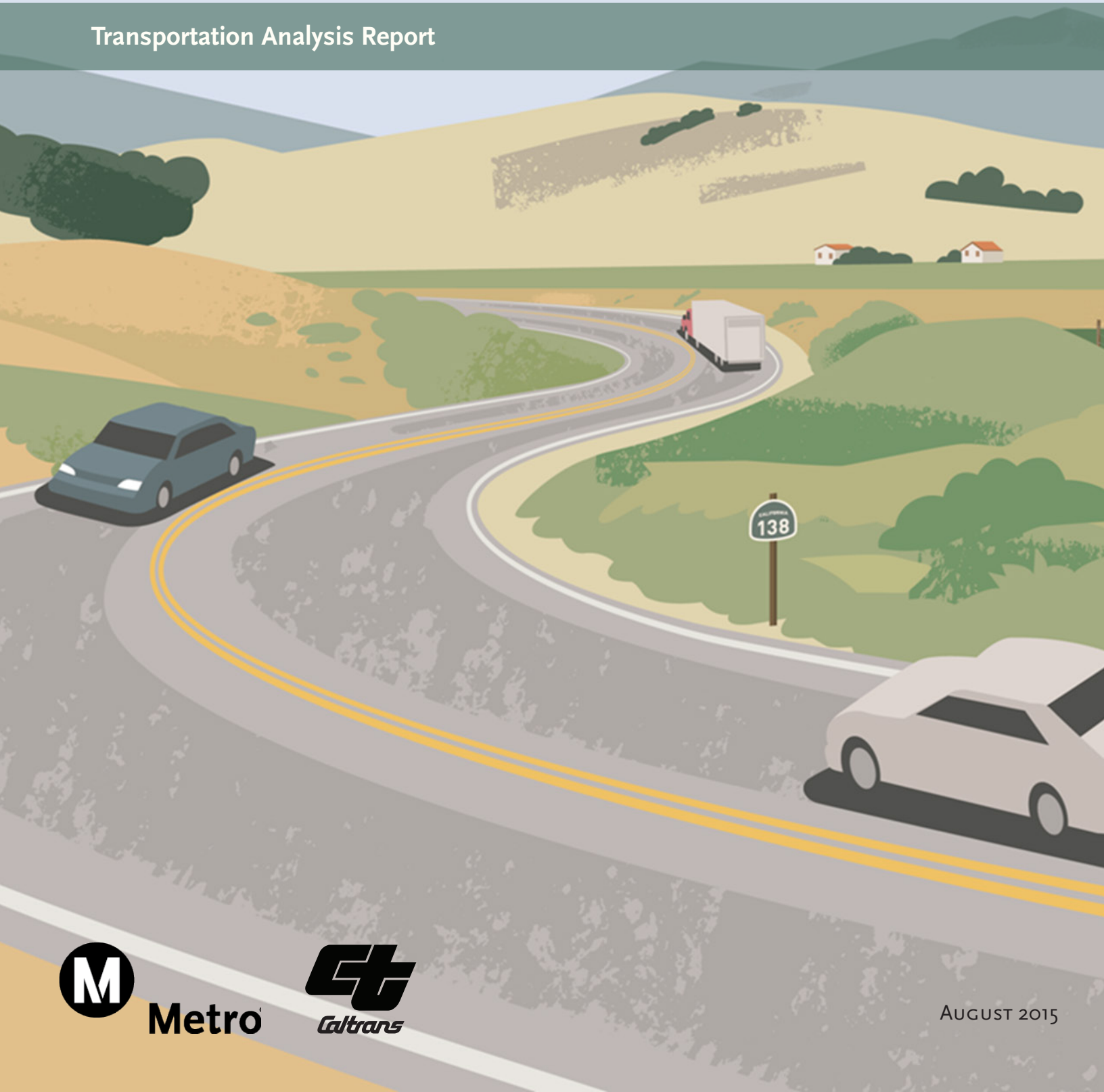
metro.net/nw138

Northwest 138 Corridor Improvement Project

Transportation Analysis Report



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1 Introduction

This transportation analysis report was prepared for the Northwest 138 Corridor Improvement Project. The report contains the results and findings of the traffic forecasts and traffic operation analysis, while the detailed analysis calculations are compiled in the Technical Appendix.

PURPOSE OF THE TRANSPORTATION ANALYSIS REPORT

The purpose of this report is to analyze project design alternatives and their effects on the highway transportation network. The report focuses on a comparison of alternatives that are each designed to improve future traffic operations and safety along the Northwest 138 corridor consistent with the purpose and need statement. Portions of the analysis results will also be used to comply with environmental impact analysis requirements for the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).

PROJECT BACKGROUND

The Northwest 138 Corridor Improvement Project consists of a 36-mile section of State Route 138 (SR-138) between Interstate 5 (I-5) and State Route 14 (SR-14). Situated in Antelope Valley in the northwest corner of Los Angeles County and just south of the Kern County border, the highway is the main east-west route connecting the I-5 to the Antelope Valley, Lancaster, Palmdale and other High Desert communities. This corridor is currently a 2-lane undivided highway and functions as a bypass for people and goods movement, as well as providing critical mobility for the Antelope Valley economy, which provides employment opportunities, such as space technology and alternative energy.

The Northwest 138 Corridor Improvement Project will expand on the previous North County combined Highway Corridor Study completed in 2004 to develop a multi-modal transportation plan for the northern portion of Los Angeles County to address both short and long-term needs for a variety of trip purposes and goods movement. To accommodate the potential for population and economic growth in the future, a variety of project alternatives have been developed to improve this portion of SR-138.

STUDY AREA

The study area is shown in Figure 1. For the purposes of producing traffic forecasts that reflect regional travel demands, the northern portion of Los Angeles County and southern portion of Kern County were included as part of the study vicinity. However, the traffic operations analysis and selected study locations are focused on SR-138 corridor from I-5 to SR-14.

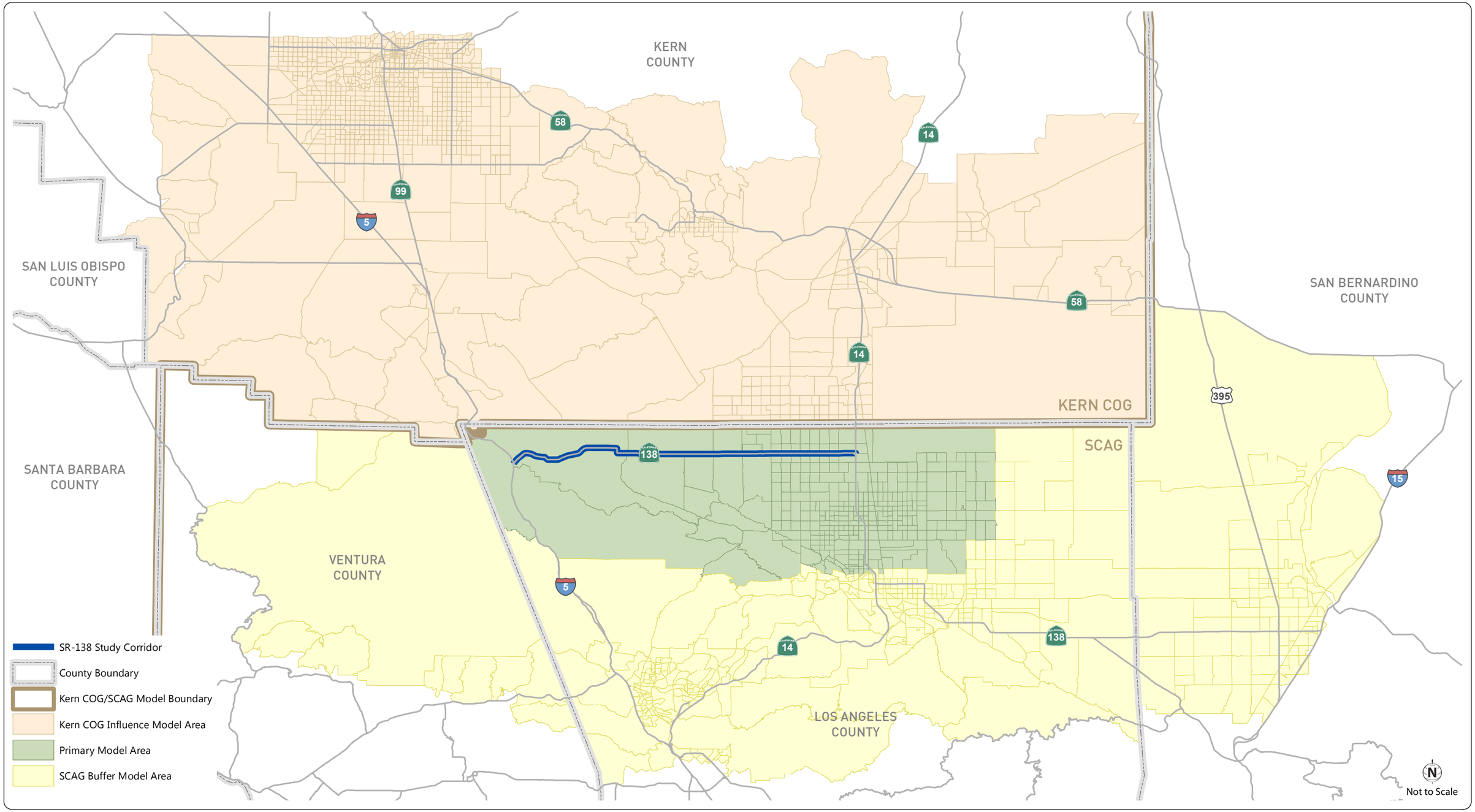

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Figure 1
Study Area

PROJECT DESCRIPTION

The California Department of Transportation (Caltrans), in cooperation with the Los Angeles County Metropolitan Transportation Authority (Metro), propose to widen and improve approximately 36.8 miles of State Route 138 (SR-138) between the Interstate 5 (I-5) interchange and the State Route 14 (SR-14) interchange.

The existing facility is a 2-lane highway that contributes to the local circulation network and provides an alternate route for east-west traffic in northwest (NW) Los Angeles County. The NW SR-138 Corridor Improvement Project (project) would widen SR-138 and provide operational and safety improvements. The project corridor spans east-west approximately 36.8 miles (Post Mile [PM] 0.0 to PM 36.8) in the NW portion of Los Angeles County, just south of the Kern County border.

This section describes the proposed action and the project alternatives that were developed to achieve the identified purpose and need of the project while avoiding or minimizing environmental impacts. The alternatives are the No Build Alternative, Alternative 1 (Freeway/Expressway) with or without a design option for a bypass around Antelope Acres, and Alternative 2 (Expressway/ Conventional Highway). SR-138 is an undivided 2-lane highway that travels from I-5 around the south side of Quail Lake and east to SR-14. SR-138 is not a controlled-access facility; access and egress points include at-grade intersections with paved and unpaved roads and driveways. The existing roadway consists of two 12-foot lanes with variable shoulders ranging from 2- to 4-foot paved to 8 foot unpaved non-standard shoulders.

The purpose of the project is to improve mobility and operations in northwest Los Angeles County, enhance safety within the SR-138 Corridor based on future projected traffic conditions, and accommodate foreseeable increases in travel and goods movement within northern Los Angeles County.

The need for the proposed project is derived from foreseeable increases in travel demand that would exceed the current capacity of SR-138 and higher than average state-wide fatal accident rates at several locations.

ALTERNATIVES

NO-BUILD ALTERNATIVE

Implementation of the No-Build Alternative would maintain the existing configuration of SR-138 and would not result in improvements to the route. However, additional residential, commercial, and interregional development is anticipated to occur in Antelope Valley in the future. With Los Angeles to the southeast and Bakersfield to the northwest, this area is poised for large-scale growth, which is anticipated to result in increased traffic demands beyond the capacity of the existing system (Caltrans, 2008).

The No-Build Alternative would not accommodate the projected population growth or expected substantial increase in goods movement truck traffic in Northern Los Angeles County and the existing corridor would not be improved. As discussed in the Project Study Report/ Project Development Study (PSR/PDS), the existing SR-138 corridor is projected to degrade and operate consistently at a Level of Service (LOS) E and F for 2040 conditions (Caltrans, 2008). The No-Build Alternative could result in indirect impacts on air quality, mobility, safety, and the economy within Northern Los Angeles County. There would be increased maintenance costs to maintain the route without any other improvements.

BUILD ALTERNATIVE 1 | Freeway - Expressway

Alternative 1 (Freeway/Expressway) would include a 6-lane freeway from the I-5 interchange connector ramps to County Road 300th Street West , and a 4-lane expressway from County Road 300th Street West to the SR-14 interchange generally following the existing alignment of SR-138. There would also be improvements to the I-5/SR-138 and SR-138/SR-14 freeway connections and structure over the SR-14. Study limits on I-5 are from PM 79.5 to PM 83.1 and on SR -14 the limits are from PM 73.4 to PM 74.4.

BUILD ALTERNATIVE 1 WITH DESIGN OPTION I Antelope Acres Bypass

There is a design option with this alternative to include a bypass route around the Antelope Acres community. This option was developed to reduce the impacts to the existing residences of Antelope Acres due to the proposed four-lane expressway along the existing alignment of SR-138. The alignment would bypass the community to the north along West Avenue C and going from west to east, the alignment would begin to deviate from the existing SR-138 near 100th Street West and continue in a northeasterly direction towards West Avenue C. After paralleling West Avenue C for approximately one mile, the alignment would continue in a southeasterly direction back towards the existing SR-138, and eventually join the existing SR-138 near 70th Street West. The existing highway would be relinquished to the County as a local roadway between 100th Street West and 70th Street West, with additional speed reduction measures proposed to reduce cut-through traffic.

BUILD ALTERNATIVE 2| Expressway – Conventional Highway

Alternative 2 (Expressway/Highway) would include a 6-lane freeway from the I-5 interchange connector ramps to Gorman Post Road, a 6-lane expressway from the Gorman Post Road interchange to County Road 300th Street West, a 4-lane expressway from 300th Street West to County Road 240th Street West, and a 4-lane limited access Conventional Highway from County Road 240th Street West to the SR-14 interchange, generally following the existing alignment of SR-138. There would also be improvements to the I-5/SR-138 and SR-138/SR-14 freeway connections and the structure over the SR-14. The study limits on these connectors would be the same as Alternative 1; on I-5 from PM 79.5 to PM 83.1 and on SR -14 the limits are from PM 73.4 to PM 74.4.

For Alternative 1 (with or without the Antelope Acres Bypass design option), and Alternative 2, new overcrossings would also be considered at various intersections with local roads including 60th Street West, 90th Street West, 110th Street West, 170th Street West, 190th Street West, 210th Street West, and Three Points Road to enhance traffic safety and improve local vehicular, pedestrian and bicycle circulation.

Note on the Transportation System Management (TSM) Alternative:

The TSM Alternative was developed to strategize improvements to the facility without major changes to the overall capacity. This alternative had improvements to the vertical and horizontal roadway alignment in areas that are currently non-standard, shoulder widening, localized improvements at accident locations, intersection improvements, and additional lanes to improve safety and traffic flow at focused areas. Upgrades to signage and lighting were also evaluated to improve safety and operations.

A TSM Alternative was proposed originally as a result of agency and public input during circulation of the Notice of Intent (NOI)/Notice of Preparation (NOP) in 2013 and subsequent public meetings.

The TSM Alternative was studied and evaluated in all of the technical studies for the proposed project but the TSM Alternative was not recommended for further analysis and it was ultimately rejected from further study because it did not fully address the project's purpose and need. For that reason, the TSM Alternative is included in this technical study analysis but not included in the project description seen above. Please refer to the NW SR-138 Draft EIR/EIS for more information on the TSM Alternative.

REPORT ORGANIZATION

The remainder of this report is divided into the following sections:

- **Chapter 2** – Traffic Analysis Methodology
- **Chapter 3** – Existing Conditions
- **Chapter 4** – Project Alternatives
- **Chapter 5** – Opening Year (2020/2025) Conditions
- **Chapter 6** – Design Year (2040) Conditions
- **Chapter 7** – Conclusions

2 Traffic Analysis Methodology

This chapter describes the methodologies used to develop traffic demand forecasts and analyze traffic operations as well as the evaluation criteria used to determine acceptable traffic operations.

TRAVEL DEMAND FORECASTING METHODOLOGY

The North County Sub-Area Travel Demand Forecasting Model was developed for use in the Northwest 138 Corridor Improvement Project. The North County Sub-Area Model reflects the socioeconomic projections and transportation network improvements contained in the Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan (RTP) and Kern Council of Governments (COG) RTP models. It also reflects local land use and roadway network details from the Enhanced Antelope Valley Transportation Analysis Model (EAVTAM). The *Northwest 138 Corridor Improvement Project - Final Model Development Report* was completed in May 2014 and approved by Caltrans and Metro (see Appendix A).

The sub-area model includes the northern portion of the County, including the Cities of Lancaster, Palmdale and Santa Clarita. The sub-area model also includes the southern portion of Kern County as contained in the latest version of the Kern COG model. The model contains the existing and planned highway system within the Project Area.

The following steps were taken to develop the North County Sub-Area Model:

1. Applied the SCAG regional model version 6.1 to generate a sub-area model platform; extracted the trip tables and roadway network for both base year and future year
2. Added detailed traffic analysis zone (TAZ) and network structure from EAVTAM for Palmdale and Lancaster
3. Joined Kern COG TAZ and network structure
4. Refined TAZ and network structure within LA County

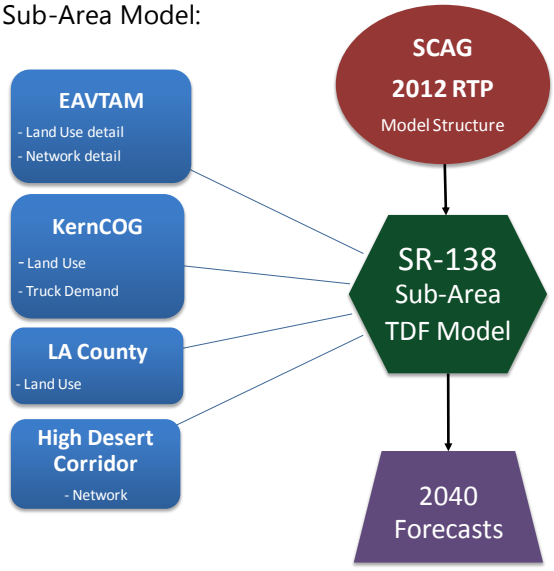

Figure 2 – Sub-Area Model Development

Figure 2 presents the modeling approach. Figure 3 presents the subarea model boundary and transportation network.

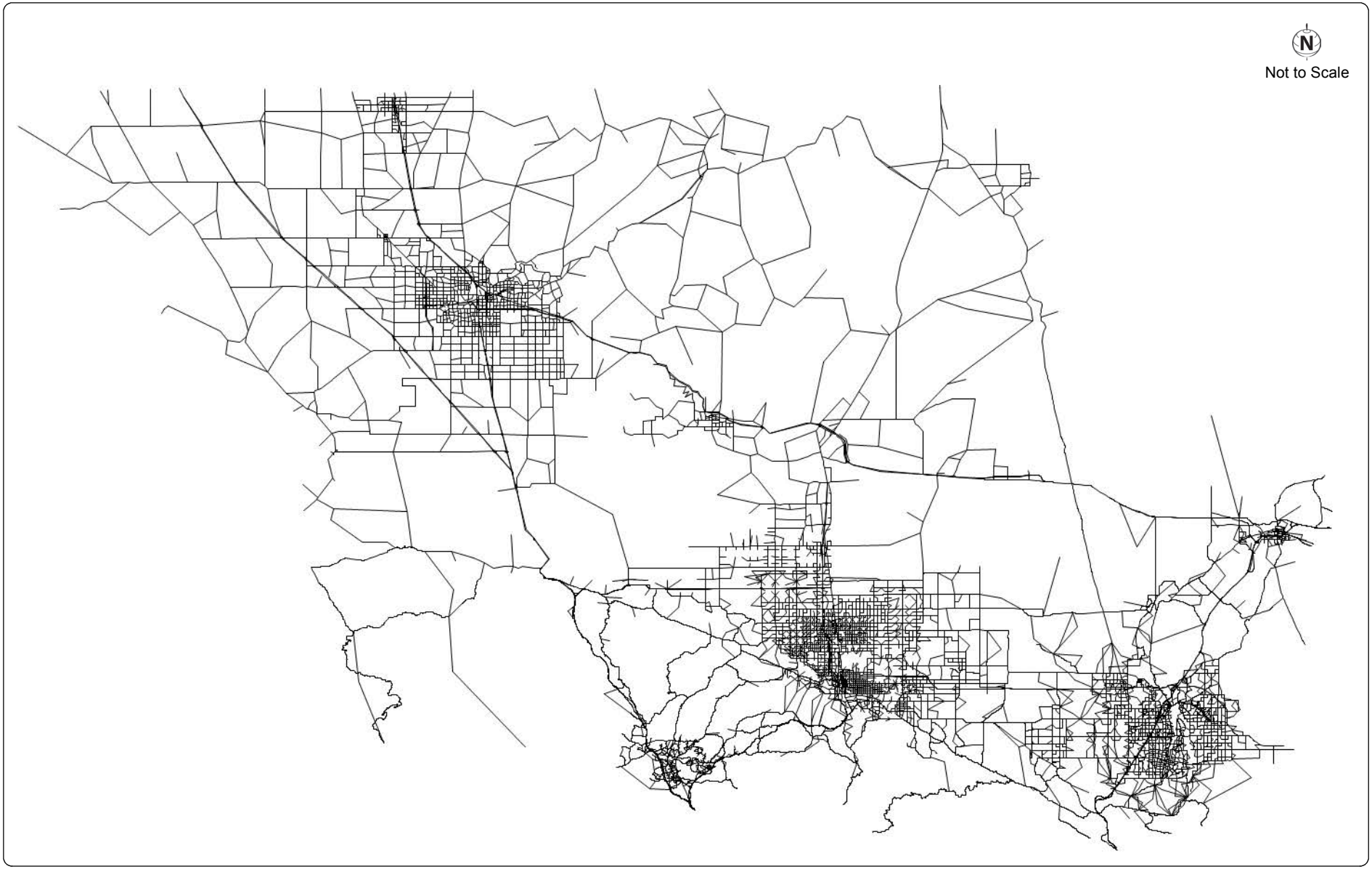

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Figure 3
SR-138 Subarea Network

The sub-area model was validated to the standards presented in the 2010 California Regional Transportation Plan Guidelines, produced by the California Transportation Commission. In addition to these criteria, the subarea model volume-to-count ratio was checked against a desired maximum threshold of no more than a 10 percent deviation. The model was validation to Year 2013 travel conditions. Table 1 shows the results of the model validation.

TABLE 1 - SUB-AREA MODEL VALIDATION

Statistical Measure	Criterion of Acceptance	Model Results		
		Daily	AM Peak Hour	PM Peak Hour
Model Deviation	Within + 10%	-5%	-3%	2%
Percent of Links with Volume-to-Count Ratios Within Caltrans Deviation Allowance	At Least 75%	87%	78%	78%
Correlation Coefficient	At Least 88%	98%	94%	95%
Percent Root Mean Square Error	40% or less	26%	36%	32%

Source: Fehr & Peers, 2014

Sub-Area Model Socio-Economic Data

Base year and future year socio-economic data was reviewed for both Los Angeles and Kern Counties, as summarized below.

SCAG Region

For the SCAG RTP model, there are two versions of growth projections: 1) the 2035 Baseline socioeconomic data, and 2) the 2035 Planning socioeconomic data. The former is based on incremental growth to the region, whereas the latter applies local and regional planning policies to project future land use and population. The Planning version was used in the sub-area model, as it provides a more realistic forecast of land use growth in the area in consideration of regional growth totals. The SCAG area includes unincorporated Los Angeles County land along the SR-138 corridor and the cities of Palmdale, Lancaster and Santa Clarita. Table 2 summarizes the land use growth in the SCAG RTP model within the study area. Land use by TAZ is contained in Attachment A.

TABLE 2 – SCAG LAND USE SUMMARY FOR SR-138 CORRIDOR STUDY AREA					
Lancaster					
Category	**Base Year**	**2035**	**Delta**	**% Growth**	**AGR[1]**
Population	155,648	206,658	51,010	32.8%	1.2%
Households	46,653	60,571	13,918	29.8%	1.1%
Employment	48,225	54,230	6,005	12.5%	0.5%
Palmdale					
Category	**Base Year**	**2035**	**Delta**	**% Growth**	**AGR**
Population	147,541	211,752	64,211	43.5%	1.6%
Households	41,401	60,425	19,024	46.0%	1.7%
Employment	34,580	48,989	14,409	41.7%	1.5%
LA County (within Study Area only)					
Category	**Base Year**	**2035**	**Delta**	**% Growth**	**AGR**
Population	112,824	198,689	85,865	76.1%	2.8%
Households	37,293	70,449	33,156	88.9%	3.3%
Employment	22,372	57,799	35,427	158.4%	5.9%
Santa Clarita					
Category	**Base Year**	**2035**	**Delta**	**% Growth**	**AGR**
Population	182,803	250,010	67,207	36.8%	1.4%
Households	61,446	85,975	24,529	39.9%	1.5%
Employment	93,011	122,079	29,068	31.3%	1.2%
Total					
Category	**Base Year**	**2035**	**Delta**	**% Growth**	**AGR**
Population	598,816	867,109	268,293	44.8%	1.7%
Households	186,793	277,420	90,627	48.5%	1.8%
Employment	198,188	283,097	84,909	42.8%	1.6%

Notes:
1. Annual Growth Rate – Linear

Source: Fehr & Peers, 2014

Kern COG Region

The study area within Kern County includes the Sierra Highway to the east, just west of I-5 to the west, Silver Queen Road and the Grapevine to the north, and the County line to the south. The Kern COG model forecasts an overall growth in the study area of 8,900 households (3.4% annual growth) and 15,500 jobs (11% annual growth). The majority of new jobs would be in the service industry. Table 3 summarizes the land use data adjacent to the study area in the Kern COG model.

TABLE 3 – KERN COG MODEL LAND USE SUMMARY					
Category	**2006**	**2035**	**Delta**	**% Growth**	**AGR[1]**
Population	22,212	50,287	28,075	126.4%	4.4%
Households	8,904	17,783	8,879	99.7%	3.4%
Retail Employment	563	2,687	2,124	377.3%	13.0%
Service Employment	1,481	14,513	13,032	879.9%	30.3%
Other Employment	2,853	3,162	309	10.8%	0.4%
Total Employment	4,897	20,362	15,465	315.8%	10.9%

Notes:
1. Annual Growth Rate - Linear

Source: Fehr & Peers, 2014

Sub-Area Model Transportation Network

The traffic volume forecasts are also influenced by modifications to the existing transportation network according to improvement projects anticipated to be constructed by the design year (2040). The SCAG and Kern COG models were compared for network improvements between the base and future years.

SCAG Network

The SCAG RTP model has three networks:

- Base Year Network
- 2035 Baseline Network – Includes all Near-Term Funded Projects
- 2035 Planning Network – Includes all Financially Constrained Projects to 2035

When comparing the base year network to the 2035 Baseline network, the following modifications were made in the study area (see Figure 4):

- Avenue G between 20th Street and 30th Street – widened from two to six lanes
- Avenue I between the SR-14 Southbound On-Ramp and SR-14 Northbound On-Ramp – widened from four to six lanes

The 2035 Baseline network was then compared to the 2035 Planning network. Both of these networks are considered financially constrained, with the difference being that the Baseline network only contains projects in the 6-year FTIP while the Planning network contains projects that are matched to reasonably available funding, with a detailed financial analysis being performed every few years.

In addition to the improvements contained in the 2035 Baseline network, the following roadway improvements are reflected in the 2035 Planning network:

- High Speed Rail – The 2035 Planning network reflects Phase I of the High Speed Rail project, extending from Anaheim into Kern County. In the model area, the High Speed Rail travels north-south between SR-14 and I-15. The High Speed Rail also travels south on SR-14 into Santa Clarita with a station in Palmdale.

- High Desert Corridor – New expressway route with limited access beginning at SR-14 and extending east into San Bernardino County. The High Desert Corridor would be a divided highway with three to four travel lanes in each direction.
- SR-138 between I-5 and SR-14 – Planned widening from a 2-lane full-access expressway route with at-grade crossings to a 6-lane limited-access expressway route with interchanges.
- Sierra Highway between SR-138 and Avenue E – Planned widening from a 2-lane full-access arterial to a 4-lane limited access expressway route (SR-138 extension/High Desert Corridor).
- Avenue E between Sierra Highway and 90th Street – Planned widening from a 2-lane full-access collector to a 4-lane limited access expressway route (SR-138 extension).
- 90th Street between Avenue E and Avenue L – Planned widening from a 2-lane full-access collector to a 4-lane limited access expressway route (SR-138 extension).
- I-5 between Ridge Route Road and SR-14 – Construction of an HOV lane in each direction.
- SR-14 between Avenue M and I-5 – Addition of an HOV lane in each direction.
- 30th Street between Avenue G and Avenue H – Planned widening from two to four lanes.

Figure 4 presents the network improvements in the SCAG RTP Model and includes HOV Lanes on SR 14 and I-5, the High Desert Corridor, and roadway widening projects in the Palmdale, Lancaster and Los Angeles County areas of the Antelope Valley.

Kern COG Network

North of the study area, in Bakersfield, there are four major roadway improvements, located on SR-58, SR-99 and the Westside Parkway, respectively:

- SR-58 will be widened between SR-99 and Fairfax Road from four to six lanes to eight lanes of mainline freeway. Additionally, one HOV lane in each direction will be constructed from SR-99 to SR-184. These improvements are located in Bakersfield.
- An HOV lane will be constructed in each direction of SR-99 from SR-119 to Merle Haggard Drive.
- Westside Parkway will be constructed east of SR-99 to SR-43. It will be a limited-access freeway with three to four mainline travel lanes and one HOV lane per direction.
- SR-43 will be improved from a 2-lane arterial roadway to a 4-lane divided highway with limited access.

The network improvements in the Kern COG Model are presented in Figure 4 and include HOV lanes on SR-99, widening of SR-58 from SR-184 to SR-99, and extension of SR-58 / Westside Parkway from Allen Road to SR-43. It should be noted that the Kern COG Model does not show SR-58 extended to I-5, and vehicles (cars and trucks) would continue to travel along 9.2 miles of rural highway to connect between I-5 and SR 58/Westside Parkway.

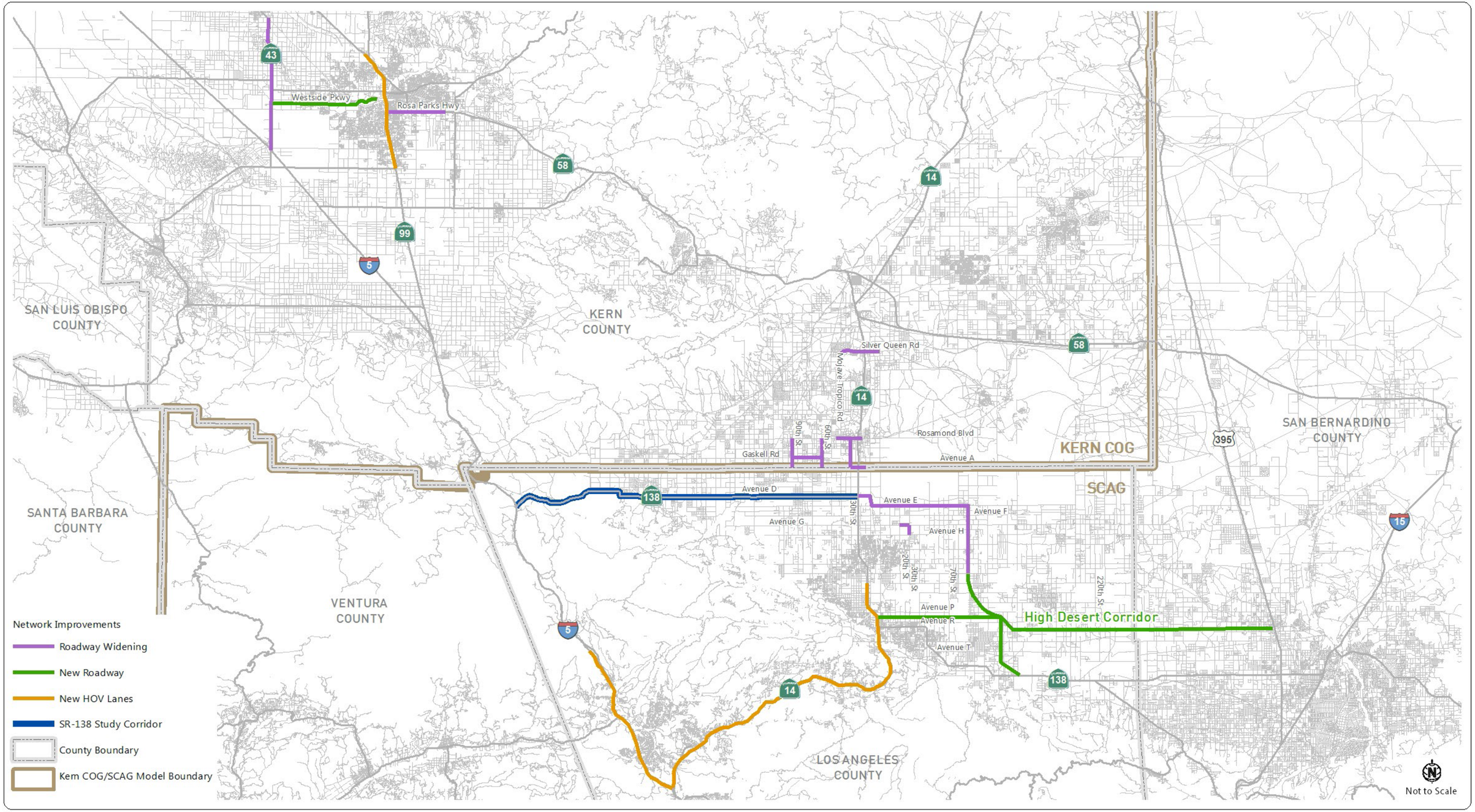

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Figure 4
Network Improvements in SCAG RTP and Kern COG Model Area

TRUCK TRAVEL

This section presents an inventory of relevant truck studies and data within the study area as well as a review of the SCAG Heavy Duty Truck (HDT) model. The HDT model estimates truck trip generation and distribution of the heavy duty trucks. The truck forecasts in the HDT model are integrated with the light and medium vehicles (autos) in the traffic assignment. The truck module in the SCAG regional model was used to forecast truck-trip demand in the SR-138 corridor.

Truck Studies, Reports and Data

The project team[1] compiled and reviewed goods movement studies and reports relevant to the study area as well as truck data in the study area. The collected reports and data were reviewed and used to evaluate the volume of truck traffic as well as its performance in the study area. Relevant documents and databases being reviewed are as follows:

1. 2008 North Los Angeles County Truck Study
2. 2011 Interstate 210 (I-210) Truck Origin and Destination Study
3. SR-58 Origin and Destination Truck Study
4. California Statewide Freight Forecasting Model (CSFFM)
5. Caltrans Weight-In-Motion Data
6. Caltrans Truck Count Book
7. Collection of additional vehicle classification counts in the study area

The inventory of truck studies and data were summarized by data source, data attributes, coverage, and data collection methodology. The complied data was then evaluated for usefulness, compatibility, and applicability for this study.

HDT Model Review

The SCAG RTP model includes a separate set of procedures for forecasting (HDT traffic, which is comprised of three major components:

- **Internal HDT Model** – The internal HDT model consist of trip generation and trip distribution of intra-regional truck trips using procedures similar to those used to generate and distribute person trips. The HDT model forecasts heavy duty trucks in the following three Gross Vehicle Weight (GVW) categories:
    - Light-Heavy (LH) duty trucks (8,500 to 14,000 lbs. Gross Vehicle Weight)

[1] AFSHA Consulting, Inc. has provided the background truck information for use in this report.

- Medium-Heavy (MH) duty trucks (14,001 to 33,000 lbs. Gross Vehicle Weight)
- Heavy-Heavy (HH) duty trucks (more than 33,000 lbs. Gross Vehicle Weight)

- **External HDT Model** – The external HDT model incorporates trip generation and trip distribution of inter-regional truck trips based on commodity flow data. The model uses various factors developed from published and survey data to estimate daily truck trips from the annual tonnage flows.
- **Special Generators** – The HDT model special generators are as follows:
  - Ports of Long Beach and Los Angeles Truck Trips – The port truck trips are generated based on the Ports Transportation Analysis Model (PortsTAM).
  - Airport Truck Trips – The airport truck trips are generated by the SCAG aviation model for the LH, MH and HH duty trucks for all airports within the SCAG region. The airport truck trip tables are added to the regional heavy duty truck trip tables prior to the traffic assignment.

The HDT trips are combined with the auto trip matrices and assigned in a multi-vehicle class traffic assignment. The traffic assignment results are reported for six vehicle classes:

- Drive alone autos
- Shared ride (2 occupants) autos
- Shared ride (3+ occupants) autos
- Light heavy-duty trucks
- Medium heavy-duty trucks
- Heavy heavy-duty trucks

Since heavy duty trucks are prohibited along some roadways, truck prohibitions are incorporated in the model by using the "Truck Prohibition Flag" in the highway network. The truck prohibition flag are as follows:

- 0 - Trucks are not prohibited
- 1 - Trucks are prohibited

OPERATIONS ANALYSIS METHODOLOGY

The traffic operations analysis for the proposed project addresses intersection and highway operations. The intersection operations analyses were conducted using procedures and methodologies consistent with the Highway Capacity Manual (HCM) 2010 (Transportation Research Board, 2010). Highway facilities were also analyzed using HCM 2010 procedures and methodologies. The intersection methodology was applied using the Synchro 8 traffic analysis software, and the highway analysis was completed using Highway Capacity Software 2010 (HCS 2010).

The analysis results include a descriptive term known as level of service (LOS). LOS is a measure of traffic operating conditions from a driver's perspective, which varies from LOS A (the best) to LOS F (the worst). Table 4 describes the LOS thresholds from the HCM 2010 for intersections.

TABLE 4 - INTERSECTION LOS THRESHOLDS

LOS	Average Delay		Description
	Signalized	Unsignalized	
A	< 10	< 10	Very low delay occurs with favorable progression and/or short cycle length.
B	> 10 to 20	> 10 to 15	Low delay occurs with good progression and/or short cycle lengths.
C	> 20 to 35	> 15 to 25	Average delays result from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.
D	> 35 to 55	> 25 to 35	Longer delays occur due to a combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop and individual cycle failures are noticeable.
E	> 55 to 80	> 35 to 50	High delay values indicate poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.
F	> 80	> 50	Delays are unacceptable to most drivers due to over-saturation, poor progression, or very long cycle lengths.

Note: Average delay is reported in seconds per vehicle.

As defined in the 2010 HCM, the LOS for Class I 2-lane highways is based on average vehicle travel speeds (ATS) and delays due to passing restrictions (PTSF) as defined below:

- ***ATS*** reflects vehicle mobility on a 2-lane highway, and is defined by the highway segment length divided by the average vehicle travel time.
- ***PTSF*** represents the freedom of vehicles to maneuver and comfort of travel, and is defined by the average percentage of time that vehicles are traveling in platoons behind slower vehicles with the inability to pass. The measurement is based on the percentage of vehicles traveling at headways of less than 3.0 along a designated highway segment.

Table 5 presents the LOS thresholds and descriptions for Class I two-lane highways.

TABLE 5 - TWO-LANE HIGHWAY LOS THRESHOLDS

LOS	Class I Highways		Description
	ATS (mi/h)	PTSF (%)	
A	> 55	< 35	Motorists experience high operating speeds with little difficulty in passing.
B	> 50 to 55	> 35 to 50	Passing demand and passing capacity are balanced. The degree of platooning becomes noticeable and some speed reductions occur.
C	> 45 to 50	> 50 to 65	Most vehicles are traveling in platoons with speeds noticeably curtailed.
D	> 40 to 45	> 65 to 80	Platooning increases significantly. Passing demand is high but passing capacity approaches zero with a high percentage of vehicles traveling in platoons.
E	< 40	> 80	Demand is approaching capacity with passing virtually impossible and speeds seriously curtailed. At LOS F, demand flow in one or both directions exceeds the capacity of the segment.

Source: 2010 HCM definitions for 2-lane Highways.

Table 6 describes the LOS thresholds for freeway sections identified in the HCM. The I-5 & SR-138 interchange and ramp junction analysis was applied to the No Build and Build Alternatives. The peak-hour density calculations provided for the SR-138 & I-5 interchange are consistent with the definitions from the HCM, which defines the following freeway section types:

- Merge and diverge sections, which refer to the freeway ramp junctions, are defined as the section of the freeway 1,500 feet downstream of an on-ramp and upstream of an off-ramp, respectively. The density is measured over the two adjacent freeway through lanes plus any auxiliary lanes.
- Basic freeway sections include all other freeway sections that are not included in a merge, diverge, or weaving section. The densities at weaving and basic sections are measured across all mixed-flow freeway lanes (including both through lanes and auxiliary lanes).

To provide a thorough analysis of the ramp connections between I-5 and SR-138, a microsimulation model of the interchange under design year conditions was developed using the VISSIM software package. The VISSIM model was developed to simulate Year 2040 travel demands at the interchange during the AM and PM peak hours. VISSIM considers the interaction between vehicles traveling to/from SR-138 as they merge/diverge with vehicles traveling on the I-5 mainline.

TABLE 6 - FREEWAY MAINLINE AND RAMP JUNCTION/WEAVE SECTION LOS THRESHOLDS			
Level of Service	**Description**	**Density (pc/mi/ln)[1]**	
		Mainline (Basic)	**Ramp Merge/ Diverge**
A	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	< 11	< 10
B	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted.	> 11 to 18	> 10 to 20
C	Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	> 18 to 26	> 20 to 28
D	Speeds decline slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort.	> 26 to 35	> 28 to 35
E	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing.	> 35 to 45	> 35 to 45[2]
F	Represents a breakdown in flow.	> 45	> 45[2]

Notes:

1. Density is reported in passenger cars per mile per lane.
2. The maximum density for ramp junctions and weaving sections under LOS E is not defined in the HCM. The maximum density for basic segments of 45 vplpm was assumed to apply to ramp junctions and weaving sections.

Source: Highway Capacity Manual (Transportation Research Board, 2010).

Table 7 presents the LOS thresholds and descriptions for multilane highways. The LOS for multilane highways is based on vehicle density, which is defined as the proximity of vehicles to each other along the facility. Since LOS A through D represent multilane uninterrupted traffic flows, the criteria for multilane highways are the same as for basic freeway segments. However, LOS E and F thresholds vary based upon the free-flow speed along the corridor. This methodology was applied to the multilane highway and expressway segments as described under the build alternatives analysis.

The peak-hour density calculations provided in this report are consistent with the definitions from the HCM, which defines four freeway section types: merge, diverge, weave, and basic. Merge and diverge sections, which refer to the freeway ramp junctions, are defined as the section of the freeway 1,500 feet downstream of an on-ramp and upstream of an off-ramp, respectively. The density is measured over the two adjacent freeway through lanes plus any auxiliary lanes. A weaving section occurs between a successive on-ramp and off-ramp pair connected by an auxiliary lane, and the maximum weaving distance between the ramps is no longer a fixed distance but determined by the weaving/total volumes and number of weaving lanes in the HCM 2010. Basic freeway sections include all other freeway sections that are not included in a merge, diverge, or weaving section. The densities at weaving and basic sections are measured across all mixed-flow freeway lanes (including both through lanes and auxiliary lanes).

TABLE 7 - MULTILANE HIGHWAY LOS THRESHOLDS			
Level of Service	**Description**	**FFS (mi/hr)[1]**	**Density (pc/mi/ln)[2]**
A	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	All	< 11
B	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted.	All	> 11 to 18
C	Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	All	> 18 to 26
D	Speeds decline slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort.	All	> 26 to 35
E	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing.	60 55 50 45	> 35 to 40 > 35 to 41 > 35 to 43 > 35 to 45
F	Represents a breakdown in flow.	60 55 50 45	> 40 > 41 > 43 > 45

Notes:

1. FFS = Free flow speed.
2. Density is reported in passenger cars per mile per lane.
3. LOS F is defined as demand flow rate exceeding capacity; while the thresholds shown will be exceeded under LOS F conditions, the HCM does not produce a specific value for densities at LOS F.

Source: Highway Capacity Manual (Transportation Research Board, 2010).

ANALYSIS EVALUATION CRITERIA

The analysis evaluation criteria described below were used to determine acceptable traffic operating conditions and are based on the level of service policies identified by Caltrans.

A *Transportation Concept Report* (TCR, formerly the Route Concept Report) for SR-138 was prepared by Caltrans and approved in June 2014. To maintain an acceptable level of service through 2035, the TCR recommends adding two mixed-flow lanes in each direction to SR-138 between I-5 and SR-14. This is consistent with the planned improvements identified in the 2012-2035 Regional Transportation Plan/ Sustainable Communities Strategy (RTP/SCS).

Caltrans strives to have freeway facilities operate at a level of service between C and D. Therefore, LOS D was used as the threshold for freeway facilities analysis. Any future LOS on freeway facilities that are projected to operate at unacceptable LOS (worse than LOS D) needs to be mitigated. Per Caltrans guidance, an impact to freeway facilities would be considered significant if either of the following occurs:

- Project would cause the LOS of the freeway facilities to degrade from LOS D (or better) to LOS E or LOS F
- Project would worsen operations at a facility that is already operating at an unacceptable LOS E or LOS F

3 Existing Conditions

This chapter provides an overview of the study locations, data collection, existing operations along the SR-138 corridor and collision history.

STUDY LOCATIONS

The project study corridor consists of SR-138 from I-5 to SR-14. For data collection purposes, 21 intersections and 14 roadway segments (including freeway mainlines and connector ramps) were identified as study count locations as shown on Figure 5. As shown in Table 8, the majority of the study intersections were included in the Project Study Report (PSR) for SR-138 in 2007. Additional intersection locations were added based on their proximity to active land uses. Table 8 presents the study roadway segment locations.

TABLE 8 – STUDY INTERSECTIONS

Intersection	Status
1. Hwy 138 & Gorman Post Road	Studied in PSR; Continue to Include
2. Hwy 138 & Old Ridge Route Rd	Studied in PSR; Continue to Include
3. Hwy 138 & Private Rd	Studied in PSR; Continue to Include
4. Hwy 138 & 300th St W	Studied in PSR; Continue to Include
5. Hwy 138 & Margalo Dr	Not Studied in PSR; Include in Study
6. Hwy 138 & 280th St W	Not Studied in PSR; Include in Study
7. Hwy 138 & 3 Points Rd	Studied in PSR; Continue to Include
8. Hwy 138 & La Petite Ave	Studied in PSR; Continue to Include
9. Hwy 138 & 230th St W	Studied in PSR; Continue to Include
10. Hwy 138 & 210th St W	Studied in PSR; Continue to Include
11. Hwy 138 & 190th St W	Studied in PSR; Continue to Include
12. Hwy 138 & 170th St W	Studied in PSR; Continue to Include
13. Hwy 138 & 110th St W	Studied in PSR; Continue to Include
14. Hwy 138 & 90th St W	Studied in PSR; Continue to Include
15. Hwy 138 & 85th St W	Not Studied in PSR; Include in Study
16. Hwy 138 & 80th St W	Studied in PSR; Continue to Include
17. Hwy 138 & 70th St W	Studied in PSR; Continue to Include
18. Hwy 138 & 60th St W	Studied in PSR; Continue to Include
19. Hwy 138 & 30th St W	Studied in PSR; Continue to Include
20. Hwy 138 & Hwy 14 SB Off-Ramp	Studied in PSR; Continue to Include
21. Hwy 138 & Hwy 14 NB Off-Ramp	Studied in PSR; Continue to Include

The study roadway segments are presented in Table 9.

TABLE 9 – STUDY ROADWAY SEGMENTS

ID	Segment
I-5	
1	Connector from I-5 SB to SR-138
2	Connector from I-5 NB to SR-138
SR-138/Lancaster Road	
3	Connector from SR-138 to I-5 SB
4	Connector from SR-138 to I-5 NB
5	East of Gorman Post Road
6	Between Gorman Post Road and Old Ridge Route
7	Between Old Ridge Route and 300th Street
SR-138/W Avenue C-6	
8	Between 280th Street and 270th Street
SR-138/270th Street W	
9	Between Three Points Road and 245th Street W
SR-138/W Avenue D	
10	Between 230th Street W and 190th Street W
11	Between 190th Street W and 130th Street W
12	Between 130th Street W and 80th Street W
13	Between 80th Street W and 30th Street W
14	East of SR-14

LEGEND

- SR-138 Study Intersection
- SR-138 Study Intersection (previously studied in PSR)
- Previously Studied in PSR
- Study Segments
- Study Corridor

N

Not to Scale

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SR-138 COUNT LOCATIONS

FIGURE 5

DATA COLLECTION

Within the study corridor, empirical data was collected at the intersection and roadway segment level. This includes manual intersection turning movement counts and daily roadway segment counts, classified by vehicle type. Speed data was also collected for the study area.

The four main sources of traffic data are presented below:

- **Manual Intersection Turning Movement Counts** – Turning movements at study intersections during the AM and PM peak periods, reported in 15-minute increments.
- **Roadway Segment Counts** – Tube counts for each roadway segment to capture daily traffic volumes and vehicle classification.
- **PeMS Data** – PeMS is the Freeway Performance Measurement System, which collects, filters, processes, aggregates and examines traffic data for major facilities throughout California. PeMS data is collected and processed by Caltrans using raw freeway detector data. PeMS data can be accessed for a specific day, a series of time, or time of day.
- **Inrix Data** – Inrix aggregates data from multiple sources into a package of data focused on travel speeds. Data is collected from road sensors, traffic incident data, GPS data (such as smartphone probes), user generated content, and traffic cameras. Inrix prepares both real-time traffic data and historical traffic data.

Preliminary Traffic Counts

As part of the data collection effort, an initial set of daily traffic counts along the SR-138 corridor was collected to determine the typical peak hours of traffic flow prior to the collection of peak hour intersection turning movement counts. Daily classified traffic counts were collected along four segments of SR-138 on Tuesday, August 13, 2013. Traffic counts were reported in 15-minute increments throughout the day. The four counts were collected at various points along the SR-138 corridor to obtain peak period trends. The data collection points were:

- SR-138 between Gorman Post Road and Old Ridge Road
- SR-138 between 280th Street and 270th Street
- SR-138 between 230th Street and 190th Street
- SR-138 between 80th Street and 38th Street

Figure 6 identifies the sum of all vehicles counted at the four locations. Because SR-138 is a major corridor with little development, many of the vehicles counted at one segment may have been counted again at another segment along the route. As shown in Figure 6, the highest vehicular volume occurs in the afternoon around 3:30 PM followed by the morning peak of approximately 6:00 AM. As illustrated in this figure, there is a drop in vehicular volumes during the midday, with the lowest daytime volumes occurring between 11:00 AM and 12 noon.

Figure 6
Daily Traffic Flows on SR-138

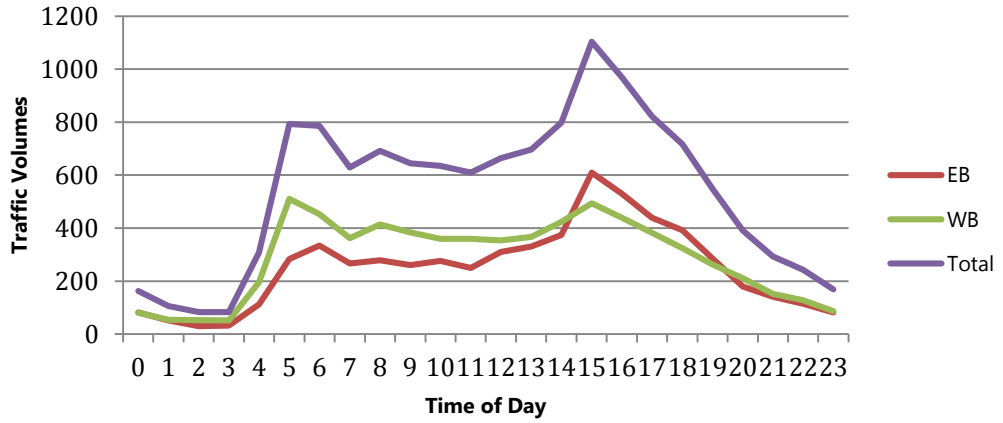


Figure 7 - Traffic Flows on SR-138 between Gorman Post Rd and Old Ridge Rd

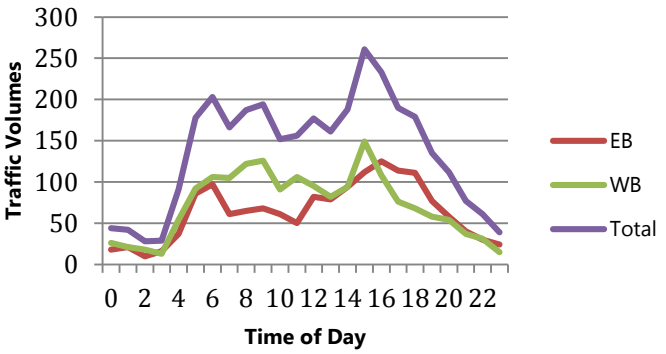
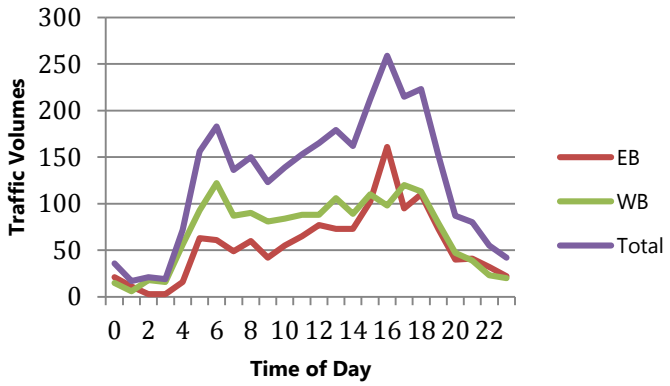


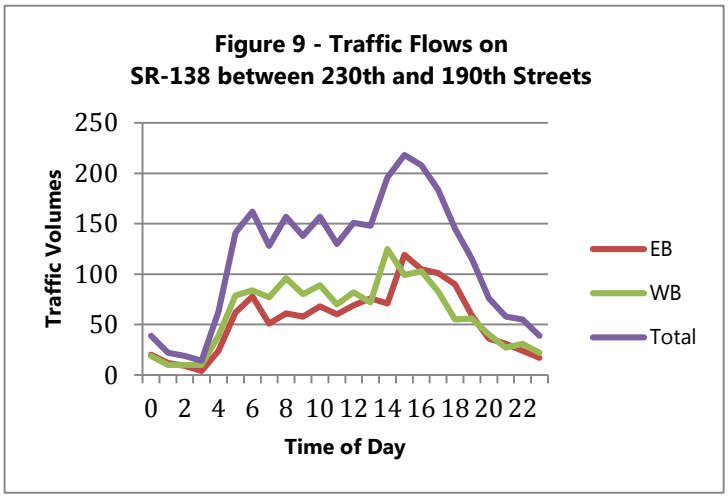
Figure 8 - Traffic Flows on SR-138 between 280th and 270th Streets

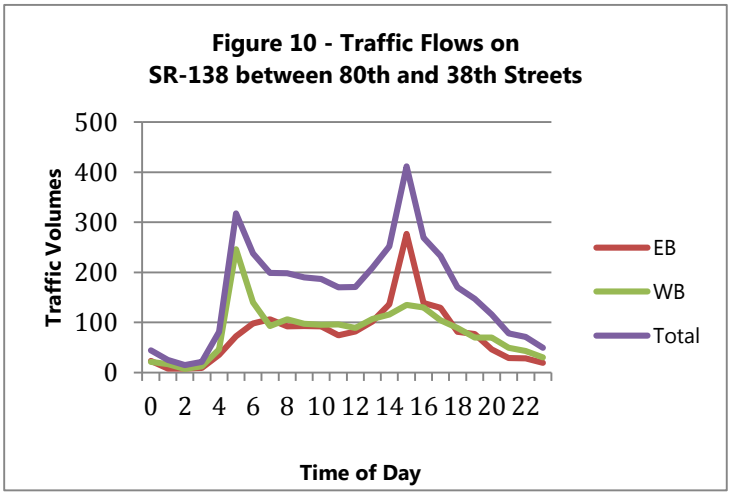


Figures 7 through 10 show the travel characteristics of each roadway segment. In all four segments, there is a distinct peak between 3:30 and 5:30 PM. The morning peak tends to be slightly earlier than the traditional morning peak period, but is still within the range of the SCAG model's AM peak period assignment (6:00 to 9:00 AM). As shown in the figures, there is a noticeable drop in traffic volumes during the mid-day.

Based on the initial data collection effort, the AM and PM peak periods reflect the highest levels of travel throughout the day and a mid-day peak does not occur along the corridor. As such, the turning movement volumes and peak period analyses were limited to the AM and PM peak periods with traffic counts collected as follows:

- 6:30 to 8:30 AM during the morning commute period
- 3:30 to 5:30 PM during the afternoon commute period





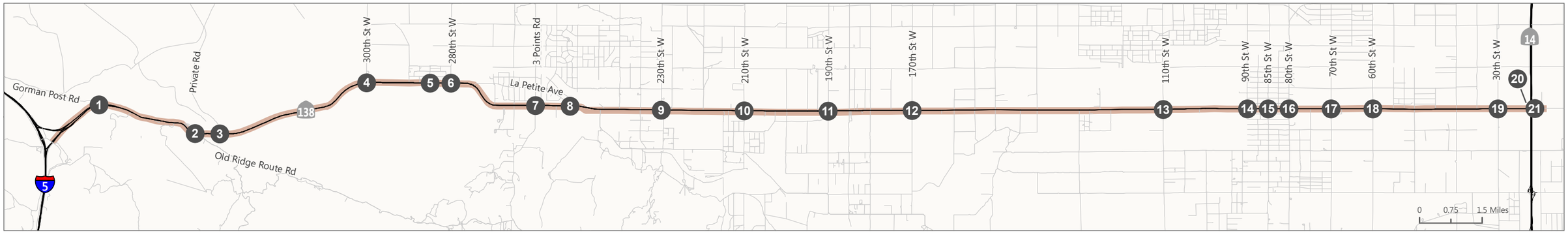
Project Traffic Counts

Traffic counts for the study intersections and roadway segments were collected in December 2013. The traffic counts were collected on a Tuesday, Wednesday or Thursday during the first two weeks of the month to avoid fluctuations in travel patterns due to the holidays. The data collection effort was delayed until early December due to construction activity on I-5 in the vicinity of its junction with SR-138.

Due to the seasonal variation in traffic flows along the SR-138 corridor and the recent construction activities in the area, the December 2013 traffic counts were increased by 25 percent. The seasonal adjustment was based on a detailed review of PeMS data (http://pems.dot.ca.gov) that compared December traffic counts to August traffic flows, which reflect the peak month of travel in the area. The PeMS data review indicated a seasonal variation ranging between 20 to 25 percent during off-peak hours and 5 to 10 percent during peak hours. To ensure that the existing counts were not underrepresenting current demand, the 25 percent adjustment was applied to both the daily and peak hour traffic counts.

In order to analyze peak month traffic conditions and validate the Northwest SR-138 Sub-Area model, a 25 percent adjustment factor was applied to the December 2013 counts to develop peak month (August) traffic volumes. Therefore, the peak hour traffic volumes that will be used in the traffic operations analyses for Existing, Construction and Design Year AM and PM peak hour conditions represent peak month (August) traffic volumes. This will ensure that the proposed design and corresponding level of service analysis are consistent with Caltrans 30th Highest Design Hour criteria for infrastructure projects. For the roadway segment volumes, the 25 percent increase was applied to the average daily traffic count recorded. For the intersection turning movement volumes, the 25 percent increase was only applied to through traffic along the SR-138 corridor since local traffic generation is not as affected by seasonal variations.

The AM and PM peak hour turning movement volumes for the 21 study intersections are displayed on Figure 11. These volumes reflect the 25 percent adjustment to through vehicular movements along the SR-138 corridor and were used to calculate existing traffic operations as explained in Chapter 3. Figure 12 displays the I-5 & SR-138 interchange volumes. Figure 13 displays the roadway segment daily traffic volumes. Appendix B contains the raw count sheets (prior to the seasonal adjustment factor).



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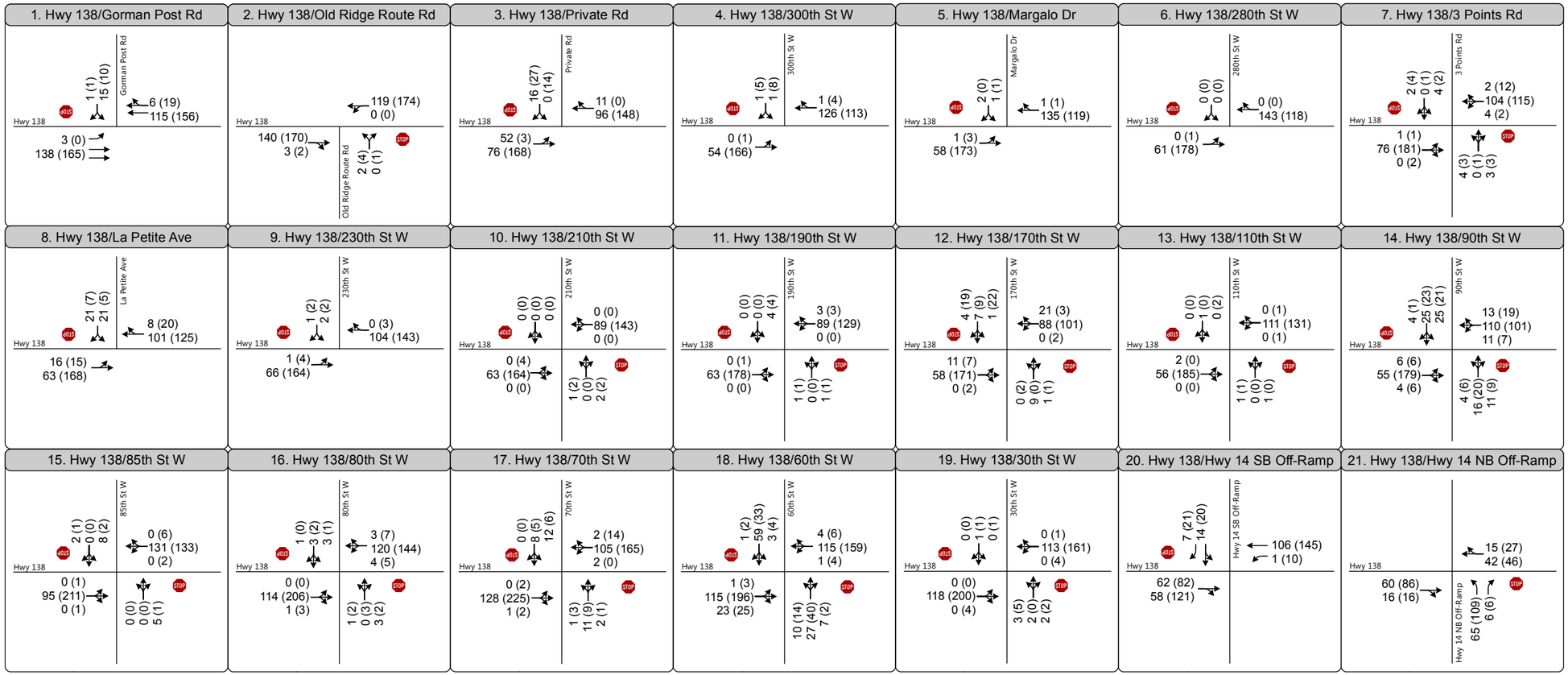

LEGEND

1 Study Intersection

Study Corridor

Turn Lane

AM (PM) Peak Hour Traffic Volume

STOP Stop Sign

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Peak Hour Traffic Volumes And Lane Configurations- Existing Conditions

FIGURE 11

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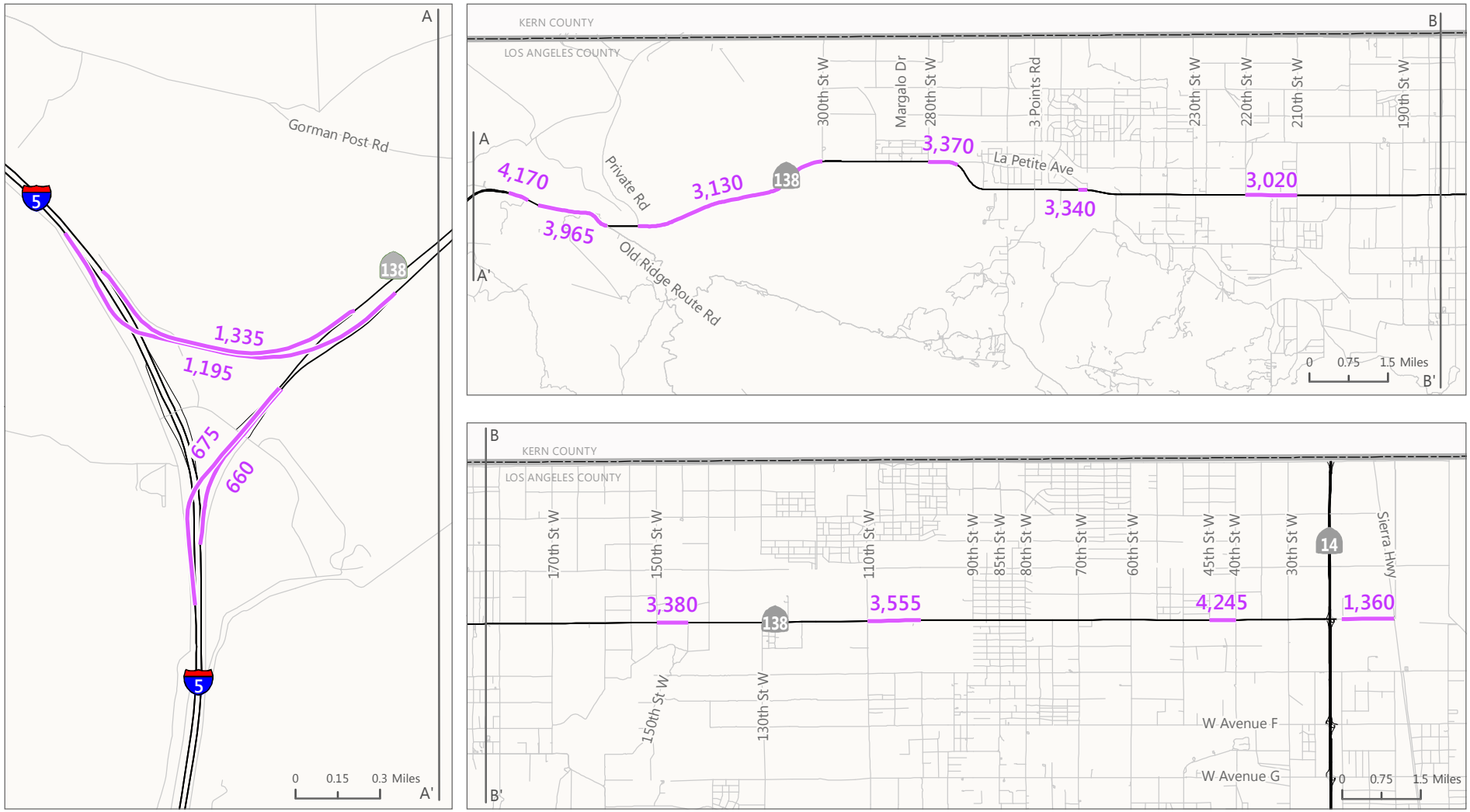
Figure 12

Peak Hour Traffic Volumes -
I-5 and SR 138



LEGEND

Study Segment

1,000 Average Daily Traffic Count

N

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Daily Roadway Volumes-Existing Conditions

FIGURE 13

PeMS Freeway Data

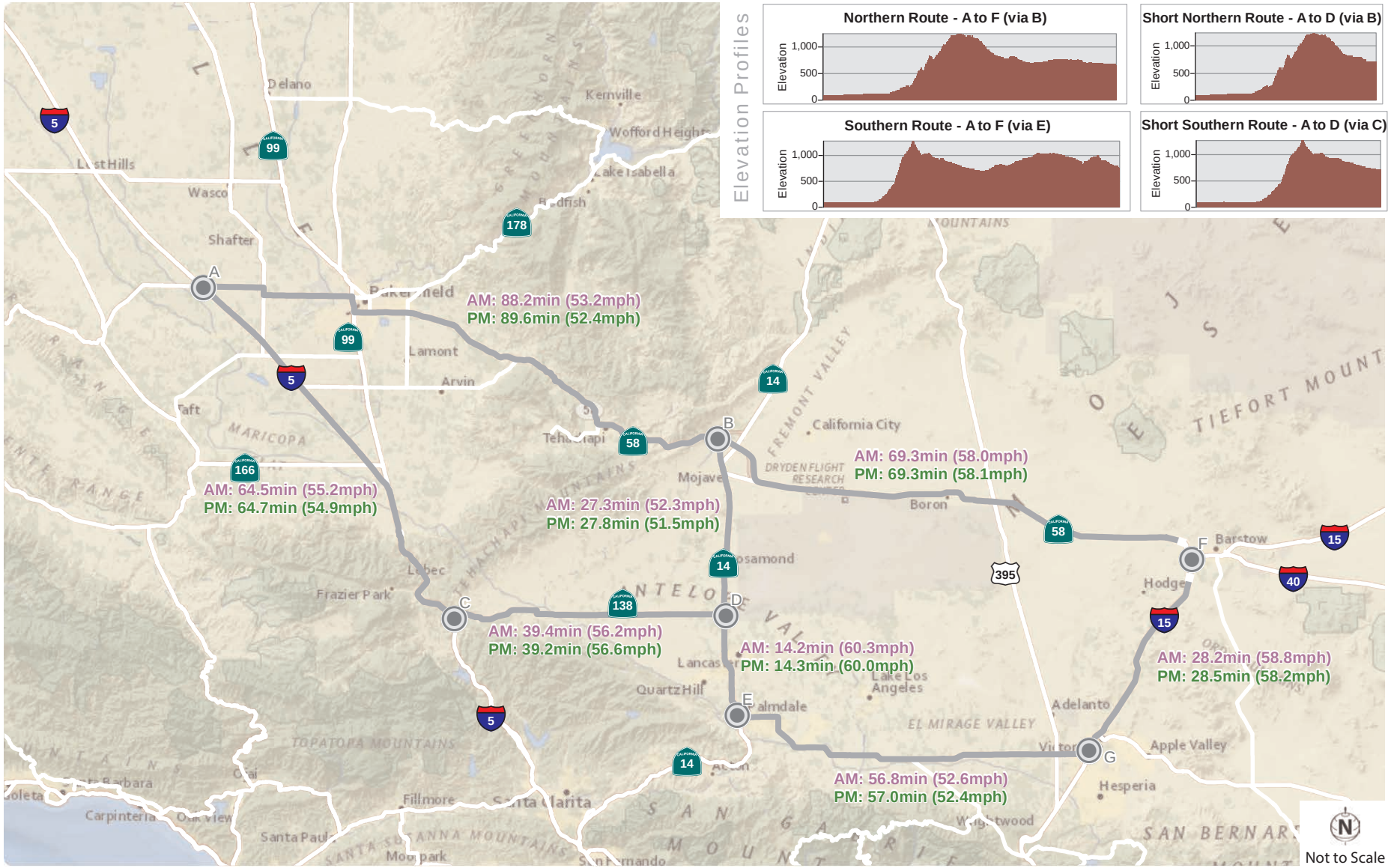
PeMS data is available for several locations within the study area, as shown in Table 10. PeMS data was collected for these locations for the purposes of calibrating the base year TDF model. PeMS data is contained in Appendix C.

TABLE 10 - PEMS DETECTOR LOCATIONS

ID	Segment
SR-14	
1	Mainline at Avenue S
I-5	
2	Mainline at Templin Highway
SR-99	
3	Mainline north of Route 119
4	Mainline north of McKee Road
5	Mainline north of Hoskins Road
6	Mainline at Berkshire Road
7	Mainline south of Panama Lane
8	Mainline at White Lane
9	Mainline south of Planz Road
SR-58	
10	Mainline west of Vineland Road
11	Mainline at SR-184

Inrix Data

Inrix speed and travel time data was collected for the major corridors, consisting primarily of the state highway system. Figure 14 displays the average travel speed, travel time between select locations and the grade of the roadways based on GIS data. This data captures regional travel flows in northwest Los Angeles County as well as the interaction between Los Angeles and Kern Counties.



Note: INRIX Data (August 2013)

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Travel Time Comparison

FIGURE 14

TRAFFIC OPERATIONS

The following procedures and inputs were used for developing the existing (2013) conditions traffic operations analysis results.

- Peak hour traffic volumes were entered according to the peak hour of each intersection. As previously discussed, a 25 percent increase to the through movement volumes along SR-138 were applied to the raw count volumes as a seasonal adjustment factor.
- The AM and PM peak hour truck percentages were calculated based on the daily traffic counts collected along the SR-138 corridor.
- The peak hour factor (PHF) was calculated based on the 15-minute traffic flows recorded during the peak hour.
- All study intersections are currently unsignalized; therefore, no signal phasing or timing data was needed for the existing conditions analysis.
- Speeds for the model network were set based on the posted speed limit.

Highway Operations

Traffic operations for the 2-lane highway segment analysis are provided in Table 11. As shown, SR-138 currently operates at LOS B or better or both the AM and PM peak hours. Appendix D contains the HCS 2010 LOS worksheets for Existing Conditions.

TABLE 11 - SR-138 LOS EXISTING CONDITIONS

SR-138 SEGMENT	Peak Hour LOS	
	AM	PM
1- I-5 Connector to Gorman Post Road	A	B
2-Gorman Post Road to Old Ridge Route	A	B
3-Old Ridge Route to 300th Street W	A	B
4-280th Street W to 270th Street W	A	B
5-Three Points Road to 245th Street W	A	B
6-230th Street W to 190th Street W	A	B
7-190th Street W to 130th Street W	B	C
8-130th Street W to 80th Street W	B	B
9-80th Street W to 30th Street W	B	B
10-30th Street W to SR-14	A	A

Note: LOS per the HCM 2010 methodology.
Source: *Fehr & Peers, 2014.*

Traffic operations for the I-5 & SR-138 interchange are provided in Table 12. As shown, the merge and diverge points on I-5 to/from SR-138 along with the I-5 mainline segments currently operate at LOS B or better or both the AM and PM peak hours. Appendix E contains the LOS worksheets for the I-5 & SR-138 interchange analysis.

TABLE 12 - I-5 & SR-138 OPERATIONS EXISTING CONDITIONS

Mainline/Ramp Operations	AM Peak Hour (Density) (LOS)	PM Peak Hour (Density) (LOS)
NB I-5 South of SR-138	13.5 B	13.4 B
NB I-5 Off-Ramp Diverge	7.2 A	11.4 B
NB I-5 On-Ramp Merge	14.8 B	14.7 B
NB I-5 North of SR-138	14.4 B	13.9 B
SB I-5 North of SR-138	14.4 B	13.7 B
SB I-5 Off-Ramp Diverge	12.3 B	11.7 B
SB I-5 On-Ramp Merge	14.2 B	13.6 B
SB I-5 South of SR-138	14.0 B	13.1 B

Intersection Operations

Traffic operations analysis was performed for existing conditions under AM and PM peak hour conditions. Table 13 shows the LOS and delay for the worst-case movement at the study intersections under existing conditions. As shown, all of the study intersections currently operate at LOS B or better during the AM and PM peak periods under existing conditions. Appendix F contains the Synchro LOS worksheets for Existing Conditions.

TABLE 13 – INTERSECTION LOS EXISTING CONDITIONS

Intersection	Traffic Control	AM Peak Hour		PM Peak Hour	
		Delay (sec)[1]	LOS	Delay (sec) [1]	LOS
1. Hwy 138 & Gorman Post Road	TWSC[2]	9.9	A	10.3	B
2. Hwy 138 & Old Ridge Route Rd	TWSC[2]	10.4	B	10.5	B
3. Hwy 138 & Private Rd	TWSC[2]	9.1	A	10.3	B
4. Hwy 138 & 300th St W	TWSC[2]	9.3	A	9.9	A
5. Hwy 138 & Margalo Dr	TWSC[2]	9.2	A	10.4	B
6. Hwy 138 & 280th St W	TWSC[2]	0.0	A	0.0	A
7. Hwy 138 & 3 Points Rd	TWSC[2]	9.8	A	10.4	B
8. Hwy 138 & La Petite Ave	TWSC[2]	9.8	A	9.7	A
9. Hwy 138 & 230th St W	TWSC[2]	9.3	A	9.8	A
10. Hwy 138 & 210th St W	TWSC[2]	9.1	A	10.0	B
11. Hwy 138 & 190th St W	TWSC[2]	9.8	A	11.5	B
12. Hwy 138 & 170th St W	TWSC[2]	10.6	B	10.6	B
13. Hwy 138 & 110th St W	TWSC[2]	10.3	B	10.8	B
14. Hwy 138 & 90th St W	TWSC[2]	11.0	B	12.3	B
15. Hwy 138 & 85th St W	TWSC[2]	10.2	B	10.8	B
16. Hwy 138 & 80th St W	TWSC[2]	10.3	B	11.4	B
17. Hwy 138 & 70th St W	TWSC[2]	10.6	B	12.1	B
18. Hwy 138 & 60th St W	TWSC[2]	11.3	B	12.7	B
19. Hwy 138 & 30th St W	TWSC[2]	10.5	B	11.6	B
20. Hwy 138 & Hwy 14 SB Off-Ramp	TWSC[2]	10.1	B	10.9	B
21. Hwy 138 & Hwy 14 NB Off-Ramp	TWSC[2]	10.2	B	11.0	B

Note:
1. Indicates worst approach delay per the HCM 2010 methodology.
2. TWSC = Two-way stop control.

Source: *Kimley-Horn and Associates, Inc. 2014 based on volumes provided by Fehr & Peers.*

COLLISION HISTORY

Traffic collision data from the Traffic Accident Surveillance and Analysis System (TASAS) for the highway sections on SR-138 were obtained from Caltrans. The data shown are for the three-year period between April 1, 2009 and March 31, 2012. Within the study area, 121 collisions occurred in the 3-year period. The TASAS summary was divided into three sections according to type of highway facility, and the data is presented in the following tables.

SR-138 PM 0.0 to PM 36.956

Table 14 shows the collision history along the section of SR-138 consisting of highway mainline segments from Post Mile (PM) 0.0 to 39.956.

TABLE 14 – COLLISION HISTORY FROM SR-138 PM 0.0 TO PM 36.956

Location	Number of Accidents				Actual Collision Rate[1]			Average Collision Rate[1]		
	Total	Fatal	Injury	F+I	F	F+I	Total	F	F+I	Total
SR-138 Mainline PM 0.0 – 1.391 R	1	0	0	0	0.000	0.00	0.39	0.023	0.28	0.61
SR-138 Mainline PM 0.0 – 1.246 L	0	0	0	0	0.000	0.00	0.00	0.018	0.22	0.50
SR-138 Mainline PM 1.392 – 39.956	118	6	52	58	0.046	0.44	0.89	0.023	0.44	0.96

Notes:
1. The accident rate is accidents per million vehicle-miles. "F" refers to the fatality rate, and "F&I" refers to the fatality and injury rate. Total number of accidents includes non-injury accidents, which are not included in the table.

Source: Caltrans District 7 TASAS Table B, April 1, 2009 to March 31, 2012.

There are five locations with multiple accidents:

- PM 1.34 to PM 9.76 - 51 accidents (43% of total accidents) occurred on this 8.5 mile stretch of SR-138 between I-5 and 300th Street.
  - The most common cause was improper turning, followed by speeding and driving under the influence of drugs or alcohol
  - Most common type of accident was hit object followed by sideswipe and head-on
  - There was 1 fatal accident at PM 5.28 with 2 fatalities and 12 injured
  - No pedestrians were injured
- 245th Street (PM 14.52 to PM 14.534) – 3 accidents
  - There were 2 fatalities in 2 accidents
  - Most common cause was speeding
  - There was 1 head on, 1 hit object and 1 rear end
  - No pedestrians were injured

- 90th Street intersection (PM 30.075) – 7 accidents
    - The most common cause was failure to yield followed by speeding
    - There were 4 broadsides, 2 rear ends and 1 sideswipe
    - No fatalities occurred
    - No pedestrians were injured
- 60th Street intersection (PM 33.075) – 7 accidents
    - The most common cause was failure to yield followed by other vehicle code violations
    - All of the accidents were broadside
    - There was 1 fatality
    - No pedestrians were injured
- PM 36.795 to PM 36.810 (SR-14 SB Off/On-Ramp Intersection) – 4 accidents of which 3 occurred at the intersection
    - Most common cause was improper turn
    - There were 2 broadsides and 2 sideswipes
    - No pedestrians were injured

I-5 Off-Ramps to Eastbound SR-138 (I-5 PM 82.397)

Table 15 shows the collision history on the section of SR-138 that consists of the I-5 off-ramps to SR-138.

TABLE 15 – COLLISION HISTORY FROM I-5 OFF-RAMPS TO EASTBOUND SR-138

Location	Number of Accidents				Actual Collision Rate[1]			Average Collision Rate[1]		
	Total	Fatal	Injury	F+I	F	F+I	Total	F	F+I	Total
I-5 SB off-ramp to EB SR-138 (I-5 PM 82.397)	2	0	1	1	0.000	0.68	1.35	0.006	0.25	0.77

Notes:
1. The accident rate is accidents per million vehicle-miles. "F" refers to the fatality rate, and "F&I" refers to the fatality and injury rate. Total number of accidents includes non-injury accidents, which are not included in the table.

Source: Caltrans District 7 TASAS Table B, April 1, 2009 to March 31, 2012.

The collision summary is as follows:

- 2 accidents occurred
- There was 1 accident with 1 injured
- No fatalities occurred

- Both accidents were caused by speeding
- There was 1 overturn and 1 hit object
- The actual rate of total amount of accidents and accidents with fatalities and injuries is twice as much as state average

I-5 On-Ramps from Westbound SR-138 (I-5 PM 82.265)

Table 16 shows the collision history on the section of SR-138 that consists of the I-5 on-ramps to SR-138. There were no accidents reported for this section.

TABLE 16 – COLLISION HISTORY FROM I-5 ON-RAMPS FROM WESTBOUND SR-138

Location	Number of Accidents				Actual Collision Rate[1]			Average Collision Rate[1]		
	Total	Fatal	Injury	F+I	F	F+I	Total	F	F+I	Total
I-5 NB on-ramp from WB SR-138 (I-5 PM 82.265)	0	0	0	0	0.000	0.00	0.00	0.002	0.10	0.29

Notes:
1. The accident rate is accidents per million vehicle-miles. "F" refers to the fatality rate, and "F&I" refers to the fatality and injury rate. Total number of accidents includes non-injury accidents, which are not included in the table.

Source: Caltrans District 7 TASAS Table B, April 1, 2009 to March 31, 2012.

4 Project Alternatives

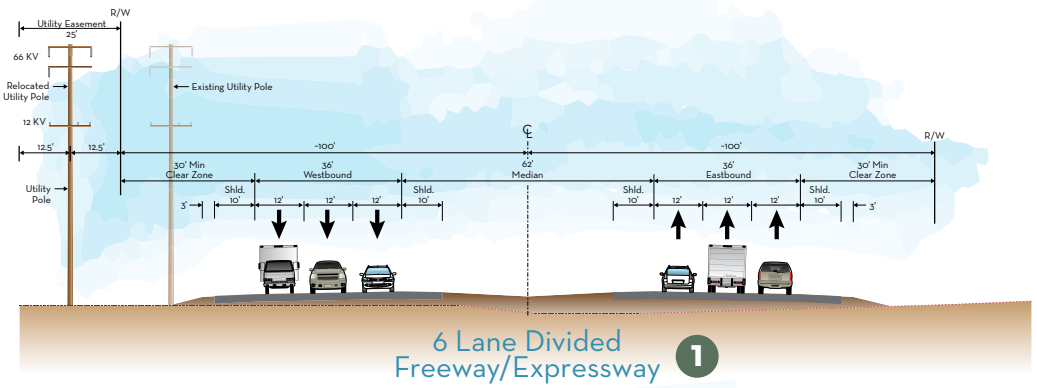
Project Alternatives have been developed to meet the purpose and need of the project. The common design features of the build alternatives along with a description of each alternative are provided below.

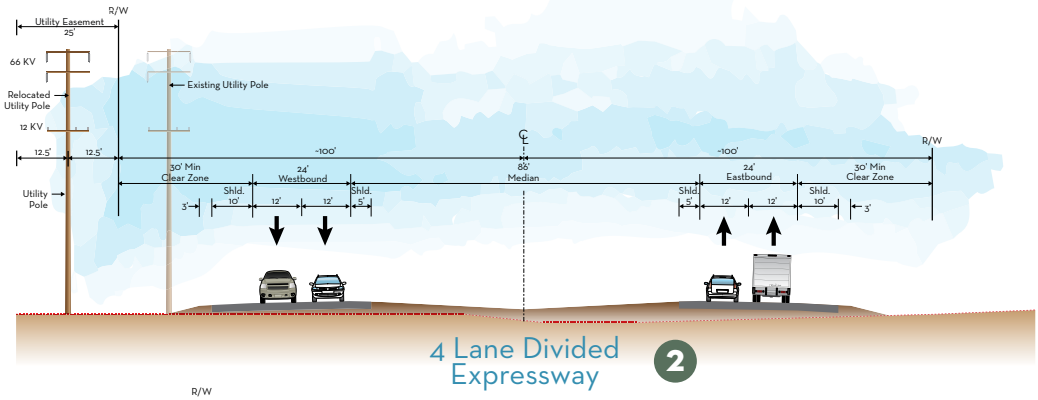
DESIGN FEATURES

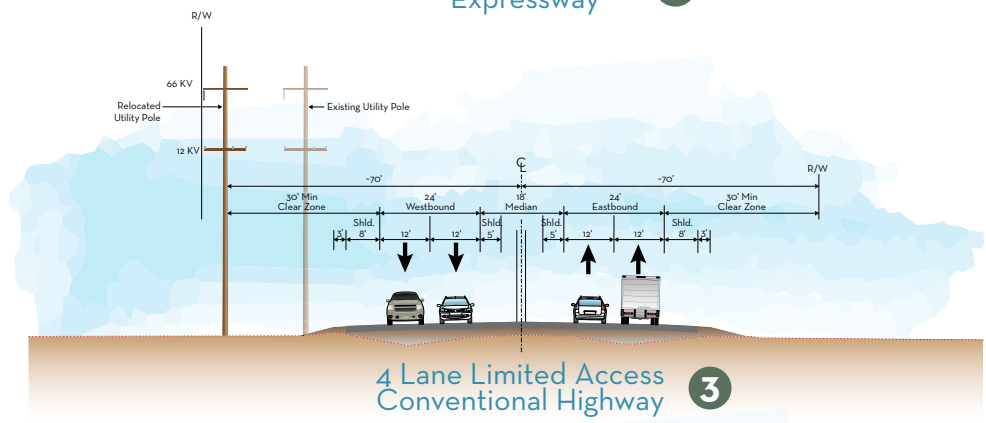
Three build alternatives have been developed for SR-138:

- Alternative 1 (Freeway and Expressway)
- Alternative 2 (Expressway and Limited Access Conventional Highway)
- Transportation System Management (TSM) Alternative

The design features for each facility type are illustrated in Figure 15. The corridor alignment and design features of the build alternatives are illustrated in Figure 16.







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Design Features by Facility Type

FIGURE 15

Each alternative is described in further detail below.

NO BUILD ALTERNATIVE

Implementation of the No-Build Alternative would maintain the existing configuration of SR-138 and would not result in improvements to the route. However, additional residential, commercial, and interregional development is anticipated to occur in Antelope Valley in the future. With Los Angeles to the southeast and Bakersfield to the northwest, this area is poised for large-scale growth, which is anticipated to result in increased traffic demands beyond the capacity of the existing system (Caltrans, 2008).

The No-Build Alternative would not accommodate the projected population growth or expected substantial increase in goods movement truck traffic in Northern Los Angeles County and the existing corridor would not be improved. As discussed in the Project Study Report/ Project Development Study (PSR/PDS), the existing SR-138 corridor is projected to degrade and operate consistently at a Level of Service (LOS) E and F for 2040 conditions (Caltrans, 2008). The No-Build Alternative could result in indirect impacts on air quality, mobility, safety, and the economy within Northern Los Angeles County. There would be increased maintenance costs to maintain the route without any other improvements.

BUILD ALTERNATIVE 1 | FREEWAY - EXPRESSWAY

Alternative 1 (Freeway/Expressway) would include a 6-lane freeway from the I-5 interchange connector ramps to County Road 300th Street West , and a 4-lane expressway from County Road 300th Street West to the SR-14 interchange generally following the existing alignment of SR-138. There would also be improvements to the I-5/SR-138 and SR-138/SR-14 freeway connections and structure over the SR-14. Study limits on I-5 are from PM 79.5 to PM 83.1 and on SR -14 the limits are from PM 73.4 to PM 74.4.

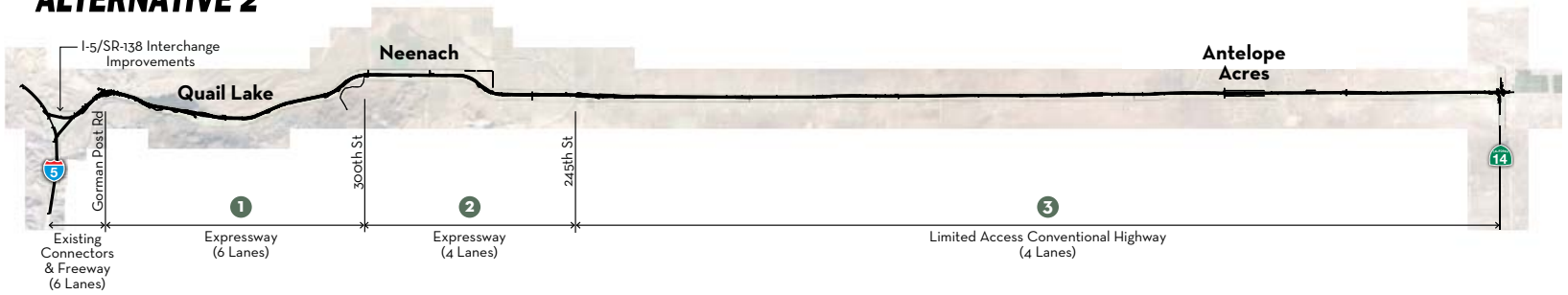
BUILD ALTERNATIVE 1 WITH DESIGN OPTION L ANTELOPE ACRES BYPASS

There is a design option with this alternative to include a bypass route around the Antelope Acres community. This option was developed to reduce the impacts to the existing residences of Antelope Acres due to the proposed four-lane expressway along the existing alignment of SR-138. The alignment would bypass the community to the north along West Avenue C and going from west to east, the alignment would begin to deviate from the existing SR-138 near 100th Street West and continue in a northeasterly direction towards West Avenue C. After paralleling West Avenue C for approximately one mile, the alignment would continue in a southeasterly direction back towards the existing SR-138, and eventually join the existing SR-138 near 70th Street West. The existing highway would be relinquished to the County as a local roadway between 100th Street West and 70th Street West, with additional speed reduction measures proposed to reduce cut-through traffic.

Figure 17 displays the access locations along the corridor and analyzed traffic control devices under Alternative 1. For the purposes of analyzing traffic operations with the implementation of Alternative 1, traffic control treatments at the proposed access locations were assumed to be in place based on the projected traffic forecasts and allowable turning movements at each location. However, alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area. Table 17 summarizes the access locations along the corridor and the analyzed and potential treatment options at each location.

ALTERNATIVE 1

ALTERNATIVE 2



TSM ALTERNATIVE

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Highway Definitions:
- Freeway: Access limited to interchanges
- Epressway: Access limited to intersections
- Conventional: No Access Restrictions

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Overview of Build Alternative

FIGURE 16

The potential treatment options are documented in the Intersection Control Evaluation (ICE) Report (see Appendix G).

TABLE 17 – ACCESS & TREATMENT OPTIONS FOR ALTERNATIVES 1 & 2

No.	Location	Alternative 1			Alternative 2		
		Access Type	**Analyzed Treatment**	**Other Treatment Options**	**Access Type**	**Analyzed Treatment**	**Other Treatment Options**
1	Gorman Post Road	Grade Separated Overcrossing	Tight Diamond	Diverging Diamond	Grade Separated Overcrossing	Tight Diamond	Diverging Diamond
2	Private Road	Grade Separated Undercrossing	Tight Diamond	Diverging Diamond, Jughandle	At-grade Full Access	Signalized	Median U-Turn, Jughandle
3	300th St	Grade Separated Undercrossing	Tight Diamond	Diverging Diamond, Jughandle	At-grade Full Access	Signalized	Median U-Turn, Jughandle
4	Margalo Drive	At-grade Full Access	Displaced Left-Turn	Diverging Diamond	At-grade Full Access	Signalized	Displaced Left-Turn
5	3 Points Road	At-grade Full Access	Median U-Turn	Diverging Diamond, Tight Diamond, Jughandle	At-grade Full Access	Signalized	Median U-Turn, Jughandle
6	La Petite Ave./ 250th St	At-grade Full Access	Displaced Left-Turn	Tight Diamond	At-grade Full Access	Signalized	Median U-Turn, Jughandle
7	245 St	Right-in/out only	Side Street Stop Control	Median U-Turn	Right-in/out only	Side Street Stop Control	Median U-Turn
8	240 St	Right-in/out only	Side Street Stop Control	Median U-Turn	Right-in/out only	Side Street Stop Control	Median U-Turn
9	230 St	Right-in/out only	Side Street Stop Control	Displaced Left-Turn, Median U-Turn	Right-in/out only	Side Street Stop Control	Displaced Left-Turn, Median U-Turn
10	210 St	At-grade Full Access	Median U-Turn	Jughandle Modified *(to avoid sub-station)*	At-grade Full Access	Signalized	Jughandle Modified *(to avoid sub-station)*
11	190 St	Right-in/out only	Side Street Stop Control	Tight Diamond, Jughandle	Right-in/out only	Side Street Stop Con-trol	Median U-Turn

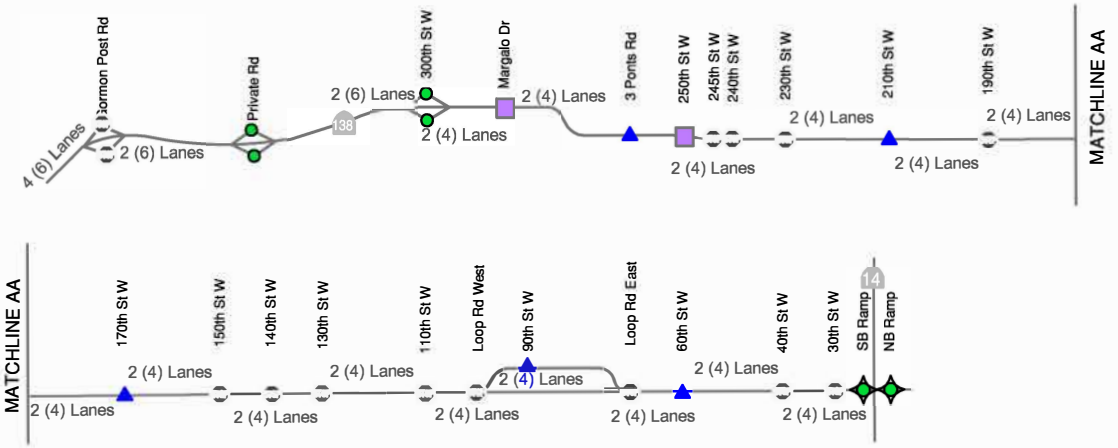
TABLE 17 – ACCESS & TREATMENT OPTIONS FOR ALTERNATIVES 1 & 2

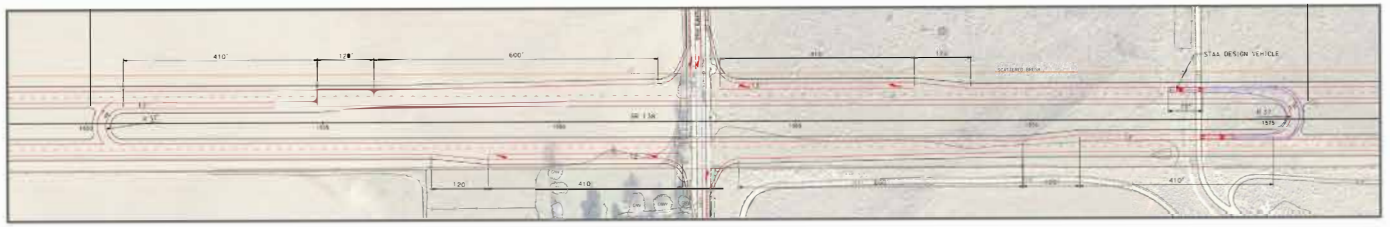
No.	Location	Alternative 1			Alternative 2		
		Access Type	**Analyzed Treatment**	**Other Treatment Options**	**Access Type**	**Analyzed Treatment**	**Other Treatment Options**
12	170 St	At-grade Full Access	Median U-Turn	Signalized, Jughandle Modified *(to avoid solar farm)*	At-grade Full Access	Signalized	Median U-Turn, Jughandle Modified *(to avoid solar farm)*
13	150 St	Right-in/out only	Side Street Stop Control	Median U-Turn	Right-in/out only	Side Street Stop Control	Median U-Turn
14	140 St	Right-in/out only	Side Street Stop Control	Median U-Turn	Right-in/out only	Side Street Stop Control	Median U-Turn
15	130 St	Right-in/out only	Side Street Stop Control	Median U-Turn	Right-in/out only	Side Street Stop Control	Median U-Turn
16	110 St	Right-in/out only	Side Street Stop Control	Median U-Turn, Jughandle	Right-in/out only	Side Street Stop Control	Median U-Turn, Jughandle
17[1]	Loop Road West	Right-in/out only	Side Street Stop Control	Tight Diamond, Jughandle	*No Loop Road under Alt. 2*		
17/ 18[1]	90 St	At-grade Full Access	Median U-Turn	Roundabout, Tight Diamond, Jughandle	At-grade Full Access	Signalized	Roundabout, Tight Diamond, Jughandle
18[1]	80 Street	*No Access at 80 St. with Proposed Loop Road*			Right-in/out only	Side Street Stop Control	Median U-Turn
19[1]	Loop Road East	Right-in/out - In & Left-In only	Side Street Stop Con-trol (2025); Displaced Left-Turn (2040)	Median U-Turn	*No Loop Road under Alt. 2*		
19[1]	70 Street	*No Access at 70 St. with Proposed Loop Road*			Right-in/out only	Side Street Stop Control	Median U-Turn
20	60 St	At-grade Full Access	Median U-Turn	Roundabout, Tight Diamond, Jughandle	At-grade Full Access	Signalized	Roundabout, Tight Diamond, Jughandle

TABLE 17 – ACCESS & TREATMENT OPTIONS FOR ALTERNATIVES 1 & 2

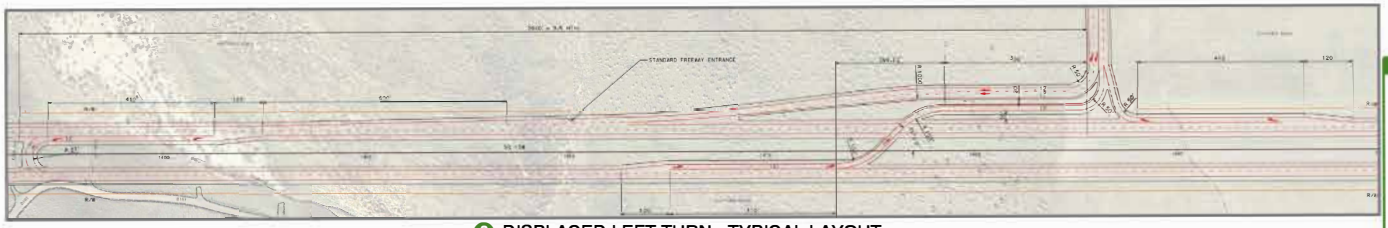
No.	Location	Alternative 1			Alternative 2		
		Access Type	**Analyzed Treatment**	**Other Treatment Options**	**Access Type**	**Analyzed Treatment**	**Other Treatment Options**
21	40 St	Right-in/out only	Side Street Stop Control	Median U-Turn	Right-in/out only	Side Street Stop Control	Median U-Turn
22	30 St	Right-in/out only	Side Street Stop Control	Median U-Turn	Right-in/out only	Side Street Stop Control	Median U-Turn
23/24	SR-14 Ramp Terminal Intersections	Grade Separated Overcrossing	Roundabout	Signalized	Grade Separated Overcrossing	Signalized	Roundabout

Notes:
1. Intersections 17, 18, and 19 vary between Alternatives 1 & 2 due to the access provided with and without the Loop Road (Only Alt. 1 has the proposed Loop Road).





1 MEDIAN U-TURN - TYPICAL LAYOUT



2 DISPLACED LEFT TURN - TYPICAL LAYOUT

LEGEND

- Grade Separated
- Median U-Turn
- Displaced Left Turn
- Traffic Signal
- Two-Way Stop
- Roundabout
- #(#) Existing Number of Lanes (Proposed Number of Lanes)

FIGURE 17
ANALYZED TREATMENTS

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BUILD ALTERNATIVE 2| EXPRESSWAY – CONVENTIONAL HIGHWAY

Alternative 2 (Expressway/Highway) would include a 6-lane freeway from the I-5 interchange connector ramps to Gorman Post Road, a 6-lane expressway from the Gorman Post Road interchange to County Road 300th Street West, a 4-lane expressway from 300th Street West to County Road 240th Street West, and a 4-lane limited access Conventional Highway from County Road 240th Street West to the SR-14 interchange, generally following the existing alignment of SR-138. There would also be improvements to the I-5/SR-138 and SR-138/SR-14 freeway connections and the structure over the SR-14. The study limits on these connectors would be the same as Alternative 1; on I-5 from PM 79.5 to PM 83.1 and on SR -14 the limits are from PM 73.4 to PM 74.4.

Figure 18 displays the access locations along the corridor and analyzed traffic control devices under Alternative 2. For the purposes of analyzing traffic operations with the implementation of Alternative 2, traffic control treatments at the proposed access locations were assumed to be in place based on the projected traffic forecasts and allowable turning movements at each location. However, alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G). Table 17 summarizes the access locations along the corridor and the analyzed and potential treatment options at each location.

NOTE ON THE TRANSPORTATION SYSTEM MANAGEMENT (TSM) ALTERNATIVE

The TSM Alternative was developed to strategize improvements to the facility without major changes to the overall capacity. This alternative had improvements to the vertical and horizontal roadway alignment in areas that are currently non-standard, shoulder widening, localized improvements at accident locations, intersection improvements, and additional lanes to improve safety and traffic flow at focused areas. Upgrades to signage and lighting were also evaluated to improve safety and operations.

Figure 19 displays the access locations along the corridor and analyzed traffic control devices under the TSM Alternative. Alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G).

It should be noted that the TSM Alternative was studied as part of this Transportation Analysis Report. However, this alternative has since been removed from further consideration because it does not meet the Project Objectives outlined in the Purpose & Need.

LEGEND

- Traffic Signal
- Two-Way Stop
- #(#) Existing Number of Lanes (Proposed Number of Lanes)

FIGURE 18
ANALYZED TREATMENTS

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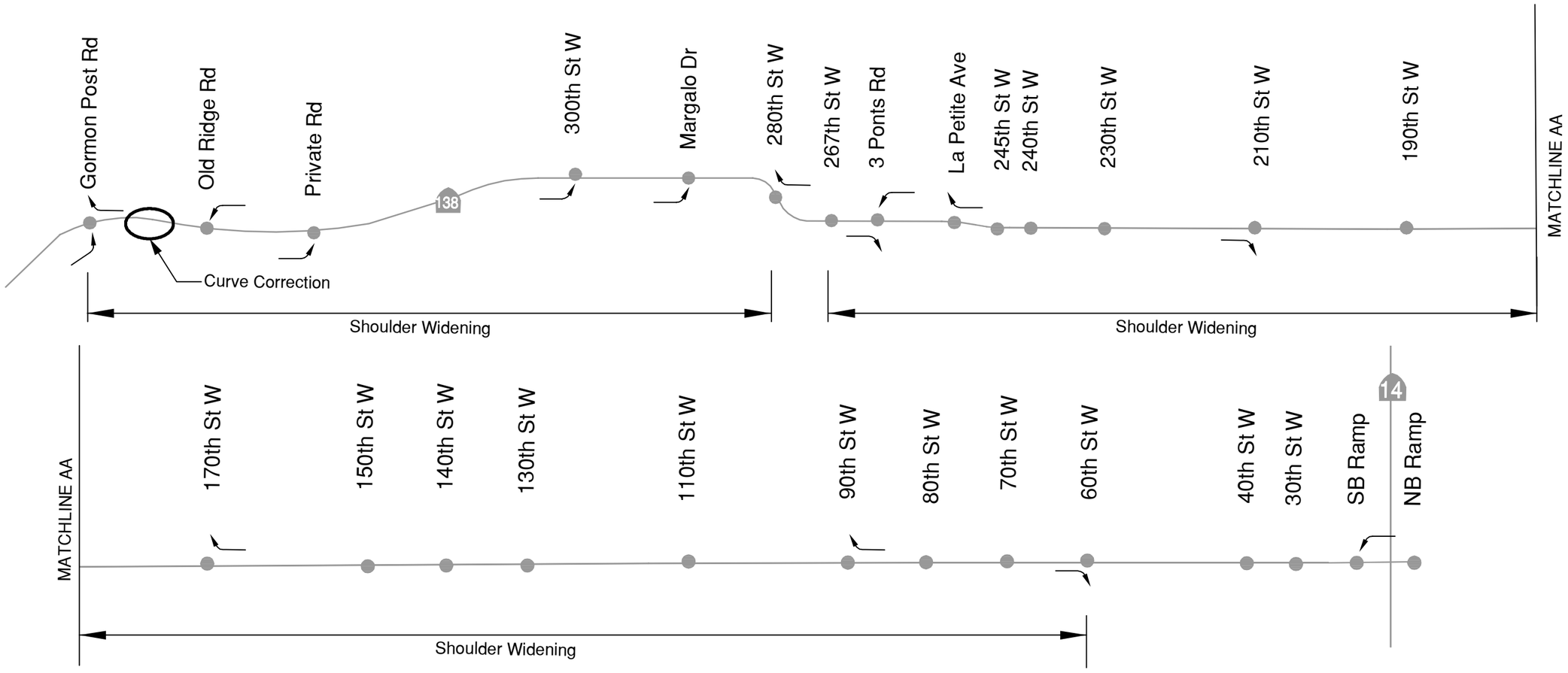


FIGURE 19
ANALYZED TREATMENTS

Kimley»Horn

COMPARISON OF ALTERNATIVES

Table 18 provides a comparison of No Build, Alternative 1 (Freeway and Expressway), Alternative 2 (Expressway and Four-Lane Conventional Highway), and the TSM Alternative.

TABLE 18 – SUMMARY COMPARISON OF SR-138 ALTERNATIVES

Design Feature	Alternative (No Build)	Alternative 1 (Freeway & Expressway)	Alternative 2 (Expressway & Limited Access Conventional Highway)	TSM Alternative[1]
Type of Facility	2-lane conventional highway	6-lane Freeway to 300th Street West ; 4-lane Expressway to SR-14	6-lane Expressway to 300th Street West; 4-lane Expressway to 240th Street West/4 lane limited access conventional highway to SR-14	2-lane conventional highway with improvements (curve corrections, paved shoulders, passing lanes, intersection channelization)
Access	Multiple access location, driveways, field roads, county roads	Interchanges along Freeway; Median U-Turns, Displaced Left-Turns, Two-Way Stop Controlled, Roundabouts	Tight Diamond Interchange; Traffic Signals; Two-Way Stop Control; Roundabouts	TBD
Median Widths	N/A	Varies 22 to 86 feet	Varies 0 to 86 feet	N/A – TBD

Note:

1. The TSM Alternative was studied as part of the Transportation Analysis Report. However, this alternative has since been removed from further consideration because it does not meet the Project Objectives outlined in the Purpose & Need.

At this time, the Project Development Team has not identified a preferred alternative.

5 Opening Year 2020/2025 Conditions

This chapter presents the analysis results of the project alternatives under opening year (2020/2025) conditions. The purpose of the opening year analysis is to evaluate near-term traffic operations on SR-138 with and without the improvement alternatives. For each alternative, traffic operations are evaluated at the corridor and intersection level of detail.

ANALYSIS SCENARIOS

Traffic forecasts were developed and traffic operations were analyzed for each of the following project alternatives under opening year conditions. Depending on the level of investment needed to implement the improvements proposed under each alternative, the project's opening year was estimated to be Year 2020 or 2025, as follows:

- No Build Alternative - Year 2020
- Build Alternative 1 (Freeway and Expressway) - Year 2025
- Build Alternative 2 (Expressway and Limited Access Conventional Highway) - Year 2025
- TSM Alternative – Year 2020

TRAFFIC FORECASTS

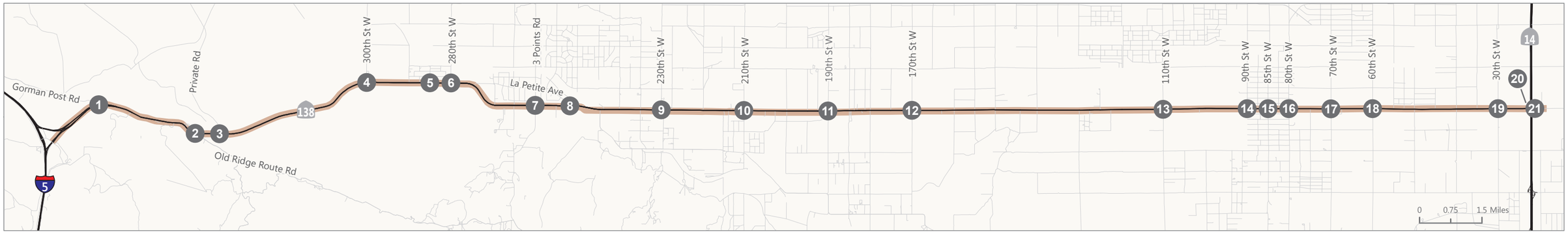
The North County Sub-Area model was used to develop travel demand forecasts under each Build Alternative based on the increase in capacity along the corridor. Both daily and peak hour traffic forecasts were obtained from the model to reflect Year 2035 traffic conditions based on planned improvements and growth in the study area. Since the sub-area model reflects Year 2035 conditions, the Opening Year 2020/2025 forecasts were developed using a calculated annual growth rate between existing volumes and the 2035 traffic forecasts.

The truck percentages for 2020/2025 were developed through linear interpolation of the 2012, 2020, 2025, and 2035 ADT with 2012 and 2035 truck ADT from the sub-area model. Truck percentages differed from east and west end of the SR-138 corridor. As shown in Table 19, the 2020 No Build scenario forecasts a 13% truck percentage on SR-138 near I-5 and an 18% truck percentage on SR-138 near SR-14. With the increased capacity under Alternatives 1 and 2, single occupancy vehicles on SR-138 were forecast to increase; thus Alternatives 1 and 2 would have a lower truck percentage of 8-9% along the corridor. For the I-5 mainline, trucks were forecasted to remain at 25% of total daily traffic volumes.

TABLE 19 – 2020/2025 TRUCK PERCENTAGES			
Scenario	**SR-138 West at I-5**	**SR-138 East at SR-14**	**I-5 Mainline**
2020 No Build	13%	18%	25%
2025 Alternative 1	8%	9%	25%
2025 Alternative 2	8%	9%	25%

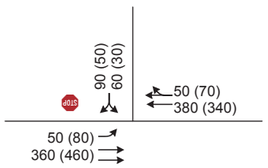
Table 20 displays the ADT forecasts under 2020/2025 opening year conditions. ADT and peak hour forecasts for No Build and TSM Alternative are the same for the freeway and intersection operations analysis as TSM Alternative includes minor capacity improvements along SR-138 that are not expected to increase travel demand along the corridor beyond that expected under No Build conditions. Figures 20 through 24 display the AM and PM peak hour traffic flows at the access points along the corridor and for the I-5 & SR-138 interchange for each of the project alternatives.

TABLE 20 – 2020/2025 ADT VOLUMES & FORECASTS					
ID	**Location**	**2012 Subarea Model**	**2020 Subarea No Build/TSM Alternative Scenario**	**2025 Subarea Alternative 1 Scenario**	**2025 Subarea Alternative 2 Scenario**
1	I-5 North of SR138	70,600	81,000	94,500	93,700
2	I-5 South of SR138	67,900	82,000	93,600	93,600
3	I-5 NB Off-Ramp to SR-138	600	3,610	9,760	9,570
4	I-5 NB On-Ramp to SR-138	1,335	3,645	7,960	7,820
5	I-5 SB Off-ramp to SR-138	1,195	3,040	6,920	6,800
6	I-5 SB On-Ramp to SR-138	675	3,690	10,550	10,350
7	SR-138 East of I-5	4,500	13,900	35,200	34,300
8	SR-138 West of 300th Street	4,500	11,200	32,900	31,900
9	SR-138 West of 245th Street	4,000	9,100	26,500	25,700
10	SR-138 West of 190th Street	3,500	7,100	23,400	22,400
11	SR-138 West of 110th Street	3,700	7,500	22,400	21,300
12	SR-138 West of 60th Street	3,800	7,400	20,800	19,200
13	SR-138 West of SR14	3,800	7,200	19,500	18,000
14	SR14 North of SR138	44,300	49,500	49,800	50,500
15	SR14 South of SR138	46,400	51,600	56,100	56,000

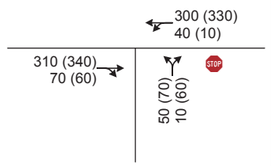


Not to Scale

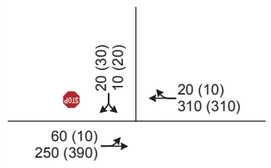
1. Hwy 138/Gorman Post Rd



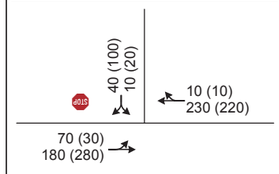
2. Hwy 138/Old Ridge Route Rd



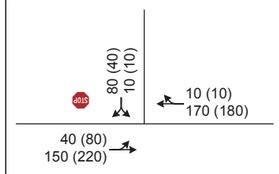
3. Hwy 138/Private Rd



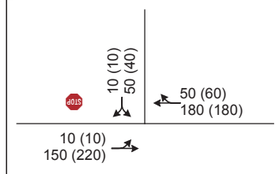
4. Hwy 138/300th St W



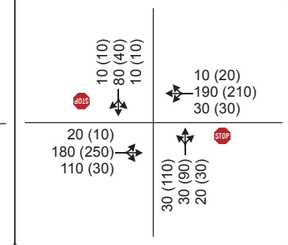
5. Hwy 138/Margalo Dr



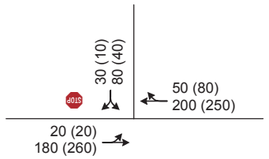
6. Hwy 138/280th St W



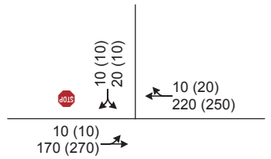
7. Hwy 138/3 Points Rd



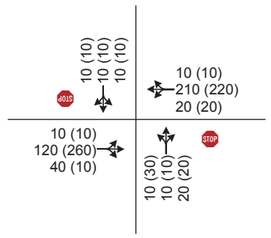
8. Hwy 138/La Petite Ave



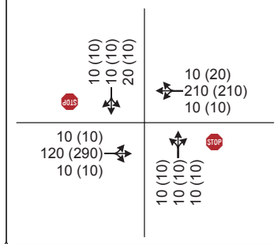
9. Hwy 138/230th St W



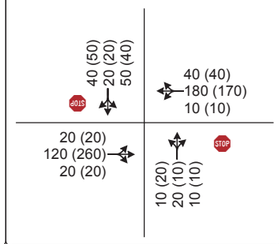
10. Hwy 138/210th St W



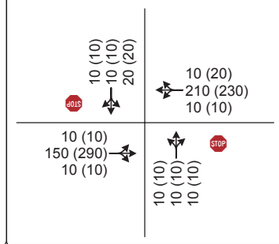
11. Hwy 138/190th St W



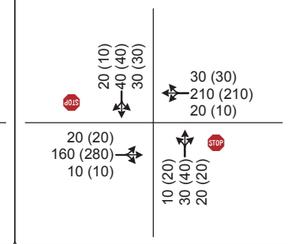
12. Hwy 138/170th St W



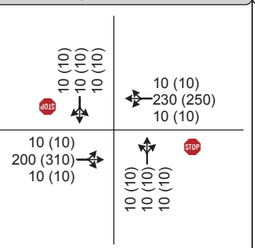
13. Hwy 138/110th St W



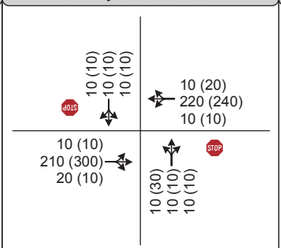
14. Hwy 138/90th St W



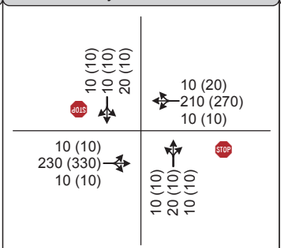
15. Hwy 138/85th St W



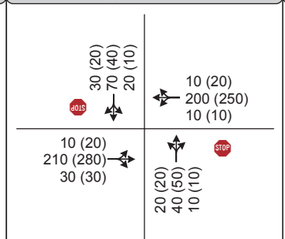
16. Hwy 138/80th St W



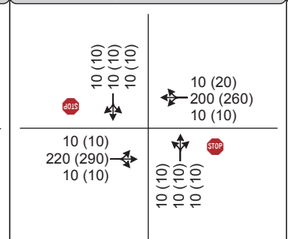
17. Hwy 138/70th St W



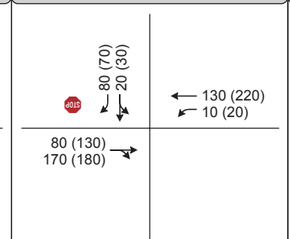
18. Hwy 138/60th St W



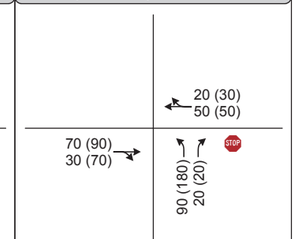
19. Hwy 138/30th St W



20. Hwy 138/Hwy 14 SB Off-Ramp



21. Hwy 138/Hwy 14 NB Off-Ramp



LEGEND

- 1 Study Intersection
- Study Corridor
- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- STOP Stop Sign

FEHR & PEERS

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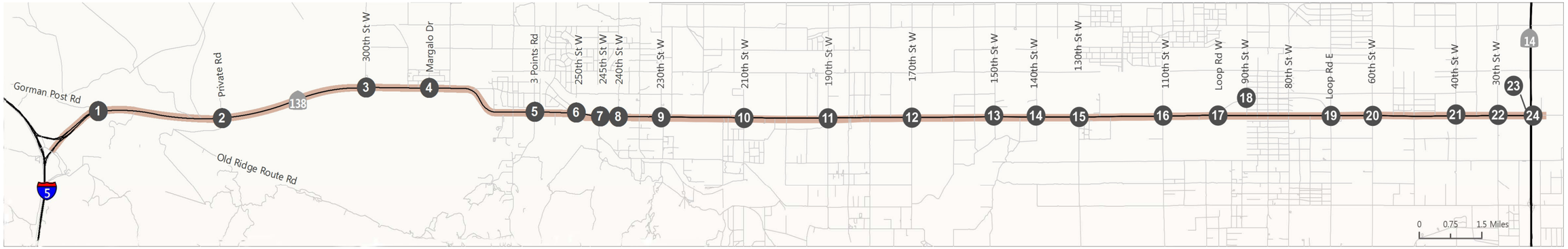
Peak Hour Traffic Forecasts
Future 2020 Conditions (No Build/TSM Alternative)
FIGURE 20



1. Hwy 138/Gorman Post Rd

See Figure 22

2. Hwy 138/Private Rd

See Figure 22

3. Hwy 138/300th St

See Figure 22

4. Hwy 138/Margalo Dr

	340 (160) 100 (70)	80 (110) 1,030 (1,090)
160 (340) 810 (880)		

5. Hwy 138/3 Points Rd

	170 (80) 40 (10) 160 (120)	140 (180) 900 (1,010) 20 (20)
80 (170) 750 (750) 80 (30)	40 (120) 10 (50) 10 (20)	

6. Hwy 138/250th St

	20 (10) 20 (10)	10 (10) 1,040 (1,180) 30 (30)
10 (20) 900 (860)		

7. Hwy 138/245th St

	10 (10)	10 (20) 1,070 (1,200)
860 (850) 90 (50)	10 (10)	

8. Hwy 138/240th St

	10 (10)	10 (10) 1,080 (1,220)
870 (860) 10 (10)	10 (10)	

9. Hwy 138/230th St

	20 (10)	10 (10) 1,060 (1,210)
780 (810) 90 (50)	30 (80)	

10. Hwy 138/210th St

	20 (10) 10 (10) 30 (10)	10 (20) 1,000 (1,070) 20 (20)
50 (100) 690 (760) 80 (40)	30 (70) 10 (10) 10 (20)	

11. Hwy 138/190th St

	20 (10)	10 (20) 1,000 (1,080)
650 (750) 80 (40)	10 (10)	

12. Hwy 138/170th St

	30 (20) 10 (10) 30 (30)	30 (30) 940 (1,010) 20 (20)
20 (40) 630 (700) 10 (20)	40 (70) 10 (10) 30 (20)	

13. Hwy 138/150th St

	10 (10)	10 (10) 970 (1,040)
680 (740) 10 (10)	10 (10)	

14. Hwy 138/140th St

	20 (10)	10 (20) 950 (1,040)
670 (730) 10 (0)	10 (0)	

15. Hwy 138/130th St

	10 (10)	10 (10) 960 (1,060)
680 (730) 10 (10)	10 (10)	

16. Hwy 138/110th St

	10 (10)	10 (30) 950 (1,050)
670 (730) 10 (10)	10 (10)	

17. Hwy 138/Loop Rd West

		970 (1,080)
640 (700) 50 (50)	10 (10)	

18. Hwy 138/90th St

	10 (10) 10 (10) 10 (10)	10 (10) 830 (950) 50 (40)
10 (10) 540 (590) 90 (100)	140 (130) 10 (10) 60 (50)	

19. Hwy 138/Loop Rd East

		820 (970) 40 (70)
610 (630) 10 (10)	60 (20) 40 (40)	

20. Hwy 138/60th St

	40 (40) 60 (40) 40 (20)	10 (30) 750 (880) 10 (10)
20 (30) 610 (620) 30 (30)	70 (110) 30 (50) 10 (10)	

21. Hwy 138/40th St

	10 (10)	10 (10) 760 (900)
640 (640) 10 (10)	10 (10)	

22. Hwy 138/30th St

	10 (10)	10 (10) 750 (900)
640 (640) 10 (10)	10 (10)	

23. Hwy 138/Hwy 14 SB Off-Ramp

	230 (240) 20 (30)	520 (660) 20 (20)
170 (220) 470 (420)		

24. Hwy 138/Hwy 14 NB Off-Ramp

		20 (30) 150 (240)
70 (90) 130 (180)	410 (440) 10 (10)	

LEGEND

- 1 Study Intersection
- Study Corridor
- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- STOP Stop Sign

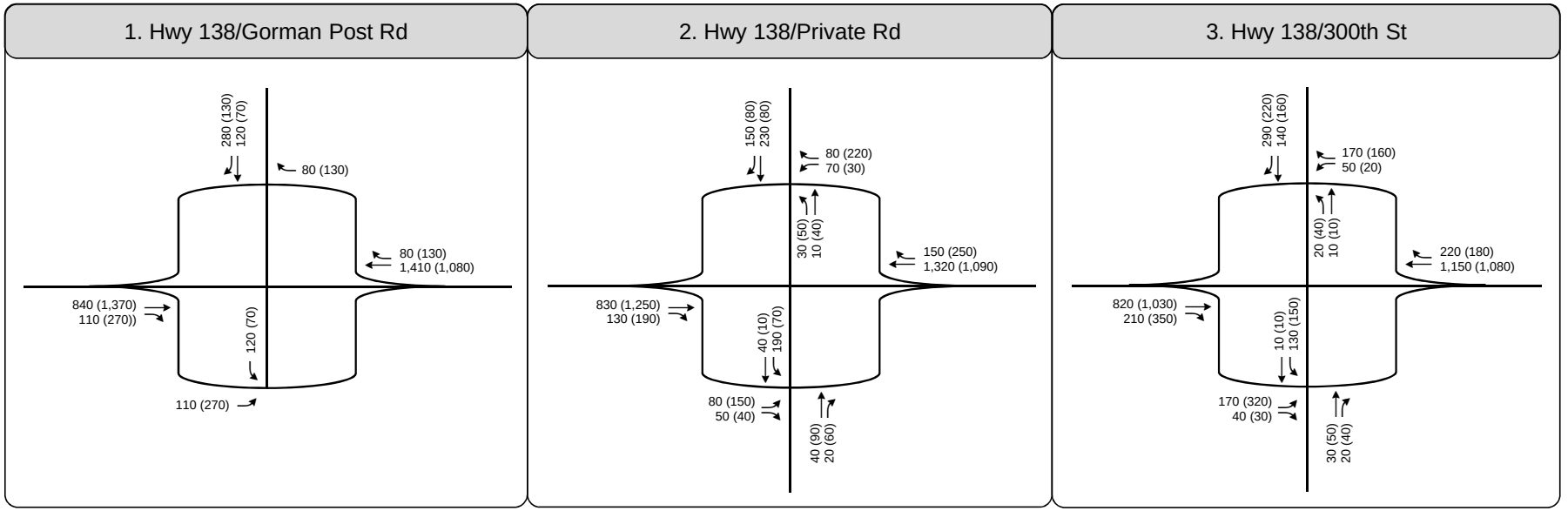
Note: If Loop Road is not constructed, traffic forecasts for 90th Street West should be the same as volumes shown in Figure 24.

FEHR PEERS

Source: INSERT PATH HERE

Peak Hour Traffic Volumes And Lane Configurations - 2025 Alt 1 Conditions

FIGURE 21



LEGEND

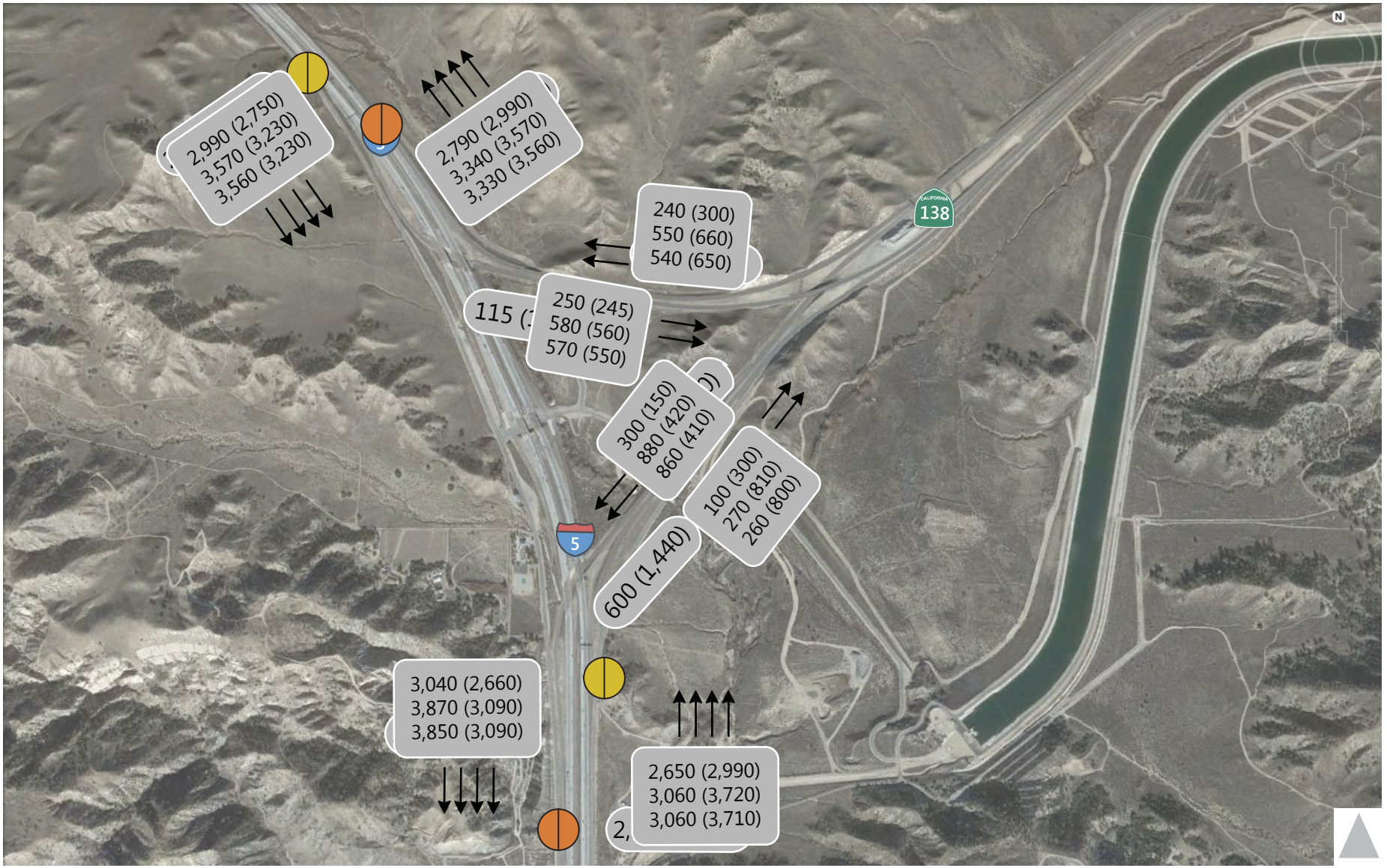
1 Study Intersection AM (PM) Peak Hour Traffic Volume

Study Corridor

FEHR PEERS

Peak Hour Traffic Forecasts
2025 Alt 1 Conditions

FIGURE 22



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AM (PM) - No Build / TSM 2020
AM (PM) - Alternative 1 2025
AM (PM) - Alternative 2 2025

*25% trucks on I-5

Figure 23

Future 2020/2025 Conditions -
I-5 and SR 138

1. Hwy 138/Gorman Post Rd

280 (130) 120 (70)	80 (130) 1,390 (1,010)
110 (270) 820 (1,350)	

2. Hwy 138/Private Rd

150 (80) 40 (10) 190 (70)	80 (220) 1,290 (1,020) 70 (30)
80 (150) 810 (1,230) 50 (40)	30 (50) 10 (40) 20 (60)

3. Hwy 138/300th St

290 (220) 10 (10) 130 (150)	170 (160) 1,130 (1,010) 50 (20)
170 (320) 800 (1,010) 40 (30)	20 (40) 10 (10) 20 (40)

4. Hwy 138/Margalo Dr

340 (160) 100 (70)	80 (110) 1,010 (1,020)
160 (340) 780 (860)	

5. Hwy 138/3 Points Rd

170 (80) 40 (10) 160 (120)	140 (180) 880 (940) 20 (20)
80 (170) 730 (730) 80 (30)	40 (120) 10 (50) 10 (20)

6. Hwy 138/250th St

20 (10) 20 (10)	10 (10) 1,020 (1,110) 30 (20)
10 (20) 880 (840)	

7. Hwy 138/245th St

10 (10)	10 (20) 1,040 (1,130)
840 (820) 90 (40)	10 (10)

8. Hwy 138/240th St

10 (10)	10 (10) 1,050 (1,150)
850 (830) 10 (10)	10 (10)

9. Hwy 138/230th St

20 (10)	10 (10) 1,030 (1,140)
750 (790) 90 (50)	30 (80)

10. Hwy 138/210th St

20 (10) 10 (10) 30 (10)	10 (20) 970 (1,000) 20 (20)
50 (100) 670 (740) 80 (40)	30 (70) 10 (10) 10 (20)

11. Hwy 138/190th St

20 (10)	10 (20) 970 (1,010)
630 (720) 80 (40)	10 (10)

12. Hwy 138/170th St

30 (20) 10 (10) 30 (30)	30 (20) 910 (930) 20 (20)
30 (40) 600 (680) 10 (20)	40 (70) 10 (10) 20 (20)

13. Hwy 138/150th St

10 (10)	10 (10) 940 (950)
640 (720) 10 (10)	10 (10)

14. Hwy 138/140th St

20 (10)	10 (20) 920 (950)
640 (700) 10 (0)	10 (0)

15. Hwy 138/130th St

10 (10)	10 (10) 930 (970)
650 (700) 10 (10)	10 (10)

16. Hwy 138/110th St

10 (10)	10 (40) 920 (960)
640 (700) 10 (10)	10 (20)

17. Hwy 138/90th St

100 (80) 30 (30) 60 (40)	20 (20) 800 (870) 50 (30)
40 (80) 600 (630) 20 (10)	30 (50) 20 (30) 20 (10)

18. Hwy 138/80th St

50 (20)	10 (40) 810 (890)
570 (600) 120 (80)	10 (10)

19. Hwy 138/70th St

10 (10)	10 (20) 810 (920)
570 (610) 10 (10)	10 (10)

20. Hwy 138/60th St

40 (40) 60 (40) 30 (20)	10 (20) 730 (800) 10 (10)
20 (50) 560 (560) 30 (30)	50 (90) 30 (50) 10 (10)

21. Hwy 138/40th St

10 (10)	10 (10) 730 (820)
580 (570) 10 (10)	10 (10)

22. Hwy 138/30th St

10 (10)	10 (10) 730 (820)
580 (570) 10 (10)	10 (10)

23. Hwy 138/Hwy 14 SB Off-Ramp

230 (240) 20 (30)	500 (590) 20 (20)
170 (190) 420 (390)	

24. Hwy 138/Hwy 14 NB Off-Ramp

	20 (30) 130 (180)
70 (90) 120 (150)	390 (430) 10 (10)

LEGEND

1 Study Intersection AM (PM) Peak Hour Traffic Volume

Study Corridor

FEHR PEERS

Peak Hour Traffic Forecasts
2025 Alt 2 Conditions
FIGURE 24

FREEWAY OPERATIONS

Table 21 shows the AM and PM peak hour LOS for the study freeway mainline segments on eastbound and westbound SR-138 under 2020 and 2025 conditions, respectively.

For all study segment locations, SR-138 would operate at LOS D or better under the No Build Alternative. Under Alternatives 1 and 2, SR-138 would operate at LOS A or B at all study segment locations due to the additional lane capacity provided under both alternatives in the opening year. The capacity improvements would meet the near-term increase in travel demand along the corridor and improve operations from LOS C and D in the western portion of the corridor to LOS A or B, and from LOS B to C in the central and eastern portions of the corridor to LOS A or B. Appendix H contains the HCS 2010 LOS worksheets for 2020 and 2025 conditions.

TABLE 21 – SR-138 SEGMENT LOS – 2020/2025

Segment	Direction	Existing		2020 No Build/ TSM Alt		2025 Alt 1		2025 Alt 2	
		AM	PM	AM	PM	AM	PM	AM	PM
1- I-5 Connector to Gorman Post Road	EB	A	A	A	A	A	A	A	A
	WB			A	A	A	A	B	A
2-Gorman Post Road to Old Ridge Route	EB	A	B	C	C	A	A	A	A
	WB					A	A	A	A
3-Old Ridge Route to 300th Street W	EB	A	B	C	D	A	A	A	A
	WB					A	A	B	A
4-280th Street W to 270th Street W	EB	A	B	B	C	A	A	A	A
	WB					A	B	A	A
5-Three Points Road to 245th Street W	EB	A	B	B	C	A	A	A	A
	WB					B	B	B	A
6-230th Street W to 190th Street W	EB	A	B	B	C	A	A	A	A
	WB					B	B	A	A
7-190th Street W to 130th Street W	EB	B	C	B	C	A	A	A	A
	WB					B	A	B	A
8-130th Street W to 80th Street W	EB	B	B	B	C	A	A	A	A
	WB					A	A	A	A
9-80th Street W to 30th Street W	EB	B	B	C	C	A	A	A	A
	WB					A	A	A	A
10-30th Street W to SR-14	EB	A	A	A	B	A	A	A	A
	WB					A	A	A	A

The interchange of SR-138 and I-5 was also analyzed under No Build/TSM, Alternative 1 and Alternative 2 conditions. The analysis was completed for the merge and diverge points between I-5 and SR-138 as well as the I-5 mainline. Improvements to the merge/diverge lanes on I-5 serving the interchange with SR-138 under Alternatives 1 and 2 consist of two-lane off-ramps with 1,300-foot deceleration lanes plus shared mainline/off-ramp lanes and 2,500-foot acceleration lanes; as an enhanced safety measure the south-bound on-ramp acceleration lane has been extended to 3,500 feet as required by Caltrans. A more detailed analysis using the VISSIM software package was also conducted under design year (Year 2040) conditions as explained in the following chapter.

The operations of the I-5 & SR-138 interchange are shown in Table 22. The interchange and I-5 mainline are expected to operate at LOS C or better under 2020/2025 conditions under no build and the build alternatives. Appendix E contains the LOS worksheets for the I-5 & SR-138 interchange analysis.

TABLE 22 – I-5 & SR-138 OPERATIONS YEAR 2020/2025

Mainline/Ramp Operations	No Build/TSM		Alternative 1		Alternative 2	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
NB I-5 South of SR-138	16.1 B	18.2 C	18.6 C	22.6 C	18.6 C	22.6 C
NB I-5 Off-Ramp Diverge	8.6 A	15.5 B	9.9 A	19.3 B	9.9 A	19.2 B
NB I-5 On-Ramp Merge	16.9 B	17.9 B	4.6 A	6.0 A	4.6 A	5.9 A
NB I-5 North of SR-138	16.9 B	18.2 C	20.3 C	21.7 C	20.2 C	21.6 C
SB I-5 North of SR-138	18.2 C	16.7 B	21.7 C	19.6 C	21.6 C	19.6 C
SB I-5 Off-Ramp Diverge	15.5 B	14.2 B	18.5 B	16.7 B	18.4 B	16.7 B
SB I-5 On-Ramp Merge	18.1 B	16.0 B	8.1 A	3.1 A	7.9 A	3.0 A
SB I-5 South of SR-138	18.5 C	16.2 B	23.6 C	18.8 C	23.5 C	18.8 C

INTERSECTION OPERATIONS

Table 23 shows the No Build and TSM Alternative AM and PM peak hour delay and LOS for the study intersections under 2020 conditions. Appendix I contains the Synchro LOS worksheets for 2020 and 2025 conditions.

TABLE 23 – INTERSECTION LOS 2020 NO BUILD & TSM ALTERNATIVE

Intersection	Traffic Control	2020 No Build				2020 TSM Alternative			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (sec) [1]	LOS	Delay (sec) [1]	LOS	Delay (sec) [1]	LOS	Delay (sec) [1]	LOS
1. Hwy 138 & Gorman Post Road	TWSC[2]	16.8	C	15.5	C	13.9	B	13.7	B
2. Hwy 138 & Old Ridge Route Rd	TWSC[2]	20.4	C	17.0	C	18.7	C	18.1	C
3. Hwy 138 & Private Rd	TWSC[2]	14.6	B	14.9	B	14.4	B	15.8	C
4. Hwy 138 & 300th St W	TWSC[2]	10.8	B	11.4	B	10.7	B	11.2	B
5. Hwy 138 & Margalo Dr	TWSC[2]	10.0	B	10.6	B	10.1	B	10.5	B
6. Hwy 138 & 280th St W	TWSC[2]	11.2	B	12.2	B	11.2	B	11.4	B
7. Hwy 138 & 3 Points Rd	TWSC[2]	22.0	C	34.6	D	17.1	C	31.9	D
8. Hwy 138 & La Petite Ave	TWSC[2]	14.3	B	13.2	B	13.7	B	14.5	B
9. Hwy 138 & 230th St W	TWSC[2]	11.1	B	11.5	B	11.0	B	11.4	B
10. Hwy 138 & 210th St W	TWSC[2]	13.4	B	13.9	B	13.0	B	17.1	C
11. Hwy 138 & 190th St W	TWSC[2]	12.8	B	15.1	C	12.9	B	15.8	C
12. Hwy 138 & 170th St W	TWSC[2]	15.8	C	14.8	B	15.2	C	17.9	C
13. Hwy 138 & 110th St W	TWSC[2]	13.4	B	14.0	B	13.4	B	16.5	C
14. Hwy 138 & 90th St W	TWSC[2]	15.6	C	18.5	C	15.6	C	18.3	C
15. Hwy 138 & 85th St W	TWSC[2]	13.1	B	15.1	C	13.1	B	15.1	C
16. Hwy 138 & 80th St W	TWSC[2]	12.5	B	14.5	B	12.5	B	15.8	C
17. Hwy 138 & 70th St W	TWSC[2]	13.2	B	14.5	B	13.2	B	14.8	B
18. Hwy 138 & 60th St W	TWSC[2]	14.6	B	17.4	C	14.2	B	17.1	C
19. Hwy 138 & 30th St W	TWSC[2]	12.1	B	13.8	B	12.1	B	13.6	B
20. Hwy 138 & Hwy 14 SB Off-Ramp	TWSC[2]	10.1	B	11.5	B	10.7	B	11.2	B
21. Hwy 138 & Hwy 14 NB Off-Ramp	TWSC[2]	10.4	B	11.9	B	10.8	B	12.8	B

Source: Kimley-Horn and Associates, Inc.; Analysis based upon traffic forecasts provided by Fehr & Peers.
1. Worst approach delay reported for two-way stop control locations.
2. TWSC = Two-way stop control.

Table 24 shows the Alternative 1 and Table 25 shows the Alternative 2 AM and PM peak hour delay and LOS for the study intersections under 2025 conditions.

TABLE 24 – INTERSECTION LOS 2025 ALTERNATIVE I						
No.	Intersection	2025 Alternative 1				
		Traffic Control	AM Peak Hour		PM Peak Hour	
			Delay (sec) [1]	LOS	Delay (sec) [1]	LOS
1a.	Hwy 138 & Gorman Post Road EB Ramps[2]	TWSC[3]	11.4	B	11.7	B
1b.	Hwy 138 & Gorman Post Rd WB Ramps[2]	TWSC[3]	9.2	A	10.6	B
2a.	Hwy 138 & Private Rd EB Ramps[2]	Signal	4.8	A	5.8	A
2b.	Hwy 138 & Private Rd WB Ramps[2]	Signal	5.0	A	4.7	A
3a.	Hwy 138 & 300th St W EB Ramps[2]	Signal	6.6	A	8.3	A
3b.	Hwy 138 & 300th St W WB Ramps[2]	Signal	3.1	A	3.5	A
4.	Hwy 138 & Margalo Dr	Displaced Left (Free-flow)				
5.	Hwy 138 & 3 Points Rd	Median U-turn (Free-flow)				
6.	Hwy 138 & 250th St W	Displaced Left (Free flow)				
7.	Hwy 138 & 245th St W	TWSC[3]	12.4	B	13.0	B
8.	Hwy 138 & 240th St W	TWSC[3]	12.4	B	13.0	B
9.	Hwy 138 & 230th St W	TWSC[3]	12.5	B	13.0	B
10.	Hwy 138 & 210th St W	Median U-turn (Free-flow)				
11.	Hwy 138 & 190th St W	TWSC[3]	12.1	B	12.3	B
12.	Hwy 138 & 170th St W	Median U-turn (Free-flow)				
13.	Hwy 138 & 150th St W	TWSC[3]	11.8	B	11.9	B
14.	Hwy 138 & 140th St W	TWSC[3]	11.9	B	11.9	B
15.	Hwy 138 & 130th St W	TWSC[3]	11.8	B	12.0	B
16.	Hwy 138 & 110th St W	TWSC[3]	11.7	B	12.1	B
17.	Hwy 138 & Loop Rd West	TWSC[3]	10.6	B	10.9	B
18.	Hwy 138 & 90th St W	Median U-turn (Free-flow)				
19.	Hwy 138 & Loop Rd East	TWSC[3]	23.3	C	18.0	C
20.	Hwy 138 & 60th St W	Median U-turn (Free-flow)				
21.	Hwy 138 & 40th St W	TWSC[3]	10.9	B	11.2	B
22.	Hwy 138 & 30th St W	TWSC[3]	10.8	B	11.2	B
23.	Hwy 138 & Hwy 14 SB Off-Ramp	Roundabout	6.1	A	6.5	A
24.	Hwy 138 & Hwy 14 NB Off-Ramp	Roundabout	8.0	A	9.7	A

Source: Kimley-Horn and Associates, Inc.; 2014; Analysis based upon traffic forecasts provided by Fehr & Peers.
1. Worst approach delay reported for two-way stop control locations.
2. Grade Separated from SR-138.
3. TWSC = Two-way stop control.

TABLE 25 – INTERSECTION LOS 2025 ALTERNATIVE 2						
No.	Intersection	2025 Alternative 2				
		Traffic Control[4]	AM Peak Hour		PM Peak Hour	
			Delay (sec)[1]	LOS	Delay (sec) [1]	LOS
1a.	Hwy 138 & Gorman Post Rd EB Ramps[2]	TWSC[3]	< 10	A	< 10	A
1b.	Hwy 138 & Gorman Post Rd WB Ramps[2]	TWSC[3]	9.2	A	10.6	B
2.	Hwy 138 & Private Rd	Signal	13.9	B	12.6	B
3.	Hwy 138 & 300th St W	Signal	15.4	B	18.2	B
4.	Hwy 138 & Margalo Dr	Signal	11.1	B	13.0	B
5.	Hwy 138 & 3 Points Rd	Signal	21.5	C	13.9	B
6.	Hwy 138 & 250th St W	Signal	13.9	B	12.4	B
7.	Hwy 138 & 245th St W	TWSC[3]	12.4	B	13.0	B
8.	Hwy 138 & 240th St W	TWSC[3]	12.4	B	13.0	B
9.	Hwy 138 & 230th St W	TWSC[3]	12.5	B	13.0	B
10.	Hwy 138 & 210th St W	Signal	6.4	A	7.0	A
11.	Hwy 138 & 190th St W	TWSC[3]	12.1	B	12.3	B
12.	Hwy 138 & 170th St W	Signal	6.5	A	7.0	A
13.	Hwy 138 & 150th St W	TWSC[3]	11.8	B	11.9	B
14.	Hwy 138 & 140th St W	TWSC[3]	11.9	B	11.9	B
15.	Hwy 138 & 130th St W	TWSC[3]	11.8	B	12.0	B
16.	Hwy 138 & 110th St W	TWSC[3]	11.7	B	12.1	B
17.	Hwy 138 & 90th St W	Signal	14.5	B	16.8	B
18.	Hwy 138 & 80th St W	TWSC[3]	11.7	B	11.9	B
19.	Hwy 138 & 70th St W	TWSC[3]	11.2	B	11.8	B
20.	Hwy 138 & 60th St W	Signal	12.0	B	14.4	B
21.	Hwy 138 & 40th St W	TWSC[3]	10.9	B	11.2	B
22.	Hwy 138 & 30th St W	TWSC[3]	10.8	B	11.2	B
23.	Hwy 138 & Hwy 14 SB Off-Ramp	Signal	6.1	A	6.5	A
24.	Hwy 138 & Hwy 14 NB Off-Ramp	Signal	8.0	A	9.7	A

Source: Kimley-Horn and Associates, Inc. 2014; Analysis based upon traffic forecasts provided by Fehr & Peers.
1. Worst approach delay reported for two-way stop control locations.
2. Grade Separated from SR-138.
3. TWSC = Two-way stop control.
4. Analyzed treatments are shown in this table. Alternative traffic control treatments, such as roundabouts, are indicated in Table 17 for Alternative 2.

No Build Conditions

Under the No Build Alternative, 16 intersections are forecasted to operate at LOS B and five intersections are forecasted to operate at LOS C during the AM peak hour. During the PM peak hour, 14 intersections are forecasted to operate at LOS B, six intersections are forecasted to operate at LOS C, and one intersection – SR-138 & 3 Points Road – is forecasted to operate at LOS D.

Build Alternative 1

Under Build Alternative 1, during the AM peak hour, seven intersections are forecasted to operate at LOS A and 13 intersections are forecasted to operate at LOS B. Several intersections were not analyzed because they are configured to have free-flow traffic conditions. During the PM peak hour, six intersections were forecasted to operate at LOS A and 14 intersections were forecasted to operate at LOS B. Compared to the No Build scenario, conditions are expected to remain the same or improve at every analyzed intersection. Alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G).

Build Alternative 2

Under Build Alternative 2, during the AM peak hour, four intersections are expected to operate at LOS A, 19 intersections are expected to operate at LOS B, and one intersection – SR-138 & 3 Points Road – is expected to operate at LOS C. During the PM peak hour, five intersections are expected to operate at LOS A, and 19 intersections are expected to operate at LOS B. Compared to the No Build scenario, conditions are expected to remain the same or improve at every analyzed intersection. Compared to the Build Alternative 1, some intersections are forecasted to experience slightly more delay (SR-138 & 3 Points Road, SR-138 & Private Road, SR-138 & 300th Street), but nearly every intersection is still forecasted to operate at LOS B or better. Alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G).

TSM Alternative

Under the TSM Alternative, during the AM peak hour, 17 intersections are forecasted to operate at LOS B and four intersections are forecasted to operate at LOS C. During the PM peak hour, 10 intersections are forecasted to operate at LOS B, 10 intersections are forecasted to operate at LOS C, and one intersection – SR-138 & 3 Points Road – is expected to operate at LOS F. Compared to the No Build scenario, conditions improve slightly at some intersections, worsen slightly at some intersections, and remain the same at most intersections. Compared to the Build Alternative 1 and 2, the TSM Alternative is expected to generally result in more delayed conditions overall, particularly during the PM peak period. Alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G).

6 Design Year 2040 Conditions

This chapter presents the analysis results of the project alternatives under design year (2040) conditions. The purpose of the design year analysis is to evaluate long-term traffic operations on SR-138 with and without the mainline improvements under the design year (2040) conditions. For each alternative, traffic operations are evaluated at the roadway segment and intersection level of detail.

ANALYSIS SCENARIOS

Traffic forecasts were developed and traffic operations were evaluated for each of the following project alternatives under design year (2040) conditions:

- No Build Alternative
- Build Alternative 1 (Freeway and Expressway)
- Build Alternative 2 (Expressway and Limited Access Conventional Highway)
- TSM Alternative

TRAFFIC FORECASTS

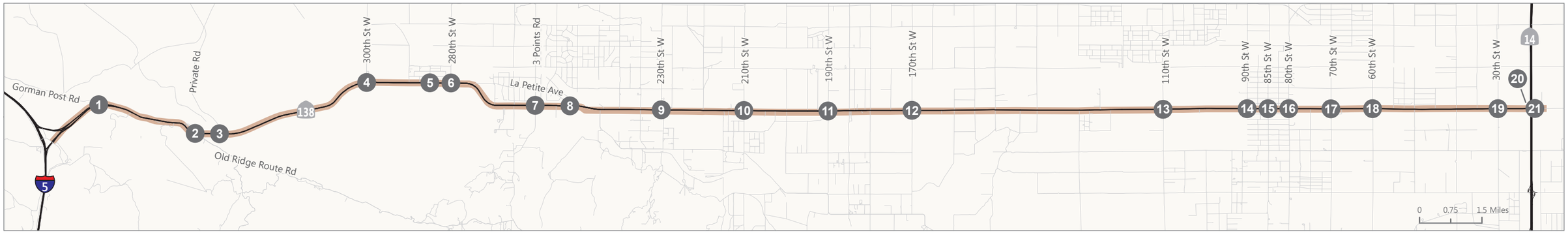
The North County Sub-Area model was used to develop travel demand forecasts under each Build Alternative based on the increase in capacity along the corridor. Both daily and peak hour traffic forecasts were obtained from the model to reflect Year 2035 traffic conditions based on planned improvements and growth in the study area. Since the sub-area model reflects Year 2035 conditions, the Design Year 2040 forecasts were developed using a calculated annual growth rate between existing volumes and the 2035 traffic forecasts, and extending the growth projections to Year 2040.

The truck percentages for 2040 were based on the Year 2035 model projections for truck travel along the corridor. Truck percentages differed from east and west ends of the SR-138 corridor. As shown in Table 26, the 2040 No Build scenario forecasts 6% trucks on SR-138 near I-5 and 4% trucks on SR-138 near SR-14. The number of trucks using the corridor under Alternatives 1 and 2 are higher than in the No Build alternative; however, the traffic forecasts are also higher and therefore the overall truck percentage is lower (approximately 5-6% trucks along the entire corridor). For the I-5 mainline, trucks were forecasted to remain at 25% of total daily traffic volumes.

TABLE 26 – 2040 TRUCK PERCENTAGES			
Scenario	**SR-138 West at I-5**	**SR-138 East at SR-14**	**I-5 Mainline**
2020 No Build	6%	4%	25%
2025 Alternative 1	6%	5%	25%
2025 Alternative 2	6%	5%	25%

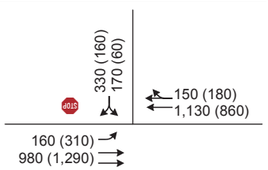
Figures 25 through 29 display the AM and PM peak hour traffic forecasts for each of the project alternatives under 2040 conditions along the SR-138 corridor and at the I-5 & SR-138 interchange. Table 27 displays the ADT forecasts for each segment of the project alternatives under 2040 conditions.

TABLE 27 – 2040 ADT VOLUMES & FORECASTS					
ID	**Location**	**2012 Subarea Model**	**2040 Subarea No Build/TSM**	**2040 Subarea Alternative 1**	**2040 Subarea Alternative 2**
1	I-5 North of SR138	70,600	110,900	124,500	122,600
2	I-5 South of SR138	67,900	122,300	125,800	125,800
3	I-5 NB Off-Ramp to SR-138	600	13,250	22,080	21,640
4	I-5 NB On-Ramp to SR-138	1,335	9,400	16,200	15,900
5	I-5 SB Off-ramp to SR-138	1,195	8,350	14,400	14,100
6	I-5 SB On-Ramp to SR-138	675	13,990	24,120	23,640
7	SR-138 East of I-5	4,500	40,700	73,600	71,500
8	SR-138 West of 300th Street	4,500	30,500	68,400	66,200
9	SR-138 West of 245th Street	4,000	23,500	54,700	52,700
10	SR-138 West of 190th Street	3,500	17,500	48,300	46,100
11	SR-138 West of 110th Street	3,700	18,200	45,800	43,200
12	SR-138 West of 60th Street	3,800	17,500	42,000	38,500
13	SR-138 West of SR14	3,800	17,100	39,100	35,700
14	SR-14 North of SR138	44,300	64,200	56,700	58,300
15	SR-14 South of SR138	46,400	66,300	68,100	68,000

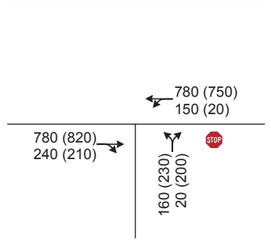


Not to Scale

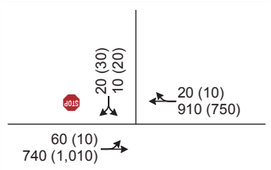
1. Hwy 138/Gorman Post Rd



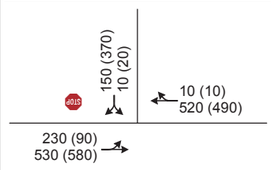
2. Hwy 138/Old Ridge Route Rd



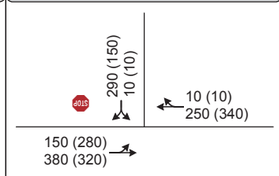
3. Hwy 138/Private Rd



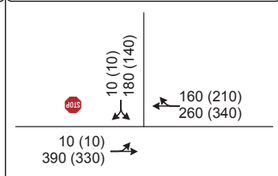
4. Hwy 138/300th St W



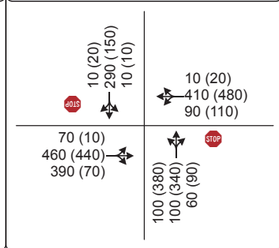
5. Hwy 138/Margalo Dr



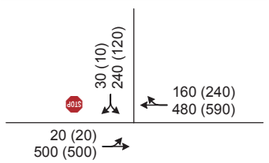
6. Hwy 138/280th St W



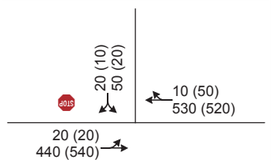
7. Hwy 138/3 Points Rd



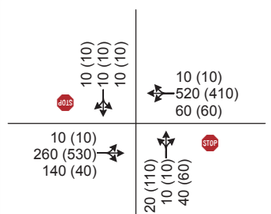
8. Hwy 138/La Petite Ave



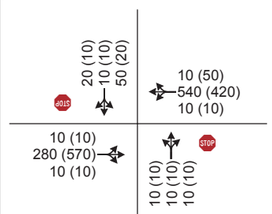
9. Hwy 138/230th St W



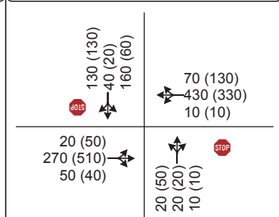
10. Hwy 138/210th St W



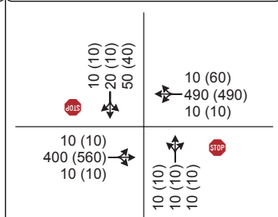
11. Hwy 138/190th St W



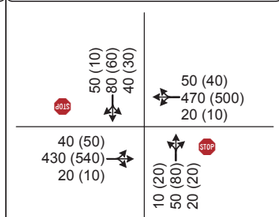
12. Hwy 138/170th St W



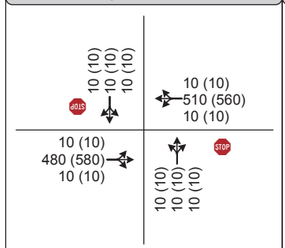
13. Hwy 138/110th St W



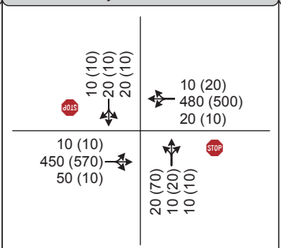
14. Hwy 138/90th St W



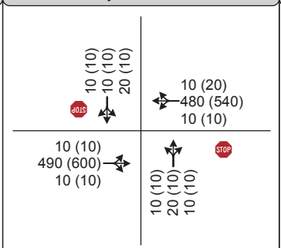
15. Hwy 138/85th St W



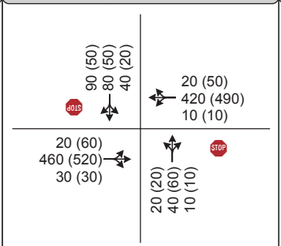
16. Hwy 138/80th St W



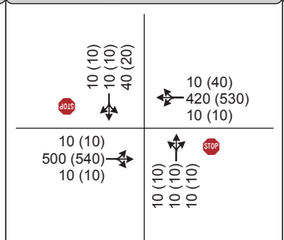
17. Hwy 138/70th St W



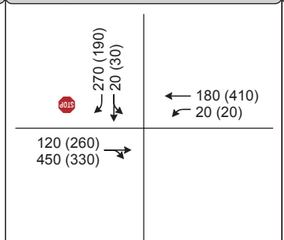
18. Hwy 138/60th St W



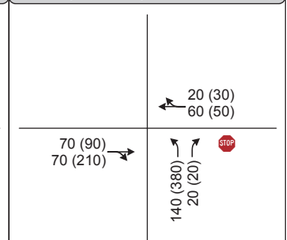
19. Hwy 138/30th St W



20. Hwy 138/Hwy 14 SB Off-Ramp



21. Hwy 138/Hwy 14 NB Off-Ramp



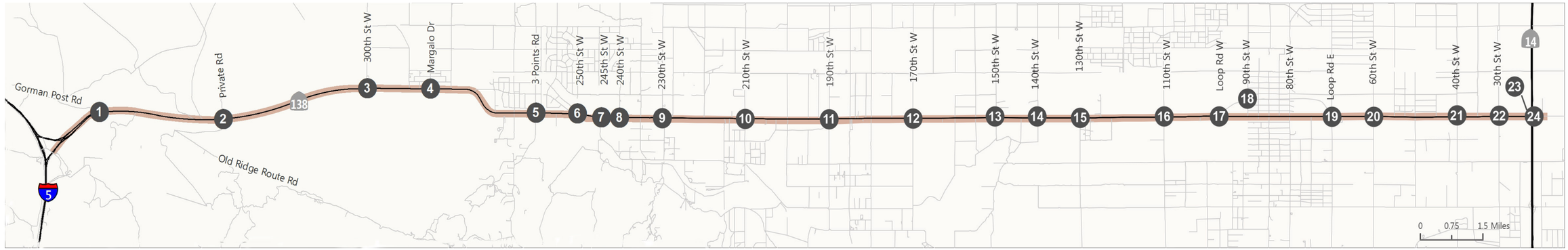
LEGEND

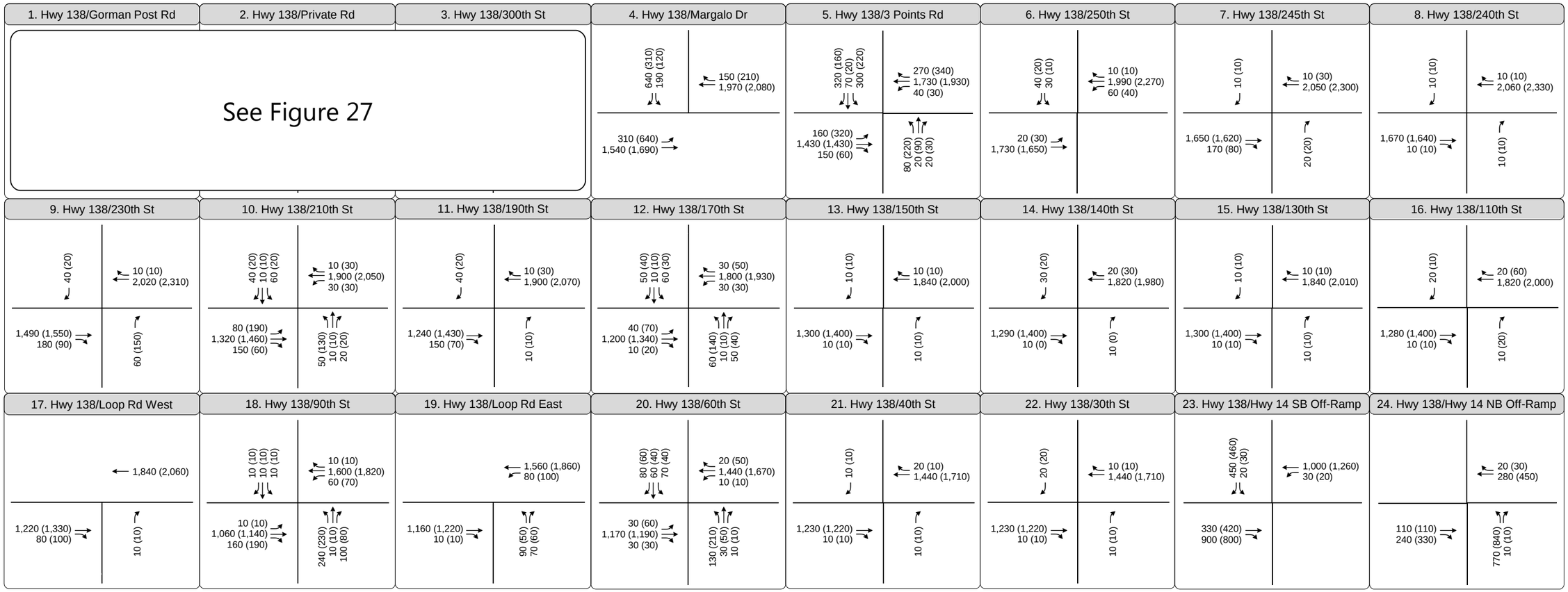
- 1 Study Intersection
- Study Corridor
- Turn Lane
- AM (PM) Peak Hour Traffic Volume
- STOP Stop Sign

FEHR & PEERS

Path: N:\2013Projects\LA_Projects\LA13-2599\June2015Update\GIS\MXD\Fig25_PHTV_2040NoBuild.mxd

Peak Hour Traffic Forecasts
Future 2040 Conditions (No Build/TSM Alternative)
FIGURE 25





LEGEND

1 Study Intersection AM (PM) Peak Hour Traffic Volume

Study Corridor

Note: If Loop Road is not constructed, traffic forecasts for 90th Street West should be the same as volumes shown in Figure 29.

FEHR PEERS

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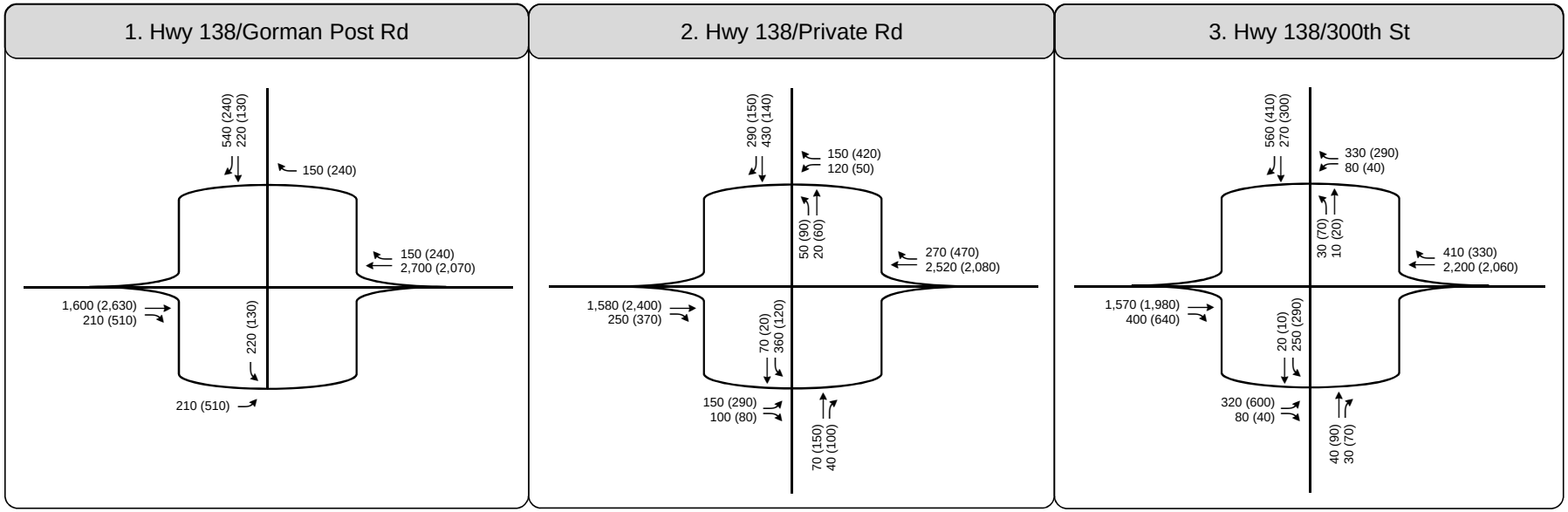
Peak Hour Traffic Forecasts-
2040 Alt 1 Conditions

FIGURE 26



LEGEND

1 Study Intersection AM (PM) Peak Hour Traffic Volume

Study Corridor

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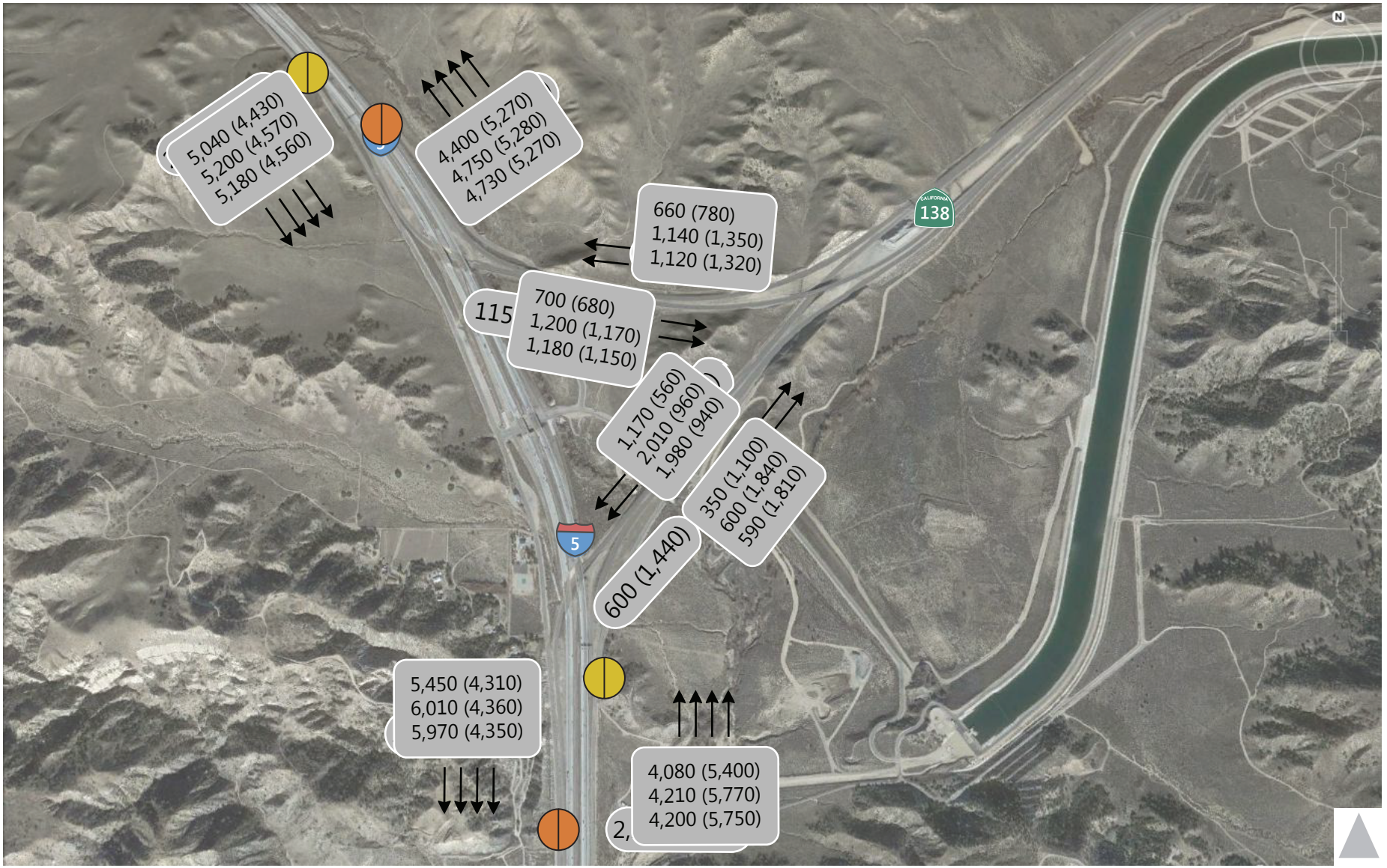
Peak Hour Traffic Forecasts
2040 Alt 1 Conditions

FIGURE 27



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AM (PM) - No Build / TSM
AM (PM) - Alternative 1
AM (PM) - Alternative 2

*25% trucks on I-5

Figure 28

Future 2040 Conditions -
I-5 and SR 138

1. Hwy 138/Gorman Post Rd

540 (240) 220 (130)	150 (240) 2,660 (1,940)
210 (510) 1,560 (2,590)	

2. Hwy 138/Private Rd

290 (150) 70 (20) 360 (120)	150 (420) 2,480 (1,950) 120 (50)
150 (290) 1,540 (2,350) 100 (80)	50 (90) 20 (60) 40 (100)

3. Hwy 138/300th St

560 (410) 20 (10) 250 (290)	330 (290) 2,160 (1,930) 80 (40)
320 (600) 1,530 (1,930) 80 (40)	30 (70) 10 (20) 30 (70)

4. Hwy 138/Margalo Dr

640 (310) 190 (120)	150 (210) 1,930 (1,950)
310 (640) 1,500 (1,640)	

5. Hwy 138/3 Points Rd

320 (160) 70 (20) 300 (220)	270 (340) 1,680 (1,800) 30 (30)
160 (320) 1,390 (1,390) 150 (60)	80 (220) 20 (90) 20 (30)

6. Hwy 138/250th St

40 (20) 30 (10)	10 (10) 1,950 (2,130) 50 (40)
20 (30) 1,680 (1,600)	

7. Hwy 138/245th St

10 (10)	10 (30) 1,990 (2,170)
1,600 (1,570) 160 (80)	20 (20)

8. Hwy 138/240th St

10 (10)	10 (10) 2,000 (2,200)
1,620 (1,590) 10 (10)	10 (10)

9. Hwy 138/230th St

40 (20)	10 (10) 1,960 (2,170)
1,440 (1,510) 180 (90)	60 (150)

10. Hwy 138/210th St

40 (20) 10 (10) 60 (20)	10 (30) 1,850 (1,910) 30 (30)
80 (190) 1,280 (1,410) 150 (60)	50 (130) 10 (10) 20 (20)

11. Hwy 138/190th St

40 (20)	10 (30) 1,850 (1,930)
1,200 (1,380) 150 (70)	10 (10)

12. Hwy 138/170th St

50 (40) 10 (10) 50 (30)	30 (40) 1,750 (1,790) 30 (30)
50 (80) 1,150 (1,290) 10 (20)	60 (140) 10 (10) 30 (30)

13. Hwy 138/150th St

10 (10)	10 (10) 1,790 (1,840)
1,230 (1,340) 10 (10)	10 (10)

14. Hwy 138/140th St

30 (20)	10 (30) 1,760 (1,830)
1,230 (1,340) 10 (0)	10 (0)

15. Hwy 138/130th St

10 (10)	10 (10) 1,770 (1,850)
1,240 (1,340) 10 (10)	10 (10)

16. Hwy 138/110th St

20 (10)	20 (70) 1,760 (1,840)
1,220 (1,330) 10 (10)	10 (20)

17. Hwy 138/90th St

190 (150) 30 (30) 100 (70)	20 (30) 1,530 (1,670) 90 (40)
70 (150) 1,140 (1,200) 30 (20)	60 (90) 20 (40) 20 (10)

18. Hwy 138/80th St

90 (40)	20 (70) 1,540 (1,700)
1,090 (1,150) 220 (150)	10 (10)

19. Hwy 138/70th St

10 (10)	10 (20) 1,560 (1,760)
1,090 (1,160) 10 (10)	10 (10)

20. Hwy 138/60th St

80 (60) 60 (40) 50 (30)	20 (40) 1,390 (1,540) 10 (10)
30 (100) 1,060 (1,070) 30 (30)	100 (170) 30 (50) 10 (10)

21. Hwy 138/40th St

10 (10)	20 (10) 1,390 (1,570)
1,110 (1,090) 10 (10)	10 (10)

22. Hwy 138/30th St

20 (20)	10 (10) 1,390 (1,570)
1,110 (1,090) 10 (10)	10 (10)

23. Hwy 138/Hwy 14 SB Off-Ramp

440 (450) 20 (30)	980 (1,120) 30 (20)
310 (360) 800 (740)	

24. Hwy 138/Hwy 14 NB Off-Ramp

	20 (30) 250 (350)
100 (90) 230 (290)	750 (820) 10 (10)

LEGEND

1 Study Intersection AM (PM) Peak Hour Traffic Volume

Study Corridor

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Peak Hour Traffic Forecasts
2040 Alt 2 Conditions
FIGURE 29

FREEWAY OPERATIONS

Table 28 shows the AM and PM peak hour LOS for the study freeway mainline segments on eastbound and westbound SR-138 under 2040 conditions, respectively.

Under the No Build Alternative, SR-138 would operate at LOS E or worse conditions between Gorman Post Road and 300th Street during AM and PM peak hours. For all other study segment locations, SR-138 would operate at LOS D or better under the No Build Alternative.

Under Alternatives 1 and 2, SR-138 would operate at LOS B or better at all study segment locations due to the additional lane capacity. Alternative 2 would operate at a slightly worse LOS (LOS B) than Alternative 1 in the westbound direction during the AM peak hour at segments 1 and 3. However, Alternative 2 operations would improve over Alternative 1 LOS at segments 4 and 6 under both peak hours in the westbound direction. For all other locations, the LOS would remain at LOS A or B for both alternatives, showing no change in results. Appendix J contains the SR-138 HCS 2010 LOS worksheets for 2040 conditions.

TABLE 28 – SR-138 SEGMENT LOS YEAR 2040

Segment	Direction	Existing		2040 No Build/ TSM		2040 Alt 1		2040 Alt 2	
		AM	PM	AM	PM	AM	PM	AM	PM
1- I-5 Connector to Gorman Post Road	EB	A	A	B	B	A	B	B	C
	WB			B	A	C	B	C	B
2-Gorman Post Road to Old Ridge Route	EB	A	B	E	E	B	B	B	B
	WB					B	B	C	B
3-Old Ridge Route to 300th Street W	EB	A	B	E	E	B	B	B	C
	WB					C	B	C	B
4-280th Street W to 270th Street W	EB	A	B	D	D	B	B	B	B
	WB					C	C	C	C
5-Three Points Road to 245th Street W	EB	A	B	D	D	C	B	C	B
	WB					C	C	C	C
6-230th Street W to 190th Street W	EB	A	B	D	D	B	B	B	B
	WB					C	C	C	C
7-190th Street W to 130th Street W	EB	B	C	C	D	B	B	B	B
	WB					C	C	C	C
8-130th Street W to 80th Street W	EB	B	B	D	D	B	B	B	B
	WB					B	B	B	B
9-80th Street W to 30th Street W	EB	B	B	D	D	B	B	A	A
	WB					B	B	B	B
10-30th Street W to SR-14	EB	A	A	B	C	B	B	A	A
	WB					B	B	B	B

To provide a thorough analysis of the ramp connections between I-5 and SR-138, a microsimulation model of the interchange was developed using the VISSIM software package under design year conditions for Alternatives 1 and 2. The VISSIM model was developed to simulate Year 2040 travel demands at the interchange during the AM and PM peak hours. VISSIM considers the interaction between vehicles traveling to/from SR-138 as they merge/diverge with vehicles traveling on the I-5 mainline.

Table 29 presents the analysis parameters used in the VISSIM model for the I-5 & SR-138 interchange.

TABLE 29 – I-5 & SR-138 ANALYSIS PARAMETERS

Analysis		Parameters/Description
Interchange Geometrics	NB/SB Off-Ramps	Provide Two-Lane Off-Ramps: One 1,300' Deceleration Lane + A Shared Mainline/Off-Ramp Lane
	NB/SB On-Ramps	Provide 2,500' Acceleration Lanes; Extend SB on-ramp to 3,500 feet as an enhanced safety measure as required by Caltrans
Design Year (2040) Forecasts	% of ADT	8%[1]
	NB I-5 AM Peak	4,210
	SB I-5 AM Peak	6,010
	NB I-5 PM Peak	5,770
	SB I-5 PM Peak	4,360
I-5 Mainline Trucks	% Truck Traffic	25%
	Lane Assignment	70% Lane 4/30% Lane 3[2]
I-5 Travel Speeds (Average) [3]	NB Cars	60 MPH
	NB Trucks	50 MPH
	SB Cars	65 MPH
	SB Trucks	55 MPH
Analysis Software	VISSIM	VISSIM was used to analyze the interchange geometrics based on the parameters presented above. The LOS results are from VISSIM and based on Speed (MPH) and Density (Vehicles per Lane per Mile).

Notes:

1. Peak hour volumes increase to account for 8% of ADT to present a conservative analysis. Caltrans Transportation Concept Report for I-5 (dated June 2013) shows that the peak hour is 6.6% of the ADT on I-5 between SR-138 (S) to the Kern County Line under Year 2035 Conditions.
2. The VISSIM analysis reflects 70% trucks in Lane 4 and 30% trucks in Lane 3 on the I-5 mainline segments. At merge/diverge points, trucks are permitted to maneuver between Lanes 3 and 4. VISSIM only allows trucks to change lanes if a gap in the adjacent travel lane is available; therefore, lane changes for trucks are minimal but are allowed to provide some flexibility for drivers at the merge/diverge locations. Trucks often travel in Lane 3 at major freeway-to-freeway connections to avoid vehicles traveling to/from the ramp connections. Trucks are never allowed to enter Lanes 1 or 2 in the VISSIM model.
3. Travel speeds coded into the VISSIM model reflect the grade on I-5 in the vicinity of SR-138. I-5 has a 4% grade just south of SR-138 and a 3% grade just north of SR-138.

The traffic operations results are presented in Table 30 for AM and PM peak hour design year conditions. As shown, design year operations are at LOS D or better. Appendix E contains the detailed VISSIM analysis worksheets for the I-5 & SR-138 interchange analysis.

TABLE 30 – I-5 & SR-138 OPERATIONS YEAR 2040 ALTERNATIVES 1 & 2

Mainline/Ramp Operations	AM Peak Hour (Speed) (Density) (LOS)	PM Peak Hour (Speed) (Density) (LOS)
NB I-5 South of SR-138	55.1 18.9 C	50.8 29.3 D
NB I-5 Off-Ramp Diverge	52.6 14.3 B	50.1 24.9 C
NB I-5 On-Ramp Merge	52.6 21.0 C	51.0 25.3 C
NB I-5 North of SR-138	55.1 21.9 C	53.8 24.8 C
SB I-5 North of SR-138	59.8 23.9 C	60.3 21.7 C
SB I-5 Off-Ramp Diverge	59.0 20.0 C	59.6 18.8 B
SB I-5 On-Ramp Merge	58.5 26.4 C	59.5 18.1 B
SB I-5 South of SR-138	60.3 25.4 C	61.1 18.1 C

Note:

1. Year 2040 forecasts for Alternatives 1 and 2 are similar. Alternative 1, the ultimate buildout scenario with the highest forecasts, was used to produce the LOS results using VISSIM.

The Year 2040 No Build and TSM Alternative were analyzed using the 2010 HCM and the LOS results are shown in Table 31. As shown, the interchange and I-5 mainline are expected to operate at LOS D or better. Appendix E contains the LOS worksheets for the I-5 & SR-138 interchange analysis.

TABLE 31 – I-5 & SR-138 OPERATIONS YEAR 2040 NO BUILD/TSM

Mainline/Ramp Operations	AM Peak Hour (Density) (LOS)	PM Peak Hour (Density) (LOS)
NB I-5 South of SR-138	23.6 C	34.1 D
NB I-5 Off-Ramp Diverge	12.5 B	26.6 C
NB I-5 On-Ramp Merge	23.9 C	27.4 C
NB I-5 North of SR-138	25.7 C	32.8 D
SB I-5 North of SR-138	30.7 D	25.9 C
SB I-5 Off-Ramp Diverge	24.8 C	21.8 C
SB I-5 On-Ramp Merge	29.8 D	23.1 C
SB I-5 South of SR-138	34.6 D	25.1 C

INTERSECTION OPERATIONS

Table 32 shows the No Build and TSM Alternative AM and PM peak hour delay and LOS for the study intersections under 2040 conditions. Table 33 shows the Alternative 1 and Table 34 shows the Alternative 2 AM and PM peak hour delay and LOS for the study intersections under 2040 conditions. Appendix K contains the Synchro LOS worksheets for 2040 conditions.

TABLE 32 – INTERSECTION LOS 2040 NO BUILD & TSM ALTERNATIVE

Intersection	Traffic Control	2040 No Build				2040 TSM Alternative			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (sec)*	LOS	Delay (sec)*	LOS	Delay (sec)*	LOS	Delay (sec)*	LOS
1. Hwy 138 & Gorman Post Rd	TWSC	>300	F	>300	F	>300	F	>300	F
2. Hwy 138 & Old Ridge Route Rd	TWSC	83.9	F	>300	F	>300	F	>300	F
3. Hwy 138 & Private Rd	TWSC	224.0	F	142.7	F	133.2	F	218.8	F
4. Hwy 138 & 300th St W	TWSC	24.2	C	58.3	F	21.9	C	48.3	F
5. Hwy 138 & Margalo Dr	TWSC	14.0	B	15.8	C	13.9	B	14.7	C
6. Hwy 138 & 280th St W	TWSC	25.1	D	29.6	D	21.2	C	19.2	C
7. Hwy 138 & 3 Points Rd	TWSC	>300	F	>300	F	10.0	B	10.0	B
8. Hwy 138 & La Petite Ave	TWSC	>300	F	63.2	F	>300	F	167.7	F
9. Hwy 138 & 230th St W	TWSC	23.6	C	22.0	C	23.6	C	22.3	C
10. Hwy 138 & 210th St W	TWSC	44.3	E	122.1	F	34.5	D	>300	F
11. Hwy 138 & 190th St W	TWSC	39.2	E	43.6	E	39.2	E	41.5	E
12. Hwy 138 & 170th St W	TWSC	>300	F	103.0	F	>300	F	>300	F
13. Hwy 138 & 110th St W	TWSC	63.3	F	37.0	E	63.6	F	97.1	F
14. Hwy 138 & 90th St W	TWSC	223.2	F	>300	F	190.6	F	>300	F
15. Hwy 138 & 85th St W	TWSC	27.7	D	36.9	E	27.7	D	36.6	E
16. Hwy 138 & 80th St W	TWSC	28.8	D	47.9	E	28.8	D	69.9	F
17. Hwy 138 & 70th St W	TWSC	27.0	D	28.5	D	27.0	D	29.4	D
18. Hwy 138 & 60th St W	TWSC	55.8	F	86.1	F	51.1	F	81.9	F
19. Hwy 138 & 30th St W	TWSC	26.4	D	30.4	D	26.4	D	28.9	D
20. Hwy 138 & Hwy 14 SB Off-Ramp	TWSC	12.8	B	17.5	C	12.8	B	16.2	C
21. Hwy 138 & Hwy 14 NB Off-Ramp	TWSC	11.4	B	21.0	C	11.4	B	24.1	C

Source: Kimley-Horn and Associates, Inc. August 2014; Analysis based upon existing counts and lane configuration provided by Fehr & Peers
**indicates worst approach delay*
TWSC = Two-way stop control

TABLE 33 – INTERSECTION LOS 2040 ALTERNATIVE I						
No.	Intersection	2040 Alternative 1				
		Traffic Control	AM Peak Hour		PM Peak Hour	
			Delay (sec)[1]	LOS	Delay (sec) [1]	LOS
1a.	Hwy 138 & Gorman Post Rd EB Ramps[2]	TWSC[3]	18.6	C	27.8	D
1b.	Hwy 138 & Gorman Post Rd WB Ramps[2]	TWSC[3]	10.3	B	16.0	C
2a.	Hwy 138 & Private Rd EB Ramps[2]	Roundabout	<10	A	<10	A
2b.	Hwy 138 & Private Rd WB Ramps[2]	Roundabout	<10	A	<10	A
3a.	Hwy 138 & 300th St W EB Ramps[2]	Roundabout	<10	A	14.2	B
3b.	Hwy 138 & 300th St W WB Ramps[2]	Roundabout	<10	A	<10	A
4.	Hwy 138 & Margalo Dr	Displaced Left (Free-flow)				
5.	Hwy 138 & 3 Points Rd	Median U-turn (Free-flow)				
6.	Hwy 138 & 250th St W	Displaced Left (Free flow)				
7.	Hwy 138 & 245th St W	TWSC[3]	21.3	C	25.3	D
8.	Hwy 138 & 240th St W	TWSC[3]	21.3	C	25.5	D
9.	Hwy 138 & 230th St W	TWSC[3]	23.3	C	26.3	D
10.	Hwy 138 & 210th St W	Median U-turn (Free-flow)				
11.	Hwy 138 & 190th St W	TWSC[3]	21.4	C	22.7	C
12.	Hwy 138 & 170th St W	Median U-turn (Free-flow)				
13.	Hwy 138 & 150th St W	TWSC[3]	18.8	C	20.7	C
14.	Hwy 138 & 140th St W	TWSC[3]	19.8	C	21.4	C
15.	Hwy 138 & 130th St W	TWSC[3]	18.8	C	20.8	C
16.	Hwy 138 & 110th St W	TWSC[3]	19.2	C	21.3	C
17.	Hwy 138 & Loop Rd West	TWSC[3]	14.0	B	14.9	B
18.	Hwy 138 & 90th St W	Median U-turn (Free-flow)				
19.	Hwy 138 & Loop Rd East	Displaced Left-Turn (Free-flow)				
20.	Hwy 138 & 60th St W	Median U-turn (Free-flow)				
21.	Hwy 138 & 40th St W	TWSC[3]	15.1	C	17.4	C
22.	Hwy 138 & 30th St W	TWSC[3]	15.4	C	17.9	C
23.	Hwy 138 & Hwy 14 SB Off-Ramp	Roundabout	15.4	C	11.3	B
24.	Hwy 138 & Hwy 14 NB Off-Ramp	Roundabout	16.3	C	19.8	C

Source: Kimley-Horn and Associates, Inc. 2014; Analysis based upon traffic forecasts provided by Fehr & Peers.

1. Worst approach delay reported for two-way stop control locations.
2. Grade Separated from SR-138.
3. TWSC = Two-way stop control.

TABLE 34 – INTERSECTION LOS 2040 ALTERNATIVE 2						
No.	Intersection	2040 Alternative 2				
		Traffic Control[4]	AM Peak Hour		PM Peak Hour	
			Delay (sec) [1]	LOS	Delay (sec) [1]	LOS
1a.	Hwy 138 & Gorman Post Rd EB Ramps[2]	TWSC[3]	< 10	A	< 10	A
1b.	Hwy 138 & Gorman Post Rd WB Ramps[2]	TWSC[3]	10.3	B	16.1	C
2.	Hwy 138 & Private Rd EB Ramps	Signal	21.2	C	18.3	B
3.	Hwy 138 & 300th St W EB Ramps	Signal	20.7	C	21.6	C
4.	Hwy 138 & Margalo Dr	Signal	30.8	C	47.2	D
5.	Hwy 138 & 3 Points Rd	Signal	34.1	C	44.0	D
6.	Hwy 138 & 250th St W	Signal	21.3	C	29.0	C
7.	Hwy 138 & 245th St W	TWSC[3]	20.5	C	23.3	C
8.	Hwy 138 & 240th St W	TWSC[3]	20.7	C	23.4	C
9.	Hwy 138 & 230th St W	TWSC[3]	22.4	C	23.9	C
10.	Hwy 138 & 210th St W	Signal	18.0	B	36.8	D
11.	Hwy 138 & 190th St W	TWSC[3]	20.7	C	20.7	C
12.	Hwy 138 & 170th St W	Signal	13.3	B	24.6	C
13.	Hwy 138 & 150th St W	TWSC[3]	18.3	C	18.8	C
14.	Hwy 138 & 140th St W	TWSC[3]	18.9	C	19.5	C
15.	Hwy 138 & 130th St W	TWSC[3]	18.0	C	18.9	C
16.	Hwy 138 & 110th St W	TWSC[3]	18.5	C	19.5	C
17.	Hwy 138 & 90th St W	Signal	21.2	C	24.2	C
18.	Hwy 138 & 80th St W	TWSC[3]	19.5	C	19.5	C
19.	Hwy 138 & 70th St W	TWSC[3]	16.1	C	18.0	C
20.	Hwy 138 & 60th St W	Signal	15.6	B	27.2	C
21.	Hwy 138 & 40th St W	TWSC[3]	14.8	B	16.1	C
22.	Hwy 138 & 30th St W	TWSC[3]	15.0	B	16.5	C
23.	Hwy 138 & Hwy 14 SB Off-Ramp	Signal	16.4	B	18.2	B
24.	Hwy 138 & Hwy 14 NB Off-Ramp	Signal	18.5	B	23.5	C

Source: Kimley-Horn and Associates, Inc. 2014; Analysis based upon traffic forecasts provided by Fehr & Peers.

1. Worst approach delay reported for two-way stop control locations.
2. Grade Separated from SR-138.
3. TWSC = Two-way stop control.
4. Analyzed treatments are shown in this table. Alternative traffic control treatments, such as roundabouts, are indicated in Table 17 for Alternative 2.

No Build Conditions

Under the No Build Alternative, during the AM peak period, three intersections are forecasted to operate at LOS B, two at LOS C, five at LOS D, two at LOS E, and nine at LOS F. During the PM peak hour, four intersections are forecasted to operate at LOS C, three at LOS D, four at LOS E, and 10 at LOS F.

Build Alternative 1

Under Build Alternative 1, during the AM peak hour, five intersections are forecasted to operate at LOS A, one intersection is forecasted to operate at LOS B, and 15 are forecasted to operate at LOS C. Seven intersections were not analyzed because they are configured to have free-flow traffic conditions. During the PM peak hour, three intersections were forecasted to operate at LOS A, three at LOS B, nine at LOS C, and four intersections were forecasted to operate at LOS D. Alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G).

Compared to the No Build scenario, conditions are expected to remain the same or improve at every analyzed intersection, with the exception of two intersections during the AM peak hour and one intersection during the PM peak hour. During the AM peak hour, the SR-138 & SR 14 northbound and southbound off ramps are forecasted to worsen from LOS B to LOS C. During the PM peak period, SR-138 & 230th Street is forecasted to worsen from LOS C to LOS D.

Build Alternative 2

Under Build Alternative 2, during the AM peak hour, seven intersections are expected to operate at LOS B and 17 intersections are expected to operate at LOS C. During the PM peak hour, two intersections are expected to operate at LOS B, 19 intersections are expected to operate at LOS C, and three intersections are expected to operate at LOS D. Compared to the No Build scenario, conditions are expected to remain the same or improve at every analyzed intersection, with the exception of SR-138 & Margalo Drive. SR-138 & Margalo Drive is forecasted to worsen from LOS B to LOS C during the AM peak hour and from LOS C to LOS D during the PM peak hour. Compared to the Build Alternative 1, Build Alternative 2 is forecasted to experience more delayed conditions, overall. Alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G).

TSM Alternative

Under the TSM Alternative, during the AM peak hour, one intersection is forecasted to operate at LOS A, three intersections are forecasted to operate at LOS B, three intersections are forecasted to operate at LOS C, four intersections are forecasted to operate at LOS D, two intersections are forecasted to operate at LOS E, and eight intersections are forecasted to operate at LOS F. During the PM peak hour, one intersection is forecasted to operate at LOS A, five intersections are forecasted to operate at LOS C, two intersections are forecasted to operate at LOS D, two intersections are forecasted to operate at LOS E, and 11 intersections are expected to operate at LOS F. Alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G).

Compared to the No Build scenario, conditions remain the same at most intersections. During both the AM and PM peak hours, conditions at SR-138 & 280th Street and SR-138 & 3 Points Road are forecasted

to improve from LOS D to LOS C and LOS F to LOS A, respectively. At SR-138 & 110th Street and SR-138 & 80th Street, conditions are forecasted to worsen from LOS E to LOS F during the PM peak hour. Compared to the Build Alternative 1 and 2, the TSM Alternative is expected to generally result in more delayed conditions overall, particularly during the PM peak period.

Alternative Treatment Options

As discussed in the description of the build alternatives and shown in Table 17, various intersection treatment options may be implemented along the corridor. An alternative treatment option, a roundabout was analyzed in place of a traffic signal at the 90th Street intersection of SR-138. In year 2040 conditions under build Alternative 2, 90th Street would operate at LOS D during the peak hours with the implementation of a roundabout compared to LOS C operations with the implementation of a traffic signal. LOS D or better is considered acceptable peak hour operations, especially when considering design year (2040) conditions along the corridor. Additional alternate intersection treatments were also explored and could ultimately be implemented based on the development patterns and resulting traffic demands that will evolve as development occurs in the area (see ICE Report in Appendix G).

7 Conclusions

Traffic operations under the build alternatives along with no build conditions are summarized below.

EXISTING CONDITIONS

All intersection and SR-138 mainline locations operate at LOS C or better under existing conditions.

NO BUILD

Under 2020 No Build conditions, all segments of SR-138 would operate at LOS D or better during AM and PM peak hours. From Old Ridge Route Road to 300th Street, SR-138 would operate at LOS E during the AM and PM peak hours under 2040 No Build conditions. All other locations would operate at LOS D or better under 2040 No Build. However, congestion would occur along the corridor at intersection locations.

Under 2020 No Build conditions, all intersection locations operate at LOS C or better. However, the following intersections were forecast to operate at LOS E or worse under 2040 No Build conditions during either the AM or PM peak hours, or both:

1. SR-138 & Gorman Post Road
2. SR-138 & Old Ridge Route Rd
3. SR-138 & Private Road
7. SR-138 & 3 Points Road
8. SR-138 & La Petite Avenue
10. SR-138 & 210th Street West
11. SR-138 & 190th Street West
12. SR-138 & 170th Street West
13. SR-138 & 110th Street West
14. SR-138 & 90th Street West
16. SR-138 & 80th Street West
18. SR-138 & 60th Street West

ALTERNATIVE 1

All study intersections and SR-138 mainline would operate at LOS D or better under 2025 and 2040 conditions. Traffic operations based on the LOS results are shown in Figure 30 for Year 2025 and Figure 31 for Year 2040 conditions. Improvements to the merge/diverge lanes on I-5 serving the interchange with SR-138 would also provide LOS D or better operations. Interchange improvements consisting of two-lane off-ramps with 1,300-foot deceleration lanes plus shared mainline/off-ramp lanes and 2,500-foot acceler-

ation lanes; as an enhanced safety measure the southbound on-ramp acceleration lane has been extended to 3,500 feet as required by Caltrans.

ALTERNATIVE 2

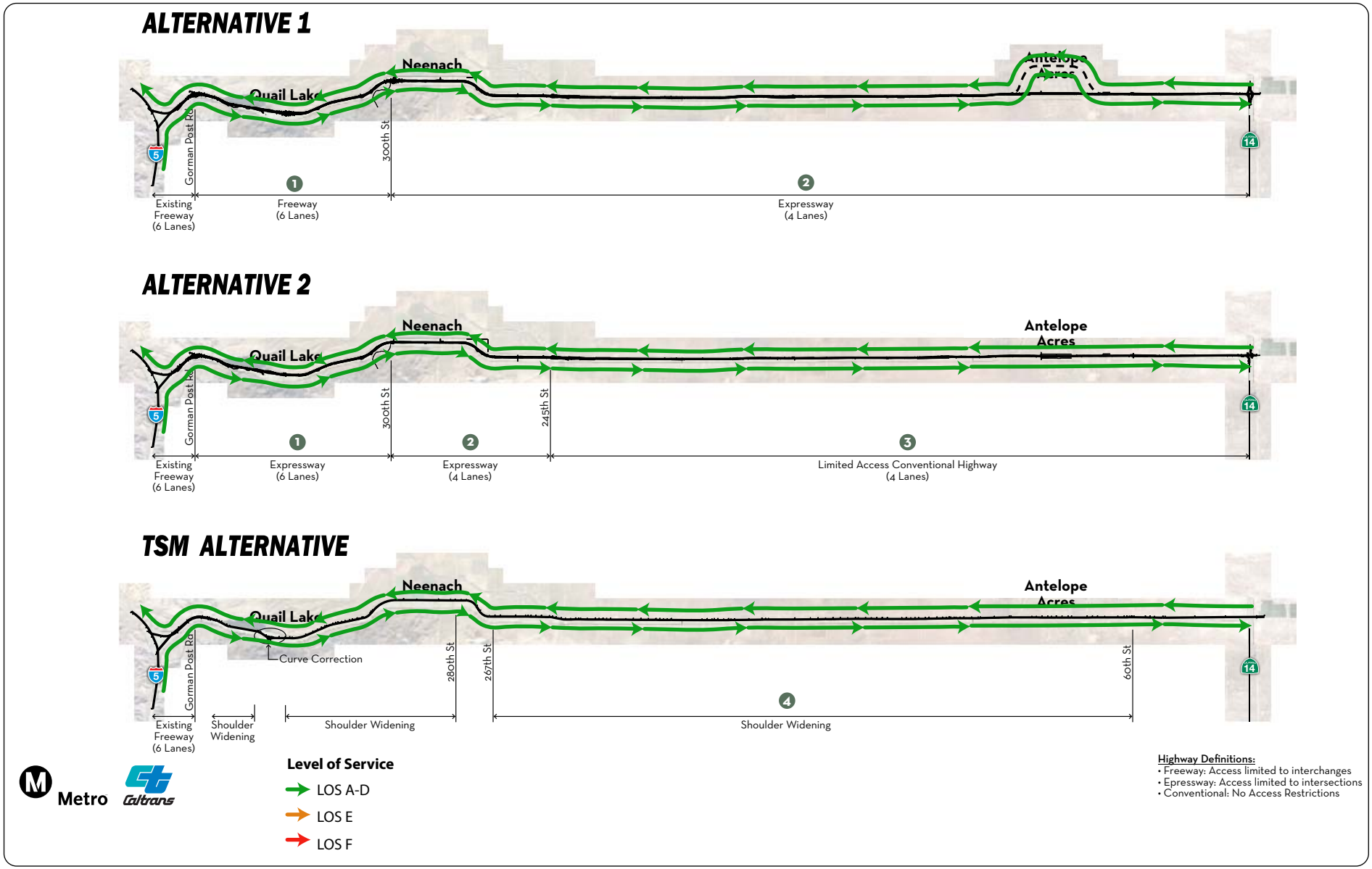
All study intersection and SR-138 mainline would operate at LOS D or better under 2025 and 2040 conditions. Traffic operations based on the LOS results are shown in Figure 30 for Year 2025 and Figure 31 for Year 2040 conditions. Improvements to the merge/diverge lanes on I-5 serving the interchange with SR-138 would also provide LOS D or better operations. Interchange improvements consisting of two-lane off-ramps with 1,300-foot deceleration lanes plus shared mainline/off-ramp lanes and 2,500-foot acceleration lanes; as an enhanced safety measure the southbound on-ramp acceleration lane has been extended to 3,500 feet as required by Caltrans.

TSM ALTERNATIVE

Under 2020 No Build conditions, all intersection locations operate at LOS C or better. However, the following intersections were forecast to operate at LOS E or worse under 2040 TSM Alternative conditions during either the AM or PM peak hours, or both:

1. SR-138 & Gorman Post Road
2. SR-138 & Old Ridge Route Road
3. SR-138 & Private Road
4. SR-138 & 300th Street West
8. SR-138 & La Petite Avenue
10. SR-138 & 210th Street West
11. SR-138 & 190th Street West
12. SR-138 & 170th Street West
13. SR-138 & 110th Street West
14. SR-138 & 90th Street West
16. SR-138 & 80th Street West
18. SR-138 & 60th Street West

Traffic operations based on the LOS results are shown in Figure 30 for Year 2025 and Figure 31 for Year 2040 conditions.



FEHR PEERS

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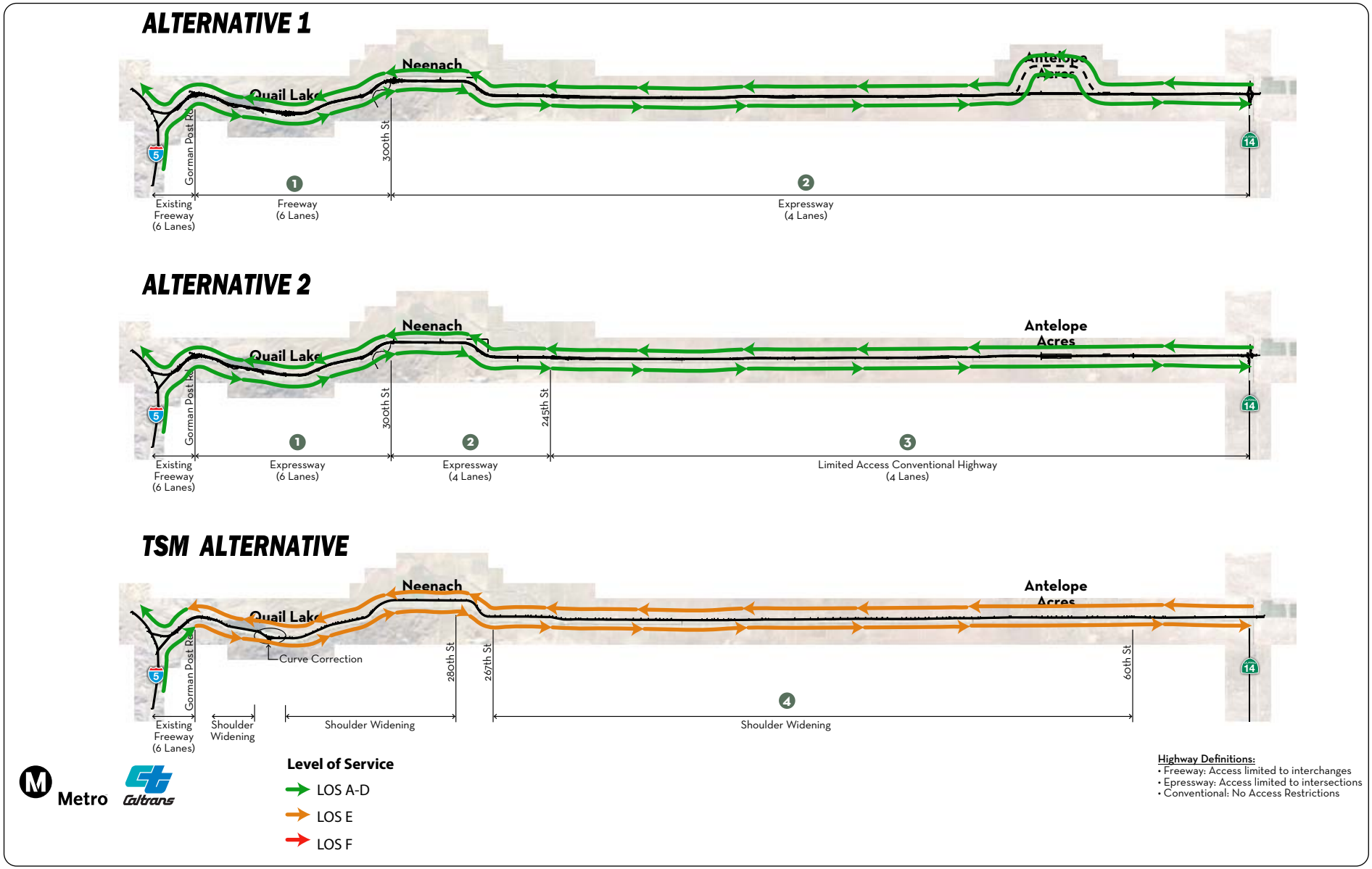
Corridor LOS for Build Alternatives - 2020/2025 Conditions

FIGURE 30



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Corridor LOS for Build Alternatives - 2040 Conditions

FIGURE 31