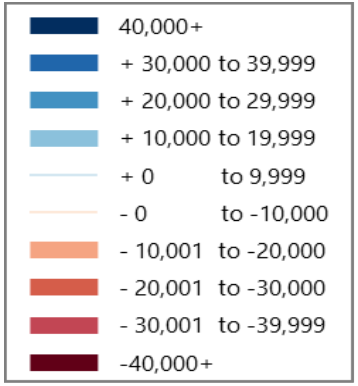
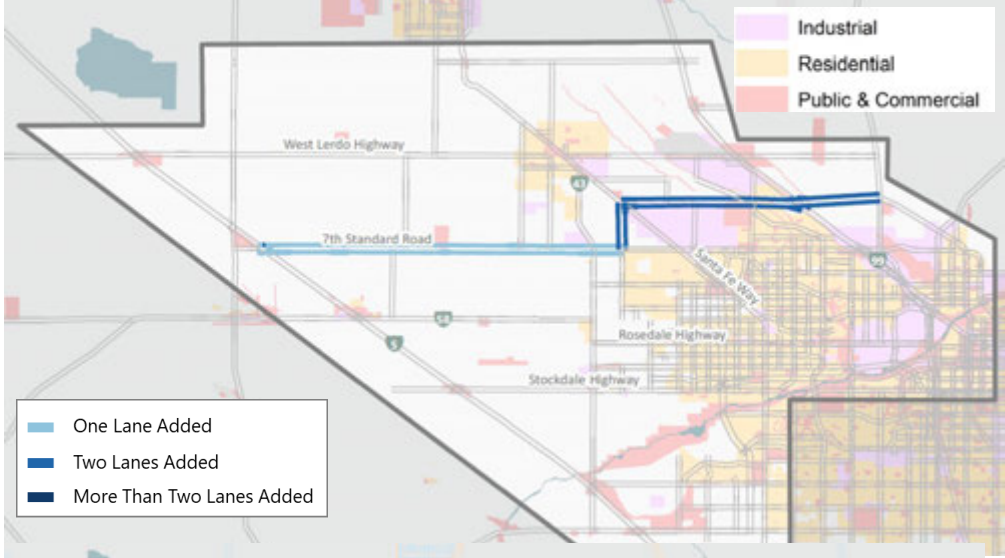
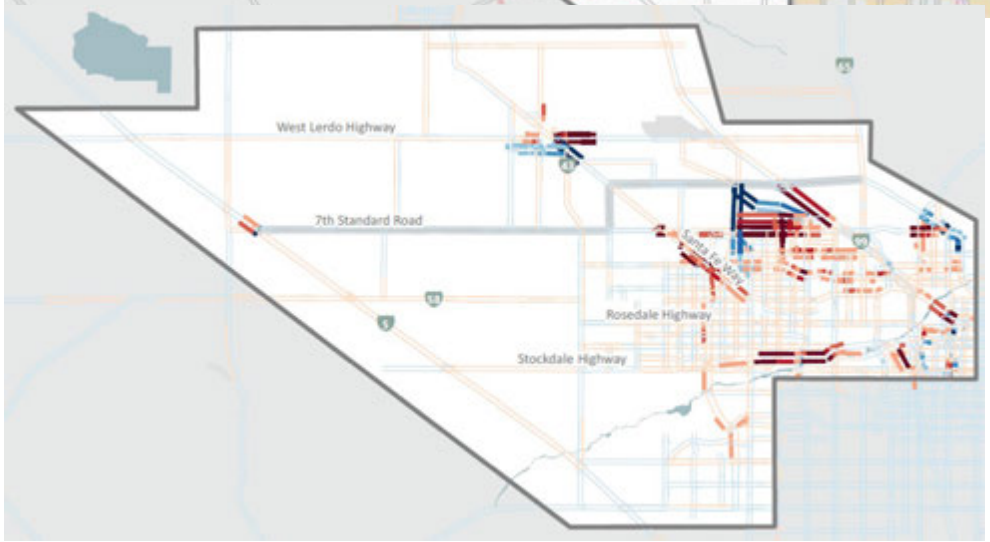
SCENARIO #1- 7TH STANDARD RD. OPT1

Scenario Overview

HH Exposure Index





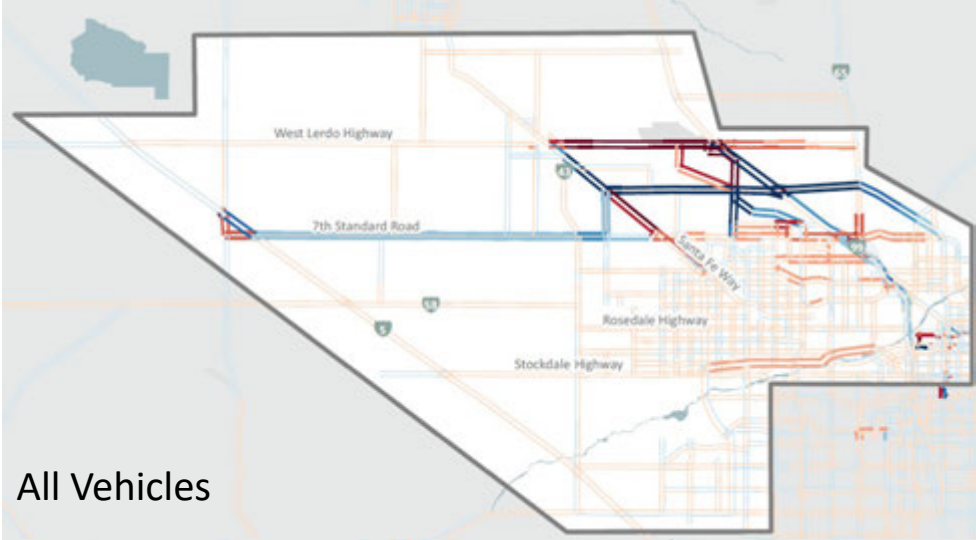


SCENARIO #1- 7TH STANDARD RD. OPT1

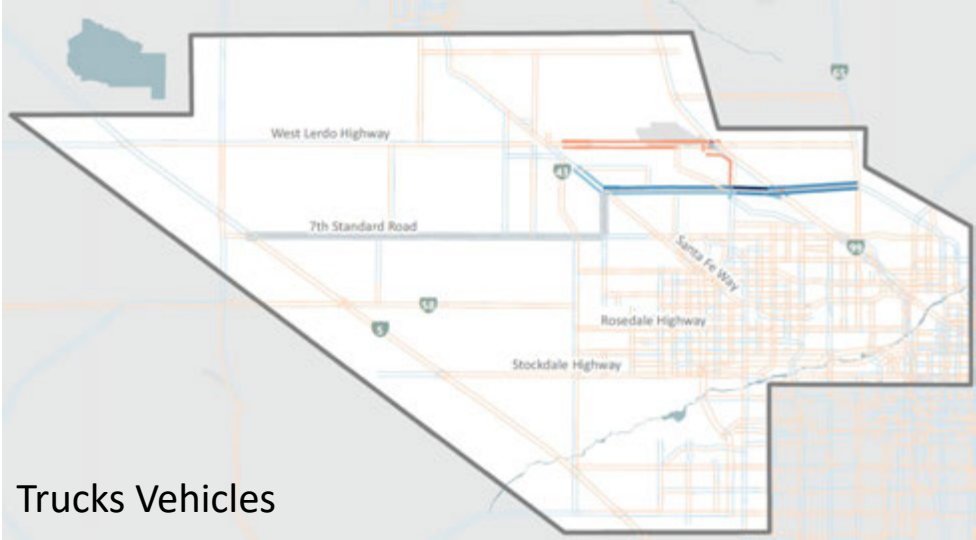
Daily Volume Change

Volume Increased by 2,000+ Vehicles
+1500 to 2000
+1000 to 1500
+ 500 to 1000
+ 0 to 500
- 0 to 500
- 500 to 1000
- 1000 to 1500
- 1500 to 2000
Volume Reduced by 2,000+ Vehicles

Volume Increased by 1200+ Trucks
+ 901 to 1200
+ 601 to 900
+ 301 to 900
+ 0 to 300
- 0 to 300
- 301 to 600
- 600 to 900
- 901 to 1200
Volume Reduced by 1200+ Trucks



All Vehicles

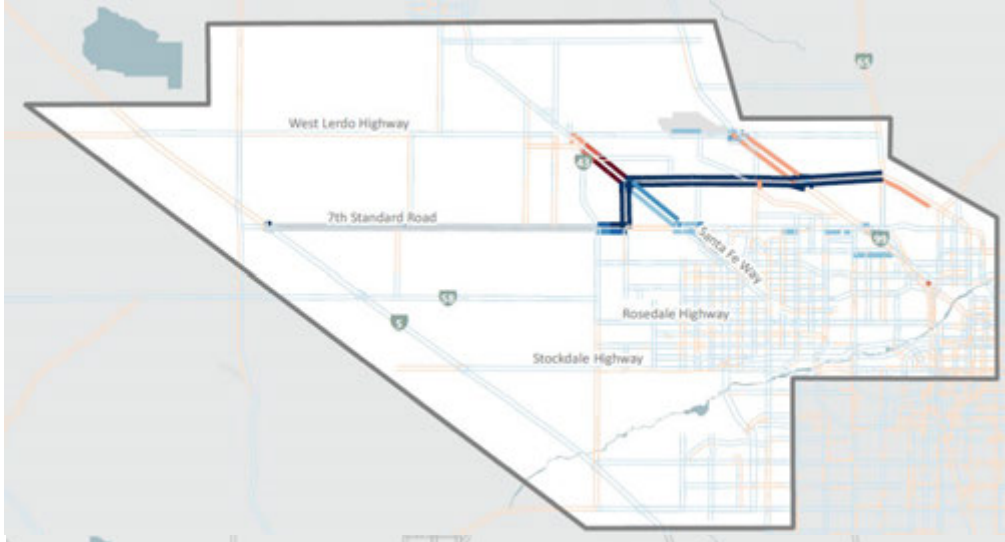


Trucks Vehicles

SCENARIO #1- 7TH STANDARD RD. OPT1

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph



- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #1- 7TH STANDARD RD. OPT1

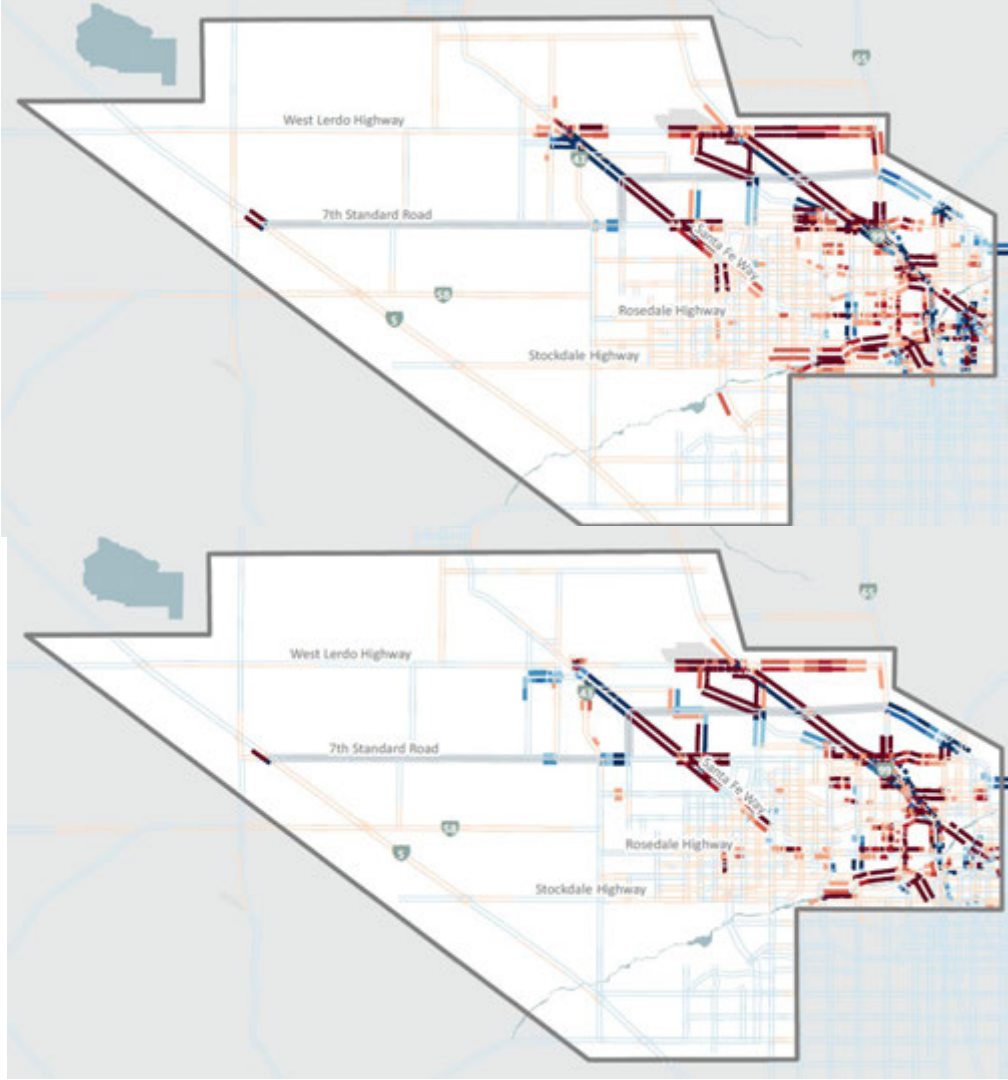
Access to Industries

Total Employment

- 20,000+
- + 15,000 to 19,999
- + 10,000 to 14,999
- + 5,000 to 9,999
- + 0 to 4,999
- - 0 to -5,000
- - 5,001 to -10,000
- - 10,001 to -15,000
- - 15,001 to -19,999
- -20,000+

Industrial Employment

- 4,000+
- + 3,000 to 3,999
- + 2,000 to 2,999
- + 1,000 to 1,999
- + 0 to 999
- - 0 to -1,000
- - 1,001 to -2,000
- - 2,001 to -3,000
- - 3,001 to -3,999
- -4,000+

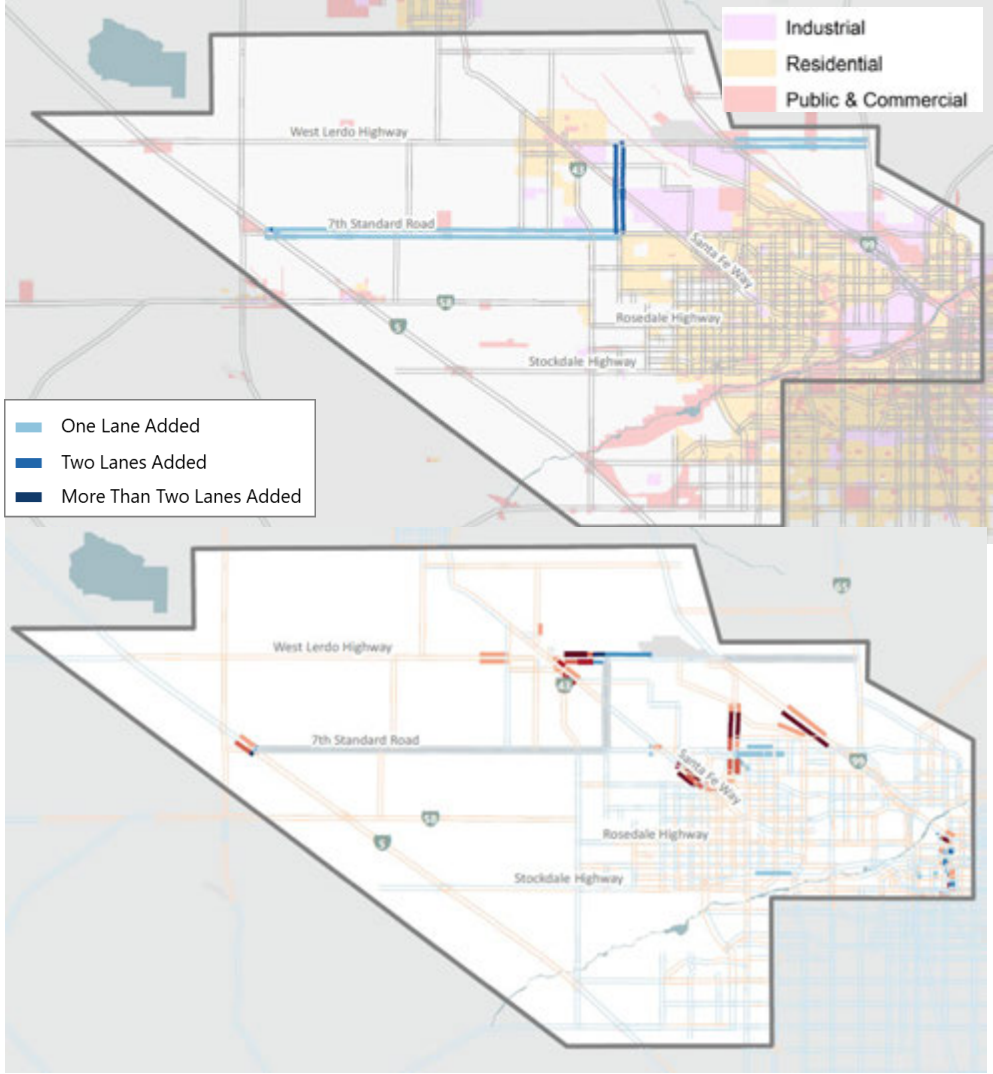


SCENARIO #2- 7TH STANDARD RD. OPT2

Scenario Overview

HH Exposure Index

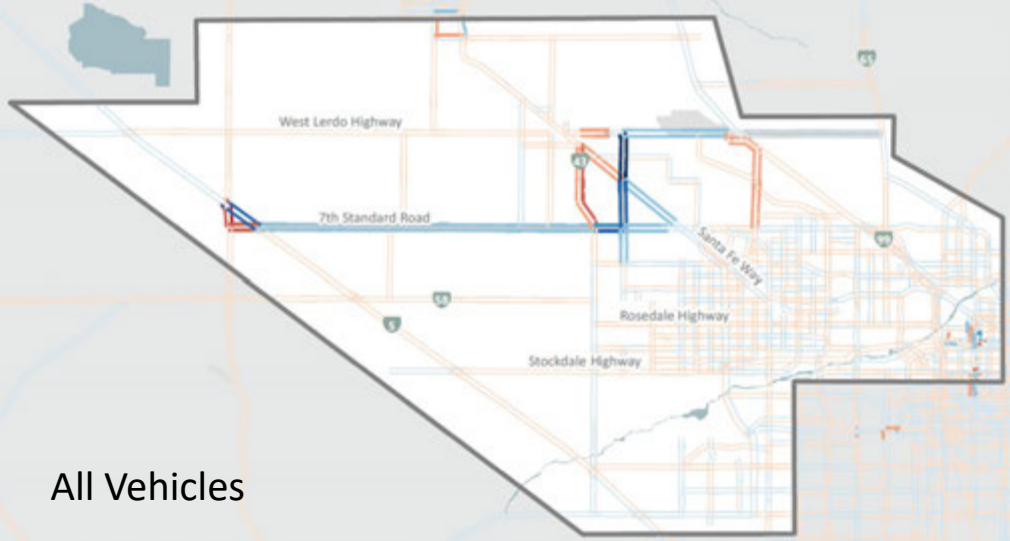
	40,000+
	+ 30,000 to 39,999
	+ 20,000 to 29,999
	+ 10,000 to 19,999
	+ 0 to 9,999
	- 0 to -10,000
	- 10,001 to -20,000
	- 20,001 to -30,000
	- 30,001 to -39,999
	-40,000+



SCENARIO #2- 7TH STANDARD RD. OPT2

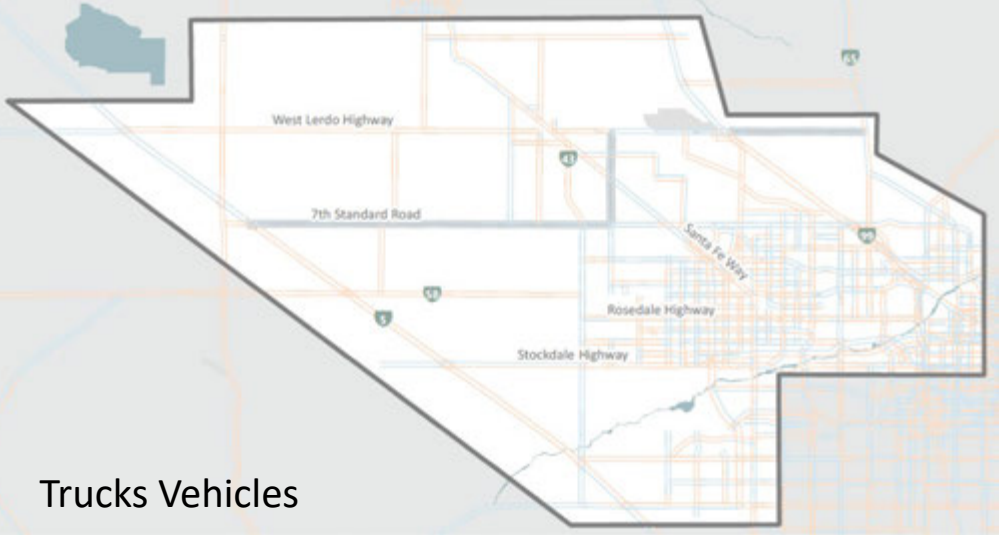
Daily Volume Change

- Volume Increased by 2,000+ Vehicles
- +1500 to 2000
- +1000 to 1500
- + 500 to 1000
- + 0 to 500
- - 0 to 500
- - 500 to 1000
- - 1000 to 1500
- - 1500 to 2000
- Volume Reduced by 2,000+ Vehicles



All Vehicles

- Volume Increased by 1200+ Trucks
- + 901 to 1200
- + 601 to 900
- + 301 to 900
- + 0 to 300
- - 0 to 300
- - 301 to 600
- - 600 to 900
- - 901 to 1200
- Volume Reduced by 1200+ Trucks

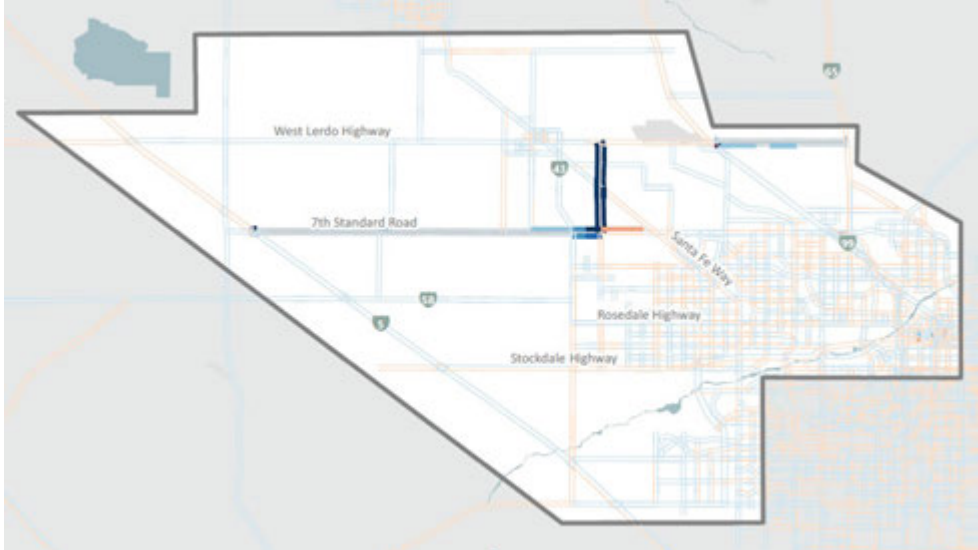


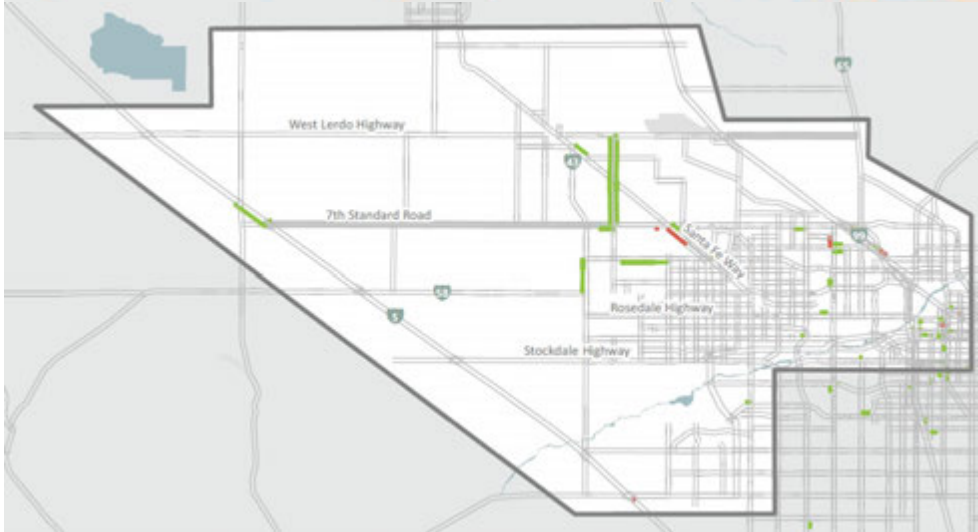
Trucks Vehicles

SCENARIO #2- 7TH STANDARD RD. OPT2

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph





- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #2- 7TH STANDARD RD. OPT2

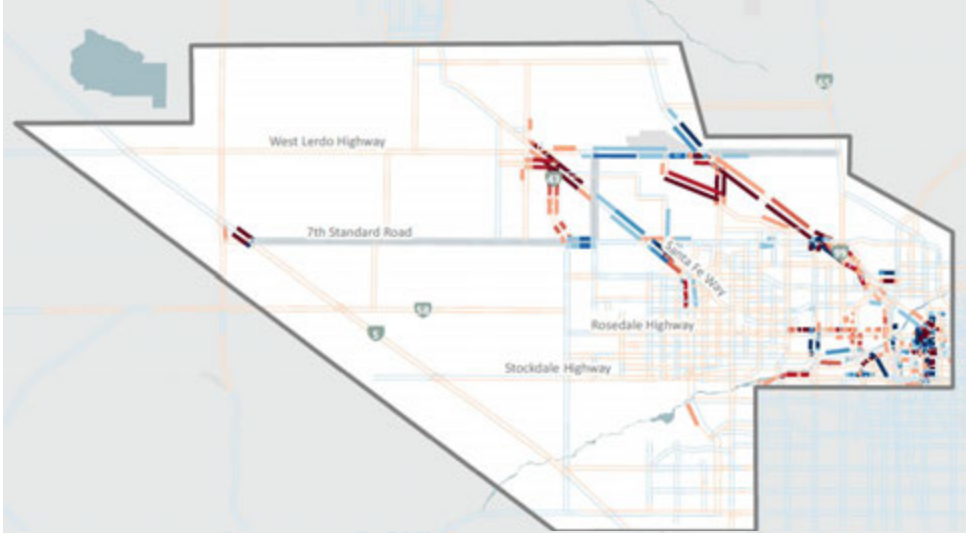
Access to Industries

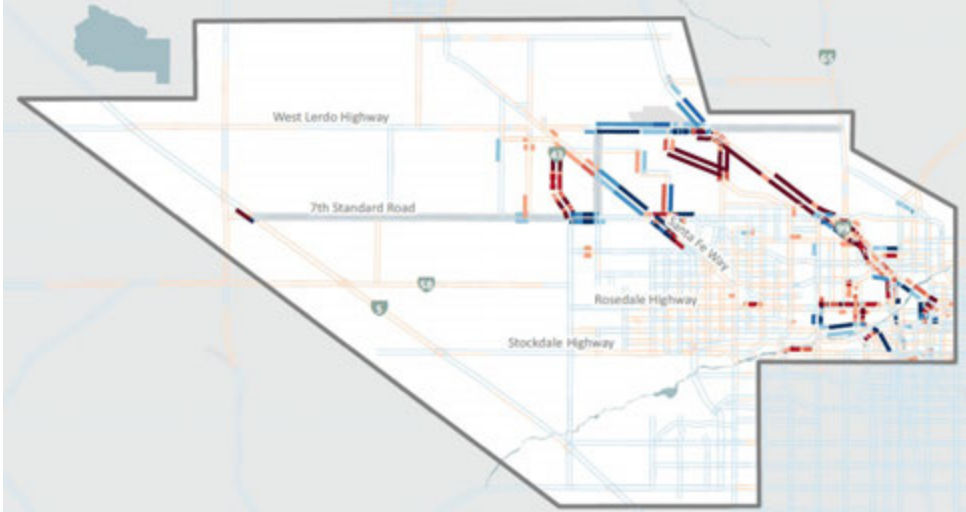
Total Employment

20,000+
+ 15,000 to 19,999
+ 10,000 to 14,999
+ 5,000 to 9,999
+ 0 to 4,999
- 0 to -5,000
- 5,001 to -10,000
- 10,001 to -15,000
- 15,001 to -19,999
-20,000+

Industrial Employment

4,000+
+ 3,000 to 3,999
+ 2,000 to 2,999
+ 1,000 to 1,999
+ 0 to 999
- 0 to -1,000
- 1,001 to -2,000
- 2,001 to -3,000
- 3,001 to -3,999
-4,000+



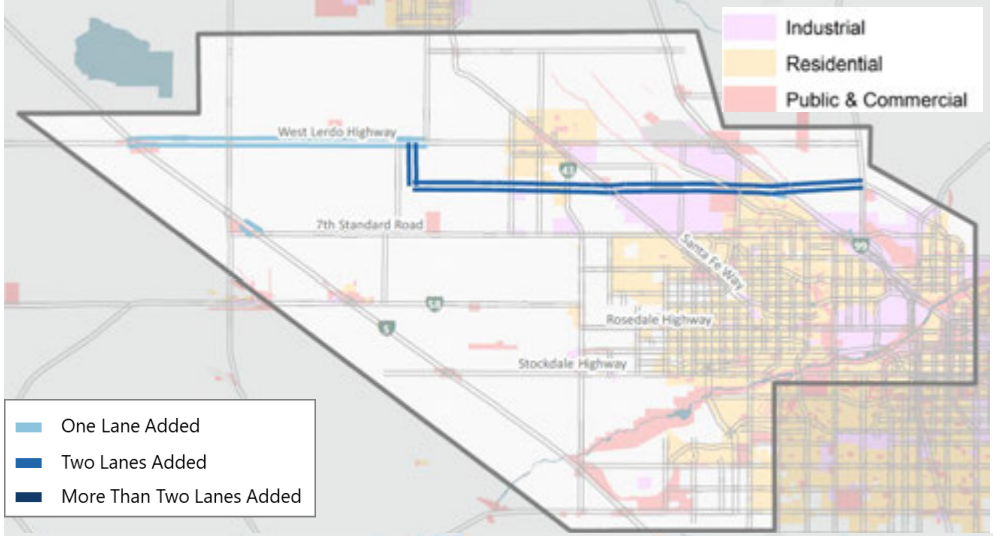


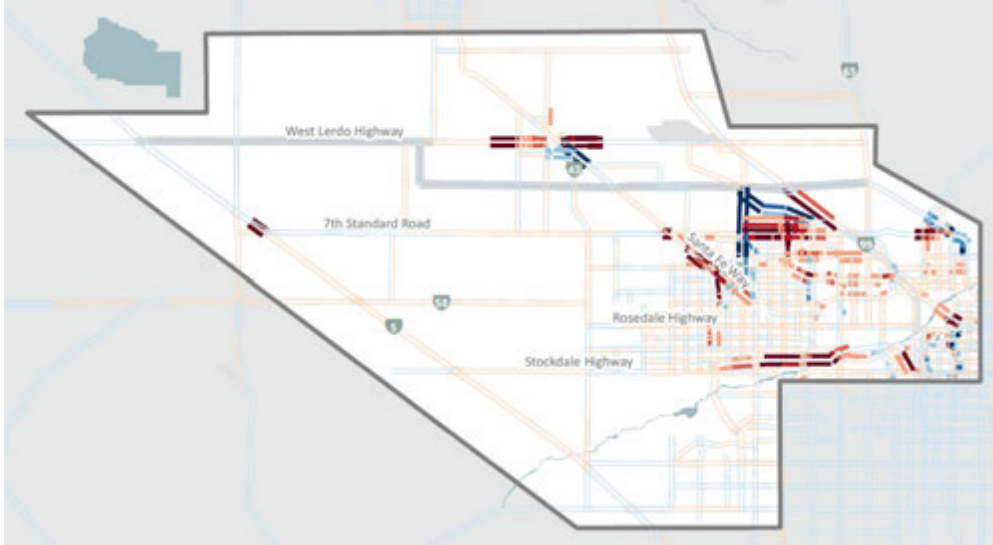
SCENARIO #3- NORTH BELTWAY OPT1

Scenario Overview

HH Exposure Index

	40,000+
	+ 30,000 to 39,999
	+ 20,000 to 29,999
	+ 10,000 to 19,999
	+ 0 to 9,999
	- 0 to -10,000
	- 10,001 to -20,000
	- 20,001 to -30,000
	- 30,001 to -39,999
	-40,000+



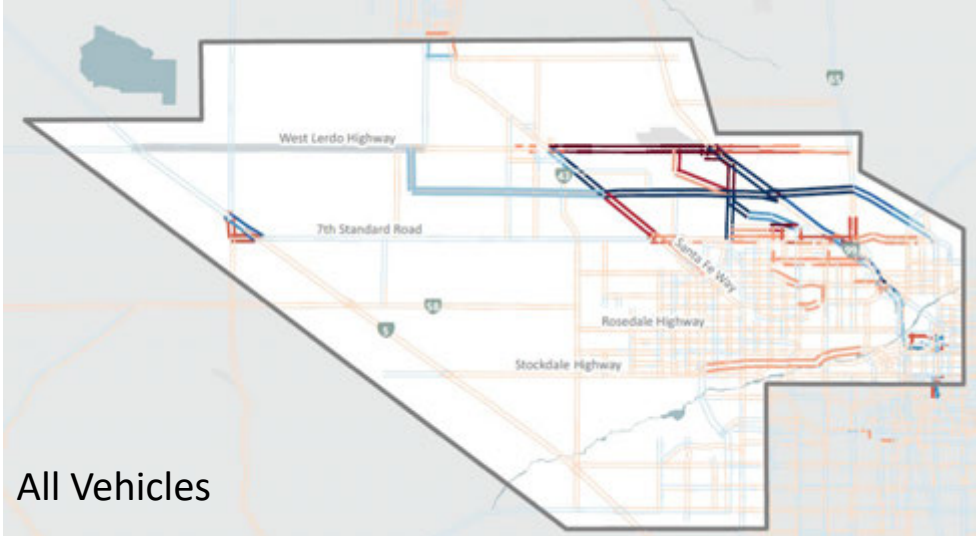


SCENARIO #3- NORTH BELTWAY OPT1

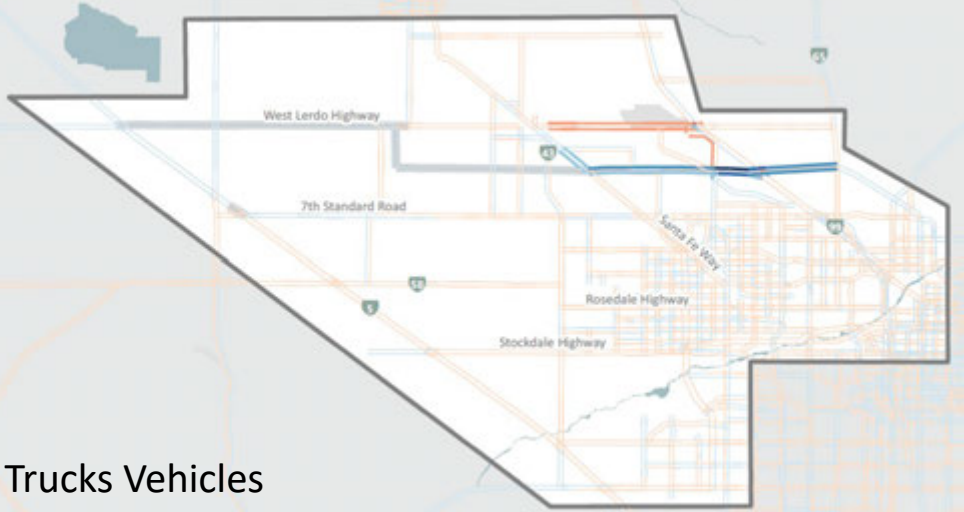
Daily Volume Change

- Volume Increased by 2,000+ Vehicles
- +1500 to 2000
- +1000 to 1500
- + 500 to 1000
- + 0 to 500
- - 0 to 500
- - 500 to 1000
- - 1000 to 1500
- - 1500 to 2000
- Volume Reduced by 2,000+ Vehicles

- Volume Increased by 1200+ Trucks
- + 901 to 1200
- + 601 to 900
- + 301 to 900
- + 0 to 300
- - 0 to 300
- - 301 to 600
- - 600 to 900
- - 901 to 1200
- Volume Reduced by 1200+ Trucks



All Vehicles

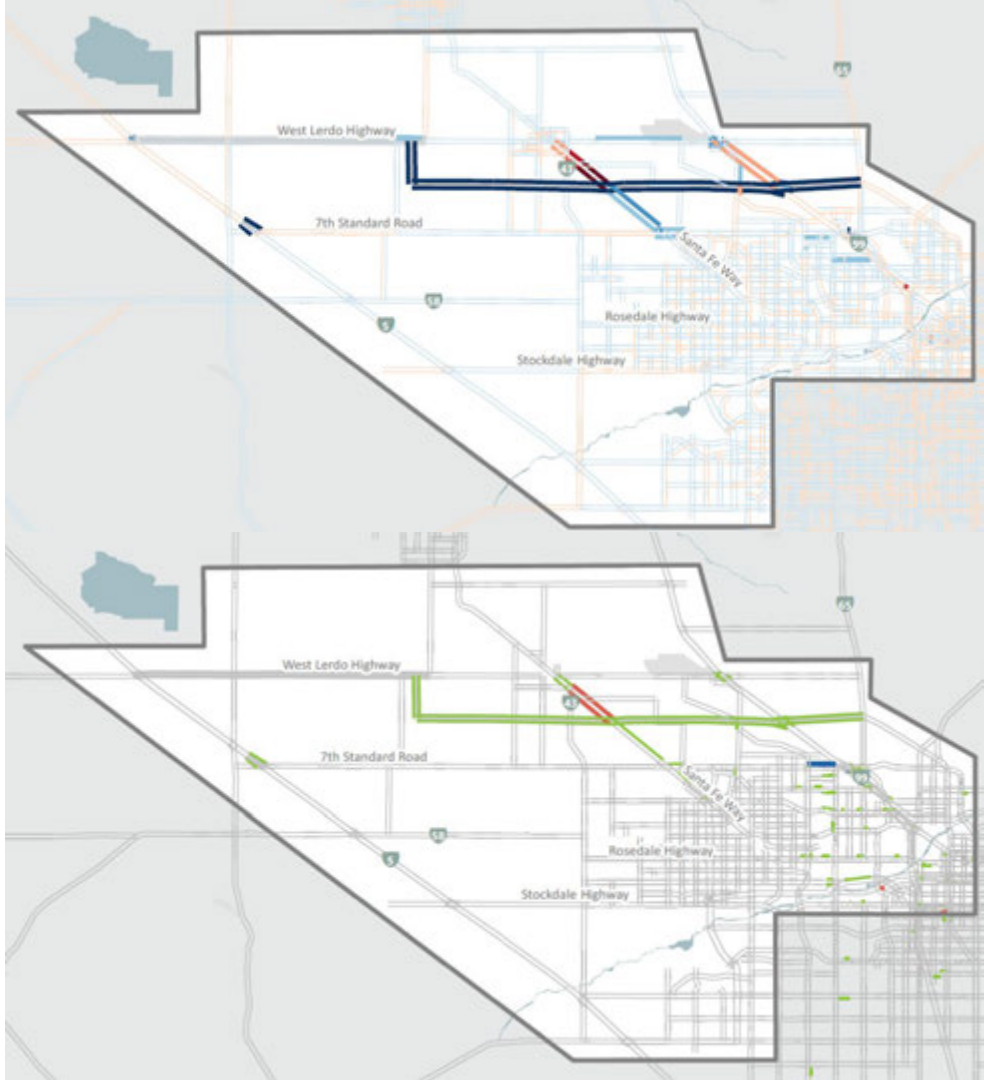


Trucks Vehicles

SCENARIO #3- NORTH BELTWAY OPT1

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph



- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #3- NORTH BELTWAY OPT1

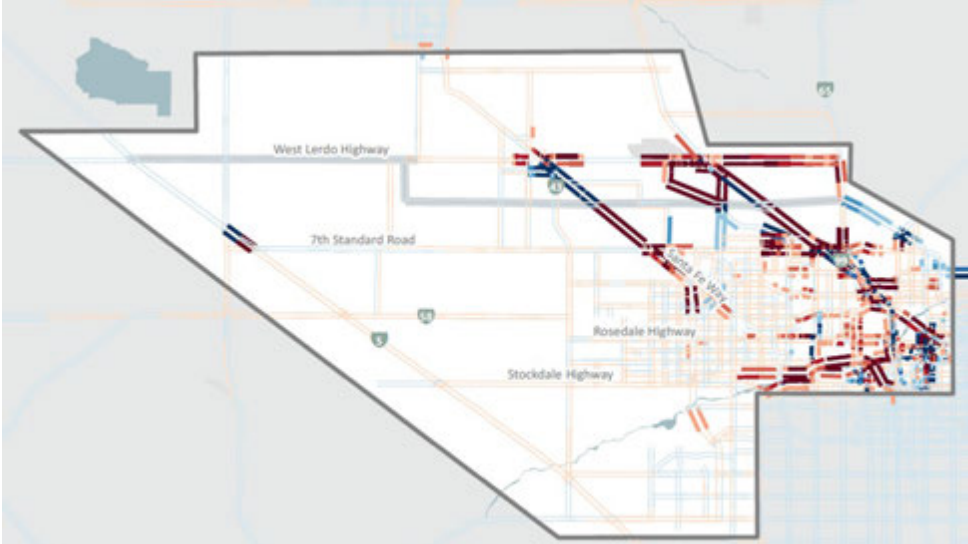
Access to Industries

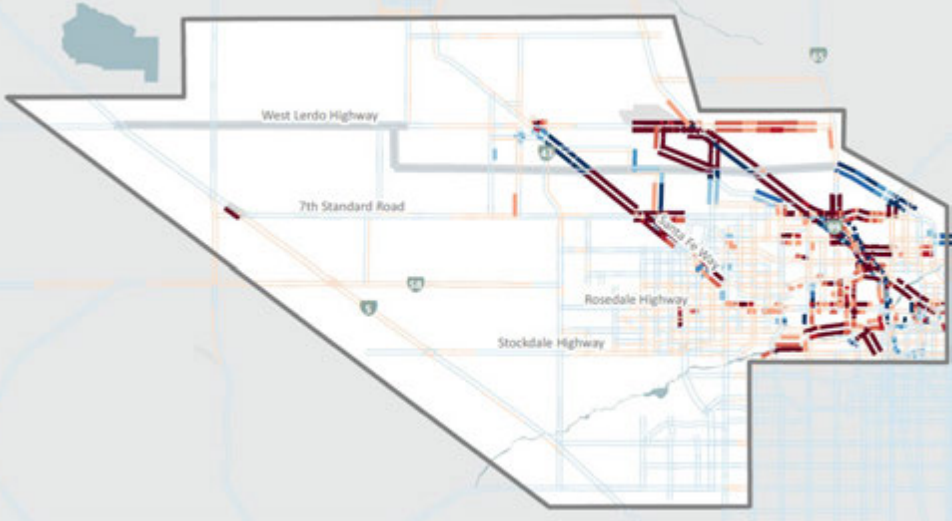
Total Employment

20,000+
+ 15,000 to 19,999
+ 10,000 to 14,999
+ 5,000 to 9,999
+ 0 to 4,999
- 0 to -5,000
- 5,001 to -10,000
- 10,001 to -15,000
- 15,001 to -19,999
-20,000+

Industrial Employment

4,000+
+ 3,000 to 3,999
+ 2,000 to 2,999
+ 1,000 to 1,999
+ 0 to 999
- 0 to -1,000
- 1,001 to -2,000
- 2,001 to -3,000
- 3,001 to -3,999
-4,000+



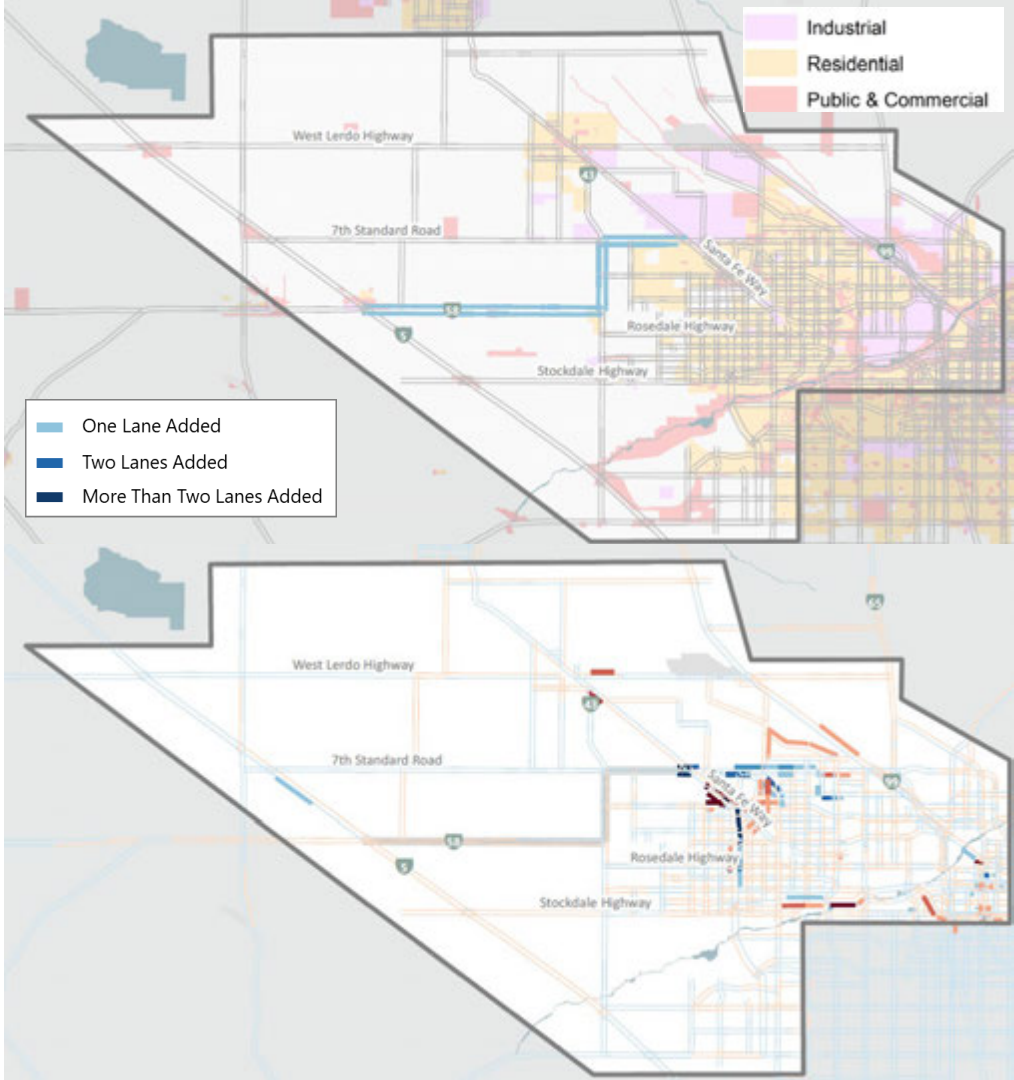


SCENARIO #4- NORTH BELTWAY OPT2

Scenario Overview

HH Exposure Index

	40,000+
	+ 30,000 to 39,999
	+ 20,000 to 29,999
	+ 10,000 to 19,999
	+ 0 to 9,999
	- 0 to -10,000
	- 10,001 to -20,000
	- 20,001 to -30,000
	- 30,001 to -39,999
	-40,000+

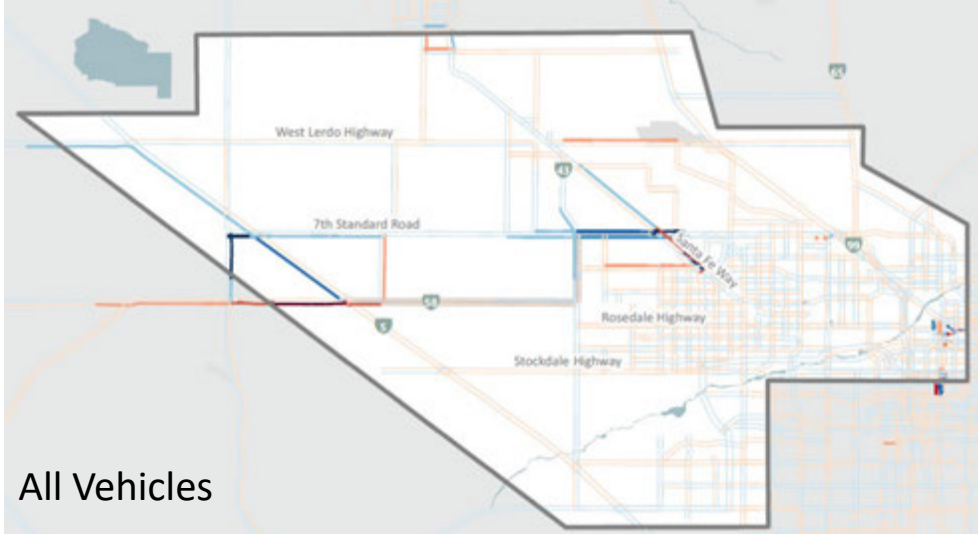


SCENARIO #4- NORTH BELTWAY OPT2

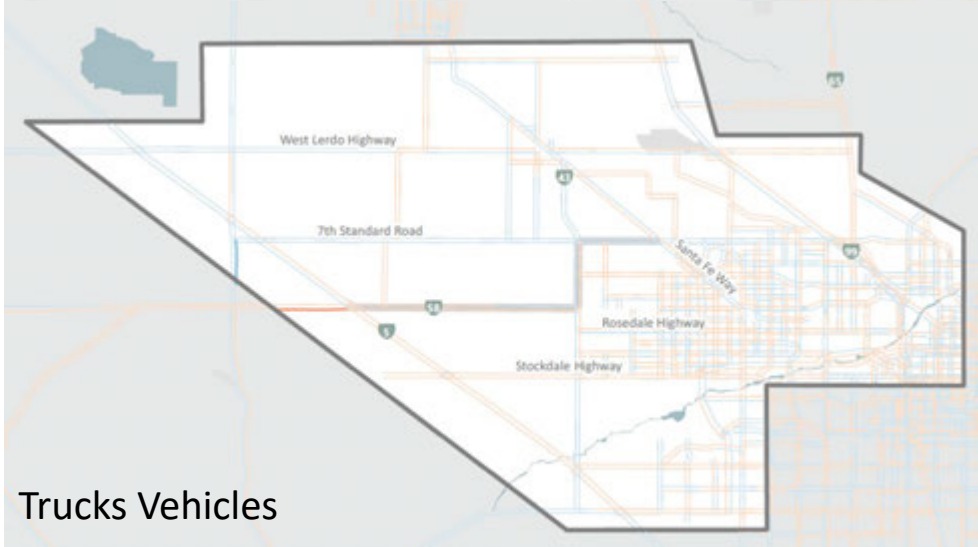
Daily Volume Change

- Volume Increased by 2,000+ Vehicles
- +1500 to 2000
- +1000 to 1500
- + 500 to 1000
- + 0 to 500
- - 0 to 500
- - 500 to 1000
- - 1000 to 1500
- - 1500 to 2000
- Volume Reduced by 2,000+ Vehicles

- Volume Increased by 1200+ Trucks
- + 901 to 1200
- + 601 to 900
- + 301 to 900
- + 0 to 300
- - 0 to 300
- - 301 to 600
- - 600 to 900
- - 901 to 1200
- Volume Reduced by 1200+ Trucks



All Vehicles

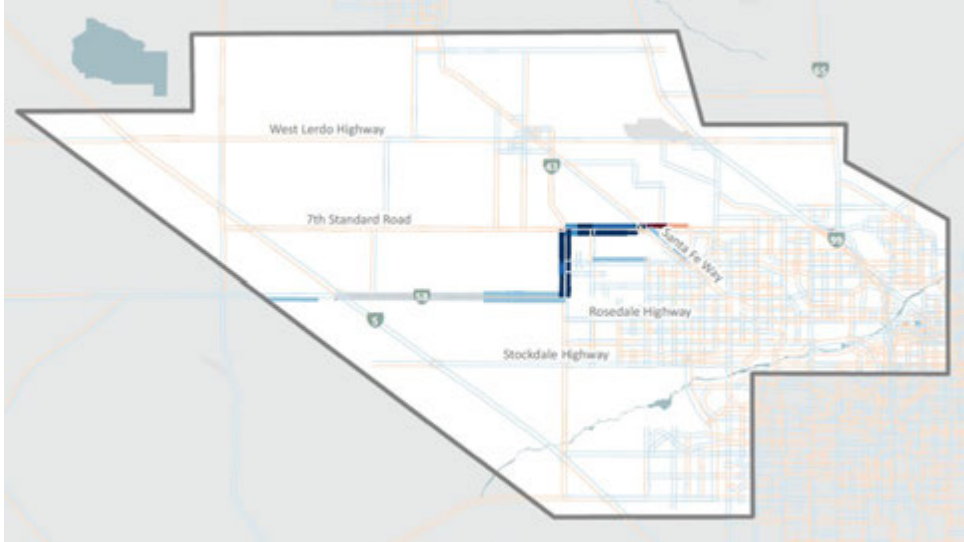


Trucks Vehicles

SCENARIO #4- NORTH BELTWAY OPT2

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph



- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #4- NORTH BELTWAY OPT2

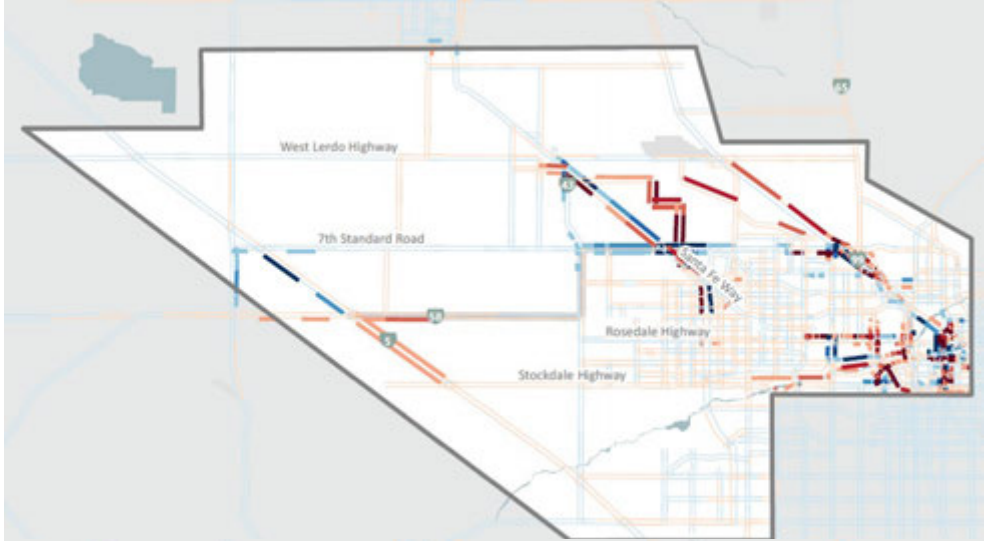
Access to Industries

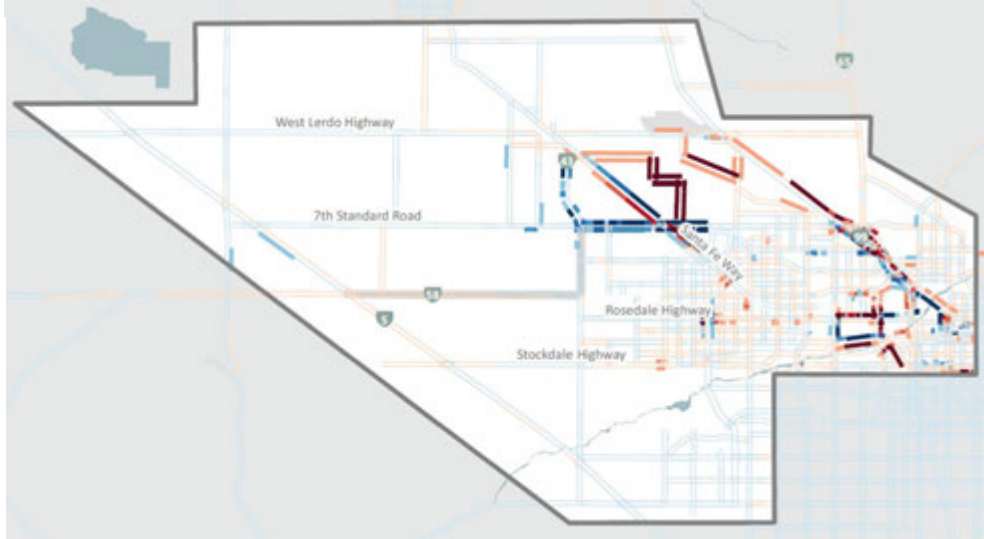
Total Employment

20,000+
+ 15,000 to 19,999
+ 10,000 to 14,999
+ 5,000 to 9,999
+ 0 to 4,999
- 0 to -5,000
- 5,001 to -10,000
- 10,001 to -15,000
- 15,001 to -19,999
-20,000+

Industrial Employment

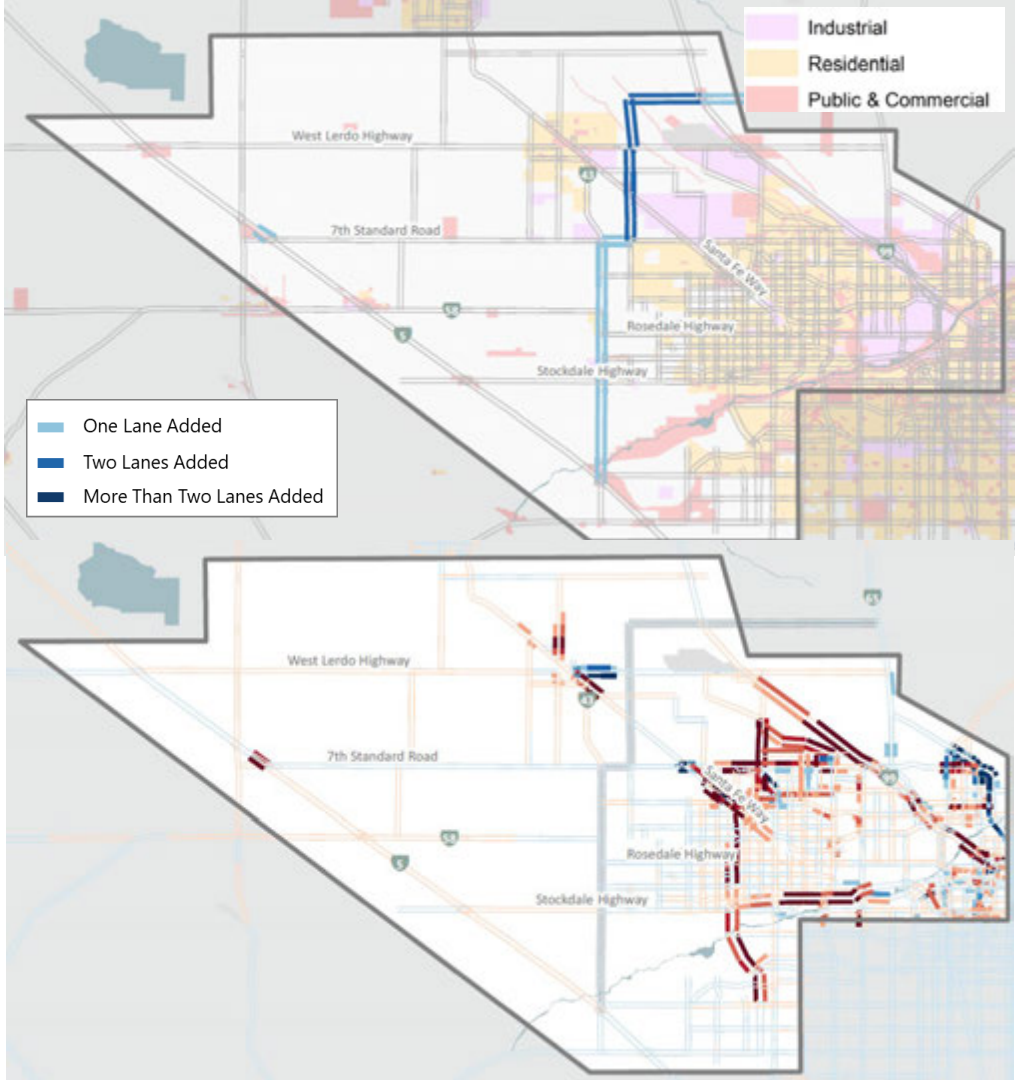
4,000+
+ 3,000 to 3,999
+ 2,000 to 2,999
+ 1,000 to 1,999
+ 0 to 999
- 0 to -1,000
- 1,001 to -2,000
- 2,001 to -3,000
- 3,001 to -3,999
-4,000+





SCENARIO #5- WEST BAKERSFIELD OPT1

Scenario Overview



HH Exposure Index

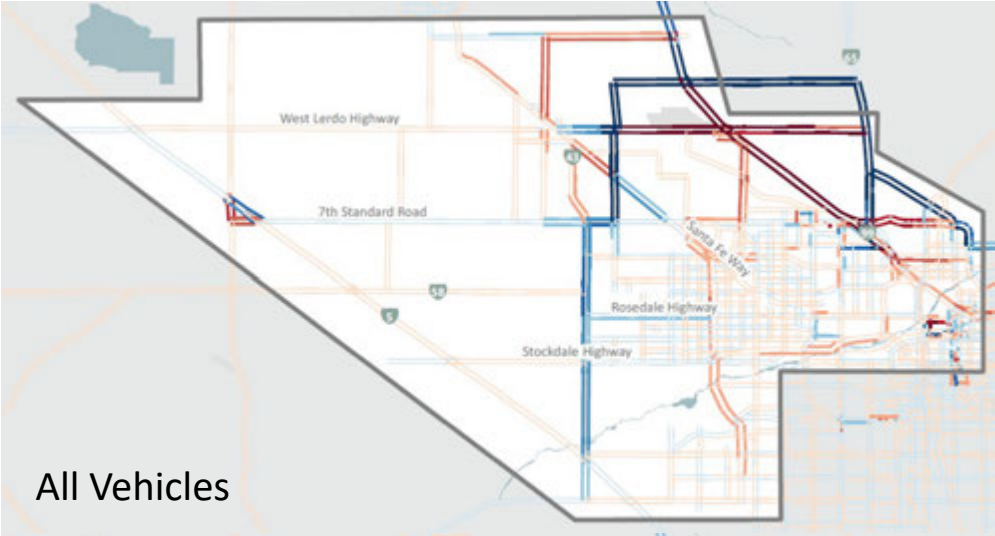
40,000+	
+ 30,000	to 39,999
+ 20,000	to 29,999
+ 10,000	to 19,999
+ 0	to 9,999
- 0	to -10,000
- 10,001	to -20,000
- 20,001	to -30,000
- 30,001	to -39,999
-40,000+	

SCENARIO #5- WEST BAKERSFIELD OPT1

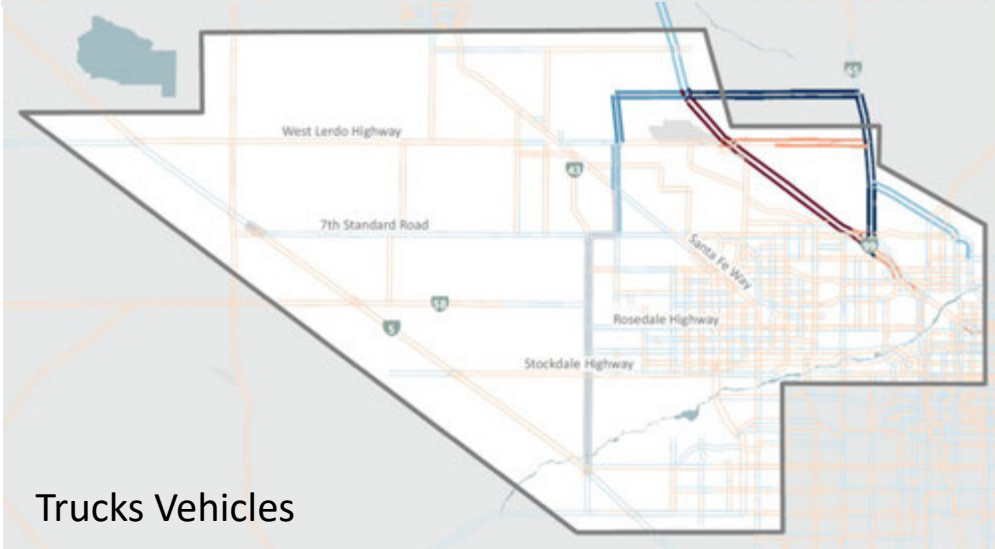
Daily Volume Change

Volume Increased by 2,000+ Vehicles
+1500 to 2000
+1000 to 1500
+ 500 to 1000
+ 0 to 500
- 0 to 500
- 500 to 1000
- 1000 to 1500
- 1500 to 2000
Volume Reduced by 2,000+ Vehicles

Volume Increased by 1200+ Trucks
+ 901 to 1200
+ 601 to 900
+ 301 to 900
+ 0 to 300
- 0 to 300
- 301 to 600
- 600 to 900
- 901 to 1200
Volume Reduced by 1200+ Trucks



All Vehicles

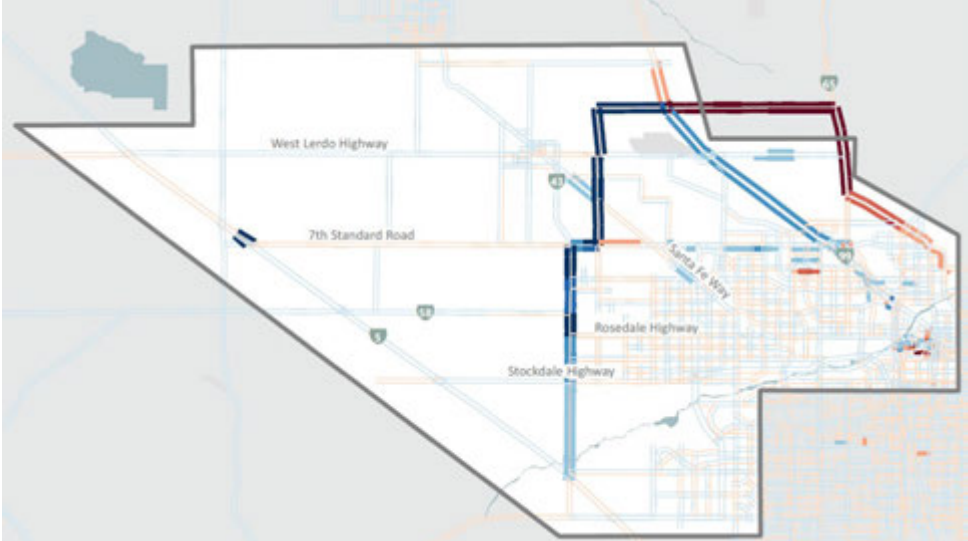


Trucks Vehicles

SCENARIO #5- WEST BAKERSFIELD OPT1

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph



- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #5- WEST BAKERSFIELD OPT1

Access to Industries

Total Employment

- 20,000+
- + 15,000 to 19,999
- + 10,000 to 14,999
- + 5,000 to 9,999
- + 0 to 4,999
- - 0 to -5,000
- - 5,001 to -10,000
- - 10,001 to -15,000
- - 15,001 to -19,999
- -20,000+

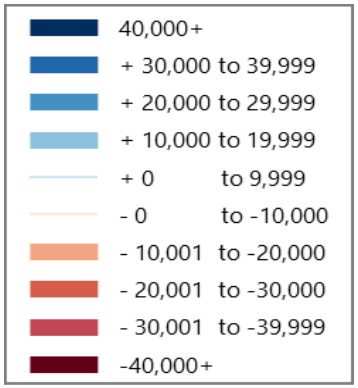
Industrial Employment

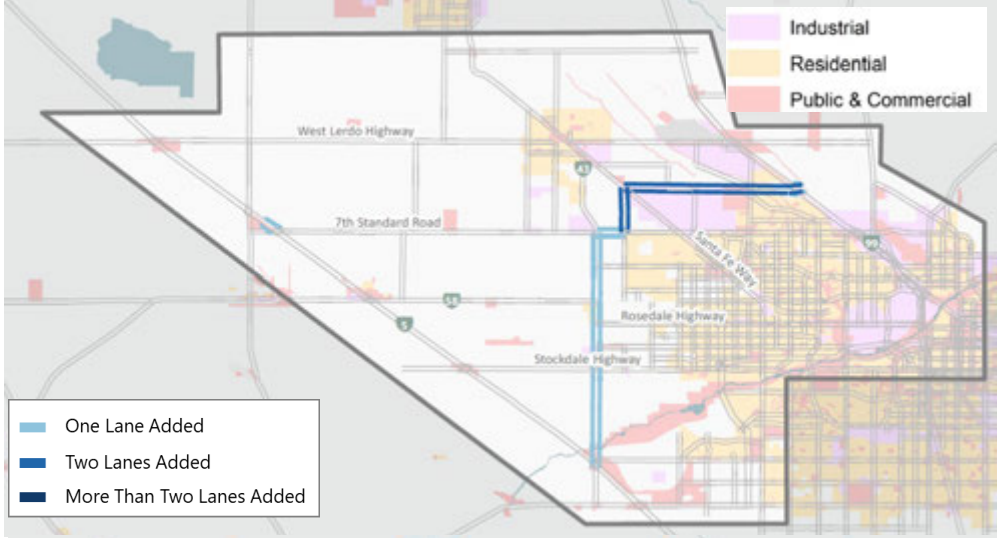
- 4,000+
- + 3,000 to 3,999
- + 2,000 to 2,999
- + 1,000 to 1,999
- + 0 to 999
- - 0 to -1,000
- - 1,001 to -2,000
- - 2,001 to -3,000
- - 3,001 to -3,999
- -4,000+

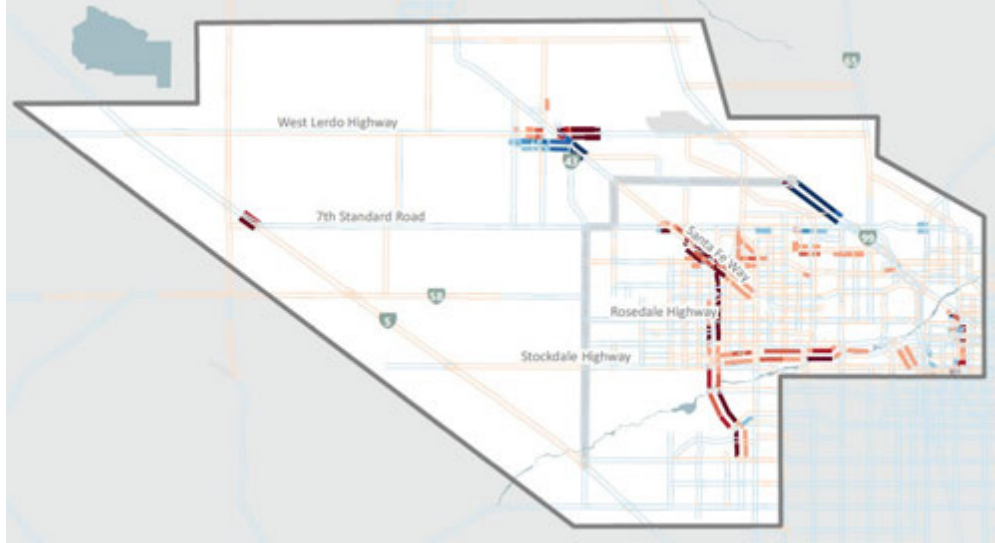
SCENARIO #6- WEST BAKERSFIELD OPT2

Scenario Overview

HH Exposure Index



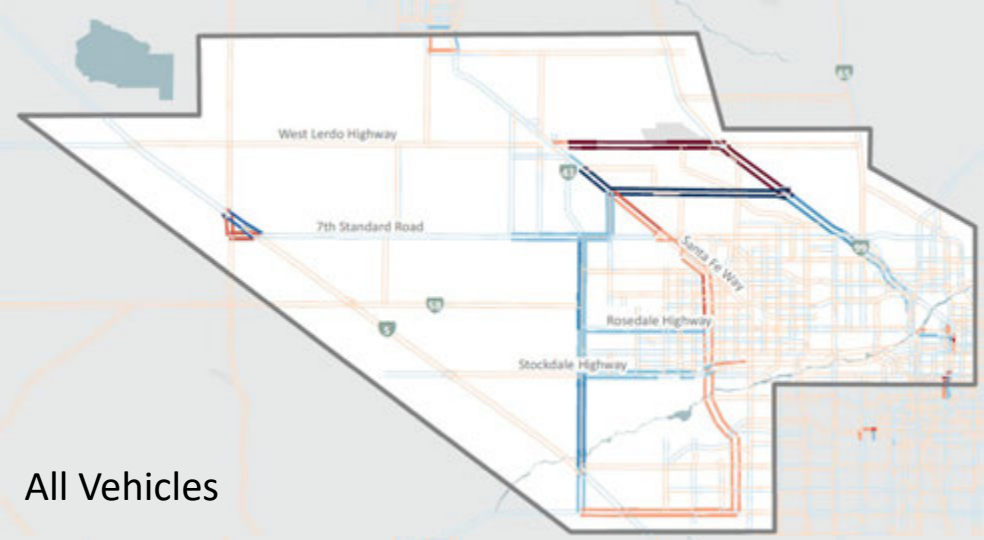




SCENARIO #6- WEST BAKERSFIELD OPT2

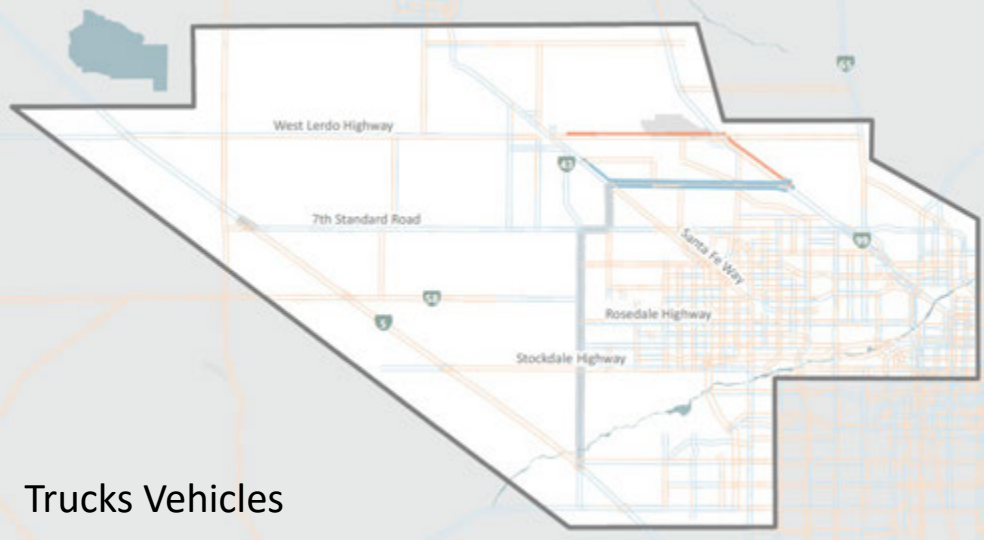
Daily Volume Change

- Volume Increased by 2,000+ Vehicles
- +1500 to 2000
- +1000 to 1500
- + 500 to 1000
- + 0 to 500
- - 0 to 500
- - 500 to 1000
- - 1000 to 1500
- - 1500 to 2000
- Volume Reduced by 2,000+ Vehicles



All Vehicles

- Volume Increased by 1200+ Trucks
- + 901 to 1200
- + 601 to 900
- + 301 to 900
- + 0 to 300
- - 0 to 300
- - 301 to 600
- - 600 to 900
- - 901 to 1200
- Volume Reduced by 1200+ Trucks

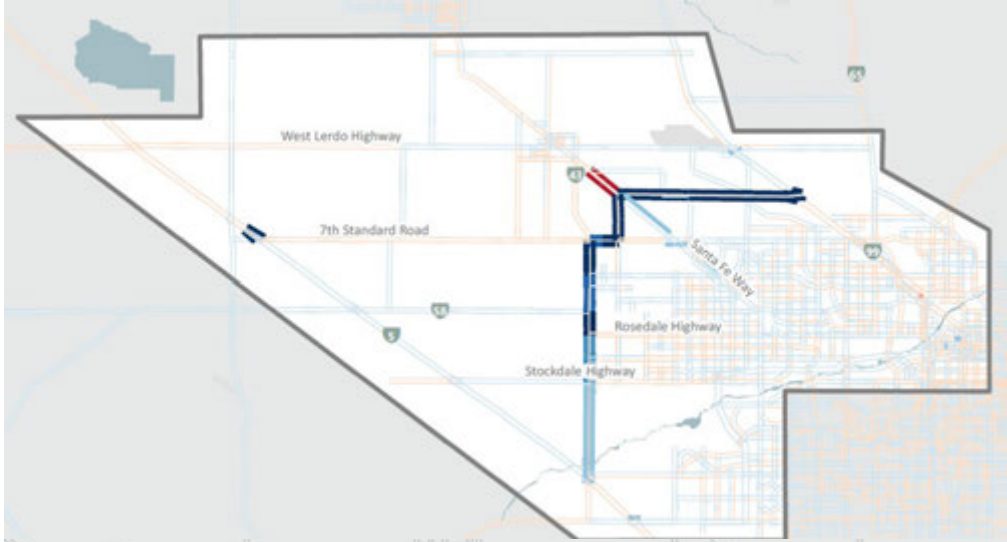


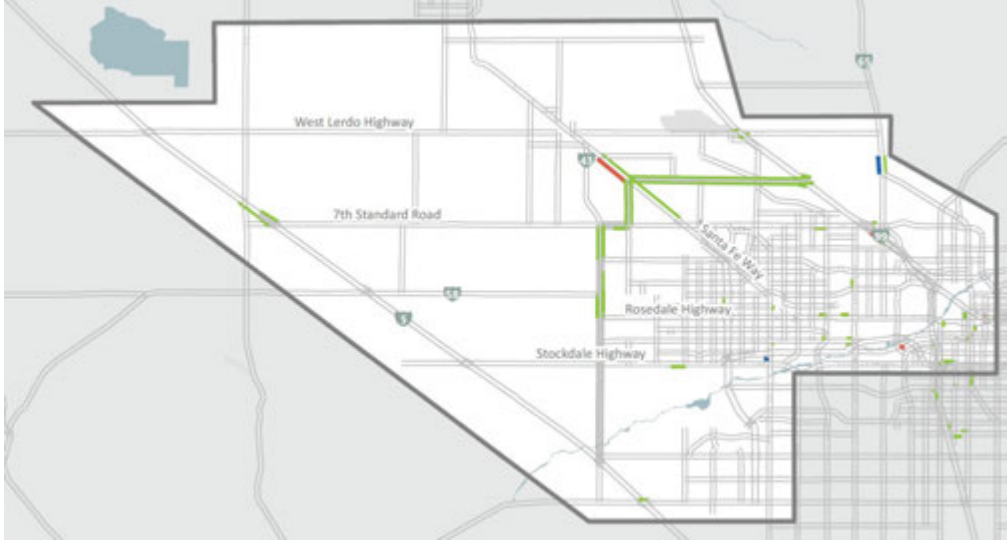
Trucks Vehicles

SCENARIO #6- WEST BAKERSFIELD OPT2

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph





- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #6- WEST BAKERSFIELD OPT2

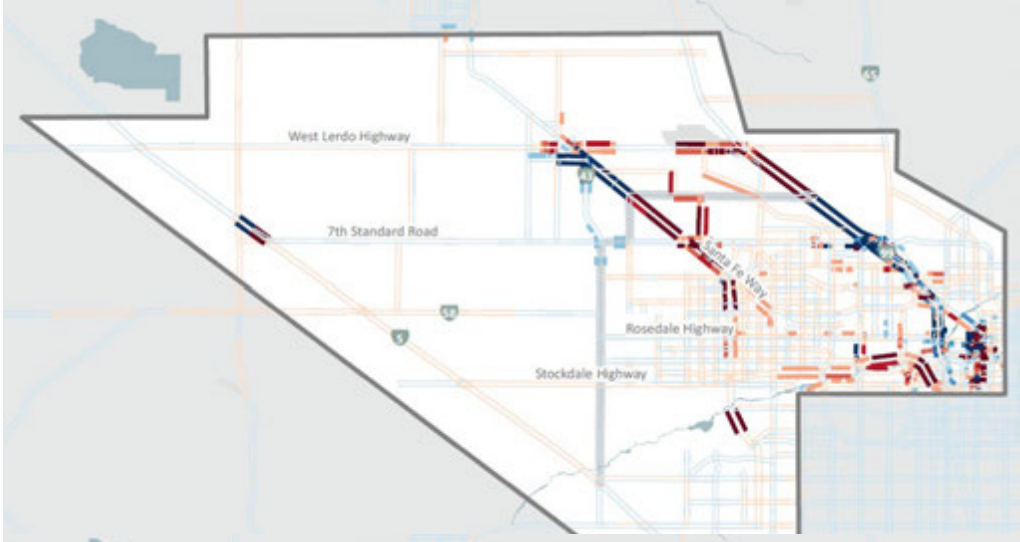
Access to Industries

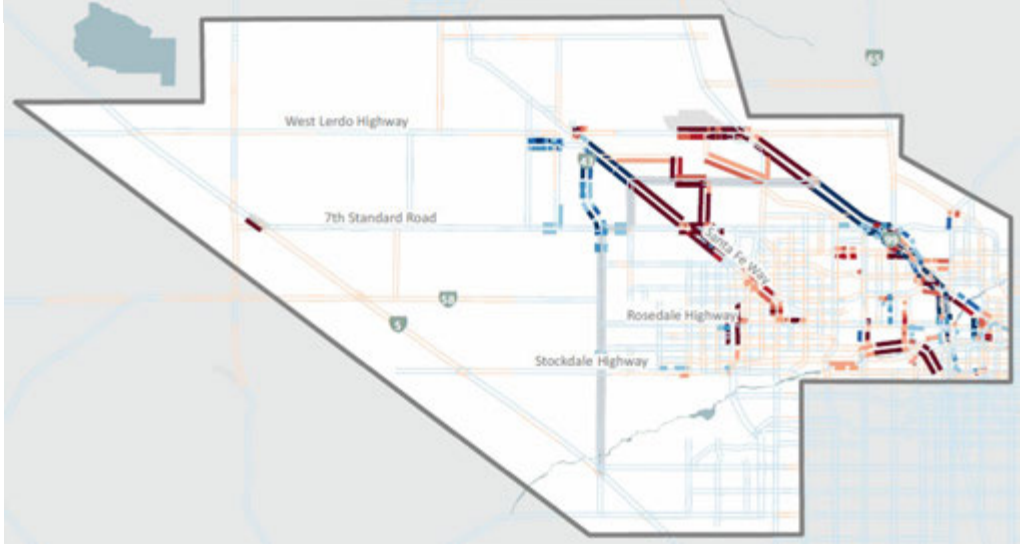
Total Employment

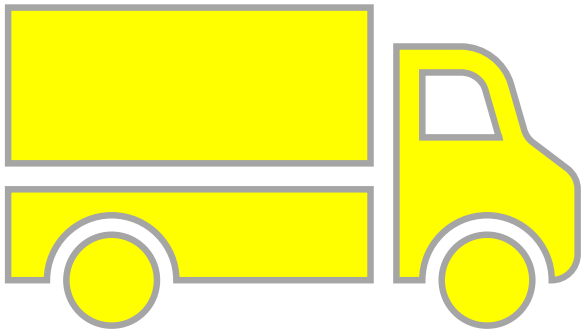
- 20,000+
- + 15,000 to 19,999
- + 10,000 to 14,999
- + 5,000 to 9,999
- + 0 to 4,999
- - 0 to -5,000
- - 5,001 to -10,000
- - 10,001 to -15,000
- - 15,001 to -19,999
- -20,000+

Industrial Employment

- 4,000+
- + 3,000 to 3,999
- + 2,000 to 2,999
- + 1,000 to 1,999
- + 0 to 999
- - 0 to -1,000
- - 1,001 to -2,000
- - 2,001 to -3,000
- - 3,001 to -3,999
- -4,000+



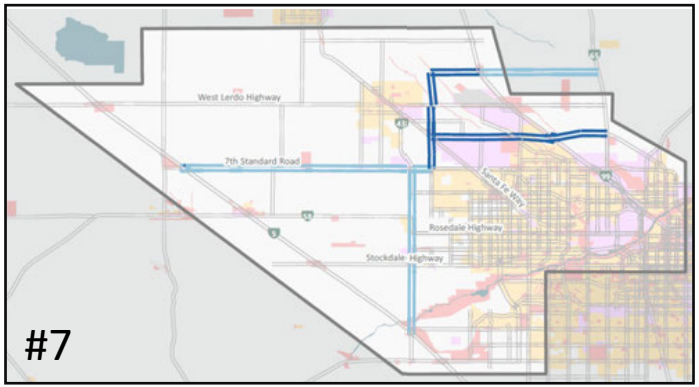


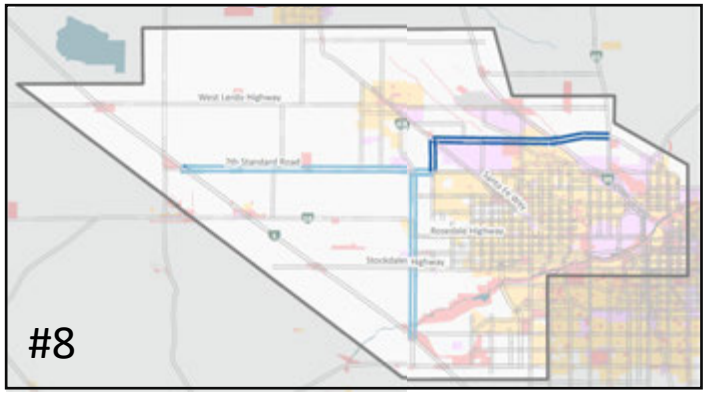


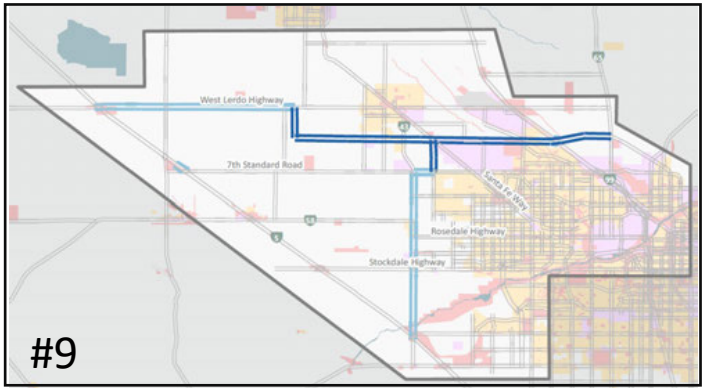
Appendix A: Alternatives' Review

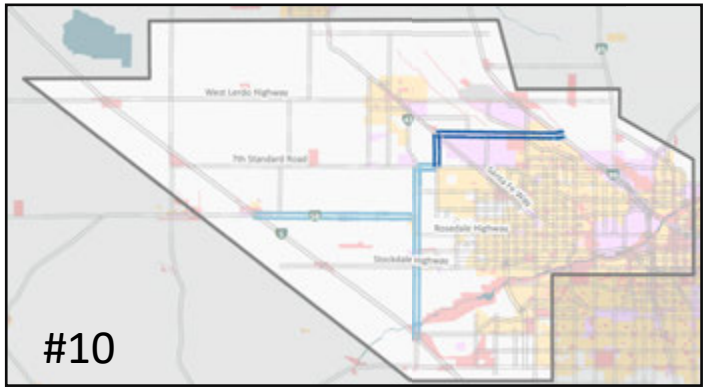
IIII..System Scenarios

System Scenarios







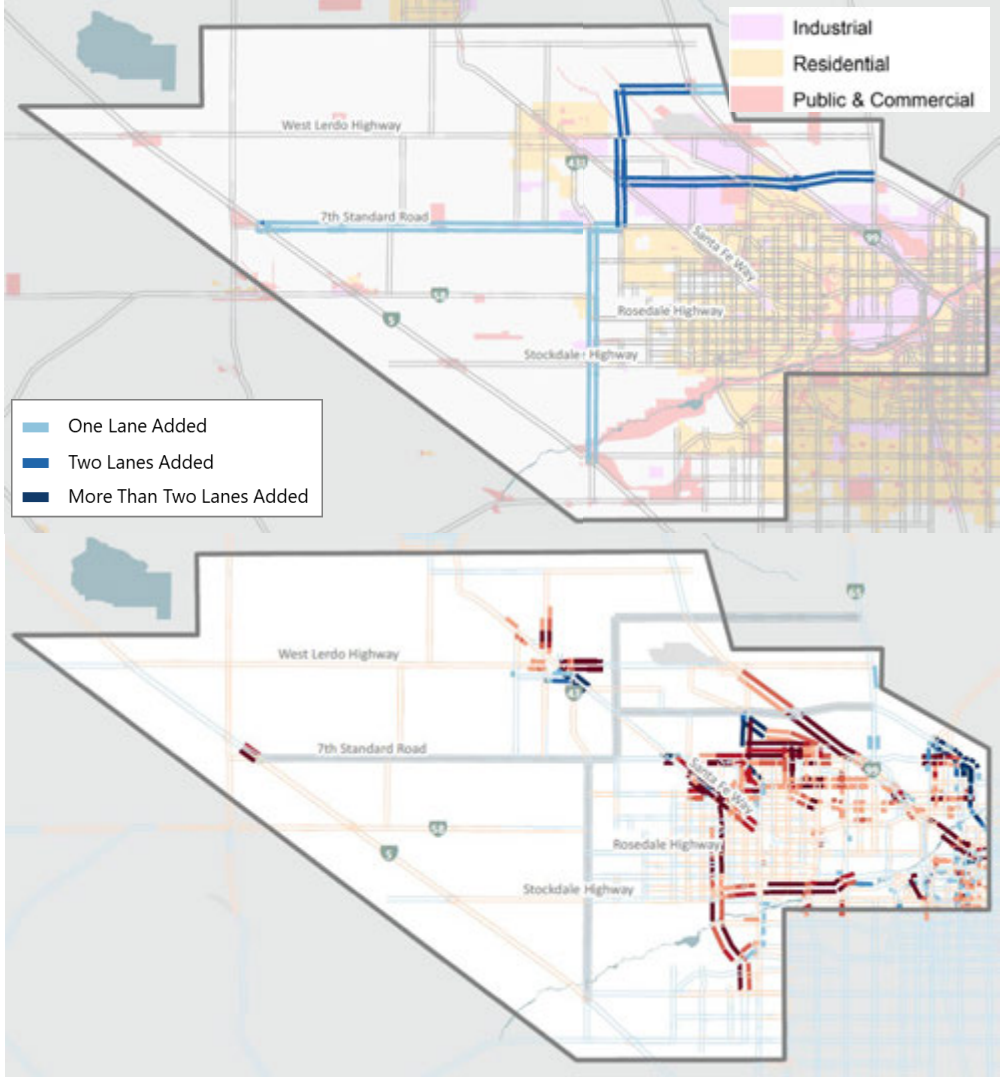


SCENARIO #7

Scenario Overview

HH Exposure Index

40,000+	
+ 30,000	to 39,999
+ 20,000	to 29,999
+ 10,000	to 19,999
+ 0	to 9,999
- 0	to -10,000
- 10,001	to -20,000
- 20,001	to -30,000
- 30,001	to -39,999
-40,000+	

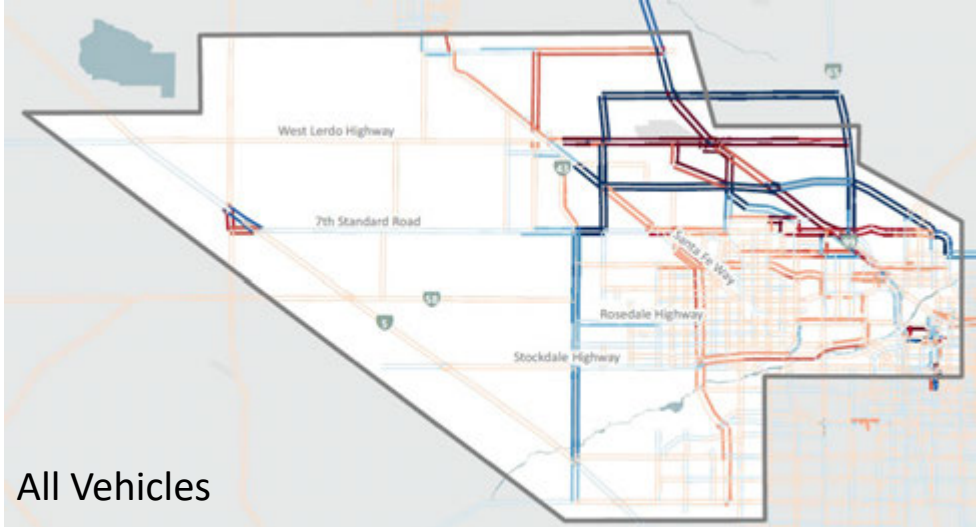


SCENARIO #7

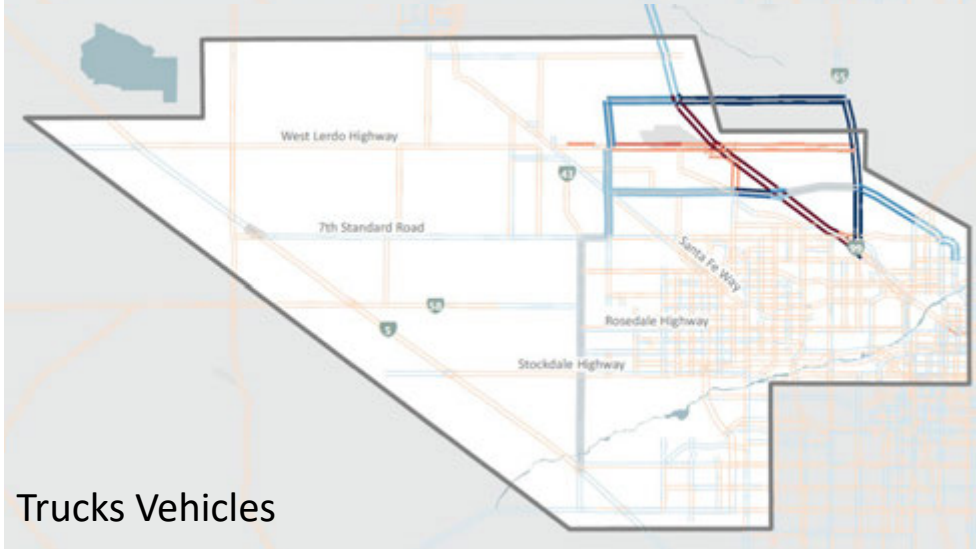
Daily Volume Change

- Volume Increased by 2,000+ Vehicles
- +1500 to 2000
- +1000 to 1500
- + 500 to 1000
- + 0 to 500
- - 0 to 500
- - 500 to 1000
- - 1000 to 1500
- - 1500 to 2000
- Volume Reduced by 2,000+ Vehicles

- Volume Increased by 1200+ Trucks
- + 901 to 1200
- + 601 to 900
- + 301 to 900
- + 0 to 300
- - 0 to 300
- - 301 to 600
- - 600 to 900
- - 901 to 1200
- Volume Reduced by 1200+ Trucks



All Vehicles

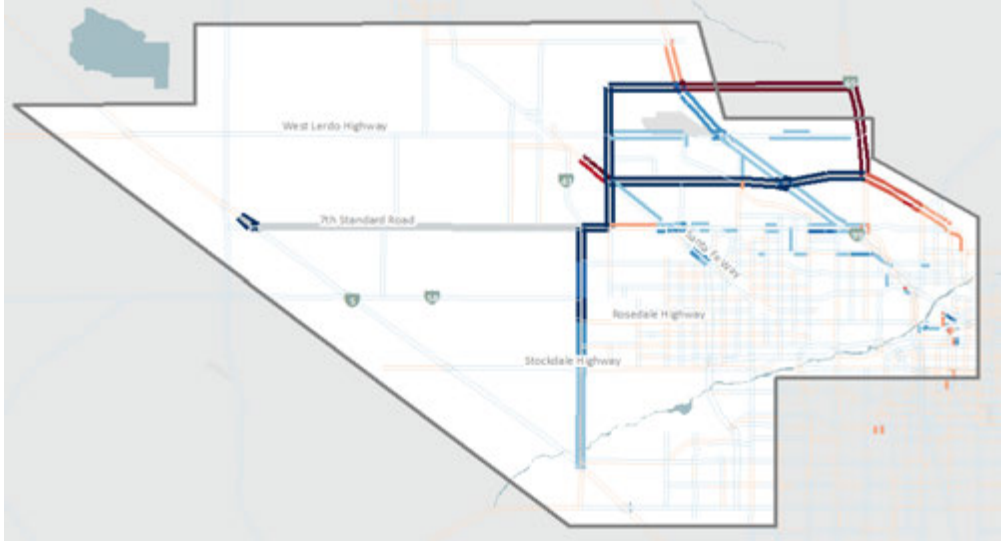


Trucks Vehicles

SCENARIO #7

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph



- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #7

Access to Industries

Total Employment

- 20,000+
- + 15,000 to 19,999
- + 10,000 to 14,999
- + 5,000 to 9,999
- + 0 to 4,999
- - 0 to -5,000
- - 5,001 to -10,000
- - 10,001 to -15,000
- - 15,001 to -19,999
- -20,000+

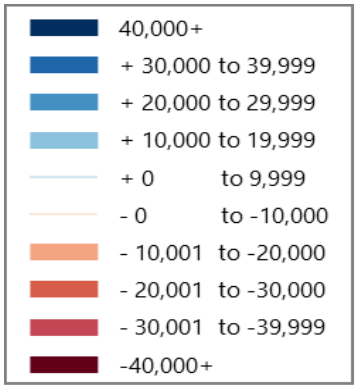
Industrial Employment

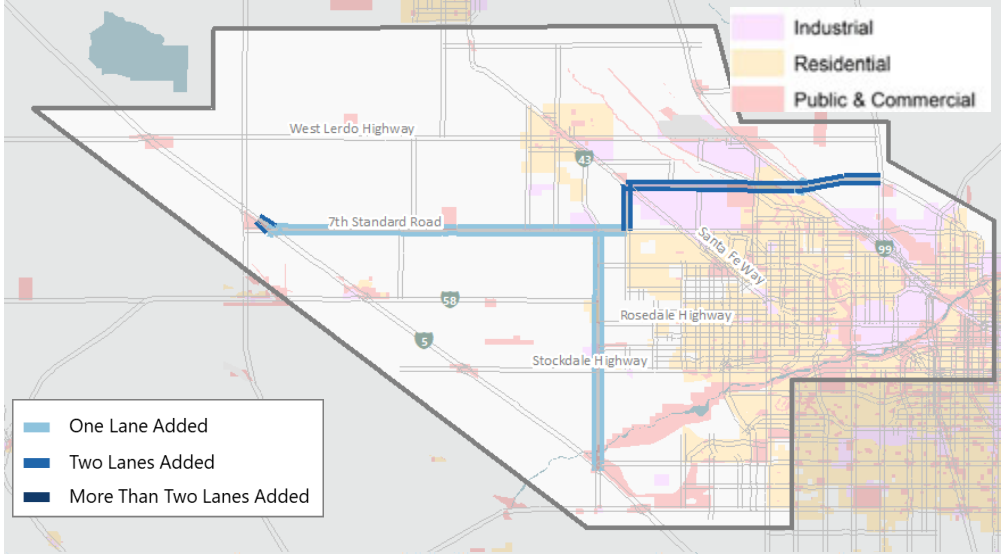
- 4,000+
- + 3,000 to 3,999
- + 2,000 to 2,999
- + 1,000 to 1,999
- + 0 to 999
- - 0 to -1,000
- - 1,001 to -2,000
- - 2,001 to -3,000
- - 3,001 to -3,999
- -4,000+

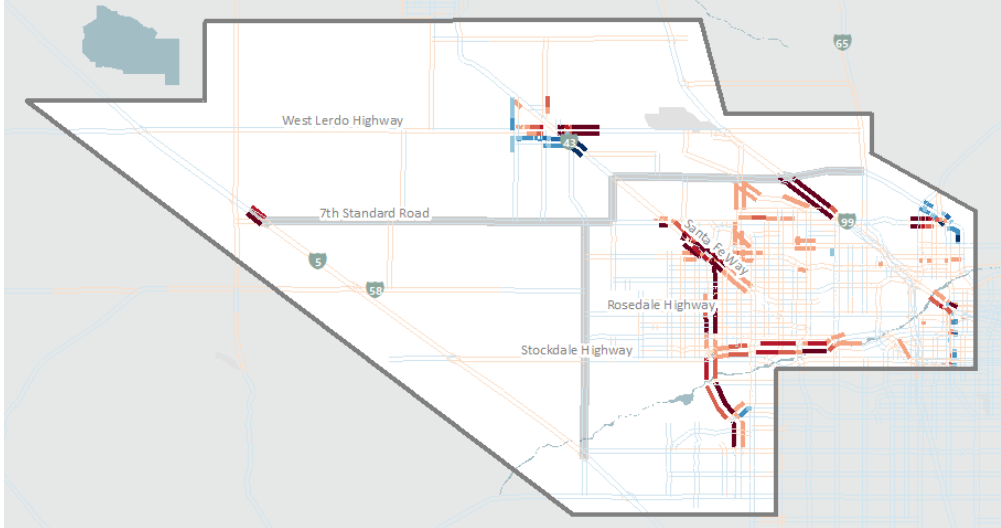
SCENARIO #8

Scenario Overview

HH Exposure Index





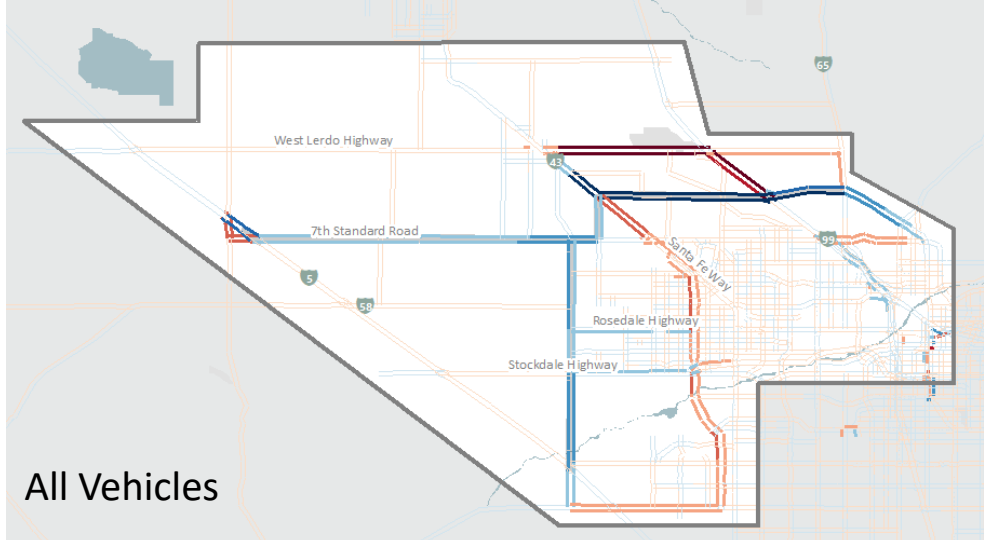


SCENARIO #8

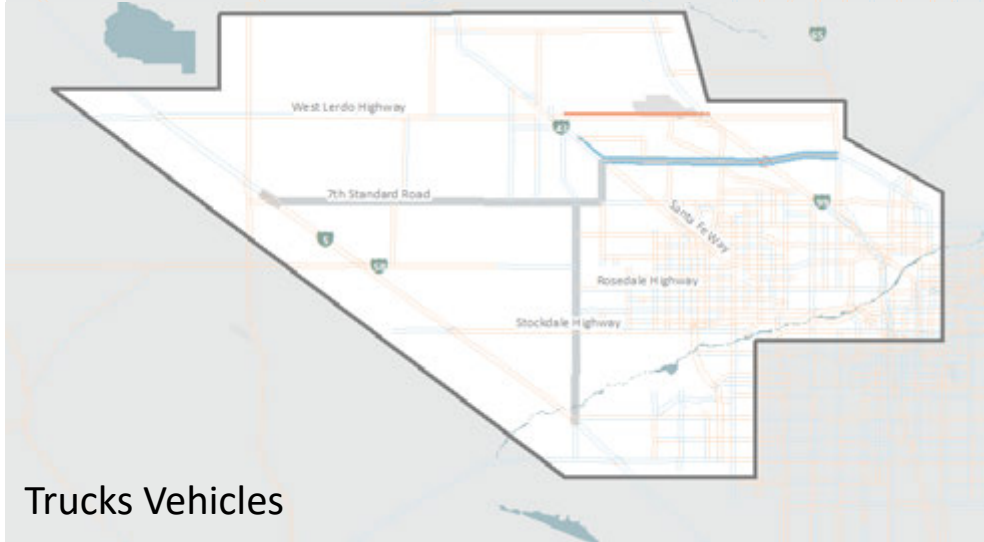
Daily Volume Change

- Volume Increased by 2,000+ Vehicles
- +1500 to 2000
- +1000 to 1500
- + 500 to 1000
- + 0 to 500
- - 0 to 500
- - 500 to 1000
- - 1000 to 1500
- - 1500 to 2000
- Volume Reduced by 2,000+ Vehicles

- Volume Increased by 1200+ Trucks
- + 901 to 1200
- + 601 to 900
- + 301 to 900
- + 0 to 300
- - 0 to 300
- - 301 to 600
- - 600 to 900
- - 901 to 1200
- Volume Reduced by 1200+ Trucks



All Vehicles

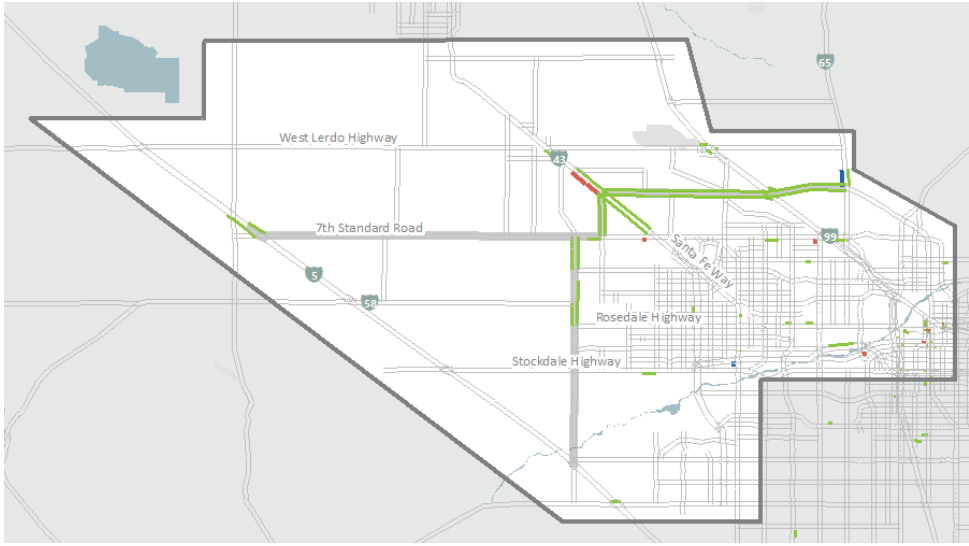


Trucks Vehicles

SCENARIO #8

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph



- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #8

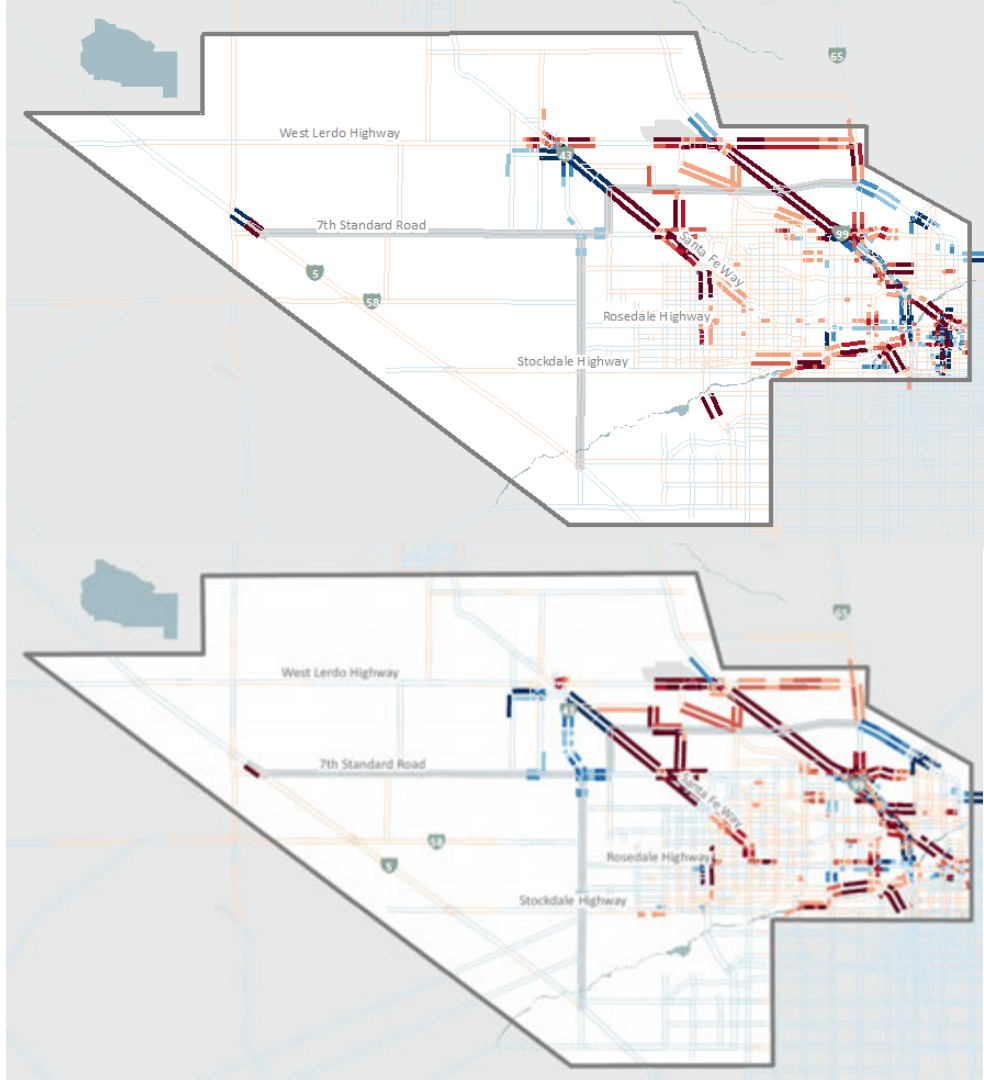
Access to Industries

Total Employment

- 20,000+
- + 15,000 to 19,999
- + 10,000 to 14,999
- + 5,000 to 9,999
- + 0 to 4,999
- - 0 to -5,000
- - 5,001 to -10,000
- - 10,001 to -15,000
- - 15,001 to -19,999
- -20,000+

Industrial Employment

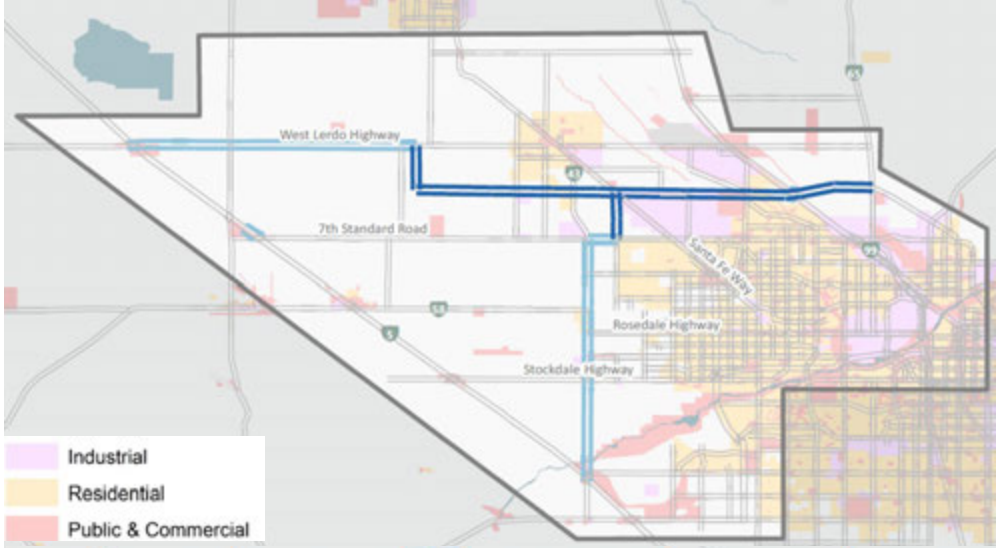
- 4,000+
- + 3,000 to 3,999
- + 2,000 to 2,999
- + 1,000 to 1,999
- + 0 to 999
- - 0 to -1,000
- - 1,001 to -2,000
- - 2,001 to -3,000
- - 3,001 to -3,999
- -4,000+



SCENARIO #9

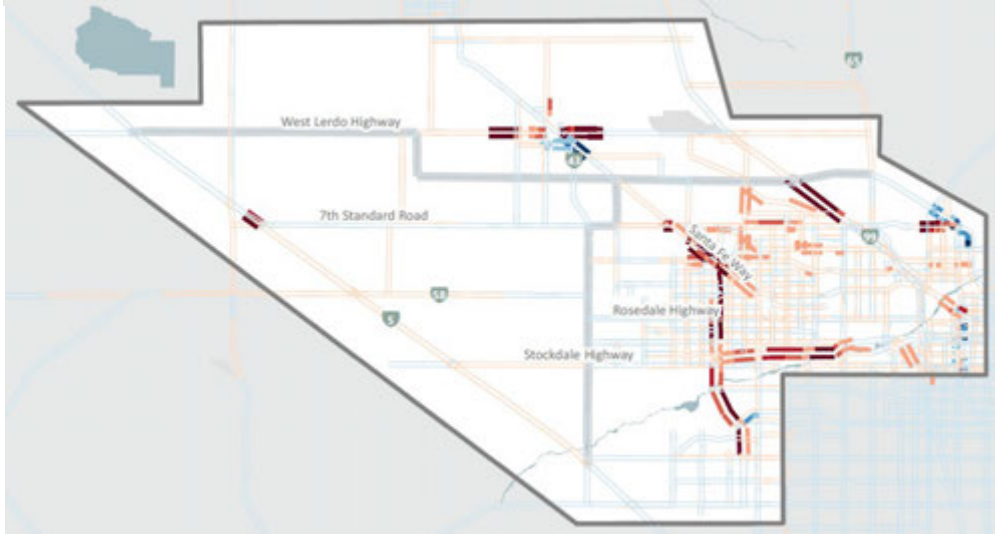
Scenario Overview

- One Lane Added
- Two Lanes Added
- More Than Two Lanes Added



HH Exposure Index

- 40,000+
- + 30,000 to 39,999
- + 20,000 to 29,999
- + 10,000 to 19,999
- + 0 to 9,999
- - 0 to -10,000
- - 10,001 to -20,000
- - 20,001 to -30,000
- - 30,001 to -39,999
- -40,000+

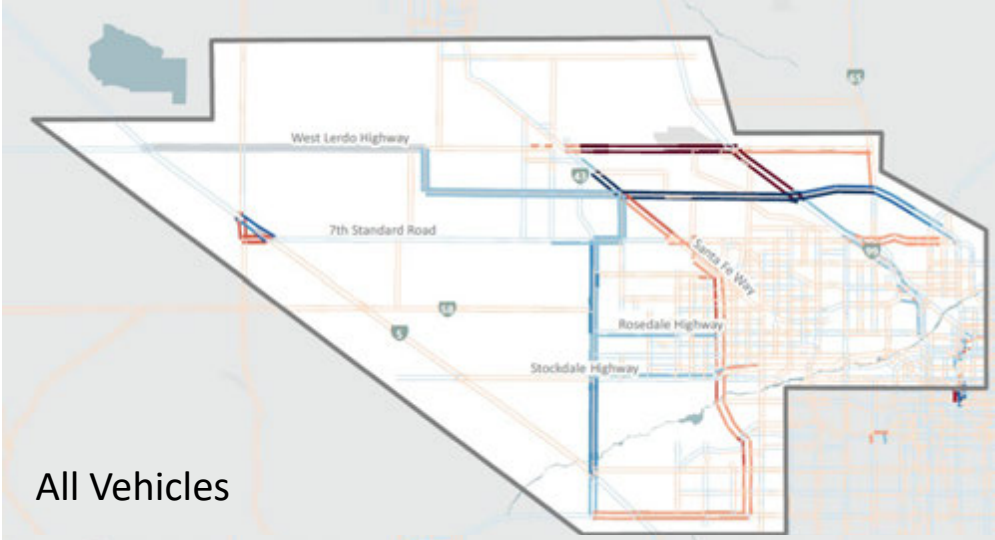


SCENARIO #9

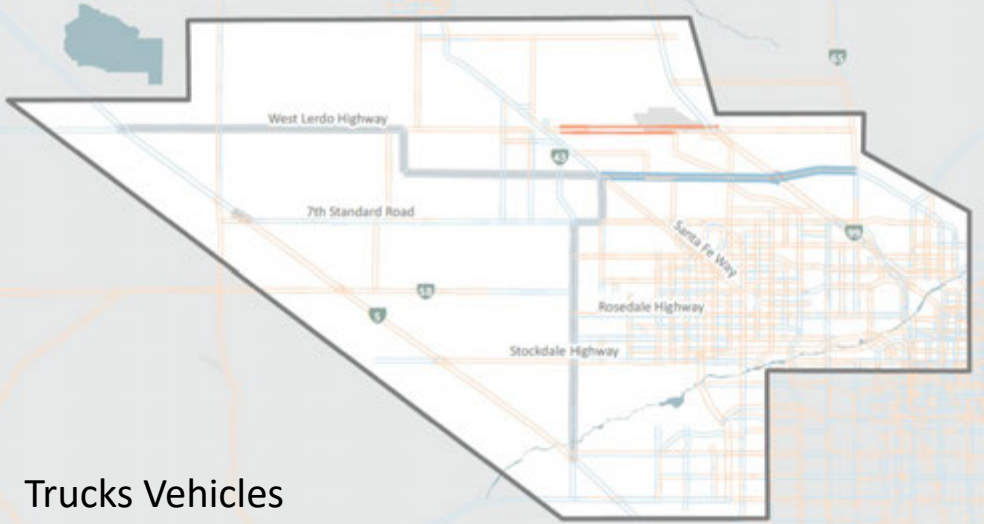
Daily Volume Change

Volume Increased by 2,000+ Vehicles
+1500 to 2000
+1000 to 1500
+ 500 to 1000
+ 0 to 500
- 0 to 500
- 500 to 1000
- 1000 to 1500
- 1500 to 2000
Volume Reduced by 2,000+ Vehicles

Volume Increased by 1200+ Trucks
+ 901 to 1200
+ 601 to 900
+ 301 to 900
+ 0 to 300
- 0 to 300
- 301 to 600
- 600 to 900
- 901 to 1200
Volume Reduced by 1200+ Trucks



All Vehicles

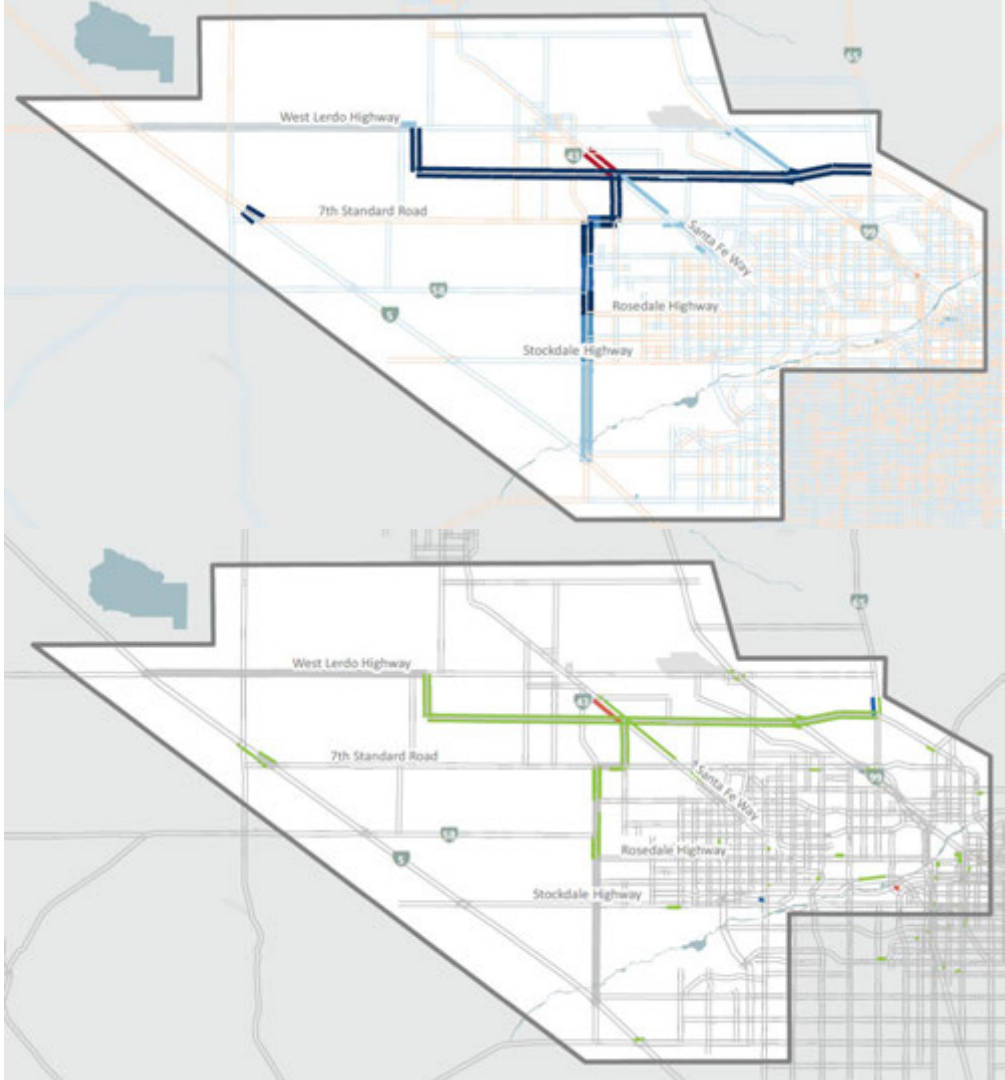


Trucks Vehicles

SCENARIO #9

Operation

- Speed Increased by 4+ mph
- + 3 to 4 mph
- + 2 to 3 mph
- + 1 to 2 mph
- + 0 to 1 mph
- - 0 to 1 mph
- - 1 to 2 mph
- - 2 to 3 mph
- - 3 to 4 mph
- Speed Reduced by 4+ mph



- Worse LOS and LOS D or worse
- Better LOS and LOS D or worse
- LOS Change and LOS C or better

SCENARIO #9

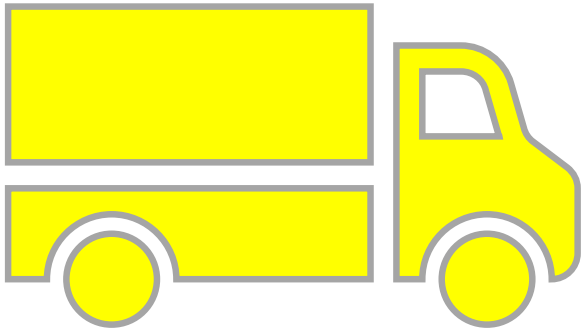
Access to Industries

Total Employment

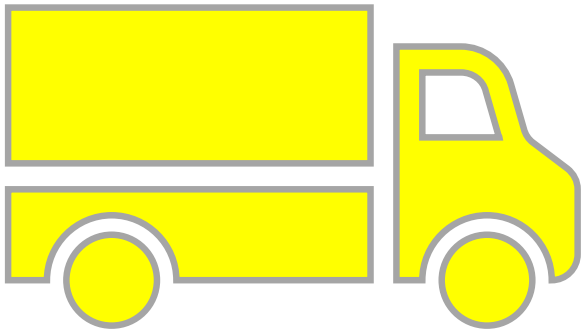
20,000+
+ 15,000 to 19,999
+ 10,000 to 14,999
+ 5,000 to 9,999
+ 0 to 4,999
- 0 to -5,000
- 5,001 to -10,000
- 10,001 to -15,000
- 15,001 to -19,999
-20,000+

Industrial Employment

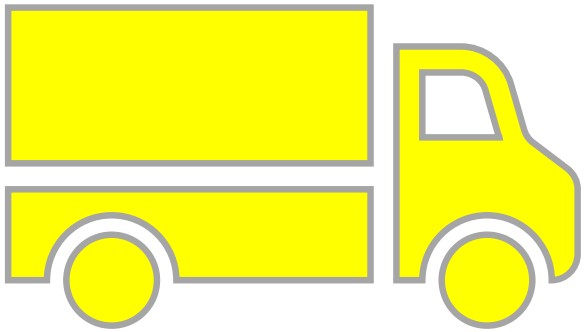
4,000+
+ 3,000 to 3,999
+ 2,000 to 2,999
+ 1,000 to 1,999
+ 0 to 999
- 0 to -1,000
- 1,001 to -2,000
- 2,001 to -3,000
- 3,001 to -3,999
-4,000+



Appendix B:
Circulation Plan Recommendations

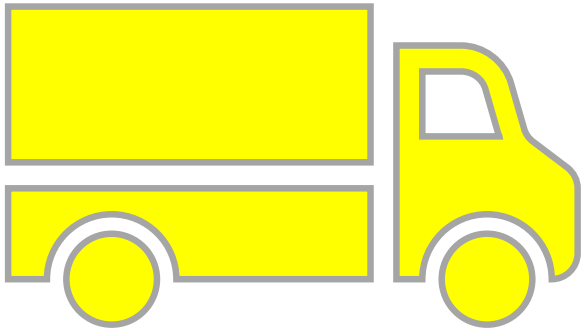


Appendix C: Sketch Drawings (separate file)



Appendix D:: Foot print Drawings

(separate file)



Appendix E: SAFETEC Concept

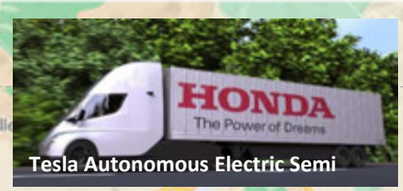
DRAFT Proposed Kern SAFETEC Logistics Zone

Safe Autonomous Freight Enhanced Testing Environmentally Clean (SAFETEC) Logistics Zone

Potential Signage for Autonomous Truck Testing Routes

Potential Trucks to be Tested


Hyundai Autonomous Semi



Tesla Autonomous Electric Semi


Volvo Autonomous Electric Semi

Kern—Ideally Suited:
Located at the crossroads of CA, Kern's aerospace industry pioneered drone technology and has already attracted a cluster of vehicle testing facilities including Honda, Hyundai, and Willow Springs leasable testing facility. Most of Kern's warehouses are new, easing retrofit requirements. Numerous daily farm/dairy to processing facility opportunities.

Potential Benefits:
- High Paying Tech Jobs
- Cleaner Air
- Improved Safety
- Community Livability
- Lower Shipping Costs
- New Road Funding Source

Potential Rural Logistics Corridor Network

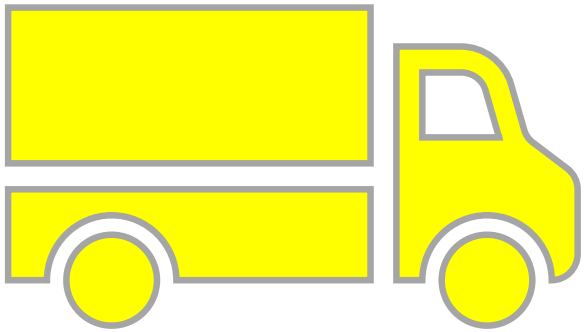
Test track / Dairy cluster
- Distribution Center (DC), Processing/Mfg. Facility
- Potential Transfer Facility to Rail or Trucks with Drivers
- Local Government Maintained Corridors/future routes (dashed lines)
- Local/State Maintained Corridors
- Local/State Corridors thru Neighboring Counties
- Interregional I-5 Autonomous Truck Shuttle Service
- Interregional Service Expansion to Existing Rail Service

Initial corridor testing would likely be warehouse to warehouse shipping points in rural, low population areas of the region, and gradually expanded as technology is proven successful and safe. Special consideration will be needed to fund road maintenance, improvements, insurance, safety patrolling, and avoidance of impacts on disadvantaged communities by these testing corridors.

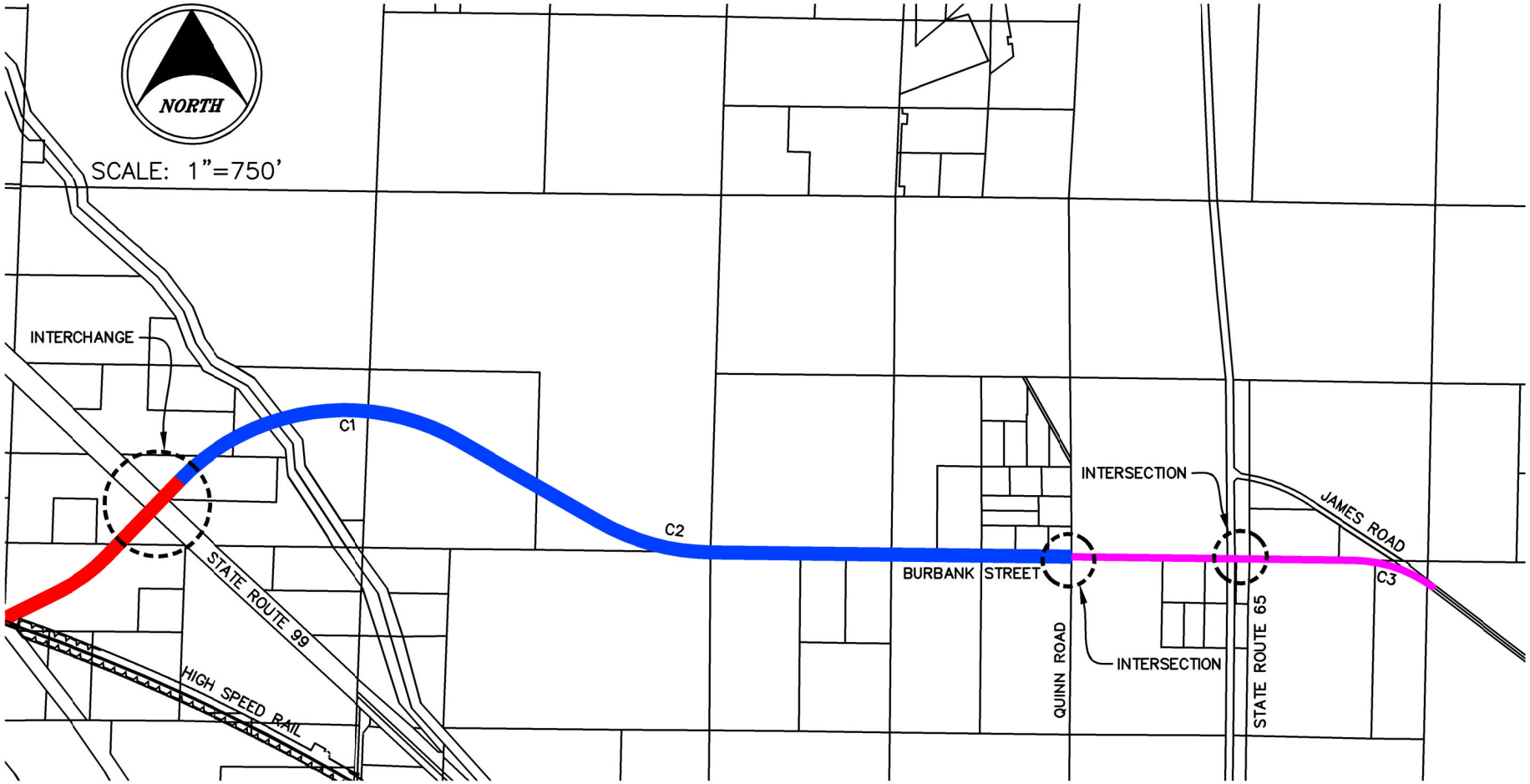
Kern Council of Governments — October 2020

Long Range Autonomous Freight Shuttle Service
200 mi. Autonomous Truck Shuttle to Central & North Valley with Potential Transfer Locations in Each County

JG Boswell Cotton
Av 120
California Dairies Inc
Major dairy processing facility for South SJV with hundreds of daily round trips to area dairies.
Walmart DC
DELANO
Famoso-Porterville Hwy
Halos/former UP refrigerated intermodal
16 dairies
Pond Rd
MCFARLAND
Whistler Rd
Planned truck stop
Industrial Pk
SunnyGem
WASCO
Famoso Rd
Famoso track
Kimberlina Rd
Merced Av
13 dairies
Riverside St
Amazon DC
BFL Intl Airport
1,100' runway
Wonderful Industrial Park/City of Shafter BNSF Container Yard Hub/ Walmart/Target/Ross DCs
SHAFTER
7th Standard Rd improvement needed
Lerdo Hwy
Buttonwillow Raceway Potential testing facility
Cal Center planned truck stop
Wonderful Nuts & Pistachios
Autonomous trailers transfer to trucks with drivers for connecting to all points West to US101 Salinas Valley Corridor
Autonomous trailers transfer to trucks with drivers or long range I-5 Autonomous Shuttles for Connecting to all points North or South
Autonomous trailers Transfer to trucks with drivers or potential UP rail service
Autonomous trailers transfer to trucks with drivers for Connecting to all points in Metro Bakersfield & air freight
BAKERSFIELD
Bolthouse
Edison Hwy
Kern Raceway potential testing facility
Autonomous trailers Transfer to trucks with drivers or potential BNSF rail service
Millux Rd
23 dairies
Grimmway
ARVIN
Truck Climbing/Passing Lanes & Interchange improvements needed
Arvin Corridor re-alignment improvement needed
Taft Industrial Pk
TAFT
Copus Rd
Cuties
MARICOPA
Autonomous trailers transfer to trucks with drivers for Connecting to all points South
Tejon Commerce Center Industrial Pk. & Truck Stops at base of Grapevine grade
Tehachapi Summit Truck Stops
TEHACHAPI
Mojave Space Port Private Sector Research Facility
Willow Springs Raceway potential testing facility
Rosamond Bv
China Lake Naval Air Weapons Station
RIDGECREST
Searles Stn Ctf
Garlock Rd
Redrock-Randsburg Rd
Honda Test Track
Neuralia Rd
CALIFORNIA CITY
Cal City Bv
Hyundai Test Track
Frntg. Rd needed
Off-Road Autonomous Haulers
Rio Tinto Borax Mine
Existing Daily BNSF Unit Train to Port of L.A.
Autonomous trailers transfer to trucks with drivers or existing rail for connecting to all points South and East
Existing BNSF Service to Port
Edwards AFB



Appendix F:: North Beltway Specific Plan Line



LEGEND

- CITY OF SHAFTER PROVIDED ALIGNMENT (210' R/W)
- COUNTY SPECIFIC PLAN LINE (210' R/W)
- COUNTY SPECIFIC PLAN LINE (110' R/W)

C1*	C2*	C3
Δ=76°13'11"	Δ=29°21'04"	Δ=36°53'01"
R=3400.00'	R=3400.00'	R=2000.00'
L=4522.97'	L=1741.73'	L=1289.49'
T=2666.89'	T=890.42'	T=666.94'

***DESIGN CRITERIA**

CURVES ARE DESIGNED PER CALTRANS HDM TABLE 202.2B WITH e% OF 4% AND DESIGN SPEED OF 70 MPH.

COUNTY OF KERN - PUBLIC WORKS DEPARTMENT

SCALE IN INCHES 0 1 2 3			
CALCULATED–DESIGNED BY	RRP	DRAFTED BY	RRP
CHECKED BY	JRC	DATE DRAFTED	10/08/20

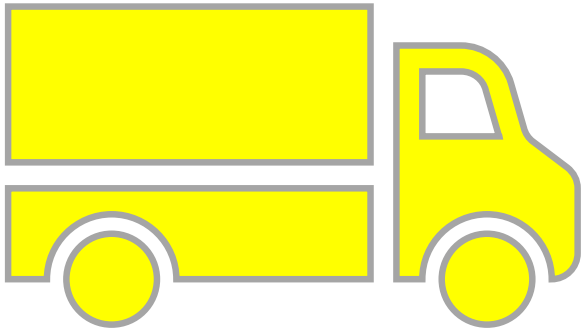
NORTH BELTWAY SPECIFIC PLAN LINE (ALTERNATE)

1

OF 1 SHEET

SCALE: 1"=750'

DWG FILE: k:\buildingdev\development review\development review\kerncog\kargo study\burbank alignment



Appendix G:: California Inland Port and Kern County

California Inland Port

Project Overview for the Kern County Council of Governments

Kern Council of Governments

Global Logistics Development Partners | GLDPartners | GLDPartners Mobility Solutions

August 24, 2020

GLDPARTNERS

California Inland Port and Kern County

Background

The California Inland Port is a proposed new cargo transportation system that would transit international cargos to and from the San Pedro seaports in Los Angeles for movement throughout California. Even over rather long distances, currently almost all containerized cargo moving through the State's seaports move via traditional manned heavy diesel truck to California destinations.

Given that the California consumer and industrial market is quite large, the Market Shed is over 1M containers (TEUs) annually and this creates a very large number of truck trips on state highways. This activity causes significant air quality issues and exasperates an already overtaxed highways system. The California Inland Port could have significant benefits to Kern County region businesses by providing cleaner and more supply chain-efficient transportation solutions for shippers. The project would yield lower costs for shippers and significant reductions in air emissions, while also reducing truck vehicle miles resulting in reduced congestion and road wear and tear.

Proposed Project

The proposed Inland Port system would transfer some portion of this cargo flow onto container rail service that would begin or be destined at the San Pedro Ports of Long Beach and Los Angeles. The Inland Port would include the creation of intermodal hubs in the Central Valley region to support onloading and offloading of cargo, which would become integrated logistics centers and investment hubs in areas of the State which would benefit by more efficient logistics connectivity to global markets. More efficient supply chain systems will create for increased competitiveness for areas of the State that have traditionally lagged economic performance of the Bay Area and Southern California regions.

Though the concept of containerized cargo rail service for the intra-California market is not new and has been discussed episodically for years, there has been little done to analyze and create a real-world operational model for a full-business system that takes advantage of the size and depth of the market. With the size and breadth of the California market shed, it becomes possible to realistically consider business model options.

Within the San Pedro ports complex the Port of Long Beach is readying a large-scale rail terminal to more efficiently manage the movement of inbound cargos via rail from both the Ports of Long Beach and Los Angeles. The Pier B project would create a streamlined system by connecting each of the terminals in the ports complex with one modern facility where trains could be efficiently assembled. This project can have the effect to enhance the economics of the inland port as the practice of shuttling rail cars between terminals would be reduced.

At the new intermodal hubs in the Central Valley, the vision is to extend the "end-to-end" logistics solution with extended clean transportation solutions between the intermodal facility and the shipper/warehouse. Each intermodal hub would be served by a fleet of clean propulsion system trucks that would travel short-to-medium travel distances to and from shipper locations. The hubs would be constructed with integrated clean energy fueling and charging for local trucks and also for long-haul trucks operating along CA99.

These intermodal hubs will be planned to serve localized high-volume cargo routes in a surrounding logistics district via automated cargo handling technology. The system would efficiently support the supply of large distribution facilities by automating a series of standardized truck routes that move cargo

from the intermodal complex to various industrial customers. The local land use plan and road system should be designed to enable an automated intermodal/industrial district.

Market Shed

The market shed for this intermodal rail service would include an area that begins in the south in Bakersfield and stretches north to include Sacramento and the Bay Area. This combined region represents a powerful market shed with the following key attributes: 1) a growing consumer market of over 14M consumers (which is larger than all but five US states), 2) a globally important export-oriented agriculture area, and 3) a sizable and growing industrial base with a market of over one billion square feet of combine industrial buildings.

Approximately 74% of all of the containerized cargo in this market shed currently moves through the Ports of Long Beach and Los Angeles so those ports are uniquely central to such a future transportation business model. As the intermodal model is shown to be viable, it would likely evolve to later include intermodal rail service to/from the Port of Oakland. By some margin, the Ports of Long Beach and Los Angeles are the busiest container ports in North America, and they represent the primary gateway for most goods into the US and California markets.

Shifting truck movements to rail can reduce the number of heavy trucks on I-5, SR 99, SR 101 and connecting routes, and will reduce criteria pollutants, fuel use and GHG emissions. To be successful, a rail logistics option must meet the needs of shippers in terms of reliability, transit time, shipment size, frequency, access, and cost. The intermodal service analyzed could provide a cost effective, viable transportation alternative to the existing single-mode (truck) transport system. There is an opportunity to develop the Central Valley as a nationally significant inland port, with seamless connectivity to key foreign markets.

Delivery Considerations

This is a complex project and likely won't occur without integrating key business and government "silos". These are the core issues that create the foundation for the project as it moves through the process of business risk analysis and operating and capital investment assessment.

- The current shipper market is quite large and is projected to grow substantially; the market is larger than most in the industry realized
- Across the whole of the system and Market Shed there are relatively balanced volumes for inbound and outbound cargos
- Due to the catchment areas serving the Bay Area, Sacramento and the northern Central Valley, the northern portion of the Market Shed is very large and will likely be fundamental to creating the unit volume/value to support an overall system
- The Preliminary Business Model suggests that a California inland port rail system can be feasible; but it is important to note that this is dependent on a range of critical factors and assumptions
- The PBM modelled scenarios that assessed one, two and three intermodal hubs, but the Developed Business Model (and active participation of the railroads) is required.
- The Inland Port will require substantial public policy leadership from State government, air quality districts, counties and cities and seaports; and will likely require a willingness between public and private interests to collaborate

If established, implementation of the inland port concept would support a spectrum of State and local region objectives, including a significant improvement in economic competitiveness, a substantial decrease in greenhouse gas emissions and a sizable reduction in highway congestion, particularly along

the CA99 corridor. Given the scale of California's market and geography, its westward orientation toward Asia through its seaports, the California Inland Port will become a nationally significant logistics and economic development project. More specifically, the CIPFA was undertaken with core objectives in mind:

1. To support new job creation and investment growth by fundamentally repositioning the economic competitiveness of the Central Valley region; with specific focus on high-value manufacturing sectors and a more robust and efficient distribution system; direct rail service to/from deep seaports would reduce shipping costs for shippers that manage global supply chains
2. To significantly reduce air pollution by reducing the number of truck trips from the seaports complex in the Los Angeles region to the Central Valley and the Bay Area
3. To reduce highway road congestion, with a parallel reduction in the requirement for road maintenance; this reducing cost and creating more capacity from existing infrastructure

Environmental Benefits

In the end, the Inland Port project would have a range of rather substantial economic and environmental impacts for markets and populations throughout the State. By taking a certain portion of trucks off the road from this region, significant emissions reductions can be realized. Based upon the analysis done for this study, NOx emissions would be reduced by up to 83% while greenhouse gas emissions would be reduced by up to 93%. Moving large quantities of freight via rail provides significant benefits to the air quality of the region, as shown by the emissions reduction analysis section of this report. Additionally, by taking some of these trucks off the road, congestion on key transportation corridors such as Highway 101 and 99 would be reduced, thereby improving the flow of traffic and the safety of the roadways in this region.

Kern County

For Kern County, the Inland Port would produce sizable environmental benefits by removing long-haul trucks from the highway system. This improvement would be the result of fewer origin/destination trucks to Kern County along CA99 as well as long-haul trucks that travel through the County on CA99 and I-5. The important corollary benefits for the region would be create a lower-cost and seamless logistics connection for existing shippers as well as improve the region's competitiveness for attracting new investment. region would enjoy the benefits of being an extension of the busiest deep-water seaports in North America, this creates a significant advantage in supporting new investment in regional and super-regional distribution, and also manufacturing.

If the Inland Port were to develop as a three-intermodal hub system, then it is likely that one of those hubs would be located in the Bakersfield/Shafter area. This would provide close-proximity access to new intermodal rail service – with a direct connection to and from the San Pedro seaports and it would be anticipated that there would be substantial cost benefits to inbound industrial supply chain and retail goods distribution, and also to outbound agriculture and other shippers. In this case, it would be vital to assure that the region's road system plan supported transportation to and from key industrial and distribution source points. In the case that there were only two intermodal hubs, it is possible that the most proximate hub would be near to, but north of the Bakersfield region. In this scenario, the region's road system would need to support truck traffic to this location. In either case, a robust internal roads plan is critical. The success of the intermodal operation will be dependent on efficient last-mile dray capability to and from the logistics hub and the origin or destination point. This would include a good road connection between CA99 and I-5 and within the expanding industrial zone.

Looking forward, for the success of the region and its intermodal potential, it would be a critical distinguishing factor if it could develop its road system plan as a strategic component of a future autonomous intermodal district. We project that within the next five years, there will be development of industrial districts that are purpose-built as high-efficiency logistics zones. These zones are built around a core road system that functions as the spine for autonomous/clean technologies moving cargo and equipment (empty containers) from warehouse to warehouse, and from intermodal hub to warehouse. GLDPartners is working with a number of companies now that are building the technology platform to operate such systems. This would require attention to two main areas: infrastructure/technology and road design. Regarding infrastructure/technology, the types of issues that will become important will include: road system traffic control technology, supporting telecommunications and cybersecurity protocols, and embedded electric infrastructure. In terms of road design, the sorts of issues that will be pertinent include road and lane widths, anticipation for the provision of electricity in/along key routes, etc.

Beyond the consideration of anticipating a future rail intermodal connection, the County could position itself and gain recognition as an early adopter for supporting autonomous trucks serving local shippers. In this regard, the region should assess the development of a truck mobility complex along one of its through highway routes. In the coming years, there will be an onslaught of autonomous trucking operating from point-to-point along highway routes. Without the ability for the heavy truck to navigate to a final urban destination away from the highway, it will be necessary to facilitate the safe and efficient hand-off the autonomous truck to a manned truck somewhere along the highway route. GLDPartners is presently working on several of these in non-California locations, where the truck mobility complex would serve as an integrated truck-to-truck hand off point but would also be a hub for technology maintenance and services. Developed as an integrated plan, the complex could also be the hub for an industrial real estate project, with adjacent and nearby uses that could take advantage of direct access to an autonomous truck route.

The target markets for transitioning cargo movement to rail will be shippers that: 1) transport large volumes of cargo, 2) require shipment services on a regular basis, 3) that operate supply chains that are very price sensitive, 4) that operate supply chains that are not extremely time sensitive, and 5) that might ship large or outsized cargos. These shippers will require to see a proven service before they will make a significant change to their supply chain system. Depending on the commodity, a truck-rail price differential will need to be enough to cause the move, with promised guarantees for several years. Shippers will be especially interested in the short-haul intermodal to shipper pricing structure, as a high cost could potentially offset the savings on the rail portion of the journey. Shorter distances from the intermodal may prove proportionally challenging, which is where an automated delivery solution could create a cost structure that supports the overall project.

Truck Technological Advancements and Regional Strategy

There are two primary technological advancements that are shaping the future of heavy cargo trucks. The first of these technologies relates to guidance systems, or a suite of skills that support semiautonomous or full autonomous driving. The second area of technological advancement concerns propulsion systems, generally this means electric motors supported by battery storage or hydrogen fuel cell systems. Alternative propulsion systems are commonly associated with clean transportation, zero emission or near zero emission vehicles.

In terms of autonomous guidance systems, there has been tremendous advancements in truck autonomy particularly over the past 5 or 6 years. Technology development is underway with OEMs, pure technology companies, trucking companies, and business model operating companies racing to perfect the integrated systems. Generally speaking, at this point the core technologies are fairly well developed with the main challenges now focused around refinement and integration of parallel technology systems. There has been a frenzy of innovation, capital expenditure and corporate partnerships with a good portion of product refinement and testing occurring in California. Testing and refinement is underway all over the US, on public roads and in secure private closed course environments.

There are still some remaining important hurdles for further refinement related to software systems. At this point, there are a range of firms developing this technology including OEMs (such as Daimler Trucks and PACCAR), technology firms (such as Luminar Technologies) and firms pursuing technology-driven operational business models (such as TuSimple, Einride and Outrider).

These and many other companies are undertaking closed course and public-road testing in locations across the US. At this point, all testing requires the presence of a safety driver or a human that monitors the operation of the vehicle. The industry generally believes that heavy trucks won't begin to operate with full autonomy for some years. We expect that over the next 3-8 years there will be some deployment of autonomous truck technology, largely operating on lightly trafficked intercity routes. In this case, the truck would stop only at designated hand-off points or truck mobility centers which will be located at urban periphery locations. In this situation, there would be a transfer to a manned truck for final delivery in the urban/suburban environment.

Beyond 8 years, there will be increasing deployment of partial and fully automated guidance systems, ultimately operating on door-to-door routes. Most industry leaders do not believe that there will be full door-to-door autonomy for at least 10 years, and possibly 15 years.

There is another dynamic in the automated truck world that requires attention for Kern County. There are a number of companies that are using off-the-shelf vehicle guidance technologies (optical cameras sensors and steering systems) and adapted to a new style truck delivery "pod". These pods are ground-up delivery vehicles that are purposely designed to support intra-company inventory management. These systems are meant to support automated transfer of cargo between company warehouse facilities. From our work with some of these companies, we believe that this technology application can be adapted to support intermodal facility cargo transfers to nearby warehouses. These systems are being actively marketed now, but we expect real-world deployment to begin in the next 2 or 3 years. There may be an opportunity for Kern County to consider how it might catalyze autonomous cargo movement within its industrial district(s) and to/from a future rail intermodal hub.

In terms of propulsion systems, there has been tremendous advancements in the areas of electric and hydrogens trucks, especially in the last 4 or 5 years. The speed and extent of deployment for both

alternative propulsion systems will be shaped by the ubiquity of charging or fueling networks. Electric powertrain development has paced hydrogen system development, but over the past two years there have been significant investments in R&D and scale-up production have been made in hydrogen trucks. A raft of electric powertrain cargo handling vehicles ready or are soon coming to market, with Daimler Trucks eCascadia products and Tesla (among others) now essentially commercially viable. Nikola, best known for its hydrogen powertrain development, has a pure electric powertrain that it is bringing to market in Europe this year with a new joint venture with IVECO in Ulm, Germany. There are also a range of lighter-duty electric trucks that are coming to market for mid-mile and last-mile delivery functions, with new entrants like Workhorse and Rivian producing large fleet orders for UPS and Amazon.

The California Fuel Cell Partnership has been working with an industry coalition of companies (e.g. Hyundai, Nikola, Shell, Air Liquide) to develop a corporate view of infrastructure deployment allowing connectivity of northern and southern, and to support larger-system networks connectivity to Nevada and Utah and to Arizona/New Mexico. GLDPartners has been involved with the CFCP in these developments, with California serving as the backbone to the system that would advance eastward across the country, with a horseshoe forming in the western states in its first years. From a technology production perspective and the realities of real-world deployment, Nikola Motor has recently issued an IPO and broken ground on two truck factories in Arizona and Germany. Most of the major heavy truck OEMs have been developing electric powertrain products and there has been significant advances in efficiency (range) and payload. Generally speaking, hydrogen technology is/will be seen by shippers as more viable for heavy loads and for long distance travel. Electric powertrains are more viable over short to mid-range distances and light to medium weight loads.