

Draft Supplemental Recirculated Environmental Impact Report

SCH# 2014041005

***Volume 4
Appendix E.2***

**GRAPEVINE SPECIFIC AND COMMUNITY PLAN (2019)
Tejon Ranchcorp**

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General Plan Amendment No. 9, Map 202
General Plan Amendment No. 10, Map 202
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Agricultural Preserve #19 - Exclusion



**Kern County
Planning and Natural Resources Department
Bakersfield, California**

August 2019

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Appendices

NOTE TO REVIEWER OF ELECTRONIC FILES:

To assist you in reviewing this electronic document, “bookmarks” and/or “links” have been provided for easier navigation between sections. When available, bookmarks are located in the panel to the left. Links are highlighted in **BLUE** in the Table of Contents. Clicking on either the bookmarks or links will take you to the selected item. This document may consist of multiple linked PDF files. If saving this document to your computer, you must save all corresponding files to a directory on your hard drive to maintain the manner in which these PDF documents are linked.

E.2 [Transportation Impact Study Technical Report](#)

**SUPPLEMENTAL RECIRCULATED
TRANSPORTATION IMPACT STUDY
TECHNICAL REPORT**

for the
**Grapevine Specific and
Community Plan Project**

August 2019

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Acronym/Abbreviation	Definition
ACS	American Community Survey
ALUCP	Airport Land Use Compatibility Plan
AWSC	All-Way Stop-Control
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CHP	California Highway Patrol
CMP	Congestion Management Program
CTC	California Transportation Commission
CVEF	Commercial Vehicle Enforcement Facility
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTIP	Federal Transportation Improvement Plan
GET	Golden Empire Transit District
GHG	Greenhouse Gases
HCM	Highway Capacity Manual
HDM	Highway Design Manual
I-5	Interstate 5
ITE	Institute of Transportation Engineers
Kern COG	Kern Council of Governments
LEHD	Longitudinal Employer-Household Dynamics
LID	Low Impact Development
LOS	Level of Service
MXD	Mixed-Use Development
PSR-PDS	Project Study Report-Project Development Support
RTP	Regional Transportation Plan
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SB 375	Senate Bill 375
SB 743	Senate Bill 743
SCAG	Southern California Association of Governments
SHOPP	State Highway Operations and Protection Program
SR 58	State Route 58
SR 99	State Route 99
SR 138	State Route 138
SR 166	State Route 166
SR 184	State Route 184
SR 223	State Route 223

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Acronym/Abbreviation	Definition
SSSC	Side-Street Stop-Control
STIP	State Transportation Improvement Program
TAZ	Traffic Analysis Zone
TCR	Transportation Concept Report
TDF	Travel Demand Forecasting
TDM	Transportation Demand Management
TMA	Transportation Management Association
TRC	Tejon Ranchcorp
TRCC	Tejon Ranch Commerce Center
USGS	United States Geological Survey
UTM	Universal Transverse Mercator

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1 INTRODUCTION, KEY ANALYSIS & CONCLUSIONS SUMMARY

1.1 REPORT OVERVIEW

This Internal Capture Rate (ICR) Traffic Impact Analysis (2019 TIA) report analyzes potential transportation impacts for the Grapevine Project (Project), as part of the Project application and environmental review process including the Supplemental Recirculated Environmental Impact Report (SREIR) that is being prepared by the Kern County (County) Planning and Natural Resources Department. The County is the Project's lead agency under the California Environmental Quality Act (CEQA).

The Project consists of an 8,010-acre Specific Plan area located in the southern portion of the San Joaquin Valley and 83 acres of off-site infrastructure improvements. The Specific Plan includes six Plan Areas, each with a village center providing retail and office uses, schools, parks, community services, and housing linked by bicycle and pedestrian trails, and served by transit. About 4,643 acres are a residential community and employment center, 632 acres are zoned for active recreation and agricultural uses, and 2,734 acres are open areas. At full buildout, the Project would include 12,000 dwelling units, 5,100,000 square feet of commercial/light industrial use, 157 acres of schools, and 96 to 112 acres of parks. In accordance with the Specific Plan, up to 14,000 dwelling units could be built provided commercial/light industrial uses are commensurately reduced to ensure that total Project vehicular trips do not increase. The most intensive commercial and higher-density residential uses are located closest to Interstate-5 (I-5) along the western border of the Project. Lower-density residential, office, research and development, retail, and light industrial/warehouse uses are located outside of the six village centers.

This 2019 TIA presents the following:

- Background and discussion of traffic modeling approach and methodology;
- Review of results from the 2016 FEIR traffic analysis and an updated 28.7% HBW ICR analysis used for apples-to-apples comparisons with the reduced ICR scenarios analyzed in Sections 3-8 of this report;
- Identification of 22 alternative buildout screening scenarios resulting in lower ICRs than in the FEIR and updated 28.7% HBW ICR analysis;
- Screening and selection of a subset of five alternative buildout reduced ICR scenarios for more detailed analysis consistent with the FEIR;
- Results of the reduced ICR scenarios analysis;
- Comparison of impacts between the FEIR, updated 28.7% HBW ICR, and the reduced ICR scenarios; and
- Recommended expansion of certain of the FEIR traffic mitigation measures which will serve to mitigate potential impacts from the proposed Project and potential impacts that could occur in the reduced ICR scenarios by mandating regular checkpoints for supplemental traffic and ICR analyses so that project applicant and appropriate transportation agencies are able to identify and mitigate potential impacts before they occur.

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1.2 BACKGROUND ON SCOPE OF 2019 TIA

The County prepared and circulated a draft and final environmental impact report (the “Project EIR” or “Grapevine EIR”) for the Project in 2016. The Kern County Board of Supervisors unanimously approved the Project and certified the final EIR (FEIR) for the Project on December 6, 2016. A lawsuit alleging that several substantive sections of the FEIR failed to comply with CEQA requirements was filed on January 4, 2017 (*Center for Biological Diversity et al. v. County of Kern et al.*, Kern County, Superior Court Case No. BCV-17-100030-KCT). The Court upheld the EIR against all of the claims brought in the lawsuit except for the need to analyze potential impacts that could occur if the Project’s vehicle trip internal capture rate (ICR) fell by what the Court determined were reasonably foreseeable variations of 10 percent to 20 percent below the ICR levels considered in the FEIR. ICR is a measure, described in greater detail below, of how many vehicular trips are expected to occur within the Project, and how many vehicular trips are expected to have either an origination or destination outside the Project. A “lower” ICR means that fewer trips will be internally captured within the Project, and more trips will have an origination or destination point outside the Project. The Court issued a Judgment and writ of mandate (Writ) directing the County to analyze whether the potentially lower ICRs “may cause significant adverse effects to traffic, air pollution, greenhouse gases, noise, public health and growth inducing impacts.” The Judgment states that the County “is not required to start the EIR process anew” and “need only correct the deficiencies in the EIR that the Court has identified before considering recertification of the EIR.”

The Judgment and Writ directed the County to set aside the project approvals and decertify the Grapevine EIR. The County Board of Supervisors rescinded the Project approvals on March 12, 2019. On March 14, 2019 the County received an application for the re-adoption of the Grapevine Specific and Community Plan and other County discretionary approvals, including related General Plan and Zoning Code amendments. The proposed Grapevine project and the requested County discretionary approvals described in the application are the same as considered in the Project EIR. On April 12, 2019, the County published a Notice of Preparation (NOP) for the SREIR in accordance with CEQA. The NOP described the scope of the SREIR, including the deficiencies identified in the Judgment by evaluating potential traffic, air pollution, greenhouse gas, noise, public health and growth inducing impacts that could occur from lower ICRs than evaluated in the Grapevine EIR. Because the Court determined that all other challenges to the Grapevine EIR traffic analysis were without merit, the SREIR will include a new Volume that includes the supplemental analysis required by the NOP, as well as the entirety of the previously certified Project EIR. The purpose of this 2019 TIA is to provide the supplemental analysis of potential Project transportation impacts that could be associated with lower ICR levels than considered in the FEIR as described in the NOP.

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1.3 INTRODUCTION TO TRAFFIC ANALYSIS AND ICRS

Public transportation agencies and project applicants use empirically observed and modeled information to estimate the number of vehicular trips generated by different land uses, such as housing, commercial, educational, industrial and recreational uses. Housing land uses, for example, generate trips from and to homes for work, shopping, recreation, school, and other activities. Commercial land uses generate employee, customer, business supply and shipping trips. To evaluate potential impacts, average daily total (ADT) and AM and PM peak hour project trips are calculated using either local trip rates or standard sources, including the Trip Generation Manual developed by the Institute of Transportation Engineers (ITE Manual). The Project EIR utilized ADT and AM and PM peak hour Project trip counts derived from the 2012 ITE Manual.

Residential and mixed-use development, such as the proposed Project, generate trips that both originate and end within a community. These are called “internal” trips. Trips that end or begin outside the community are called “external” trips. An ICR represents the proportion of internal trips relative to total trips generated by the land uses in a community. If a project area generates an average daily total of 1,000 trips, for example, and 500 trips begin and end within the community, the average daily ICR would be 50 percent. Traffic trip volumes are highest during the “peak hour” morning (AM) and evening (PM) periods. Consistent with the Grapevine EIR, this 2019 TIA analyzes potential Project impacts from lower ICRs that could occur during the peak hour AM and PM periods. If a project generates 300 trips during the AM peak hour, and 100 trips begin and end within the community, the AM peak hour ICR would be 33.3 percent. A project’s ICRs change as land uses and transportation patterns, which are affected by transit options and technologies, change over time. An ICR analysis generally reflects and considers ICRs and transportation patterns that exist at a specific point in time of the development buildout process.

Traffic studies and transportation models developed and approved by transportation and transit agencies for use in Kern County and north Los Angeles County show that most people tend to utilize locally available shopping, recreational and educational amenities when available rather than travel for longer periods and distances outside the community. Planned development communities, such as the Project, that provide a mix of land uses, including housing and parks, as well as employment-generating land uses such as retail, schools, sheriff and fire facilities, and commercial offices and facilities, within the same community will generally be expected to increase ICRs because more trips will begin and end within the project area as children attend community schools, and some residents of the community work at commercial and institutional facilities located within the community. A larger share of shopping, medical and recreational trips will also occur internally. In contrast, a new community consisting of only residential and neighborhood parks will generally be expected to have lower ICRs as residents must travel outside the community to school, work, shop, obtain medical assistance, etc. In the case of the proposed Project, more internal trips captured (a higher ICR) within the Project’s boundaries also results in lower vehicle miles travelled (VMT) because internal trips within the community are shorter than trips beginning or ending outside the Project. Because this Project is located adjacent to an existing significant regional employment center at the Tejon Ranch Commerce Center (TRCC), the ICR evaluation framework (including trip distances) in the FEIR included TRCC as part of a single contiguous community. This 2019 TIA uses the same evaluation framework for TRCC and Project trips.

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1.4 2016 TRAFFIC ANALYSIS AND EIR

The 2016 Draft Project EIR evaluated potential Project transportation impacts during the AM and PM peak traffic hours, the periods when potential impacts are most likely to occur. The Kern County Council of Governments (Kern COG) 2014 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) Travel Demand Model (Kern COG model) was used to generate peak hour ICRs for several Project trip types, including home to work trips (“Home-Based Work” trips) and home to school, shopping, recreational and other non-work related trips (“Home-Based Other/Non-Home-Based” trips).

The 2014 Kern COG model distributes trips to internal and external locations using a “gravity model” which assumes that trips are more likely to occur based on the locations of complementary uses, such as nearby residences and a supermarket. The Kern COG model accounts for the distance between trip origins and destinations in travel time, the type of land use, and the amount of land use (size) in distributing trips. The model results reflected the Project’s proposed land uses and were consistent with the adopted Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) for the region, which includes the Project site. Consistent with the Kern County COG model methodology, the 2016 Draft Project EIR included a Home-Based Work Trip ICR daily average of over 50 percent, meaning that over half of the Project’s working residents would travel to or from work within the Project or the adjacent TRCC. When non-work trips were included, the Kern COG model results utilized in the Draft EIR showed that the Project would have an AM peak period ICR of about 72.2 percent and a PM peak period ICR of about 71.4 percent.

During the Draft EIR (DEIR) comment period, the California Department of Transportation (Caltrans) requested that the ICR for Home-Based Work trips generated by the Kern COG traffic model be reduced 28.7 percent, half of the 57.4 Home-Based Work ICR identified by Fehr & Peers, the Project’s traffic consultants, in a sensitivity analysis of ICRs in other locations performed at the request of Caltrans (see FEIR Appendix JJ, Exhibit 5). As discussed in the FEIR (Volume 12, page 7-330), this adjustment was requested because employees are often willing to accept longer commutes for employment relative to trips for shopping, recreation or other non-employment purposes. As a result, the ICR for Home-Based Work trips has a larger potential to affect commuter trips on state and external roadways operated and maintained by Caltrans. Reducing the Home-Based Work trip ICR below the levels generated by the Kern COG traffic model provided a more conservative analysis of potential Project transportation impacts because only 28.7 percent of all Project Home-Based Work trips would occur internal to the Project and 71.2 percent would occur external to the Project. The FEIR analysis using the reduced ICRs requested by Caltrans is included in FEIR Appendix JJ. For ease of reference, Appendix JJ is attached as Appendix A of this report.

As requested by Caltrans, the FEIR analysis evaluated potential Project transportation and traffic impacts with a 28.7 percent ICR for Home-Based Work trips (Exhibit 5, Table 2 of FEIR Appendix JJ). Consequently, the FEIR analysis assumed that 28.7 percent of all Home-Based Work trips would be internal and 71.3 percent of all Home-Based Work trips would involve external travel. When combined with non-work Home-Based Other/Non-Home-Based trips, the ICRs evaluated in the FEIR included a daily average daily ICR of approximately 58 percent, an

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AM peak hour ICR of 59.8 percent, and a PM peak hour ICR of 64.2 percent. The FEIR revised the Project's mitigation measures to reference the reduced AM and PM peak period ICRs, which included more Project resident use of Caltrans highway facilities into and out of the Project during the AM and PM peak hours for work-related trips.

In 2017, Caltrans approved two traffic mitigation agreements with the Grapevine project applicant to mitigate Project-related impacts to state highway facilities located in Kern County (Caltrans District 6) and Los Angeles county (Caltrans District 7) identified by analysis based on the ICRs evaluated, as requested by Caltrans, in the FEIR. The Caltrans Agreements are included as Appendix A to this report. In June 2017, Caltrans issued a Project Study Report-Project Development Support (PSR/PDS) for the proposed new Project interchange to be located on Interstate-5 (I-5) that would be required to serve the Project and other regional transportation demands as part of Project buildout. The PSR/PDS is included as Appendix B to this report.

It should be noted that approved development at the Tejon Ranch Commerce Center were incorporated in the FEIR traffic analysis. And based on August 2018 AM and PM Peak hour traffic counts, there has been no significant change in weekday AM and PM peak hour traffic volumes since the FEIR was certified in December 2016.

Weekday morning and evening peak hour traffic volumes at the I-5 / Grapevine interchange has remained relatively unchanged for traffic entering and exiting I-5 to and from the mix of land uses (2 gas stations, 3 eateries, and one travel hotel). No additional development has occurred at the I-5 / Grapevine interchange.

Weekday morning and evening peak hour traffic volumes at the I-5 / Laval Road / Wheeler Ridge Road interchange area have increased approximately 5 to 10 percent with the completion of additional land uses at Tejon Ranch Commerce Center. It should be noted that for the transportation impact study, the traffic volumes were increased to account for traffic generated by the Outlets at Tejon and other developments on Laval Road and Dennis McCarthy Drive. The August 2018 traffic counts are included as Appendix Z to this report.

As noted above, ICRs also affect the amount of VMT generated by a project. A lower ICR correlates with a higher amount of VMT because a greater portion of trips are external to the project area and extend for longer distances, including to other communities where Project employees may live or where Project residents may work. The FEIR quantified the VMT associated with reducing the Project's Home-Based Work trip ICR to 28.7 percent and assuming that 71.3 percent of all such trips would be external and compared the result to the VMT associated with the ICRs generated by the Kern COG model that were included in the DEIR. The reduced Home-Based Work trip ICR used in the FEIR analysis increased average weekday Project VMT from approximately 2,595,690 miles using the Kern COG model ICRs to 3,175,626 miles. In addition to transportation and traffic impacts, the FEIR evaluated potential Project impacts to air quality, greenhouse gas, noise and other impacts that could result from the higher level of VMT associated with the lower Home-Based Work ICRs in the FEIR analysis.

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1.5 2019 REPORT OVERVIEW

This 2019 TIA report considers potential transportation and traffic impacts that could occur from a 10 percent to a 20 percent reduction in the total Project ICRs used in the FEIR analysis. This report also considers other potential ICR scenarios, but includes for detailed evaluation only those that result in higher VMT than forecast for the Project in the 2016 Project EIR. Although these scenarios, such as the addition of commercial and industrial development without the development of housing immediately adjacent to the existing Tejon Ranch Commerce Center (TRCC) which is owned by the Project applicant, are unlikely to occur, they were evaluated to ensure that a broad range of potential Project-related impacts were considered in this report. The analysis of the reduced ICR scenarios is conservative for several reasons as discussed in detail in Section 9.2 of this report.

Because the reduced ICR scenarios considered in this report include higher external traffic volumes related to trips coming into and going out of the Project site each day during the AM and PM peak hours, this changed traffic pattern could result in a need to expand onsite Project roadways and highway ramps to achieve all allowed development at full Project buildout. Impacts to state highway facilities not covered by the 2017 fair share funding agreements with Caltrans also could occur under one or more of the reduced ICR scenarios.

This report confirms in Appendix C that onsite roadway expansions could be accommodated within the development area of the Project; however, building unnecessary roadway capacity based on the possibility that internal volumes could increase based on the ICR variation scenarios in this report is not recommended. Instead, this report recommends expanded Mitigation Measures, including additional mandates for periodic traffic impact analyses reports that track ICR as well as actual Project traffic patterns as the Grapevine community is built out, will provide a more accurate assessment of traffic conditions over time.

Due to the fact that lower ICR scenarios result in higher volumes of external trips, which can affect local intersections and roadways near Project external access facilities and local freeway and state highway and freeway facilities, this report focuses on potential impacts that could occur under cumulative plus project conditions. As shown in FEIR Appendix JJ (see Appendix A of this report), the cumulative plus project conditions evaluation in the FEIR included all of the significant impacts identified in the analysis of existing plus project conditions and identified several additional significant impacts to local and regional transportation facilities. Consequently, the analysis of cumulative plus project conditions provides the most comprehensive and conservative analysis of potential Project impacts in the FEIR and was utilized to analyze the reduced ICR scenarios in this report.

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1.6 EVALUATION OF UPDATED TRAFFIC MODEL COMPONENTS AND MODELING APPROACH CONCLUSION

The FEIR was certified by the County in 2016. Since that time, the Kern COG adopted a 2018 RTP/SCS traffic model (Kern COG 2018), a new version of the ITE Trip Generation Manual (10th Edition, September 2017) was published, and the California Air Pollution Officers Association released an update to the California Emissions Estimator Model (CalEEMod), a statewide land use emissions calculator used to quantify criteria pollutant and greenhouse gas (GHG) emissions from project land uses for CEQA analysis purposes. To ensure that the 2019 TIA provides a consistent analysis of potential significant adverse effects to traffic, air pollution, greenhouse gases and other resources as set forth in the NOP, the corresponding Kern COG model, ITE model, and CalEEMod models, used in the FEIR analysis were evaluated for use in this 2019 TIA.

The Project ICRs generated by the 2014 Kern COG model used in the FEIR analysis were compared with the ICRs generated by the 2018 Kern COG model. The 2018 Kern COG model incorporates the 2018 RTP/SCS for Kern County, including the Project area. The 2018 RTP/SCS designates the Grapevine project and adjacent locations, including the existing Tejon Ranch Commerce Center (TRCC) as a “Planned Transit Priority Area” and a “Strategic Employment Center.” These designations identify the Project area as an activity node around which future transit, vanpooling services, and mixed-use development patterns would be planned to support forecasted development patterns within the Kern COG planning region. The RTP/SCS designation recognizes that the Project incorporates a land use pattern and corresponding transportation network that encourages the location of housing near jobs and transportation facilities designed to reduce regional passenger vehicle travel and reduced vehicular air emissions. The Kern COG 2018 model more fully incorporates the proposed Project development, including 12,000 dwelling units and 5.1 million square feet of non-residential commercial and light industrial/warehousing land uses, than the 2014 Kern COG model.

Due to these changes, the 2018 Kern COG model was found to generate similar or higher ICRs, which result in a larger proportion of internal trips, than the ICRs generated by the 2014 Kern COG model used in the DEIR. The 2014 Kern COG Model also included trip distribution components that did not assume Project approval, whereas the 2018 Kern COG model trip distribution methodology includes the Project. Project ICRs ranged from 10 to 15 percent higher in the 2018 Kern COG model than the ICRs evaluated in the DEIR. The Kern COG model ICR rate was further modified in the FEIR, and Appendix JJ, as requested by Caltrans to assume that 28.7 percent of all Home-Based Work trips would be internal and 71.3 percent would be external to the Project, including TRCC. Since the 2014 Kern COG model results in lower Project ICRs and did not assume Project implementation, it therefore provides a more conservative assessment of potential ICR-related transportation and traffic impacts, and provides a more accurate projection of trip distribution changes that would result if the Project were implemented, than the 2018 Kern COG model. The 2014 Kern COG model is accordingly retained in this analysis.

The evaluation also considered the use of the current 2016 ITE Trip Generation Manual. Compared with the 2012 ITE Manual used in the FEIR analysis, the 2016 ITE Manual generates

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slightly lower trip rates for the proposed Project land uses based on data collected throughout the country for suburban developments. The ADT for all Project land uses at buildout using the 2012 ITE Manual, for example, was about 201,542 trips per day compared with an ADT of 197,685 trips using the 2016 ITE Manual, which represents a 1.9 percent reduction in ADT. The average weekday VMT evaluated in the FEIR analysis was 3,175,626 miles, and the use of the 2016 ITE Manual results in an average weekday VMT of 3,114,939 miles, which represents a 1.9 percent reduction in VMT. The 2016 ITE Manual also provides more current school and park trip generation rates for the land uses included in the proposed Project. The 2016 ITE Manual is considered the best available technical data and has been used in this report.

Similarly, the current version of CalEEMod provides the most up to date and refined model used to estimate criteria air and greenhouse gas emissions from specific land uses for CEQA purposes. As a result, as described in more detail in the Air Quality/Greenhouse Gas Technical Report. The most current version of CalEEMod was adjusted to incorporate the same weekday 2016 ITE Trip Generation Manual trip generation rates used in this 2019 TIA to provide the best available information for analyzing potential significant adverse effects to traffic, air pollution, greenhouse gases and other resources related to lower ICRs as described in the NOP. More detailed information about CalEEMod is included in the Air Quality/Greenhouse Gas Technical Report.

Potential impacts to Kern County intersections and roadways were evaluated by using the operational analysis methodologies in the Caltrans Highway Capacity Manual (HCM) under Existing Plus Project and Cumulative Plus Project conditions.

As discussed in the 2016 EIR, the *Guide for the Preparation of Traffic Impact Studies* states that “Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on state highway facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS.” Caltrans was consulted to determine the applicable threshold for the project analysis, and in a meeting on September 1, 2015 confirmed that the target LOS for State Highway System is LOS D and this was the basis for the assessment of impacts in the 2016 EIR and this 2019 TIA. Recognizing the unique circumstances at the Grapevine Grade, Caltrans also confirmed that LOS D may not be achievable on this segment under cumulative conditions. Consistent with these recommendations and the 2016 EIR, LOS D is used as the threshold for passenger vehicles and density as the measure of effectiveness for heavy vehicles for the evaluation of the Grapevine Grade.

As discussed in the 2016 EIR, the Kern County General Plan Land Use and Circulation Element provides that development proposed as part of a community plan or specific plan which utilizes smart growth policies that encourage efficient multi-modal movements is allowed the flexibility to assess traffic and safety impacts through other means than LOS. The project has been designed to encourage efficient multi-modal movement consistent with the General Plan amendments, and certain intersections or project roadway segments may operate below LOS D. For purposes of the 2016 EIR and 2019 TIA, consistent with the Kern County CEQA Implementation Document and Kern County Environmental Checklist, local and project roadway and intersections that exceed LOS D were identified as impacted.

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1.7 FEIR AND UPDATED 28.7% HBW ICR ANALYSIS

As discussed in Section 2.2 of this report, the FEIR evaluated potential Project AM and PM peak hour impacts to: (1) local intersections; (2) local roadways; (3) local freeway segments including I-5 ramps and the Grapevine grade located south of the Project site; (4) state highway and freeway facilities located to the north and south of the Project site; and (5) interim conditions and the level of development that would require construction of a new interchange along I-5 (see Exhibit 9 of FEIR Appendix JJ). With the mitigation measures identified in the FEIR, Project impacts were found to be less than significant, and cumulative impacts were found to be significant and unavoidable.

As discussed in Section 2.3 of this report, the FEIR analysis was adjusted to include the 2016 ITE Trip Manual daily, AM peak hour, and PM peak hour trip generation rates for the Project (the “Updated 28.7% Home-Based Work Internal Capture Rate” analysis or “Updated 28.7% HBW ICR” analysis) for consistency with the analysis of the reduced ICR and other potential low-ICR development outcomes considered in this report. The Updated 28.7% HBW ICR analysis used the same daily and peak hour ICRs that were reduced from the levels generated by the 2014 Kern COG model in the FEIR analysis as requested by Caltrans (see Exhibit 5, Table 2 of FEIR Appendix JJ). As discussed above, the FEIR cumulative plus project analysis was determined to provide the most comprehensive assessment of potential Project impacts. Consequently, the Updated 28.7% HBW ICR analysis also evaluated potential Project AM and PM peak hour impacts to: (1) local intersections; (2) local roadways; (3) local freeway segments; (4) state highway and freeway facilities located to the north and south of the Project site; and (5) interim conditions under cumulative plus Project conditions.

The Updated 28.7% HBW ICR results in the same level of significant impacts to local roadways (one (1) significant impact), local freeway segments (three (3) significant impacts, all on the Grapevine grade), state highway and freeway facilities located to the north (no significant impacts) and south (21 segments with significant AM, PM or AM and PM peak hour impacts) of the Project site, and interim conditions as the FEIR. Due to the slightly reduced AM and PM peak hour trip volumes generated by the 2016 ITE Manual for Project land uses, the Updated 28.7% HBW ICR analysis was found to result in two (2) fewer significant impacts to local intersections than identified in the FEIR. Impacts to three (3) other intersections (two in the PM peak hour and one in the AM and PM peak hours) were the same as in the FEIR. As discussed in Section 2.3 of this report, the Updated 28.7% HBW ICR was found to generate no new significant impacts that were not identified in the FEIR analysis. Consequently, the significance determination for the Updated 28.7% HBW ICR with the FEIR mitigation measures would be the same as for the FEIR analysis (see Section 2.3.5 of this report).

The Updated 28.7% HBW ICR is used as the base case for purposes of comparing the traffic and other impacts for the lower ICR scenarios evaluated in this report, since these scenarios were likewise evaluated based on the 2016 ITE trip generation rate and the current version of CalEEMod. This results in an “apples-to-apples” comparison of the proposed Project to this report’s lower ICR scenarios as described below.

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1.8 REDUCED ICR SCENARIO DEVELOPMENT AND SCREENING PROCESS

As discussed in Section 3 of this report, a total of 22 screening scenarios were developed that encompassed a broad range of potential Project development scenarios in an effort to evaluate the impacts of lower ICRs. To ensure consistency and the use of the best available information in the report, ADT, AM and PM trip generation rates, and VMT were developed for each scenario using the 2016 ITE Manual and “screened” by comparing them to the Updated 28.7% HBW ICR analysis. The 22 scenarios include:

- (a) Proposed Project development, including 12,000 dwelling units and 5,100,000 square feet of commercial/light industrial uses, at 25, 50, 75 and 100 percent of full buildout with a 10 percent reduction in the daily and peak hour ICRs used in the FEIR (Screening Scenarios 1, 3, 5 and 7);
- (b) Proposed Project development, including 12,000 dwelling units and 5,100,000 square feet of commercial/light industrial uses, at 25, 50, 75 and 100 percent of full buildout with a 20 percent reduction in the daily and peak hour ICRs used in the FEIR (Screening Scenarios 2, 4, 6 and 8);
- (c) Development of 3,000, 3,500, 5,000, 6,000, 7,000, 9,000, 10,500 and 12,000 and 14,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses (Screening Scenarios 9 to 17);
- (d) Development of 1,275,000, 2,255,000, 3,825,000 and 5,100,000 square feet of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities (Screening Scenarios 18 to 21); and
- (e) The potential development of up to 14,000 dwelling units, subject to the reduction of onsite commercial/light industrial uses to about 3,100,000 square feet, as permitted under the proposed Project Specific Plan (Screening Scenario 22).

The scenarios include the analysis of Project development, assuming that daily and peak hour ICRs were reduced by 10 percent and 20 percent from the levels in the FEIR (Screening Scenarios 1 to 8). The screening scenarios also include the potential development of residential units without complementary onsite commercial/light industrial amenities and employment-generating land uses (Screening Scenarios 9-17) as well as commercial/light industrial amenities without onsite housing (Screening Scenarios 18-21). Finally, the screening scenarios include the maximum number of dwelling units (14,000) with reduced commercial/light industrial uses that could occur under the proposed Specific Plan (Screening Scenario 22).

Daily and peak AM and PM hour trips and average daily VMT were calculated for each of the 22 scenarios and compared with the Updated 28.7% HBW ICR analysis of daily and peak AM

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and PM hour trips and average daily VMT. The number of daily and peak hour trips was used as a screening criterion because trip counts directly affect potential transportation system impacts, including the maintenance of acceptable roadway or intersection level of service standards. Average weekday VMT was used as a screening criterion because the amount of VMT is proportional to the number and length of trips that are external to the Project. Scenarios with higher levels of VMT than considered in the FEIR and the Updated 28.7% HBW ICR analysis could result in greater transportation and traffic impacts. Scenarios with higher VMT could also result in greater air quality, greenhouse gas, noise, public health and growth inducing impacts from vehicular use and increased transit external to the Project area. Each of the five higher VMT scenarios from the original 22 screening scenarios were then carried forward for a more detailed impacts analysis in this report.

The traffic analysis methodology of the SREIR was to evaluate the theoretical scenarios that would result in the worst case traffic impacts. Therefore, buildout of the proposed Project (including 12,000 dwelling units and 5,100,000 square feet of commercial/light industrial uses) was assumed in Scenarios 1 and 2. Scenarios 3 through 22 that assumed partial buildout of the proposed Project resulted in lower daily average and peak hour trips, as well as lower VMT, except for the following Scenarios:

- Construction of 75 percent of the Project with ICRs reduced by 20 percentage points from the FEIR levels (Scenario 4).
- Construction of 14,000 dwelling units and schools and parks (Scenario 9); and
- Construction of 14,000 dwelling units and schools and parks (Scenario 10)

Given the adjacent TRCC's existing and approved employment (non-residential) uses, and market conditions including buildout rate and existing permitted but unbuilt capacity at TRCC, it is unlikely that an additional 5.1 million square feet of employment-only uses without residential units would be built immediately adjacent to an existing job center.

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1.9 REDUCED ICR SCENARIOS IDENTIFIED FOR DETAILED ANALYSIS

As discussed in Section 3 of this report, none of the scenarios was found to generate a greater number of daily average and peak hour trips than identified in the FEIR or the Updated 28.7% HBW ICR analysis based on the 2016 ITE Manual. Five of the scenarios were found to generate higher levels of VMT than the FEIR and the Updated 28.7% HBW ICR analysis. These five scenarios are referred to as the “reduced ICR scenarios” and were selected for full analysis consistent with the most conservative cumulative plus project evaluation in the FEIR:

- (a) Proposed Project development of 12,000 dwelling units and 5,100,000 square feet of commercial/light industrial uses, at 100 percent of full buildout with a 10 percent reduction in the daily and peak hour ICRs used in the FEIR (Screening Scenario 1);
- (b) Proposed Project development of 12,000 dwelling units and 5,100,000 square feet of commercial/light industrial uses, at 100 percent of full buildout with a 20 percent reduction in the daily and peak hour ICRs used in the FEIR (Screening Scenario 2);
- (c) Proposed Project development of 12,000 dwelling units and 5,100,000 square feet of commercial/light industrial uses, at 75 percent of full buildout (9,000 dwelling units and 3,185,000 square feet of commercial/light industrial uses) with a 20 percent reduction in the daily and peak hour ICRs used in the FEIR (Screening Scenario 4);
- (c) Development of 14,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses (Screening Scenario 9); and
- (d) Development of 12,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses (Screening Scenario 10).

Screening Scenario 1 assumes full buildout of the proposed Project, including 12,000 dwelling units, 5.1 million square feet of commercial/light industrial use, and schools, parks and other nonresidential land uses, with daily and peak period ICRs reduced by 10 percentage points from the levels used in the FEIR and Updated 28.7% HBW ICR analysis. The ADT generated by Scenario 1 is 197,685, the same as for the approved project because the Project land uses are the same. VMT increases in Scenario 1 from the levels in the FEIR and the Updated 28.7% HBW ICR analysis because a larger proportion of Project trips are assumed to include travel to or from external locations. External trips generally extend for longer distances than trips that are internal to the Project area. The average weekday VMT for Scenario 1 is approximately 24.6 percent higher than evaluated in the Updated 28.7% HBW ICR analysis.

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Scenario 2 assumes full buildout of the proposed Project, including 12,000 dwelling units and 5.1 million square feet of commercial/light industrial use, with daily and peak period ICRs reduced by 20 percentage points from the levels used in the FEIR and Updated 28.7% HBW ICR analysis. The ADT generated by Scenario 2 is 197,685, the same as the approved project because the Project land uses are the same. VMT increases in Scenario 2 from the levels in the FEIR and the Updated 28.7% HBW ICR analysis because a larger proportion of Project trips are assumed to include travel to or from external locations. External trips generally extend for longer distances than trips that are internal to the Project area. The average weekday VMT for Scenario 2 is approximately 47.3 percent higher than evaluated in the Updated 28.7% HBW ICR analysis.

Scenario 4 assumes that 75 percent of the proposed Project is constructed, including 9,000 dwelling units and 3.825 million square feet of commercial/light industrial use, and the proportionate development of schools, parks and other non-residential land uses, with daily and peak period ICRs reduced by 20 percentage points from the levels used in the FEIR and Updated 28.7% HBW ICR analysis. The ADT generated by Scenario 4 is 148,626, about three-quarters of the total ADT considered in the Updated 28.7% HBW ICR analysis because only 75 percent of the full-buildout land uses are constructed. Although the number of trips is lower, VMT increases in Scenario 4 from the levels in the FEIR and the Updated 28.7% HBW ICR analysis because a larger proportion of Project trips are assumed to include travel to or from external locations. External trips generally extend for longer distances than trips that are internal to the Project area. The average weekday VMT for Scenario 4 is approximately 10.5 percent higher than evaluated in the Updated 28.7% HBW ICR analysis.

Scenario 9 assumes that 14,000 dwelling units and schools and parks as required by applicable land use laws and regulations are constructed on the Project site with no complementary commercial/light industrial amenities or onsite employment-generating land uses. The ADT generated by Scenario 9 is 145,616, less than the ADT for the Updated 28.7% HBW ICR analysis, because only housing and legally-required school and park amenities, and no commercial, industrial and other employment-generating land uses, are constructed on the site. Although the number of trips is lower, VMT increases in Scenario 9 from the levels in the FEIR and the Updated 28.7% HBW ICR analysis because a larger proportion of Project trips are assumed to include travel to or from external locations. External trips generally extend for longer distances than trips that are internal to the Project area. Under the development assumptions in Scenario 9, approximately 21.3 percent of total Project trips in the AM peak hour would be internal and 78.7 percent would be external to the Project. During the PM peak hour, approximately 6.5 percent of total Project trips would be internal and 93.5 percent would be external to the Project. The average weekday VMT for Scenario 9 is approximately 39.2 percent higher than evaluated in the Updated 28.7% HBW ICR analysis.

Scenario 10 assumes that 12,000 dwelling units and schools and parks as required by applicable land use laws and regulations are constructed on the Project site with no complementary commercial/light industrial amenities or onsite employment-generating land uses. The ADT generated by Scenario 10 is 124,814, less than the ADT for the Updated 28.7% HBW ICR analysis, because only housing and legally-required school and park amenities, and no commercial, industrial and other employment-generating land uses, are constructed on the site. Although the number of trips is lower, VMT increases in Scenario 10 from the levels in the FEIR and the

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Updated 28.7% HBW ICR analysis because a larger proportion of Project trips are assumed to include travel to or from external locations. Under the development assumptions in Scenario 10, approximately 21.3 percent of total Project trips in the AM peak hour would be internal and 78.7 percent would be external to the Project. During the PM peak hour, approximately 6.5 percent of total Project trips would be internal and 93.5 percent would be external to the Project. The average weekday VMT for Scenario 10 is approximately 19.3 percent higher than evaluated in the Updated 28.7% HBW ICR analysis.

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1.10 REDUCED ICR SCENARIOS AM AND PM PEAK HOUR ANALYSIS APPROACH

As discussed, the 2016 ITE Manual was used to generate the total number of AM and PM peak hour trips for each scenario. Table 1 shows the total peak AM and PM peak hour trips generated by the 2016 ITE Manual and the internal and external trips analyzed during the AM and PM peak hours for each scenario. For reference, Table 1 also shows the total peak AM and PM peak hour trips generated by the 2012 ITE Manual for the FEIR analysis and using the 2016 ITE Manual for the Updated 28.7% HBW ICR analysis as well as the internal and external trips analyzed during the AM and PM peak hours for the FEIR and Updated 28.7% HBW ICR. The Updated 28.7% HBW ICR has slightly higher peak AM trips and lower peak PM hour trips than the FEIR. Total AM and PM peak hour trips for Scenario 1 and Scenario 2 are the same as in the Updated 28.7% HBW ICR because the scenarios assume the same level of development as the Updated 28.7% HBW ICR and are based on the 2016 ITE Manual. Total AM and PM peak hour trips are lower than in the Updated 28.7% HBW ICR for Scenario 4, Scenario 9 and Scenario 10 because total land uses in these scenarios are reduced from the proposed Project levels.

**Table 1: AM Peak Hour, PM Peak Hour and Total Daily Trips Analyzed for FEIR,
Updated 28.7% HBW ICR and Reduced ICR Scenarios**

	Total AM Peak Hour Trips (2016 ITE Manual)	Total PM Peak Hour Trips (2016 ITE Manual)	Total Daily Trips (2016 ITE Manual)
FEIR (2012 ITE Manual)	17,512	20,713	201,542
Updated 28.7% HBW ICR	18,119	19,699	197,685
Scenario 1: 12,000 DUs + 5.1 MSF + 10% ICR Reduction	18,119	19,699	197,685
Scenario 2: 12,000 DUs + 5.1 MSF + 20% ICR Reduction	18,119	19,699	197,685
Scenario 4: 75% of 12,000 DUs + 5.1 MSF + 20% ICR Reduction	13,590	14,775	148,266
Scenario 9: 14,000 DUs, no onsite amenities or commercial/industrial	16,025	13,863	145,616
Scenario 10: 12,000 DUs, no onsite amenities or commercial/industrial	13,736	11,882	124,814

Source: Fehr & Peers, April 2019. ITE Trip Generation Manual, 10th Edition.

As discussed above, to provide a conservative analysis, the scenarios were analyzed using the 2014 Kern COG model. The Kern COG model distributes trips using a “gravity model” which distributes internal and external trips based on the locations of complementary uses, such as nearby residences and a supermarket, the distance between trip origins and destinations in travel time, and land use types and size. In response to reduced ICRs (Scenario 1, Scenario 2 and Scenario 4) or substantially modified development assumptions (Scenario 9 and Scenario 10), the Kern COG model was found to reassign peak hour external trips to other time periods. For example, in cases like Scenario 9 or Scenario 10, which assume no onsite employment generating land uses or shopping and other amenities, the model shifted longer commutes to non-peak periods or assumed that residents would leave the site and “chain” trips for shopping, recreation, or medical purposes in offsite locations during peak AM or PM periods. As a result, while the Kern COG model generated the correct amount of internal trips for each scenario, it understated the number of peak period external trips relative to the ITE Manual projections.

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The Kern COG model external trip time-of-day trip shifts were conservatively addressed by assigning additional external trips to local intersections, local roadways, local freeway segments and state freeway and highway facilities north and south of the Project as required to match the total AM and PM peak period trips generated for each scenario by the 2016 ITE Manual. The number of additional AM and PM peak period external trips assigned for each scenario is shown in Table 2. With the additional external trip assignments shown in Table 2, the peak period internal and external trips sum to the total AM and PM peak period trips generated for each scenario in the 2016 ITE Manual.

Table 2: AM and PM Peak Hour Total Trips and Additional External Peak Trip Assignments for Each Scenario

Scenario	Total Peak Hour Trips (2016 ITE Manual)	Total Internal Trips (Kern COG model)	External Trips (Kern COG Model)	Additional External Trip Assignments	Total External Trips
AM Peak Hour					
Scenario 1: 12,000 DUs + 5.1 MSF + 10% ICR Reduction	18,119	9,023	6,831	2,265	9,096
Scenario 2: 12,000 DUs + 5.1 MSF + 20% ICR Reduction	18,119	7,211	5,476	5,432	10,908
Scenario 4: 75% of 12,000 DUs + 5.1 MSF + 20% ICR Reduction	13,590	5,409	7,175	1,006	8,181
Scenario 9: 14,000 DUs, no onsite amenities or commercial/industrial	16,025	3,413	3,393	9,219	12,612
Scenario 10: 12,000 DUs, no onsite amenities or commercial/industrial	13,736	2,926	5,578	5,232	10,810
PM Peak Hour					
Scenario 1: 12,000 DUs + 5.1 MSF + 10% ICR Reduction	19,699	9,810	5,914	3,975	9,889
Scenario 2: 12,000 DUs + 5.1 MSF + 20% ICR Reduction	19,699	7,840	3,771	8,088	11,859
Scenario 4: 75% of 12,000 DUs + 5.1 MSF + 20% ICR Reduction	14,775	6,531	6,851	1,393	8,244
Scenario 9: 14,000 DUs, no onsite amenities or commercial/industrial	13,863	901	2,100	10,862	12,962
Scenario 10: 12,000 DUs, no onsite amenities or commercial/industrial	11,882	772	4,722	6,388	11,110

Source: Fehr & Peers, April 2019. ITE Trip Generation Manual, 10th Edition and Kern COG Travel Demand Model

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Table 3 summarizes the AM and PM peak hour ICRs for the FEIR, the Updated 28.7% HBW ICR analysis, and each of the five scenarios. The peak period ICRs for Scenario 1 are 10 percentage points below the ICRs used in the FEIR and the Updated 28.7% HBW ICR analysis. The peak period ICRs for Scenario 2 and Scenario 4 are 20 percentage points below the ICRs used in the FEIR and the Updated 28.7% HBW ICR analysis. Due to the lack of onsite employment and amenities, the AM peak hour ICR for Scenario 9 and Scenario 10 is about 21.3 percent, largely due to onsite transit to schools in the AM peak period. The PM peak period ICR, which occurs after most trips from school are completed, is about 6.5 percent.

Table 3 also shows that for Scenarios 17 through 21, ranging from 5.1 MSF (Scenario 17) to 1.275 MSF (Scenario 21) of non-residential employment and freeway oriented development, the AM Peak Hour, PM Peak Hour and Daily Trip Generation are all lower than the FEIR and Updated Proposed Project Development. For this reason, ICR checkpoints will be based primarily upon residential buildout milestones as the trips generated by residential uses result in more vehicle trips to and from the freeway and longer travel distances when compared to the employment and freeway-oriented development analyzed in Scenarios 17 through 21.

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Table 3: Summary of AM and PM Peak Hour ICRs for the FEIR, Updated 28.7% HBW ICR, and for Each Scenario

Scenario	AM ICR	PM ICR
FEIR	59.8%	64.2%
Updated 28.7% HBW ICR	59.8%	64.2%
Scenario 1: 12,000 DUs + 5.1 MSF + 10% ICR Reduction	49.8%	54.2%
Scenario 2: 12,000 DUs + 5.1 MSF + 20% ICR Reduction	39.8%	44.2%
Scenario 3: 9,000 DUs + 3.825 MSF + 10% ICR Reduction	49.8%	54.2%
Scenario 4: 9,000 DUs + 3.825 MSF + 20% ICR Reduction	39.8%	44.2%
Scenario 5: 6,000 DUs + 2.550 MSF + 10% ICR Reduction	49.8%	54.2%
Scenario 6: 6,000 DUs + 2.550 MSF + 20% ICR Reduction	39.8%	44.2%
Scenario 7: 3,000 DUs + 1.270 MSF + 10% ICR Reduction	49.8%	54.2%
Scenario 8: 3,000 DUs + 1.270 MSF + 20% ICR Reduction	39.8%	44.2%
Scenario 9: 14,000 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 10: 12,000 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 11: 10,500 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 12: 9,000 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 13: 7,000 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 14: 6,000 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 15: 5,000 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 16: 3,500 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 17: 3,000 DUs, no onsite amenities or commercial/industrial	21.3%	6.5%
Scenario 18: 5.1 MSF on highway commercial, retail, restaurant, office, industrial, and warehousing land uses	0.0 %	0.0 %
Scenario 19: 3.825 MSF on highway commercial, retail, restaurant, office, industrial, and warehousing land uses	0.0 %	0.0 %
Scenario 20: 2.550 MSF on highway commercial, retail, restaurant, office, industrial, and warehousing land uses	0.0 %	0.0 %
Scenario 21: 1.275 MSF on highway commercial, retail, restaurant, office, industrial, and warehousing land uses	0.0 %	0.0 %
Scenario 22: 14,000 DUs + 3.1 MSF	59.8%	64.2%

Source: Fehr & Peers, April 2019 and Kern COG Travel Demand Model

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Table 4 provides a more detailed summary of the total, internal and external number of AM and PM peak hour trips and ICRs used to analyze impacts in the 2016 DEIR, the FEIR, the Updated 28.7% HBW ICR analysis, and in the five reduced ICR scenarios evaluated in this report. The DEIR, which utilized higher Home-Based Work and total Project peak period ICRs, projected that the Project would generate 4,868 external trips in the AM peak hour, and 5,924 external trips in the PM peak hour. Due to the reduction in the Home-Based Work ICR to 28.7 percent as requested by Caltrans, and the resulting decrease in the total Project peak period traffic ICRs, the FEIR projected and analyzed impacts from 7,040 AM external peak hour trips and 7,415 PM external peak hour trips. As discussed in Section 2.3 of this report, the Updated 28.7% HBW ICR, which is based on the more current 2016 ITE Manual, projects and analyzes impacts from 7,284 AM peak hour external trips and 7,052 PM peak hour external trips.

Table 4 shows that each of the five reduced ICR scenarios that generate more VMT than the FEIR and the Updated 28.7% HBW ICR also result in greater peak period external trips. AM peak period external trip numbers range from 8,181 in Scenario 4 to 12,612 in Scenario 9. PM peak hour external trips range from 8,244 in Scenario 4 to 12,962 in Scenario 9. To provide a conservative analysis, the reduced number of internal trips in each scenario was first applied against Home-Based Work trips, and then to other, non-work-related trips. As shown in Table 4, the AM and PM peak period ICRs for Home-Based Work trips in all of the five reduced ICR scenarios except the AM peak period in Scenario 1 are assumed to be zero.

This means that 100 percent of all Home-Based Work trips are evaluated as external trips. In the AM peak period for Scenario 1, only 7.7 percent of all Home-Based Work trips are assumed to be internal and 92.3 percent are external to the Project. The Home-Based Work trip ICRs evaluated in the five scenarios are substantially lower than the 28.7 percent ICR for Home-Based Work trips used in the FEIR analysis.

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Table 4: Detailed Summary of AM and PM Peak Hour Total - Internal and External Trips and ICR Levels by Trip Type DEIR, FEIR, Updated 28.7% HBW ICR and Five Reduced ICR Scenarios

AM Peak Hour Total Trips by Type								
	DEIR	FEIR	Updated 28.7% HBW ICR	Scenario 1	Scenario 2	Scenario 4	Scenario 9	Scenario 10
Total AM Peak Hour Trips	17,512	17,512	18,119	18,119	18,119	13,590	16,025	13,736
Home-based Work	8,371	8,371	8,661	8,661	8,661	6,496	7,660	6,566
Home-Based Other/ Non-Home-Based	9,141	9,141	9,458	9,458	9,458	7,094	8,365	7,170
AM Peak Hour Total Trips by Type and Internal/External								
Total AM Peak Hour Internal Trips	12,644	10,472	10,835	9,023	7,211	5,409	3,413	2,926
Home-based Work Trips	4,571	2,399	2,482	670	-	-	-	-
Home-Based Other/ Non-Home-Based	8,073	8,073	8,353	8,353	7,211	5,409	3,413	2,926
Total AM Peak Hour External Trips	4,868	7,040	7,284	9,096	10,908	8,181	12,612	10,810
Home-based Work Trips	3,800	5,972	6,179	7,990	8,661	6,496	7,660	6,566
Home-Based Other/ Non-Home-Based Trips	1,068	1,068	1,105	1,105	2,247	1,685	4,952	4,244
AM Peak Hour Total ICRs								
Home-based Work AM Peak Hour	54.5%	28.7%	28.7%	7.7%	0.0%	0.0%	0.0%	0.0%
Home-Based Other/ Non-Home-Based	88.3%	88.3%	88.3%	88.3%	76.2%	76.2%	40.8%	40.8%
Total Project AM Peak Hour ICR	72.2%	59.8%	59.8%	49.8%	39.8%	39.8%	21.3%	21.3%

PM Peak Hour Total Trips by Type								
	DEIR	FEIR	Updated 28.7% HBW ICR	Scenario 1	Scenario 2	Scenario 4	Scenario 9	Scenario 10
Total PM Peak Hour Trips	20,713	20,713	19,699	19,699	19,699	14,775	13,863	11,882
Home-based Work	5,820	5,820	5,535	5,535	5,535	4,152	3,896	3,339
Home-Based Other/ Non-Home-Based	14,893	14,893	14,164	14,164	14,164	10,623	9,967	8,543
PM Peak Hour Total Trips by Type and Internal/External								
Total PM Peak Hour Internal Trips	14,789	13,298	12,647	10,677	8,707	6,531	901	772
Home-based Work Trips	3,169	1,678	1,596	-	-	-	-	-
Home-Based Other/ Non-Home-Based	11,620	11,620	11,051	10,677	8,707	6,531	901	772
Total PM Peak Hour External Trips	5,924	7,415	7,052	9,022	10,992	8,244	12,962	11,110
Home-based Work Trips	2,651	4,143	3,940	5,535	5,535	4,152	3,896	3,339
Home-Based Other/ Non-Home-Based Trips	3,273	3,273	3,112	3,487	5,457	4,093	9,066	7,771
PM Peak Hour Total ICRs								
Home-based Work	54.5%	28.7%	28.7%	0.0%	0.0%	0.0%	0.0%	0.0%
Home-Based Other/ Non-Home-Based	78.0%	78.0%	78.0%	75.4%	61.5%	61.5%	9.0%	9.0%
Total Project PM Peak Hour ICR	71.4%	64.2%	64.2%	54.2%	44.2%	44.2%	6.5%	6.5%

Note: Percentages and trip totals are subject to rounding variability.

Source: Fehr & Peers, April 2019. ITE Trip Generation Manual, 10th Edition and Kern COG Travel Demand Model

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1.11 REDUCED ICR SCENARIOS ANALYSIS RESULTS

Sections 4-8 of this report compare the potential transportation and traffic impacts that could occur during the AM and PM peak hours under each of the five scenarios with the impacts identified in the FEIR and the Updated 28.7% HBW ICR analysis under cumulative plus project conditions.

Section 4 of this report summarizes the analysis of Scenario 1, which assumes Project development with ICRs reduced by 10 percentage points from the levels utilized in the FEIR and Updated 28.7% HBW ICR analysis. Scenario 1 results in new significant impacts to one (1) local intersection in the AM peak hour, one (1) local roadway in the PM peak hour, and six (6) local freeway segments. Three (3) local intersections that are significantly impacted in the PM peak hour in the FEIR analysis and one local intersection that is significantly impacted in the PM peak hour in the Updated 28.7% HBW ICR analysis would operate at acceptable levels in Scenario 1 under cumulative plus project conditions. Scenario 1 does not result in any new significant AM or PM peak hour impacts to state highway and freeway facilities north and south of the Project site. Due to the larger volume of external trips generated by the lower ICRs in Scenario 1, a new interchange would be required earlier than estimated in the FEIR and Updated 28.7% HBW ICR to avoid significant impacts to interim Project access facilities.

Section 5 of this report summarizes the analysis of Scenario 2, which assumes Project development with ICRs reduced by 20 percentage points from the levels utilized in the FEIR and Updated 28.7% HBW ICR analysis. Scenario 2 results in new significant impacts to one (1) local intersection in both the AM and PM peak hours, one (1) local intersection in the PM peak hour, two (2) local roadways in the PM peak hour, and 12 local freeway segments (six (6) in the PM peak hour and six (6) in both the AM and PM peak hours). One (1) local intersection that is significantly impacted in the PM peak hour in the FEIR analysis would operate at acceptable levels in Scenario 2 under cumulative plus project conditions. Scenario 2 results in one (1) new significant PM peak hour impact and two (2) new significant AM peak hour impacts to state highway and freeway facilities south of the Project site. No new significant impacts to the north of the site would occur. Due to the larger volume of external trips generated by the lower ICRs in Scenario 2, a new interchange would be required earlier than estimated in the FEIR and Updated 28.7% HBW ICR to avoid significant impacts to interim Project access facilities.

Section 6 of this report summarizes the analysis of Scenario 4, which assumes 75 percent of Project development with ICRs reduced by 20 percentage points from the levels utilized in the FEIR and Updated 28.7% HBW ICR analysis. Scenario 4 results in new significant impacts to one (1) local intersection in the PM peak hour, two (2) local roadways in the PM peak hours, and six (6) local freeway segments (five (5) in the PM peak hour and one (1) in the AM peak hour). Two (2) local intersections that are significantly impacted in the PM peak hour in the FEIR analysis and one (1) local roadway that is significantly impacted in the PM peak hour in the FEIR analysis would operate at acceptable levels in Scenario 4 under cumulative plus project conditions. Scenario 4 does not result in any new significant AM or PM peak hour impacts to state highway and freeway facilities north or south of the Project site compared with the FEIR and Updated 28.7% HBW ICR analysis.

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Although Scenario 4 includes 75 percent of proposed Project development, due to the larger volume of external trips generated by lower ICRs a new interchange would be required earlier than estimated in the FEIR and Updated 28.7% HBW ICR to avoid significant impacts to interim Project access facilities.

Section 7 of this report summarizes the analysis of Scenario 9 which assumes the development of 14,000 dwelling units with no complementary amenities other than legally required parks and schools and no onsite employment-generating land uses. Scenario 9 results in new significant impacts to one (1) local intersection in the AM peak hour, one local intersection in the PM peak hour, two (2) local roadways in the PM peak hour, and 19 local freeway segments (five (5) during the AM and PM peak hours, and 14 during the PM peak hour). Two (2) local intersections that are significantly impacted in the PM peak hour in the FEIR analysis would operate at acceptable levels in Scenario 9 under cumulative plus project conditions. Scenario 9 results in new significant peak hour impacts to two (2) state highway and freeway facilities to the north in the PM peak hour and three (3) state highway and freeway facilities to the south of the Project site in the AM peak hour compared with the FEIR and Updated 28.7% HBW ICR analysis. Due to the larger volume of external trips generated by the lack of onsite amenities and employment-generating land uses, a new interchange would be required to avoid significant impacts to interim Project access facilities earlier in the development process than identified in the FEIR and Updated 28.7% HBW ICR.

Section 8 of this report summarizes the analysis of Scenario 10, which assumes the development of 12,000 dwelling units with no complementary amenities other than legally required parks and schools and no onsite employment-generating land uses. Scenario 10 results in new significant impacts to two (2) local intersections in the PM peak hour, two (2) local roadways in the PM peak hour, and 17 local freeway segments (one (1) during the AM and PM peak hours, and 15 during the PM peak hour). Three (3) local intersections that are significantly impacted during the PM peak hour in the FEIR analysis and one (1) local intersection that is significantly impacted in the Updated 28.7% HBW ICR analysis during the PM peak hour would operate at acceptable levels in Scenario 10 under cumulative plus project conditions. Scenario 10 results in new significant AM or PM peak hour impacts to one (1) state highway and freeway segment to the north during the PM peak hour and two (2) state highway and freeway segments to the south of the Project site during the AM peak hour compared with the FEIR and Updated 28.7% HBW ICR analysis. In all scenarios, due to the larger volume of external trips generated by the lack of onsite amenities and employment-generating land uses, a new interchange would be required to avoid significant impacts to interim Project access facilities earlier in the development process than identified in the FEIR and Updated 28.7% HBW ICR.

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1.12 MITIGATION MEASURES AND SIGNIFICANCE DETERMINATIONS FOR REDUCED ICR SCENARIOS

Section 9 of this report summarizes the new significant impacts that could occur relative to the FEIR and Updated 28.7% HBW ICR analysis in each of the reduced ICR scenarios:

- Under the most conservative cumulative plus project conditions, no new significant impacts would occur in the Updated 28.7% HBW ICR analysis.
- New significant impacts would occur at local intersections, local roadways, local freeway segments and to state highway and freeway segments to the north and south of the Project area, in one or more of the reduced ICR scenarios as described in in Sections 4-8 for each of the five scenarios, respectively.

As discussed in the 2016 EIR, Section 1.10.8 of the KCGP provides the flexibility to assess traffic and safety impacts through means other than LOS when development utilizes smart growth policies that encourage multi-modal movements and is proposed as part of a community plan or specific plan. The Grapevine Specific Plan is designed to achieve sustainable mixed-use land use patterns by implementing walkable neighborhoods, narrow pedestrian-scale streets, non-vehicular facilities and recognizes that these design objectives will affect vehicular movement in the project area. The project design is consistent with Section 1.10.8 of the KCGP. Feasible improvements that could be implemented within the physical footprint of the Project analyzed in the FEIR are identified in Section 9 that, if implemented, would reduce all significant impacts to local intersections and local roadways for all reduced ICR scenarios to less than significant levels.

Feasible improvements that could be implemented within the physical footprint of the Project analyzed in the FEIR are identified in Section 9 that, if implemented, would reduce all significant impacts to local intersections and local roadways for all reduced ICR scenarios to less than significant levels. Feasible improvements that could be implemented within the physical footprint of the Project have also been identified to reduce significant impacts to local freeway segments to less than significant levels, except for the AM and PM peak hours on the northbound and PM peak hour on the Grapevine Grade.

Project impacts to state highway and freeway facilities to the north and south of the site identified in the FEIR, the Updated 28.7% HBW ICR and in the reduced ICR scenarios are subject to the executed fair share funding agreements with Caltrans District 6 and District 7. An expanded version of FEIR mitigation measure 4.16-9 is recommended to address potential state highway impacts that could occur in one or more of the reduced ICR scenarios at locations not covered by the Caltrans fair share funding agreements. No project-level unmitigated significant adverse traffic impacts would occur under any of the reduced ICR scenarios, and cumulative impacts to I-5 would remain significant and unavoidable under the FEIR, Updated 28.7% HBW ICR, and all reduced ICR scenarios

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The analysis of the reduced ICR scenarios is conservative for several reasons discussed in detail in Section 9.2 of this report. Section 9.2 also identifies expanded and revised mitigation measures that would require more frequent monitoring of Project ICRs and traffic conditions. The expanded mitigation measures also provide for the implementation of feasible additional mitigation to reduce potential significant impacts that could occur in one or more of the reduced ICR scenarios. These potential measures range from expanded trip reduction measures in expanded Mitigation Measure 4.16-2, modified roadway designs and operations such as signalization as described in this report and in expanded Mitigation Measure 4.16-3, and additional requirements in MM 4.16-9 to address potential state facility impacts as discussed above, if necessary. The expanded mitigation measures recommended in this report are presented below (deleted text in strikethrough; added text underlined). The full set of mitigation measures recommended to address potential impacts identified in the FEIR, the Updated 28.7% HBW ICR and in one or more of the reduced ICR scenarios is provided in Section 9.2 of this report.

MM 4.16-2 Prior to the issuance of the first occupancy permit, a Transportation Management Association shall be formed and funded to implement transportation demand management measures that reduce vehicle trips and encourage multi-modal movement in a phased manner as development occurs within the project area. The Transportation Management Association shall fund a transportation coordinator for the project area and shall be responsible for implementing a commute trip evaluation and reduction program that includes the following strategies:

- 1) Coordinating transit schedules to align with employer work schedules;
- 2) Providing discounted transit passes;
- 3) Organizing ridesharing, bike-share or car-share programs;
- 4) Sponsored shuttle/vanpool services, in collaboration with employers, to serve major employment centers;
- 5) Preferential carpool and vanpool parking;
- 6) End of trip facilities for bicyclists;
- 7) Conducting marketing campaigns to encourage non-automotive modes for commuting and other movement requirements such as the encouragement of flexible work schedules and telecommuting, and the benefits of parking fees and parking cash-out programs.
- 8) Coordinating with project employers to establish a ride home service for employees needing to respond to an emergency condition (e.g., playground injury of a child) that have used project transit to commute to work, such as on-demand transportation provided by taxis and ride services such as Uber and Lyft;
- 9) Coordinating with local schools to establish and maintain a Safe Routes to School program to facilitate students walking and biking to schools;

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- 10) Coordinating with project employers to update internal capture rate (ICR) information within the project for future required traffic studies to determine the estimated percentage of employees who live within the project site; and
- 11) Maintaining a TMA website accessible to project residents, employers and employees that includes educational information about air quality and greenhouse gas benefits of implementing a compressed work week schedule and home-based telecommunication program.
- 12) Implementing other feasible trip reduction measures to avoid causing a significant adverse traffic impact within the project's roadway segments and intersections.

Upon commencement of project construction activities, the ~~Transportation Management Association~~ TMA or its designee shall prepare an annual report that outlines program reduction measures implemented during the past year. ~~A copy of the report~~ At the earlier of five year intervals after commencement of projection construction activities, and for each of the traffic reports submitted for an application for a tentative tract map as required by MM 4.16-3 below, the TMA or its designee shall prepare a report describing the effectiveness of program reduction measures (and any other relevant change in transportation legal mandates, or transportation services or technologies) to reduce single-occupancy automobile use in Home-Based Work trips, and may include reductions in other automobile trips. This TMA trip reduction data shall be used in subsequent project traffic reports to calibrate actual trips in relation to the estimated average daily, and AM/PM peak trips, included in the EIR certified for the Project. A copy of all TMA reports shall be submitted to the Kern County Planning and Natural Resource Department and the Kern County Public Works Department by April 15th of each calendar year.

MM 4.16-3 Concurrent with the submittal of any application for tentative tract map, parcel map (with the exception of financing maps), or parcel map or final map for commercial/industrial site plan development, the project proponent shall conduct an appropriate traffic study, which shall include an analysis to determine if project traffic volumes are consistent with the trip distribution assumptions and internal capture (ICR) rate projections identified in the EIR and whether the trip distribution and/or internal capture rate information in the traffic study identifies a potentially significant adverse impact to roadway segments or intersection operations. The study shall also specifically evaluate ~~Level of Service (LOS)~~ traffic conditions at both the I-5/Wheeler Ridge Road/Laval Road Interchange and the I-5/Grapevine Road Interchange. ~~Any~~

- 1) A 10% deviation in trip distribution or internal capture rates shall be considered potentially significant, and the traffic study shall identify the extent to which this or a greater deviation reflects a temporary snapshot of the partial buildout of the project or is likely to continue under then-reasonably foreseeable circumstances through future project buildout. For any reasonably foreseeable persistent significant deviations from the trip distribution and/or internal capture rates identified for the project in the EIR, the traffic study shall further

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identify whether this change to the trip distribution and/or internal capture rate would result in a significant adverse traffic impact to roadway segments or intersection operations. If such a significant traffic impact is identified in the traffic study, the applicant shall be required to consult with the County to review whether intersection and roadway performance is consistent with applicable County and Grapevine Specific and Community Plan criteria, or if any additional measures are required to avoid a significant adverse impact to roadway segments or intersection operations. If such measures are required, the applicant shall:

- (a) Identify additional trip reduction measures through the Transportation Management Association pursuant to the TMA procedures set forth in MM 4.16-2 to avoid causing any significant new impact to a local intersection, peak hour road, or local freeway segment;
- (b) Identify roadway and signalization design modifications within the development area of the project site that are sufficient to avoid a new significant impact or avoid substantially worsening a previously-identified significant impact, consistent with the applicable conceptual improvements identified in the table below, which includes all improvements identified in all of the reduced ICR scenarios evaluated in the 2019 TIA.;

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- I-5 Northbound, Base of Grapevine Grade to Relocated Grapevine Interchange PM Peak Hour – Extend NB I-5 Grapevine Off-Ramp Deceleration Lane
- I-5 Northbound, Grapevine Slip On-Ramp AM and PM Peak Hours - Two lane on-ramp with peak hour ramp metering
- I-5 Northbound, Grapevine Slip On-Ramp to Laval Road East Off-Ramp AM and PM Peak Hours - Auxiliary lane between Grapevine Slip On-Ramp to Laval Road East Off-Ramp
- I-5 Northbound, I-5 Northbound Off-ramp AM and PM Peak Hours - Provide dedicated two-lane off-ramp (eliminate shared off-ramp / through lane)
- I-5 Northbound, Laval Road East Off-Ramp AM and PM Peak Hours - Auxiliary lane from the Grapevine on-ramp to the Laval Road East off-ramp
- I-5 Northbound, Laval Road On-Ramp PM Peak Hour - Extend Laval Road On-Ramp acceleration lane
- I-5 Northbound, Laval Road On-Ramp to SR 99 Off-Ramp AM and PM Peak Hours – Extension of on-ramp acceleration lane
- I-5 Northbound, Laval Road West Off-Ramp PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane
- I-5 Southbound, North of SR 99 Junction PM Peak Hour - Extend third Southbound SR 99 through lane
- I-5 Southbound, Grapevine Off-Ramp PM Peak Hour – Extend Grapevine Off-Ramp deceleration lane
- I-5 Southbound, I-5 Southbound Auto / Truck Bypass PM Peak Hour - Extend third Southbound SR 99 through lane
- I-5 Southbound, Laval Road East Off-Ramp PM Peak Hour - Extend Laval Road East Off-Ramp deceleration lane
- I-5 Southbound, Laval Road On-Ramp PM Peak Hour - Two lane on-ramp with peak hour ramp metering
- I-5 Southbound, Laval Road to Grapevine PM Peak Hour - Two lane on-ramp with peak hour ramp metering
- I-5 Southbound, Laval Road West Off-Ramp PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane
- I-5 Southbound, SR 99 to Laval Road PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane
- SR 99 Southbound, CVEF Off-Ramp PM Peak Hour - Extend third Southbound SR 99 through lane
- SR 99 Southbound, North of I-5 Junction PM Peak Hour - Extend third Southbound SR 99 through lane
- SR 99 Southbound, SR 99 Auto Lanes to I-5 Southbound PM Peak Hour - Extend third Southbound SR 99 through lane
- SR 99 Southbound, Truck Bypass Off-Ramp PM Peak Hour - Extend third Southbound SR 99 through lane
- Street C / Street H, AM and PM Peak Hours - A third northbound through lane
- Street D / Street A, AM and PM Peak Hour - A shared westbound through / right –turn lane and shared eastbound through / right-turn lane
- Street C / Street G, PM – Signal timing coordination with Street C / Street A
- Street I / Street A, PM Peak Hour – New traffic signal
- S. Wheeler Ridge Road / Laval Road, PM Peak Hour - Stripe the second southbound left-turn lane;
- Street A/Street C, PM Peak Hour- A second westbound right-turn lane from the I-5 southbound off-ramp to C Street
- Street A between Street D and Street I – Construct 6-lane arterial from Street D to Street I, and construct 4-lane arterial between Street I and Street N.
- Wheeler Ridge Road north of Santa Elena Drive – Extend two northbound travel lanes to 1,500 feet north of Santa Elena Drive
- Street C from Aqueduct crossing to Street E – Widen from a 2-lane to a 4-lane roadway

Or

(c) Identify a combination of (a) and (b) above.

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- 2) In its tentative tract map submittal, the applicant shall reserve the right of way required for potential implementation of such roadway improvements that will avoid significant adverse impacts to local intersections, local roadways, and local freeway segments. These improvements may include but are not limited to those identified in the table above, which includes all improvements identified in all of the reduced ICR scenarios evaluated in the 2019 TIA. The applicant may apply to the County for the release of any such road right of way reservation in an amended tentative tract map, parcel map, or final map, or as part of a commercial site plan review, at such time as the applicant can demonstrate that it is no longer reasonably foreseeable that such expanded roadway improvements are needed to avoid the significant impact identified. Any such application shall include a traffic report documenting the absence of a current or reasonably foreseeable significant adverse impact to such local intersection, local roadways, and local freeway segments. In the interim, the reserved right of way may be developed with uses that support multi-modal transportation, including but not limited to walking, biking, or NEV trails, until such a time as the right of way is needed to construct the required roadway improvements or such right of way is released per above procedure.
- 3) Any identified roadway or signalization improvements, or reservations of right of way to accommodate potential future improvements, required by the County to be implemented under MM 4-16-3(1)(b) and (2) above shall be included as conditions of approval of any final subdivision maps or commercial/industrial site plans and be implemented prior to issuance of any building or grading permits.

MM 4.16-6 The project proponent shall implement the following measures to ensure ~~adequate performance standards at internal intersections within the Grapevine Specific~~ the absence of any significant adverse impacts on project and ~~Community Plan boundary~~ local roadways.

- 1) As part of any traffic study submitted with an application for a tentative tract map, parcel map (with the exception of financing maps), or parcel map or final map for commercial/industrial site plan development, the project proponent shall be required to identify any project or local roadway or intersection that could potentially fall below Level of Service (LOS) D under cumulative plus project conditions and reserve sufficient right of way within these intersections to implement future improvements if determined necessary in consultation with the County. This traffic study shall also identify residential and commercial uses for previously-approved tentative and/or final tract maps, occupancy permits issued for residential and commercial uses, and an updated analysis of the internal capture rate for Home-Based Work trips from the employer survey information collected by the Transportation Management Association pursuant to MM 4.16-2 above.

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- 2) Prior to issuance of the ~~65,000th~~, ~~7,500th~~, and 10,000th residential unit occupancy permits, the project proponent shall prepare ~~an intersection evaluation report~~ a traffic report to identify the Level of Service (LOS) ~~at~~ on all constructed project and local roadways and intersections. This traffic report shall be required for each tentative tract maps if the tentative tract map (TTM) aligns with these residential buildout milestones but need not be included if the TTM does not align with these milestones. If the ~~study~~ traffic report determines that any such project or local roadway or intersection is operating within LOS E or LOS F, the project proponent, in consultation with the County shall review whether ~~intersection~~ this performance is consistent with County and Grapevine Specific and Community Plan criteria and determine if any additional improvements or implementation of additional transportation demand measures are required to ensure ongoing functioning of the intersection. Any such improvements shall be constructed by the project proponent or implemented through another agreement in consultation with the Kern County Public Works Department.

MM 4.16-9

- (a) After issuance of the ~~64,000th~~ residential unit building permit and prior to issuance of the ~~75,000th~~ building permit, the project proponent shall prepare and submit to the County of Kern and to Caltrans an Internalization Rate Report for all AM and PM project related trips. If the required internalization rate report indicates that internalization rates are more than 35 percent below projected buildout levels of 59.8 percent for the AM peak hour and 64.2 percent for the PM, the project proponent shall consult with Caltrans and the project proponent shall elect to either (1) implement additional transportation demand management strategies as necessary to ensure that Caltrans facilities serving the project operate within applicable level of service standards, (2) provide fair share funding for impacts to state highway and freeway facilities not covered by the 2017 fair share funding agreements between the Project proponent and Caltrans, or (3) implement a combination of (1) and (2) herein.
- (b) After issuance of the 6,500th residential unit building permit and prior to issuance of the 7,500th building permit, the project proponent shall prepare and submit to the County of Kern and to Caltrans an Internalization Rate Report for all AM and PM project related trips. If the required internalization rate report indicates that internalization rates are more than 20 percent below projected buildout levels of 59.8 percent for the AM peak hour and 64.2 percent for the PM, the project proponent shall consult with Caltrans and the project proponent shall elect to either (1) implement additional transportation demand management strategies as necessary to ensure that Caltrans facilities serving the project operate within applicable level of service standards, (2) provide fair share funding for impacts to state highway and freeway facilities not covered by the 2017 fair share funding agreements between the Project proponent and Caltrans, or (3) implement a combination of (1) and (2) herein.

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- (c) After issuance of the 9,000th building permit and prior to issuance of the 10,000th building permit, the project proponent shall prepare and submit to the County of Kern and to Caltrans an Internalization Rate Report for all AM and PM project related trips. If the required internalization rate report indicates that internalization rates are more than 10 percent below projected levels, the project proponent shall consult with Caltrans and the project proponent shall elect to either (1) implement additional transportation demand management strategies as necessary to ensure that Caltrans facilities serving the project operate ~~with~~ within applicable level of service standards, (2) provide fair share funding for impacts to state highway and freeway facilities not covered by the 2017 fair share funding agreements between the Project proponent and Caltrans, or (3) implement a combination of (1) and (2) herein.

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2 FEIR AND UPDATED 28.7% HBW ICR TRANSPORTATION AND TRAFFIC ANALYSIS

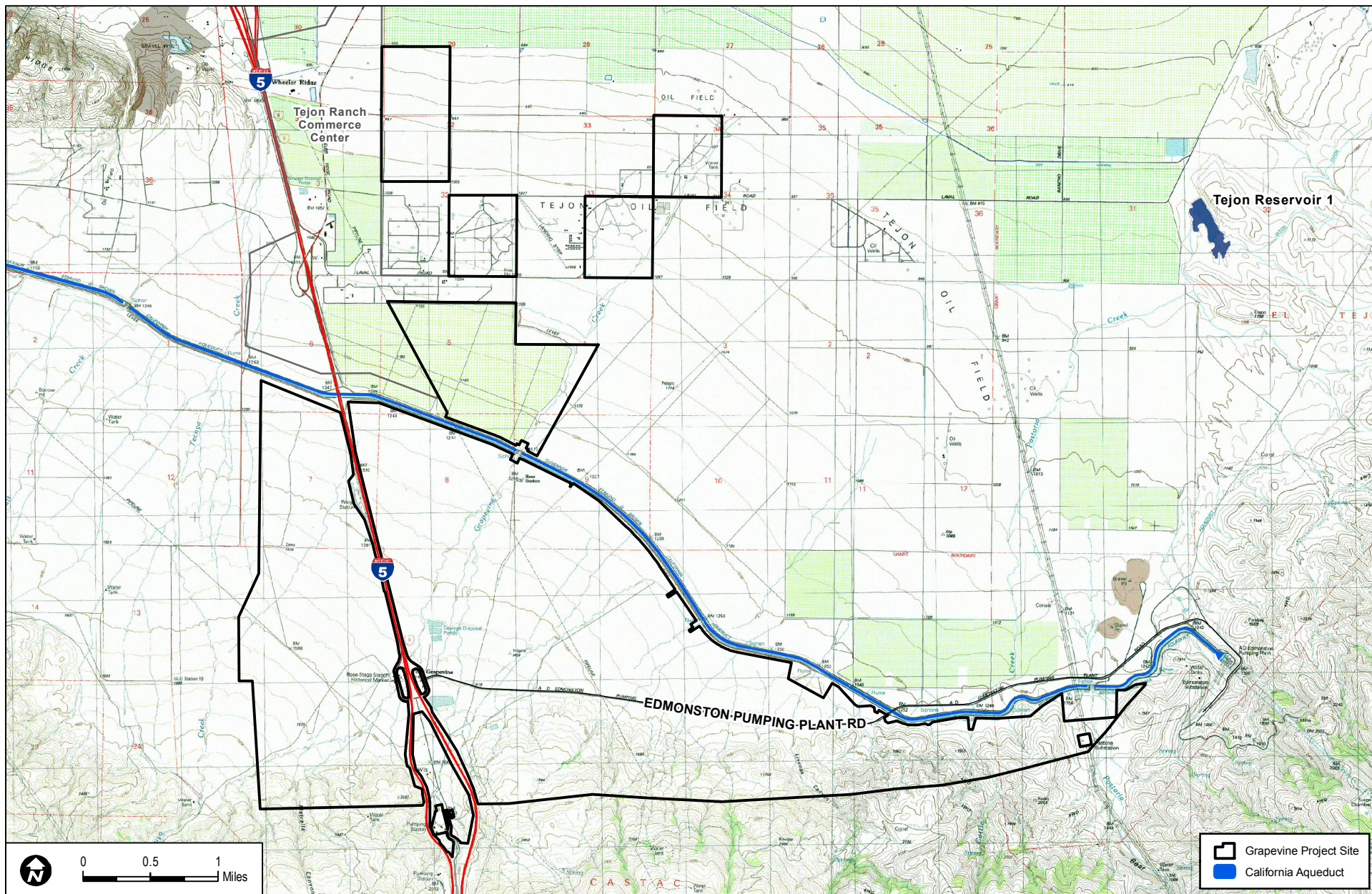
2.1 PROJECT SETTING AND PROJECT TRANSPORTATION SYSTEM OVERVIEW

The Project transportation and traffic analysis environmental setting and regulatory setting is the same as described in the Grapevine EIR (see EIR Section 4.16.2, Environmental Setting and Section 4.16.3, Regulatory Setting.) The Project description is the same as summarized in the April 12, 2019 NOP published by the County and included in the Grapevine EIR (See EIR Chapter 3, Project Description and EIR Volume 12, Chapter 3, Project Description Revisions). The following discussion summarizes the Project's proposed transportation system and design approach considered in the Grapevine EIR and in this report.

The proposed Project is presented in Figure 2-1 and is located adjacent to I-5, the major north-south freeway in the state, at the southern end of the San Joaquin Valley. The Grapevine Grade begins south of the site and extends uphill for about 6 miles to the Fort Tejon interchange. The junction of I-5 and State Route (SR) 99 is located about 3 miles to the north. Downtown Bakersfield is located about 30 miles north of the site via I-5 and SR-99. Downtown Los Angeles is located about 85 miles to the south via I-5. Santa Clarita is located about 55 miles to the south along I-5, an existing eight lane freeway running through the project site.

The closest existing interchanges on I-5 are located at Laval Road to the north and Grapevine Road to the south. North of the project site, I-5 travels northwest along the west side of the San Joaquin Valley, and connects to SR-99, which traverses the eastern portions of the valley. The Grapevine Grade includes two truck control lanes in both directions for about 6 miles south from the Grapevine Road interchange to the Fort Tejon interchange.

A Commercial Vehicle Enforcement Facility (CVEF) operated by the California Highway Patrol is located along the southbound portion of I-5 adjacent to the project and south of the I-5 and SR-99 junction. SR-138 is an east-west highway that begins south of Gorman and extends from the I-5 to SR-14 near Lancaster and Palmdale. SR-223 is an east-west state highway that travels between I-5 and SR-58 through the City of Arvin approximately 15 miles north of the project site. Wheeler Ridge Road connects I-5 to SR-223 and SR-184. Laval Road provides access to I-5 via Wheeler Ridge Road and to highway commercial and industrial warehousing uses in the Tejon Ranch Commerce Center. Edmonston Pumping Plant Road is a private two-lane roadway providing access to the Edmonston Pumping Plant operated by the State Department of Water Resources about 6 miles east of the I-5/Grapevine Road interchange.



SOURCES: McIntosh & Associates 2013; TRC 2013b

FIGURE 2-1
Grapevine Project Site

GRAPEVINE PROJECT

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As discussed in the Grapevine EIR, the Project is within a designated “Planned Transit Priority Area” and “Strategic Employment Center” in the adopted Kern County RTP/SCS. Section 1.10.8 of the Kern County General Plan (KCGP) provides the flexibility to assess traffic and safety impacts through means other than level of service (LOS) when development utilizes smart growth policies that encourage multi-modal movements and is proposed as part of a community plan or specific plan. The Project has been designed to reduce internal and external single-occupancy vehicle trips and to encourage multi-modal transportation, including walking, biking and higher occupancy vehicle and mass transit use (see Section 3.2 of the proposed Grapevine Specific Plan).

A broad range of housing, including rental, multi-family and single-family homes, will be located adjacent to employment-generating land uses proposed for the Project adjacent TRCC. Project housing, commercial, shopping and other amenities will be concentrated in compact village centers, and narrow, pedestrian-scale streets and non-vehicular facilities, such as trails and bicycle lanes, will be used throughout the site. The Grapevine Specific Plan recognizes that the proposed transportation facilities may affect vehicular movement in the project area to promote and encourage non-automotive use. The Project’s non-automotive design and transit objectives, including measures that could affect internal vehicle movement, are consistent with and implement the RTP/SCS designations for the site and Section 1.10.8 of the KCGP.

2.2 PROJECT CIRCULATION AND ACCESS

As discussed in the Grapevine EIR, the Project will construct an internal roadway network and use the existing Laval Road interchange and potentially another improved access location (subject to Caltrans approval) for interim development. A new interchange will be constructed along I-5 to meet transportation facility demand prior to full Project buildout. Interim access facilities would be used until such time as additional Project development would cause applicable LOS standards to fall below acceptable levels at any interim access location. The FEIR analysis included three interim access scenarios: (1) “Interim A,” which includes the interim use of the existing Laval Road interchange (see Figure 2-2); (2) “Interim B”, which includes the interim use of improved facilities at the I-5/Grapevine Road interchange (subject to Caltrans approval) as well as the I-5/Laval Road interchange (see Figure 2-3 for a complete list of the six (6) improvements identified to improve interchange operations and safety); and (3) an “Interim B option” requested by Caltrans that includes an interim access interchange constructed about 0.5 miles north of the existing Grapevine Road interchange (see Figure 2-4 for the location or the relocated on/off-ramps and the continued use of the Grapevine Road undercrossing for local circulation between the east and west sides of Interstate5).

Roadway Segments-Number of Lanes

2
 4

Traffic Control

Traffic Signal
 Traffic Signal or Roundabout

Side-Street Stop-Control
 Side-Street Stop-Control or Roundabout

All-Way Stop or Roundabout

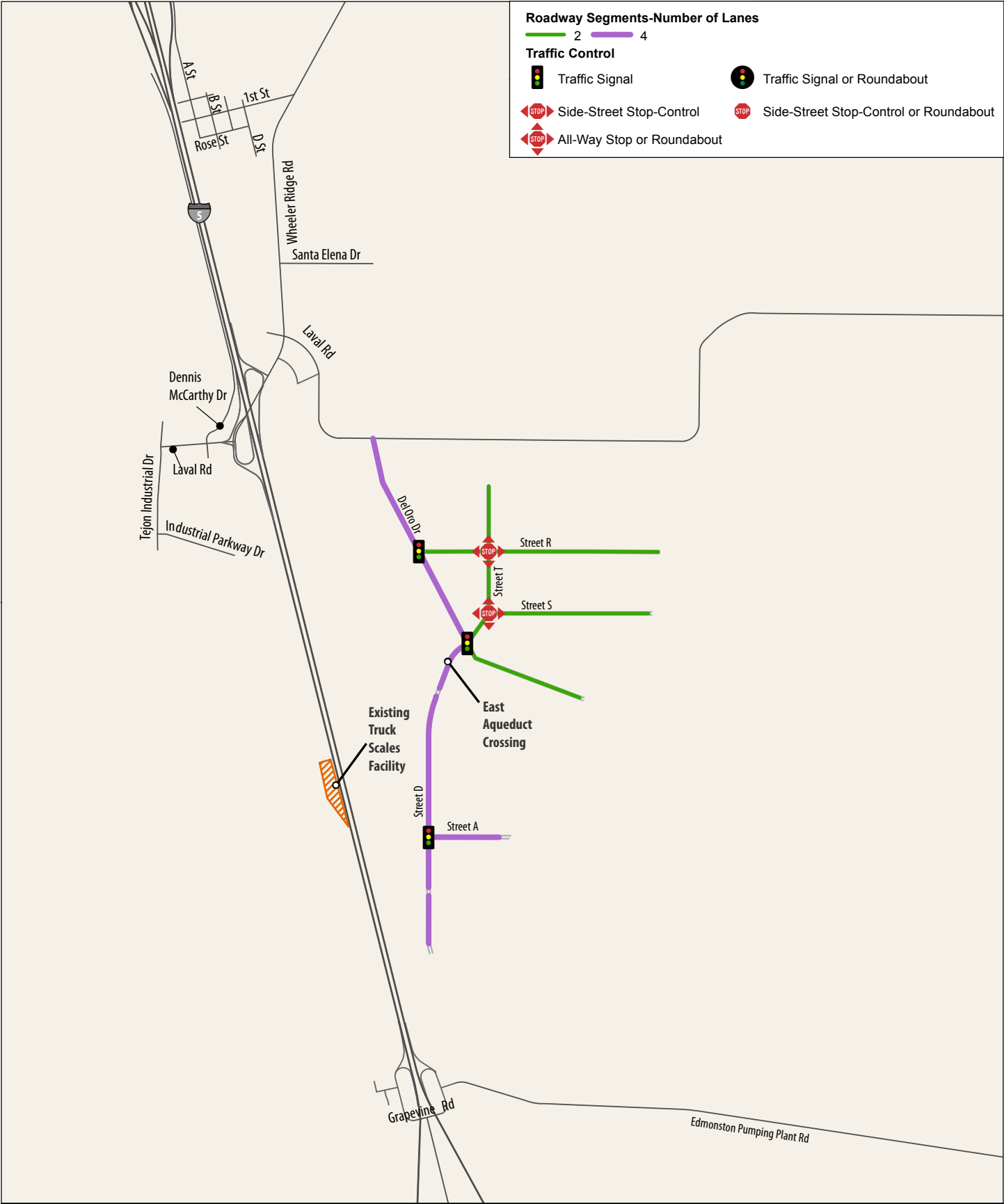


FIGURE 2-2
Project Roadway Network - Interim A

Roadway Segments-Number of Lanes

2 4 I-5/Grapevine Existing Interchange Improvements

Traffic Control

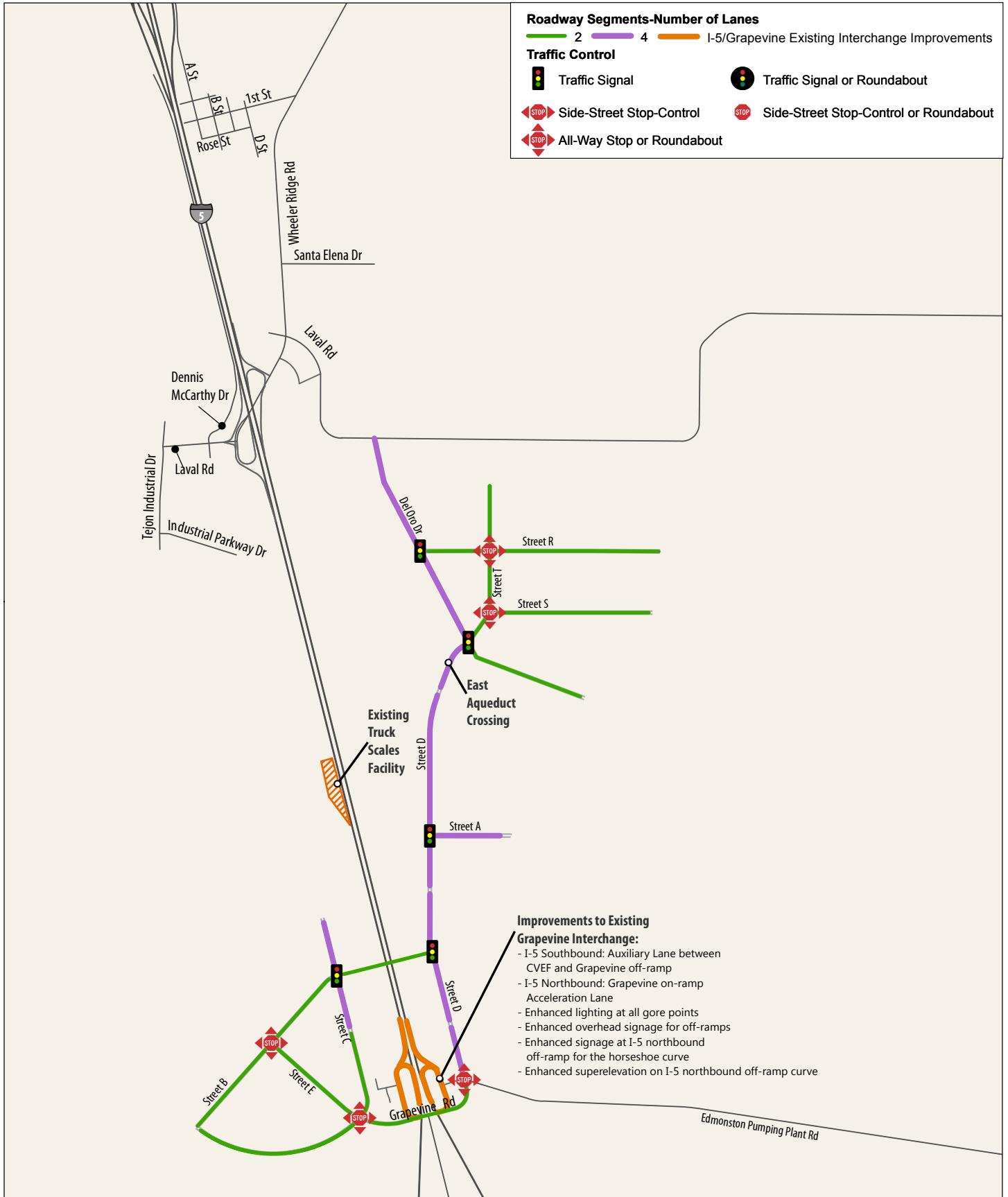
Traffic Signal

Traffic Signal or Roundabout

Side-Street Stop-Control

Side-Street Stop-Control or Roundabout

All-Way Stop or Roundabout



0 0.5 1 Miles

SOURCES: USGS, ESRI

GRAPEVINE PROJECT

FIGURE 2-3

Project Roadway Network - Interim B

Roadway Segments-Number of Lanes

2 4 I-5/Grapevine Interchange Improvements

Traffic Control

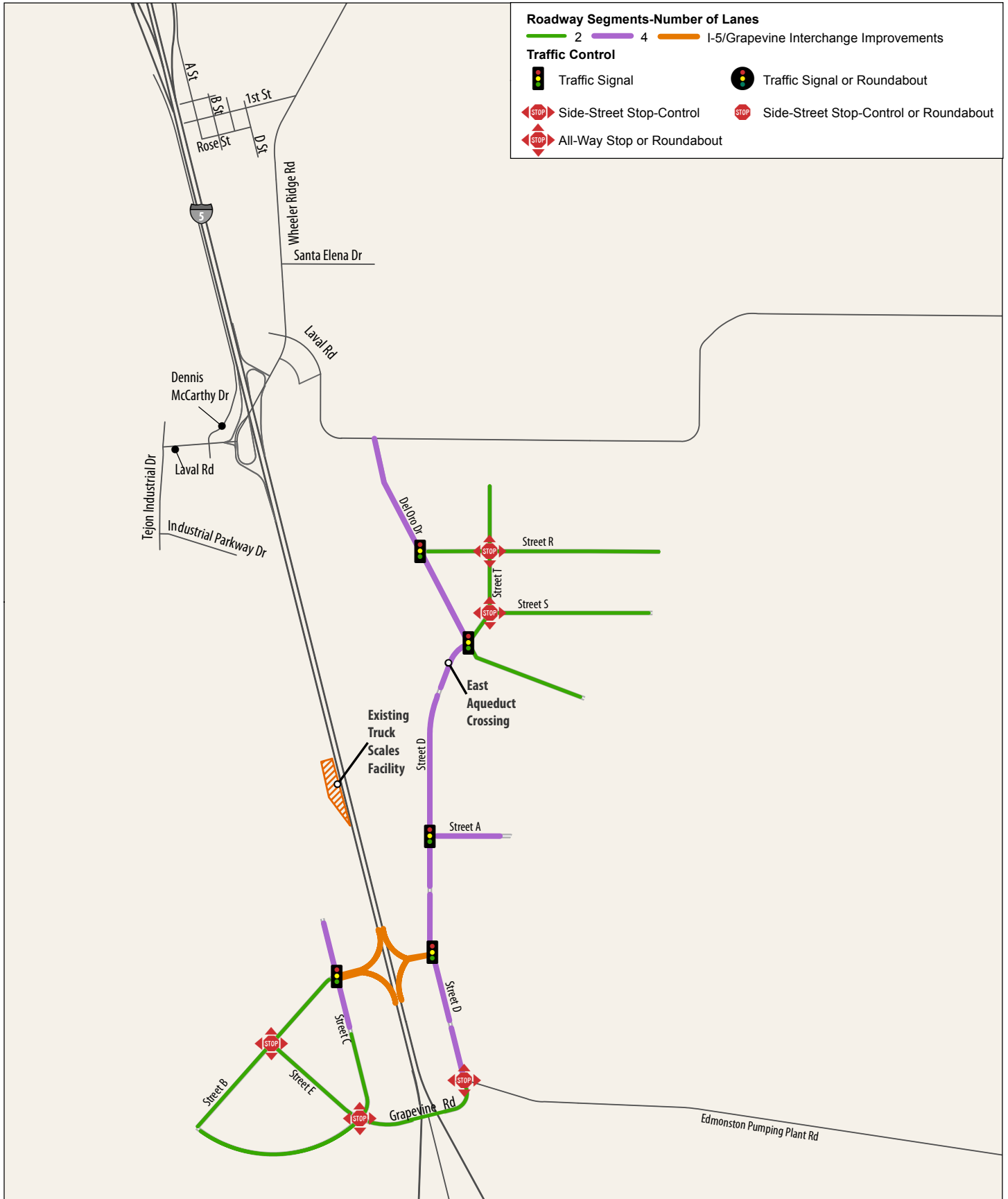
Traffic Signal

Traffic Signal or Roundabout

Side-Street Stop-Control

Side-Street Stop-Control or Roundabout

All-Way Stop or Roundabout



0 0.5 1 Miles

SOURCES: USGS, ESRI

GRAPEVINE PROJECT

FIGURE 2-4

Project Roadway Network - Interim B Option

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The Project will monitor all interim access facilities to ensure that each facility operates within applicable LOS standards (see Section 9 of this report). The construction of a new I-5 interchange will be required before Project development would cause an interim access facility to operate below applicable LOS standards. Two new interchange locations and designs were considered in the Grapevine EIR: (1) “Variant 1” located approximately one mile north of the existing I-5/Grapevine Road interchange, which would relocate the CVEF to the north, close the existing I-5/Grapevine Road interchange and require additional freeway ramp improvements in the project area (see Figure 2-5); and (2) “Variant 2” located approximately 0.5 miles north of the existing I-5/Grapevine Road interchange which would not relocate the CVEF, would close the existing I-5/Grapevine Road interchange, and require additional freeway and ramp improvements, including between the CVEF and the new interchange (see Figure 2-6). The FEIR included certain additional refinements to the new interchange design and buildout freeway ramps requested by Caltrans, including the addition of a second lane with a 500-foot deceleration lane to the previously planned one lane northbound and southbound off ramps in the new interchange layout and the extension of the Laval Road East off-ramp deceleration lane from 170 feet to 500 feet (see Figure 2-7).

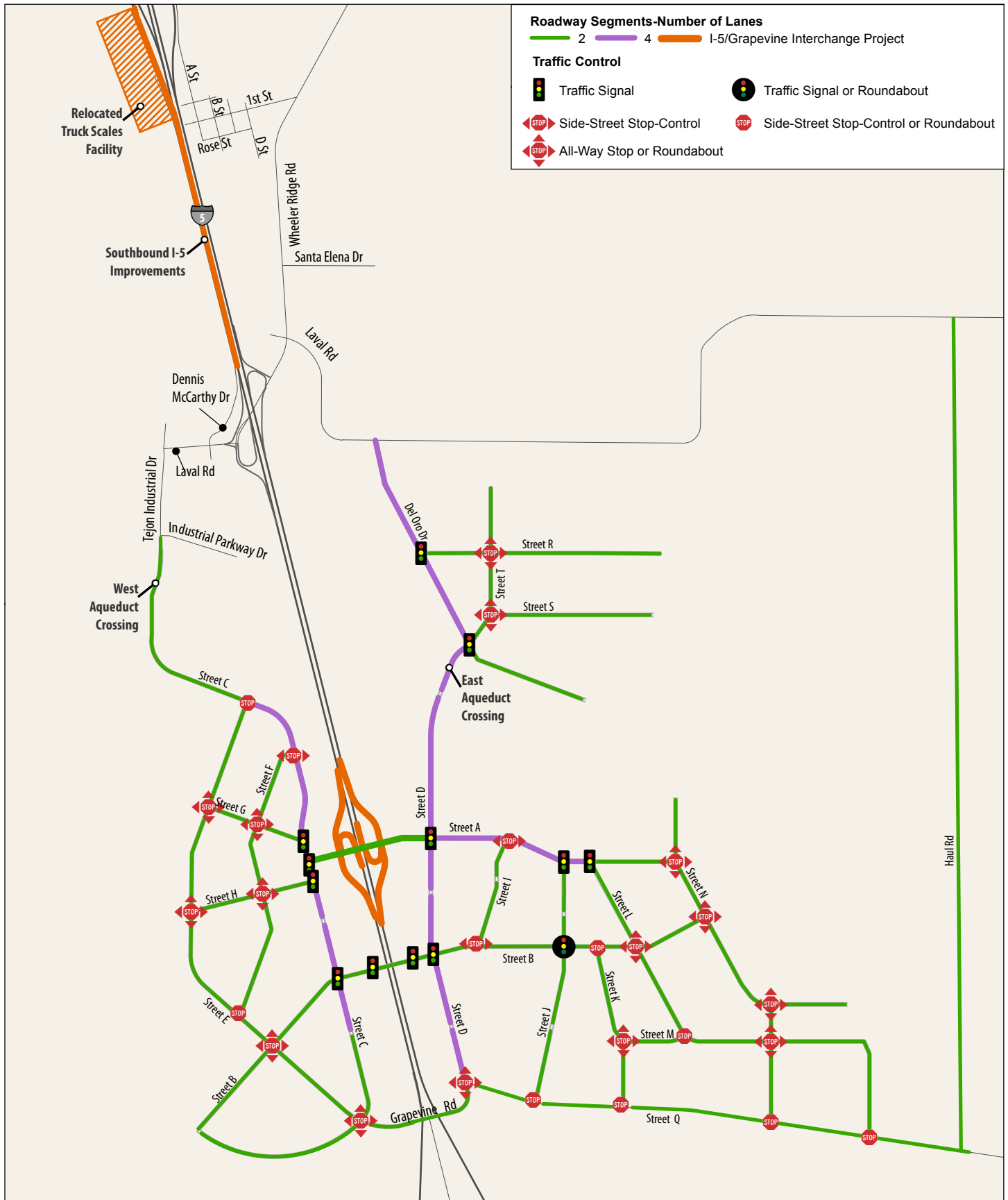


FIGURE 2-5
Project Roadway Network - Variant 1



0 0.5 1 Miles

SOURCES: USGS, ESRI

GRAPEVINE PROJECT

Roadway Segments-Number of Lanes

2 4 I-5/Grapevine Interchange Project

Traffic Control

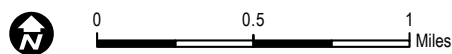
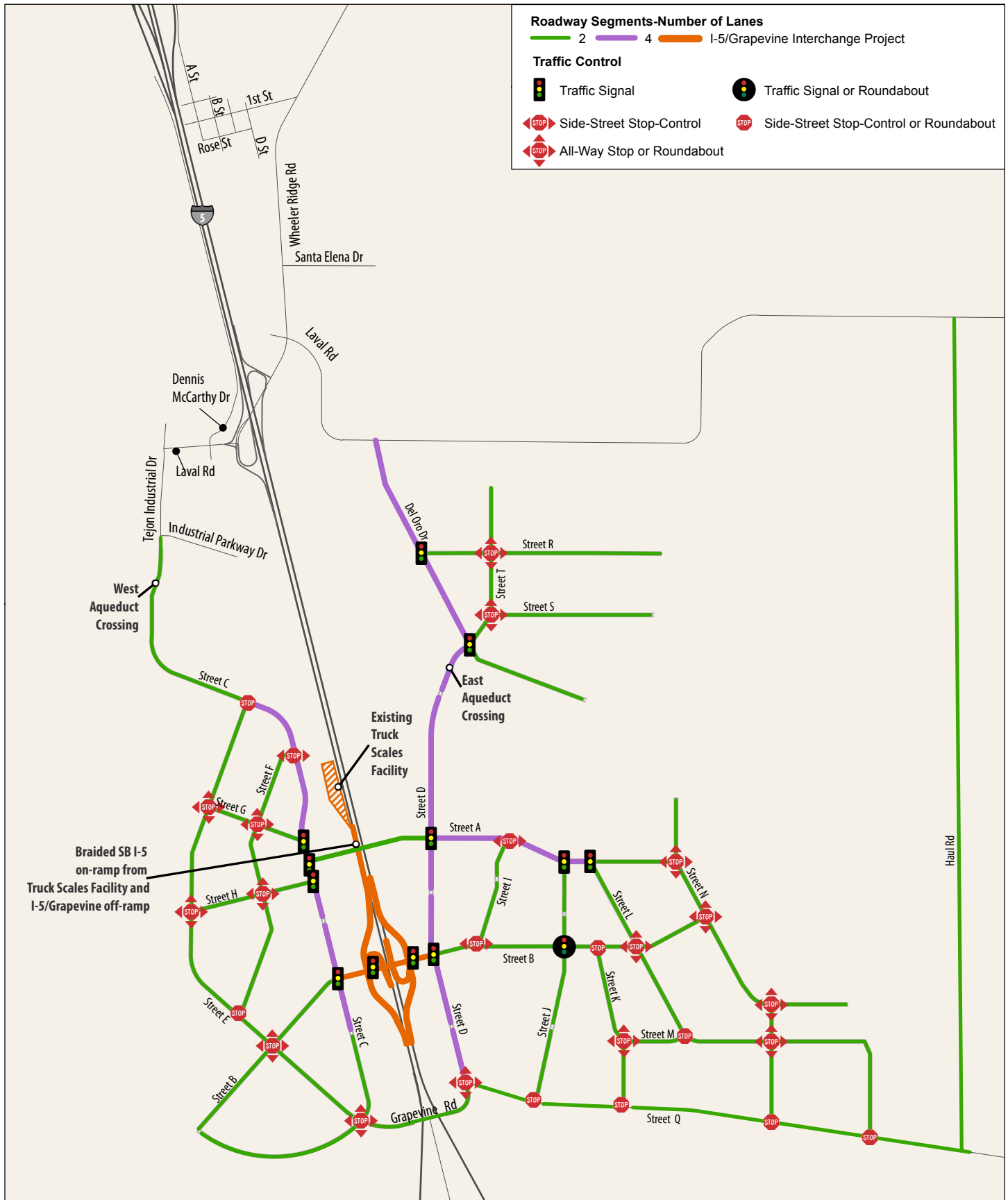
Traffic Signal

Traffic Signal or Roundabout

Side-Street Stop-Control

Side-Street Stop-Control or Roundabout

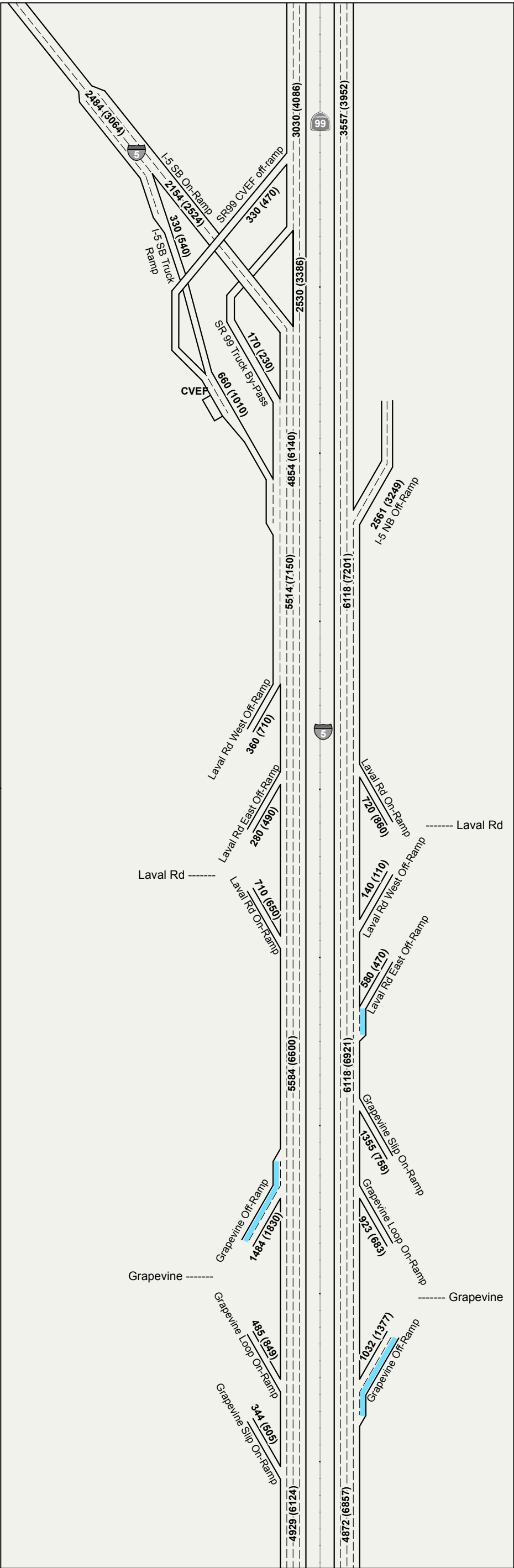
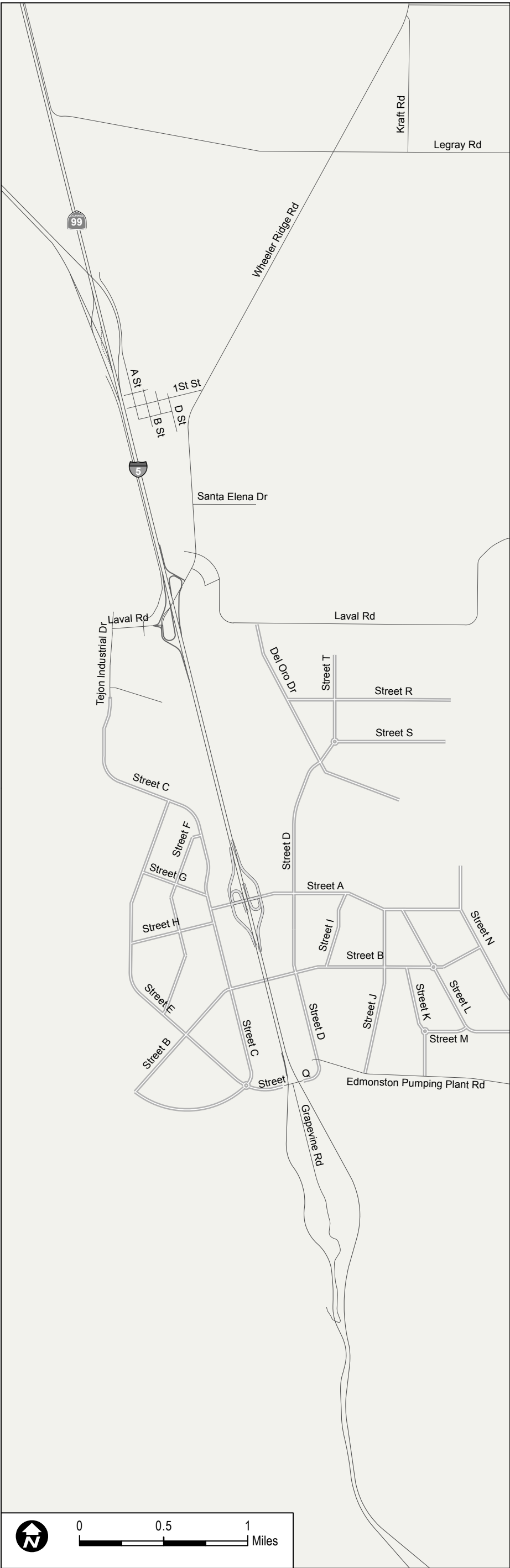
All-Way Stop or Roundabout



SOURCES: USGS, ESRI

GRAPEVINE PROJECT

FIGURE 2-6
Project Roadway Network - Variant 2



AM (PM) AM and PM Traffic Volume
Second Lane Design within the Project Development Footprint

FIGURE 2-7
Peak Hour Traffic Volumes
Freeway and Ramp Configurations Cumulative FEIR Conditions (2040)

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2.3 FEIR ANALYSIS

2.3.1 FEIR ANALYSIS METHODOLOGY AND ICR ASSUMPTIONS

The FEIR analysis estimated the average daily and AM and PM peak hour number of trips that would be generated from the full buildout of the proposed Project's land uses using the trip generation factors in the 2012 ITE Trip Generation Manual. The Project's ADT was estimated at 201,542 trips. The FEIR analysis trip generation totals by land use are shown in Table FEIR-A.

Table FEIR A: ITE Trip Generation Estimate - Proposed Project

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	In	Out	Total	In	Out	
Residential									
Residential	8,400 DUs	210	6,300	1,575	4,725	8,400	5,292	3,108	79,968
Village Center Residential	3,600 DUs	220	1,836	367	1,469	2,232	1,451	781	23,940
Non-Residential									
Village Center Commercial - Retail ¹	450 ksf	820 ¹	432	268	164	1,670	802	868	19,215
Village Center Commercial - Office ¹	350 ksf	710 ¹	546	480	66	522	89	433	3,861
Freeway Commercial	750 ksf	820	720	446	274	2,783	1,336	1,447	32,025
Office/Research & Development	2,100 ksf	710	3,276	2,883	393	3,129	532	2,597	23,163
Light Industrial/Warehouse ²	1,450 ksf	130/150 ²	813	660	153	848	187	661	7,533
Schools & Parks									
Elementary Schools	3,520 students	520	1,584	871	713	528	259	269	4,541
Middle Schools	1,760 students	522	950	523	427	282	138	144	2,851
High Schools	2,454 students	530	1,055	717	338	319	150	169	4,196
Parks ³	96 acres	411	-	-	-	-	-	-	249
Total			17,512	8,790	8,723	20,713	10,236	10,477	201,542

Notes: DUs = dwelling units; ksf = thousand square feet

Trip generation estimates calculated using the trip rates in ITE's Trip Generation Manual, 9th Edition

1Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)

2Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)

3City Park land use (ITE Code 411) in ITE's Trip Generation Manual only includes daily trip information; up to 112 acres if unit count increases to 14,000 to comply with Kern County park requirements

Source: Trip Generation Manual, 9th Edition (Institute of Transportation Engineers, 2012).

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Average daily and AM and PM peak hour ICRs were initially derived for the Project's Home-Based Work and Home-Based Other/Non-Home-Based trips based on the 2014 Kern COG traffic model. As requested by Caltrans, the average daily and AM and PM peak hour ICRs generated by the Kern COG model for Home-Based Work trips was reduced to 28.7 percent in the FEIR analysis. As discussed in the FEIR, this adjustment was requested because employees are often willing to accept longer commutes for employment relative to trips for shopping, recreation or other non-employment purposes. As a result, the internalization rate for Home-Based Work trips has a larger effect on potential project impacts to state and external roadways than other project-related trips (e.g., for shopping, school or local recreation). When combined with non-work Home-Based Other/Non-Home-Based trips, the ICRs evaluated in the FEIR analysis resulted in an AM peak hour ICR of 59.8 percent and a PM peak hour ICR of 64.2 percent (see Table FEIR-B).

Table FEIR B: Lower Internalization Sensitivity Analysis

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips ¹	% Internal ²	Total Internalization % ³	% of Trips ¹	% Internal ²	Total Internalization % ³
Home-Based Work	47.8%	28.7%	13.7%	28.1%	28.7%	8.1%
Home-Based Other/ Non-Home-Based	52.2%	88.3%	46.1%	71.9%	78.0%	56.1%
Total			59.8%			64.2%

Notes: ¹Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17 of Appendix T, page 117.

²Internalization percentage by trip purpose. Home-based work trip internalization shown in Table 18 of Appendix T, page 118. Home-based other/non-home-based trip internalization shown in Table 22 of Appendix T, page 139.

³Overall internalization estimate calculation.

Source: Fehr & Peers, August 2016.

The reduced Project ICRs evaluated in the FEIR analysis were significantly lower than the ICRs generated by the Kern COG model (e.g., an AM peak hour ICR of 72.2 percent and a PM peak hour ICR of 71.4 percent). The FEIR analysis also generated an average daily weekday VMT of 3,175,631 miles, higher than the average weekday VMT of 2,595,690 miles based on the Kern COG model ICRs. The FEIR analysis results were included in FEIR Appendix JJ and are attached as Appendix A of this report.

The distribution of external trips north and south of the Project site was estimated by using the 2014 Kern COG model. As shown in Table FEIR-C, 28.3 percent to 24.3 percent of peak AM and PM Project trips (respectively) would travel to and from the north (i.e. Bakersfield, Arvin-Lamont and Eastern Kern County) and 11.9 percent and 11.5 percent of peak AM and PM Project trips (respectively) would travel to and from the south (i.e. southern Kern County, Antelope Valley, Santa Clarita valley and metropolitan Los Angeles).

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**Table FEIR C: Project Build-out Trip Distribution Estimate -
Cumulative Plus Project Conditions (2040)**

Origin/Destination	Trip Distribution Estimate	
	A.M. Peak Hour	P.M. Peak Hour
Project Area	59.8%	64.2%
North of Grapevine	28.3%	24.3%
West Bakersfield via I-5	3.0%	2.6%
North of Bakersfield via I-5	1.5%	1.3%
Bakersfield Metropolitan Area via SR 99	16.4%	14.1%
North of Bakersfield via SR 99	1.5%	1.3%
Arvin-Lamont Area	4.5%	3.8%
Eastern Kern County via SR 58	1.5%	1.3%
South of Grapevine	11.9%	11.5%
Southern Kern County (Frazier Park/Tejon Mountain Village)	1.5%	1.3%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	4.5%	3.8%
Santa Clarita Valley Area	3.0%	2.6%
Los Angeles Basin/Orange County/Inland Empire	3.0%	3.8%

Source: Kern COG Regional Travel Demand Model
Fehr & Peers, August 2016.

The Kern COG model was used to evaluate cumulative plus project impacts in Kern County in the FEIR analysis. The Southern California Association of Governments (SCAG) RTP/SCS projections were used to analyze cumulative conditions for locations north and south of the existing I-5/Fort Tejon interchange in Los Angeles County in the FEIR analysis. The interim and new interchange facilities shown in Figures 2-2 to 2-7 and discussed in Section 2.1 of this report were evaluated in the FEIR analysis.

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2.3.2 TRAFFIC AND TRANSPORTATION IMPACT THRESHOLDS

The April 12, 2019 NOP states that the County reviewed the 2018 revisions to Appendix G of the CEQA guidelines which informs the CEQA thresholds of significance approved by the Kern County Board of Supervisors. The NOP states that the thresholds used in the previously certified EIR do not require revision because revising the thresholds of significance used in the previously-certified Grapevine EIR was not required by the NOP, and because each of the revised impact questions included in the 2018 revisions to Appendix G are already addressed in the Grapevine EIR, except for the VMT questions that are not required until July of 2020. As a result, the following thresholds of significance used to evaluate potential Project transportation and traffic impacts in the Grapevine EIR are utilized in this report:

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would have a significant impact on Traffic and Transportation if it would:

- (1) Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.
- (2) Conflict with an applicable congestion management program, including, but not limited to LOS standards and travel demand measures, or other standards established by the County congestion management agency for designated roads or highways:
 - i. Metropolitan Bakersfield General Plan LOS “C”
 - ii. Kern County General Plan LOS “D”.
- (3) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.
- (4) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- (5) Result in inadequate emergency access.
- (6) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

The Grapevine EIR also considered the following threshold:

- (7) Contribute to cumulative transportation and traffic impacts.

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2.3.3 FEIR ANALYSIS OF TRAFFIC AND TRANSPORTATION IMPACTS

The Grapevine EIR considered existing conditions to establish the existing environmental setting for transportation and traffic, existing plus project conditions, which evaluated the transportation and traffic conditions resulting from full build out of the Project added to existing conditions, and cumulative plus project conditions, which evaluated the transportation and traffic conditions that occur with full build out of the project and the development of reasonably foreseeable projects. The FEIR analysis evaluated potential impact using the reduced ICRs requested by Caltrans under existing plus project conditions (Exhibit 5, FEIR Appendix JJ in Appendix A of this report) and cumulative plus project conditions (Exhibit 9, FEIR Appendix JJ in Appendix A of this report). As discussed above, the analysis of cumulative plus project conditions includes all of the impacts identified in the existing plus project conditions assessment as well as additional impacts. Consequently, the cumulative plus project conditions in the FEIR analysis represents the most comprehensive and conservative analysis of potential Project transportation and traffic impacts and is summarized below.

2.3.3.1 LOCAL INTERSECTION IMPACTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

The FEIR analysis determined that the Project would not significantly impact any existing intersection under cumulative plus project conditions. All of the new intersections that would be constructed within the Grapevine project area would operate at acceptable performance levels except the following under cumulative plus project conditions:

- Street C / Street A – PM peak hour
- Street D/Street A – AM and PM peak hours
- Street C / Street G – PM peak hour
- Street C/ Street H – PM peak hour
- Street I / Street A – PM peak hour

2.3.3.2 LOCAL ROADWAY SEGMENT IMPACTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

The FEIR analysis evaluated potential Project impacts to local roadway segments under cumulative plus project conditions during the PM peak hour, the period of heaviest roadway use and when the combination of vehicle trip purposes is at the highest level. All roadway segments were determined to have sufficient capacity to meet demand and would operate at acceptable LOS levels under cumulative plus project conditions except the segment of future Street A between Street D and Street I.

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2.3.3.3 LOCAL FREEWAY OPERATIONS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

The FEIR analysis evaluated AM and PM peak hour LOS levels on 33 freeway segments in the vicinity of the Project area under cumulative plus project conditions. A total of 31 of 33 freeway mainline, on-ramp merge, and off-ramp diverge segments were determined to operate at acceptably during the AM and PM peak hours under cumulative plus project conditions except the Fort Tejon to Base of Grapevine Grade (6% Downgrade) segment of I-5 during the PM peak hour, and the Base of Grapevine Grade to Fort Tejon (6% Upgrade) I-5 segment during the AM and PM peak hours. The FEIR analyzed the vehicle volumes and densities in terms of passenger car equivalents per mile per lane (pcpmpl) that would occur on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade under cumulative plus project conditions in more detail. The analysis determined that the PM peak hour density in the two inside northbound lanes, which are reserved for passenger vehicles, would be 52 pcpmpl (LOS F). The outside two northbound lanes would also operate at LOS F under cumulative plus project conditions. During the PM peak hour, density in the two inside southbound lanes, which are reserved for passenger vehicles, would be 41 pcpmpl (LOS E) and the outside two southbound lanes would operate at LOS F. The FEIR analysis determined that the total PM peak hour density for the northbound Grapevine Grade would be 58 pcpmpl (LOS F) and 64 pcpmpl (LOS F) in the southbound direction under cumulative plus project conditions.

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2.3.3.4 FREEWAY OPERATIONS NORTH AND SOUTH OF THE PROJECT AREA UNDER CUMULATIVE PLUS PROJECT CONDITIONS

The FEIR analysis evaluated potential project impacts under cumulative plus project conditions at 15 state freeway and highway segments located to the north of the Project area and 66 freeway and highway segments located to the south of the Project area. Significant impacts were determined to occur at any state freeway or highway segment that was determined to: (a) decline from acceptable to unacceptable LOS standards or b) (b) the Project's contribution to the vehicle to capacity ratio at the segment operating at unacceptable LOS standard under cumulative without project conditions was greater than .020 under cumulative with project conditions.

The FEIR analysis determined that all of the freeway and highway segments analyzed to the north of the Project area along SR 99 and I-5 would operate at acceptable LOS levels under cumulative plus project conditions. The FEIR analysis determined that the Project would contribute to significant impacts under cumulative plus project conditions at the following freeway and highway segments to the south of the Project area along I-5 and SR-138:

I-5 Northbound:

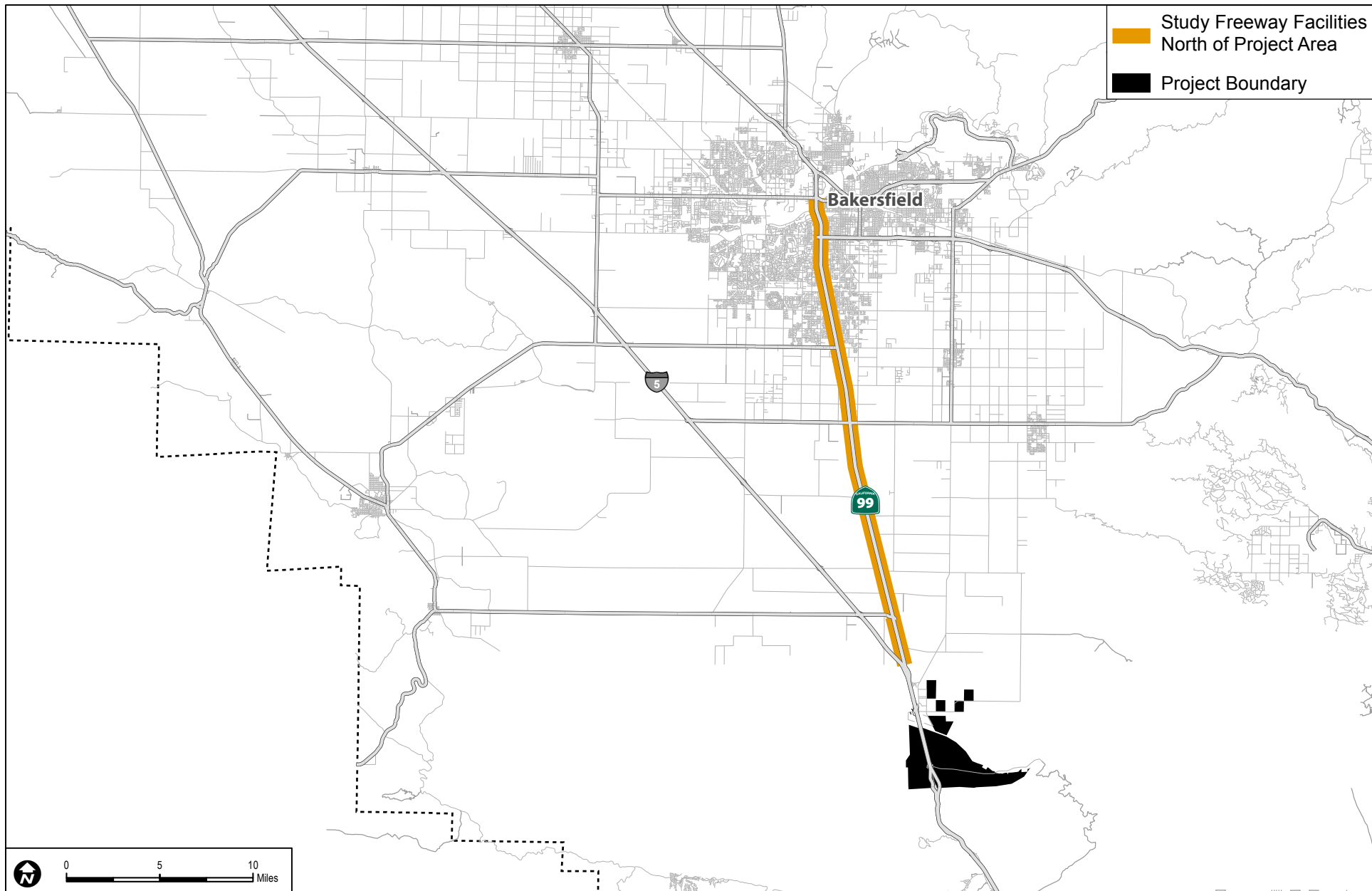
- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – AM and PM peak hours

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

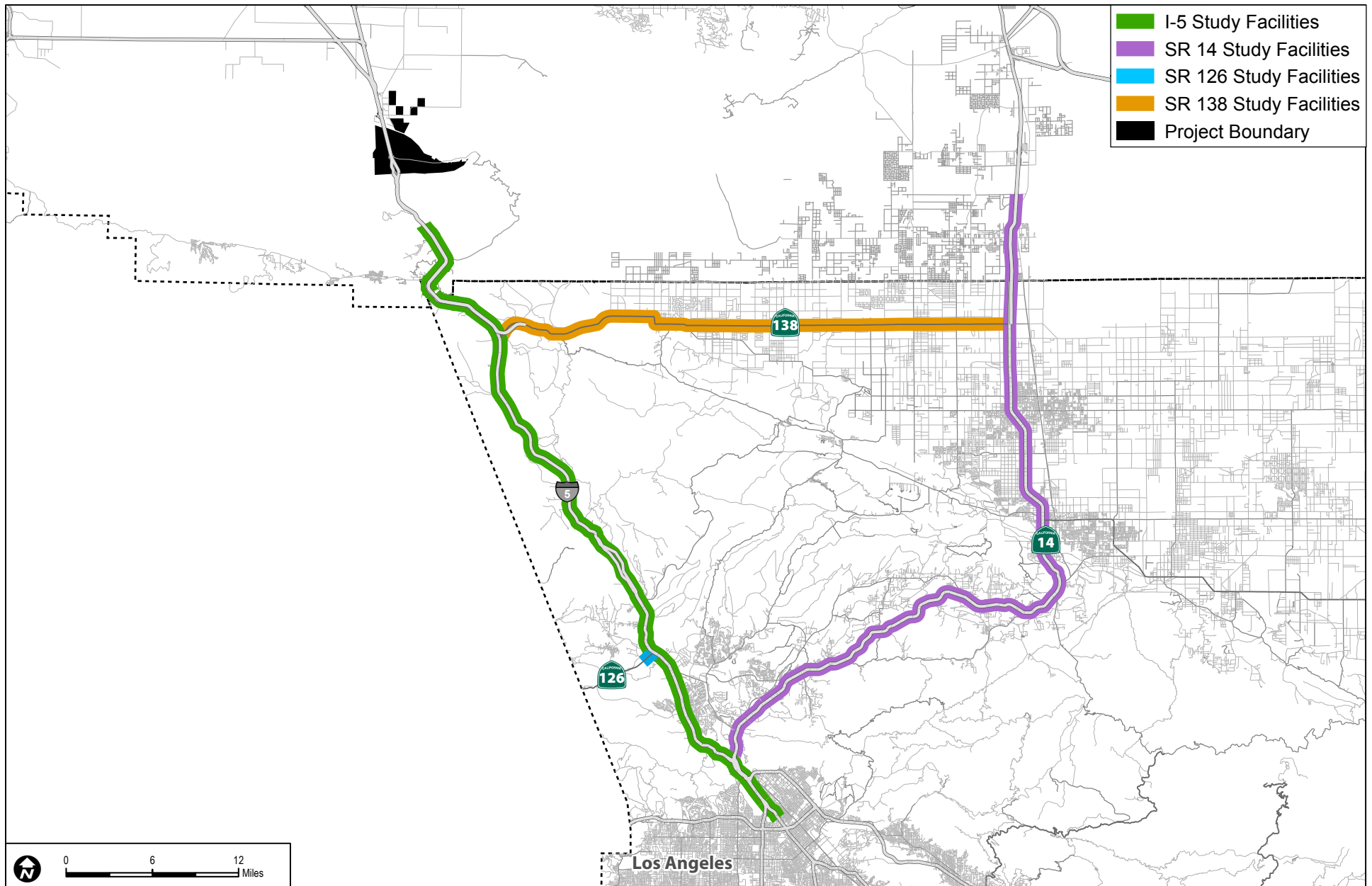
SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours



SOURCES: USGS, ESRI

FIGURE 2-8
Cumulative Freeway Analysis Locations - North of Project Area



SOURCES: USGS, ESRI

FIGURE 2-9
Cumulative Freeway Analysis Locations - South of Project Area

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2.3.3.5 INTERIM I-5 ACCESS IMPACTS

The FEIR analysis considered cumulative traffic conditions that could occur from the use of the proposed Project's interim access facilities prior to constructing a new interchange, including Interim A, Interim B and the Interim B option shown in Figure 2-2 to Figure 2-4. Implementation of the Interim B access facilities was determined to cause the greatest potential interim Project transportation and traffic impacts. The FEIR analysis found that approximately 5,000 homes and 1,700,000 square feet of non-residential land uses could be constructed until the applicable LOS standards for the Interim B access facilities would potentially be exceeded. Additional Project development above these levels would require the construction of a new and relocated interchange along I-5, including either interchange Variant 1 or Variant 2 shown in Figure 2-5 and Figure 2-6.

2.3.4 FEIR MITIGATION MEASURES

The following mitigation measures (MMs) were included in the FEIR to reduce potentially significant Project impacts to transportation and traffic:

- MM 4.16-1** All project circulation elements, including on-site public roadways and driveways, will be designed and constructed in compliance with the goals, policies and design criteria described in the Grapevine Specific and Community Plan and the Grapevine Special Plan.
- MM 4.16-2** Prior to the issuance of the first occupancy permit, a Transportation Management Association shall be formed and funded to implement transportation demand management measures that reduce vehicle trips and encourage multi-modal movement in a phased manner as development occurs within the project area. The Transportation Management Association shall fund a transportation coordinator for the project area and shall be responsible for implementing a commute trip reduction program that includes the following strategies:
- 1) Coordinating transit schedules to align with employer work schedules;
 - 2) Providing discounted transit passes;
 - 3) Organizing ridesharing, bike-share or car-share programs;
 - 4) Sponsored shuttle/vanpool services, in collaboration with employers, to serve major employment centers;
 - 5) Preferential carpool and vanpool parking;
 - 6) End of trip facilities for bicyclists;
 - 7) Conducting marketing campaigns to encourage non-automotive modes for commuting and other movement requirements such as the encouragement of flexible work schedules and telecommuting, and the benefits of parking fees and parking cash-out programs.
 - 8) Coordinating with project employers to establish a ride home service for employees needing to respond to an emergency condition (e.g., playground injury of a child) and have used project transit to commute to work, such as on-demand transportation provided by taxis and ride services such as Uber and Lyft;

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- 9) Coordinating with local schools to establish and maintain a Safe Routes to School program to facilitate students walking and biking to schools;
- 10) Maintaining a TMA website accessible to project residents, employers and employees that includes educational information about air quality and greenhouse gas benefits of implementing a compressed work week schedule and home-based telecommunication program.

Upon commencement of project construction activities, the Transportation Management Association or its designee shall prepare an annual report that outlines program reduction measures implemented during the past year. A copy of the report shall be submitted to the Kern County Planning and Natural Resource Department and the Kern County Public Works Department by April 15th of each calendar year

MM 4.16-3 Concurrent with the submittal of any application for tentative tract map, parcel map (with the exception of financing maps), or commercial/industrial site plan development, the project proponent shall conduct an appropriate traffic study to determine if project traffic volumes are consistent with trip distribution assumptions identified in the EIR. The study shall also specifically evaluate Level of Service (LOS) at both the I-5/Wheeler Ridge Road/Laval Road Interchange and the I-5/Grapevine Road Interchange. Any identified improvements shall be included as conditions of approval of any final subdivision maps or commercial/industrial site plans and be implemented prior to issuance of any building or grading permits.

MM 4.16-4 Prior to the issuance of the first building permit within each Plan Area as identified in the Grapevine Specific and Community Plan and the Grapevine Special Plan, the project proponent shall be required to provide a one-time road maintenance endowment to off-set ongoing costs of roadway maintenance. Payments(s) shall be provided in eight (8) installments as identified below.

- Plan Area 1: Total Due \$280,000
- Plan Area 2: Total Due \$481,800
- Plan Area 3: Total Due \$363,400
- Plan Area 4: Total Due \$391,600
- Plan Area 5a: Total Due \$382,000
- Plan Area 5b: Total Due \$76,400
- Plan Area 6a: Total Due \$246,400
- Plan Area 6b-6e: Total Due \$68,800

MM 4.16-5 The project proponent is responsible for ensuring construction activities associated with development of the Grapevine Project are not detrimental to any County maintained road(s) within the Grapevine Specific and Community Plan.

Prior to issuance of any grading or building permit, the project proponent shall adhere to the following provisions:

- 1) Obtain an Encroachment Permit from Kern County Public Works Department and enter into a secured agreement for unanticipated construction related road repairs. The purpose of this secured agreement is to ensure that any County

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maintained road within the Grapevine Specific and Community Plan boundary that is demonstrably damaged by the construction related activities are promptly repaired and, if necessary paved, slurry sealed or reconstructed as per requirements of the state and/or Kern County. The project proponent shall identify and provide the Kern County Public Works Department with a videotape of the pre- and post-construction condition of all County maintained public roadways within the Grapevine Specific and Community Plan boundary that will be utilized by the project proponent to access the proposed construction site.

- 2) Upon conclusion of the construction activities, the project proponent shall make any necessary construction related repairs to County roadways within the Grapevine Specific and Community Plan boundary in consultation with Public Works Staff.

Any grading or building permit for a single-family residential dwelling unit located within an approved tentative tract map or parcel map that has already complied with this measure is specifically exempt from any further maintenance requirements.

Any roadways that have been specifically over engineered and constructed by the project proponent to withstand large scale construction traffic and use, as determined by the Kern County Public Works Department shall also be exempt from future maintenance requirements.

MM 4.16-6 The project proponent shall implement the following measures to ensure adequate performance standards at internal intersections within the Grapevine Specific and Community Plan boundary.

- 1) As part of any traffic study submitted with an application for a tentative tract map, parcel map (with the exception of financing maps), or commercial/industrial site plan development, the project proponent shall be required to identify any intersection that could potentially fall below Level of Service (LOS) D under cumulative plus project conditions and reserve sufficient right-of-way within these intersections to implement future improvements if determined necessary in consultation with the County.
- 2) Prior to issuance of the 6,000th and 10,000th occupancy permits, the project proponent shall prepare an intersection evaluation report to identify the Level of Service (LOS) at all constructed intersections. If the study determines that any such intersection is operating within LOS E or LOS F, the project proponent, in consultation with the County shall review whether intersection performance is consistent with County and Grapevine Specific and Community Plan criteria and determine if any additional intersection improvements or implementation of additional transportation demand measures are required to ensure ongoing functioning of the intersection. Any such improvements shall be constructed by the project proponent or implemented through another agreement in consultation with the Kern County Public Works Department.

MM 4.16-7 Prior to the issuance of any building permit that would facilitate development within the project site that could be accessed utilizing the existing I-5/Grapevine

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Road interchange, the project proponent shall be required to consult with Caltrans and complete appropriate interchange enhancements such as implementing gore points, auxiliary lanes, acceleration lanes, lighting, signage, or reconstruction exit and entrance ramps.

MM 4.16-8 Subsequent to the commencement of construction activities on the project site, the project proponent shall be required to conduct a biennial traffic monitoring report at the existing I- 5/Wheeler Ridge Road/Laval Road interchange and, following the completion of operational enhancements, at the existing I-5/Grapevine Road interchange. The purpose of this program is to monitor Level of Service and queuing conditions at project utilized interchanges. The required report shall be submitted to Kern County and to Caltrans by April 15th every other year. If at any time, the results of this biennial traffic monitoring report indicate that the project is within 10 percent of falling below Level of Service (LOS) D at either interchange, the project proponent shall implement the following actions:

- 1) Provide Kern County and Caltrans a detailed breakdown of how many additional permits (Interim Permits) can be issued while still maintaining a Level of Service (LOS) D at either interchange. Once the Interim Permits have been issued, the County of Kern will not issue any additional building permits until such time as appropriate expanded and/or relocated improvements have been constructed.
- 2) Initiate with Caltrans all necessary actions to expand and/or relocate the existing I- 5/Grapevine Interchange. Improvements can include, but are not limited to the following options:
 - a. Variant 1 – Relocate the I-5/Grapevine interchange approximately one (1) mile north of the existing interchange, with construction phased to capacity requirements. This proposal would further connect with planned streets, construct a 2-lane overpass ½ mile north of the existing interchange, close freeway access while maintaining the underpass at the existing Grapevine interchange and require the replacement of the existing California Vehicle Enforcement Facility (CVEF) on Tejon RanchCorp land west of the junction of I-5 and State Route (SR) 99 with a new access and bypass ramps connecting the CVEF to the freeway and a southbound auxiliary lane to the existing I-5/Laval Road interchange
 - b. Variant 2 – Would include similar improvements to Variant 1, except the location of the relocated I-5/Grapevine Interchange and the 2-lane overpass would be reversed. Further, this option would not require relocation of the existing California Vehicle Enforcement Facility (CVEF) but will require braided ramp improvements.

Through consultation with Caltrans, required improvements as identified above can be construed in phases as development occurs. The project proponent shall provide any phased improvement provisions that have been approved by Caltrans to the County of Kern, and any such phased improvement provisions shall be included as

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conditions of approval for any applicable future tentative tract map, parcel map or commercial/industrial site plan development.

- MM 4.16-9** A. After issuance of the 6,000th building permit and prior to issuance of the 7,000th building permit, the project proponent shall prepare and submit to the County of Kern and to Caltrans an Internalization Rate Report for all AM and PM project related trips. If the required internalization rate report indicates that internalization rates are more than 20 percent below projected buildout levels of 59.8 percent for the AM peak hour and 64.2 percent for the PM, the project proponent shall consult with Caltrans and implement additional transportation demand management strategies as necessary to ensure that Caltrans facilities serving the project operate within applicable level of service standards.
- B. After issuance of the 9,000th building permit and prior to issuance of the 10,000th building permit, the project proponent shall prepare and submit to the County of Kern and to Caltrans an Internalization Rate Report for all AM and PM project related trips. If the required internalization rate report indicates that internalization rates are more than 10 percent below projected levels, the project proponent shall consult with Caltrans and implement additional transportation demand management strategies as necessary to ensure that Caltrans facilities serving the project operate with applicable level of service standards
- MM 4.16-10** The following statement shall be included as a note on the final map for all subdivisions, commercial site plans and included in the project Covenants, Conditions and Restrictions (CC&Rs): "This property is presently located under military training routes and a supersonic corridor subject to use by the Department of Defense. For that reason, the property may be subject to some of the annoyances or inconveniences associated with proximity to the routes and corridor (for example: noise, vibration, low-level over flight or sonic booms). Tejon Ranch currently operates a helistop and you may be exposed to noise impacts from helicopter overflights. Individual sensitivities to those annoyances can vary from person to person. You may wish to consider what annoyances, if any, are associated with the property before you complete your purchase and determine whether they are acceptable to you."
- MM 4.16-11** A Construction Traffic Management Plan shall be submitted with each application for a project tract or parcel map to ensure that safe operating conditions are maintained on local roadways, freeway facilities and for all pedestrian, cycling, trail and transit facilities. The Construction Traffic Management Plan shall be subject to the review and approval of the Kern County Public Works Department in consultation with Caltrans, as applicable. A copy of the plan shall be submitted to local emergency response agencies and transit providers as directed by Kern County, and to Caltrans. These agencies shall be notified at least 30 days before the commencement of construction that would partially or fully obstruct public roadways.

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MM 4.16-12 Prior to the issuance of any building permit, the project proponent shall provide evidence that the following off-site impact mitigation requirements have been completed: Execute traffic impact mitigation agreements with Caltrans that identify project funding that will be paid to Caltrans to mitigate the project's incremental contribution to I-5 cumulative impacts to the Grapevine Grade in Kern County and Los Angeles County and cumulative impacts to State Route (SR) 138 in Los Angeles County.

2.3.5 FEIR TRANSPORTATION AND TRAFFIC IMPACT SIGNIFICANCE DETERMINATIONS

Impacts to local intersections and roadways, freeways near the Project site, including the Grapevine Grade, and under interim access conditions were evaluated under Threshold 1. The FEIR analysis concluded that with the implementation of MM 4.16-1 to MM 4.16-9 these impacts would be less than significant.

Impacts related to congestion management plans were evaluated under Threshold 2. The FEIR analysis concluded that with the implementation of MM 4.16-2, MM 4.16-3, and MM 4.16-6 through MM 4.16-9, these impacts would be less than significant.

Impacts related to changed airport traffic patterns were evaluated under Threshold 3. The FEIR analysis concluded that with the implementation of MM 4.16-10 these impacts would be less than significant.

Impacts related to design feature or incompatible use hazards were evaluated under Threshold 4. The FEIR analysis concluded that with the implementation of MM 4.16-1 through MM 4.16-7 and MM 4.16-9 these impacts would be less than significant.

Impacts related to emergency access were evaluated under Threshold 5. The FEIR analysis concluded that with the implementation of MM 4.16-1 and MM 4.16-11 these impacts would be less than significant.

Impacts related to conflicts with adopted policies, plans, or programs supporting alternative transportation were evaluated under Threshold 6. The FEIR analysis concluded that with the implementation of MM 4.16-2, MM 4.16-6, and MM 4.16-9 these impacts would be less than significant.

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Cumulative impacts were evaluated under Threshold 7. The FEIR analysis concluded that the implementation of MM 4.16-1 to MM 4.16-11 and MM 4.16-12 would avoid potential Project contributions to cumulative traffic and transportation hazards, inadequate emergency access, programs supporting alternative transportation, and impacts to local roadways and intersections (subject to the Kern County General Plan smart growth and multi-modal transportation development goals, policies and implementation measures). The FEIR also determined that the implementation of these mitigation measures would reduce but not avoid significant impacts to the Grapevine Grade, along I-5 and in Los Angeles County. The FEIR concluded that although the Project would provide fair-share funding to mitigate for potential cumulative impacts to state highway facilities, the County lacks jurisdiction to require the implementation of the required improvements by Caltrans. As a result, cumulative impacts to state highway facilities would remain significant and unavoidable.

2.4 UPDATED 28.7% HBW ICR ANALYSIS

As discussed in Section 1.4 of this report, to ensure consistency and the use of the best available information in this report, the Kern COG model, the ITE trip generation factors and the CalEEMod and other impact assessment models used in the FEIR analysis were evaluated with reference to model versions that were available after the FEIR was certified in 2016. The 2014 Kern COG model was found to generate more conservative ICRs than the 2018 Kern COG model and was retained for this report. To ensure consistency with the most current version of CalEEMod, the 2016 ITE Manual trip generation rates for Project land uses were determined to be most appropriate for use in this report.

The FEIR analysis using the 2016 ITE Manual trip generation rates and further adjustments to parks and student trips is called the “Updated 28.7% HBW ICR analysis” in this report. The following sections compare the results of the Updated 28.7% HBW ICR analysis with the FEIR analysis and verifies that the Updated 28.7% HBW ICR analysis does not result in any new significant transportation and traffic impacts than considered in the FEIR analysis.

2.4.1 UPDATED 28.7% HBW ICR ANALYSIS METHODOLOGY AND ICR ASSUMPTIONS

Table AFA-A summarizes the Updated 28.7% HBW ICR analysis daily and AM and PM peak hour number of trips generated by proposed Project land uses. The Updated 28.7% HBW ICR analysis Average Daily Traffic (ADT) is 197,685 trips compared with 201,542 trips in the FEIR (see Table A-FEIR). Based on the 2016 ITE Trip Generation Manual trip generation rates, the average weekday VMT in the Updated 28.7% HBW ICR analysis is 3,114,939 miles compared with 3,175,626 miles in the FEIR.

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Table AFA-A: ITE Trip Generation Estimate – Updated 28.7% HBW ICR Analysis

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	In	Out	Total	In	Out	
Residential									
Residential	8,400 DUs	210	6,216	1,554	4,662	8,316	5,239	3,077	79,296
Village Center Residential	3,600 DUs	220	1,656	381	1,275	2,016	1,270	746	26,352
Non-Residential									
Village Center Commercial - Retail ¹	450 ksf	820 ¹	423	262	161	1,715	823	892	16,988
Village Center Commercial - Office ¹	350 ksf	710 ¹	406	349	57	403	64	338	3,410
Freeway Commercial	750 ksf	820	705	437	268	2,858	1,372	1,486	28,314
Office/Research & Development	2,100 ksf	710	2,436	2,095	341	2,415	386	2,029	20,454
Light Industrial/Warehouse ²	1,450 ksf	130/ 150 ²	413	326	87	428	103	325	3,706
Schools & Parks									
Elementary Schools ⁴	4,970 students	520	3,330	1,798	1,532	845	406	439	9,394
Middle Schools ⁴	1,680 students	522	974	526	448	286	140	146	3,578
High Schools ⁴	3,000 students	530	1,560	1,045	515	420	202	218	6,090
Parks ³	132 acres	411							104
Total			18,119	8,774	9,345	19,699	10,004	9,695	197,685

Notes: DUs = dwelling units; ksf = thousand square feet

Trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 10th Edition*

¹Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)

²Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)

³City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information.

⁴Student enrollment based on number of students anticipated per residential dwelling unit based on discussions with school district

Source: *Trip Generation Manual, 10th Edition* (Institute of Transportation Engineers, 2016).

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Table AFA-B summarizes the ICRs used in the Updated 28.7% HBW ICR analysis. The Home-Based Work ICR for the AM and PM peak hours is 28.7 percent, the same as in the FEIR analysis (see Table FEIR-B). The Project ICR for all trips combined in the AM peak hour is 59.8 percent and in 64.2 percent in the PM peak hour, which are also the same as in the FEIR analysis (see Table FEIR-B).

**Table AFA-B: Updated 28.7% HBW ICR Analysis Estimated Project Trip Internalization
by Peak Hour**

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips ¹	% Internal ²	Total Internalization % ³	% of Trips ¹	% Internal ²	Total Internalization % ³
Home-Based Work	47.8%	28.7%	13.7%	28.1%	28.7%	8.1%
Home-Based Other/ Non-Home-Based	52.2%	88.3%	46.1%	71.9%	78.0%	56.1%
Total			59.8%			64.2%

Notes: ¹Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17 of Appendix T, page 117.

²Internalization percentage by trip purpose. Home-Based work trip internalization shown in Table 18 of Appendix T, page 118. Home-Based other/non-home-based trip internalization shown in Table 22 of Appendix T, page 139.

³Overall internalization estimate calculation.

Source: Fehr & Peers, April 2019.

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Table AFA-C summarizes the percentage of trips traveling to the north and south of the Project during the AM and PM peak hours in the Updated 28.7% HBW ICR analysis projected by the 2014 Kern COG model. About 28.3 percent to 24.3 percent of peak AM and PM Project trips (respectively) would travel to and from the north (i.e. Bakersfield, Arvin-Lamont and Eastern Kern County) and 11.9 percent and 11.5 percent of peak AM and PM Project trips (respectively) would travel to and from the south (i.e. southern Kern County, Antelope Valley, Santa Clarita valley and metropolitan Los Angeles). The trip distributions for the Updated 28.7% HBW ICR analysis is the same as in the FEIR analysis (see Table FEIR-C).

**Table AFA-C: Updated 28.7% HBW ICR Build-out Trip Distribution Estimate -
Cumulative Plus Project Conditions (2040)**

Origin/Destination	Trip Distribution Estimate	
	A.M. Peak Hour	P.M. Peak Hour
Project Area	59.8%	64.2%
North of Grapevine	28.3%	24.3%
West Bakersfield via I-5	3.0%	2.6%
North of Bakersfield via I-5	1.5%	1.3%
Bakersfield Metropolitan Area via SR 99	16.4%	14.1%
North of Bakersfield via SR 99	1.5%	1.3%
Arvin-Lamont Area	4.4%	3.7%
Eastern Kern County via SR 58	1.5%	1.3%
South of Grapevine	11.9%	11.5%
Southern Kern County (Frazier Park/Tejon Mountain Village)	1.5%	1.3%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	4.5%	3.8%
Santa Clarita Valley Area1	3.0%	2.6%
Los Angeles Basin/Orange County/Inland Empire	2.9%	3.8%

Source: Fehr & Peers, August 2016

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2.4.2 TRAFFIC AND TRANSPORTATION IMPACT THRESHOLDS

The transportation and traffic impact significance thresholds utilized in the FEIR are discussed in Section 2.2.3 of this report. As stated in the April 12, 2019 NOP, the same significance thresholds used in the Grapevine EIR and the FEIR were considered in the Updated 28.7% HBW ICR analysis.

2.4.3 UPDATED ANALYSIS OF TRAFFIC AND TRANSPORTATION IMPACTS

Potential Project impacts under cumulative plus project conditions are summarized below for the Updated 28.7% HBW ICR analysis.

2.4.3.1 UPDATED 28.7% HBW ICR IMPACTS TO LOCAL INTERSECTIONS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

As shown in Table D-AFA, all existing intersections would operate acceptably under cumulative plus project conditions in the Updated 28.7% HBW ICR analysis. This result is the same as in the FEIR analysis. The following new intersections subject to significant impacts in the FEIR analysis would also operate below applicable LOS levels in the Updated 28.7% HBW ICR analysis:

- Street D/Street A – AM and PM peak hours
- Street C / Street G – PM peak hour
- Street I / Street A – PM peak hour

Two intersection locations subject to significant impacts in the FEIR analysis would operate above applicable LOS levels and not be significantly impacted in the Updated 28.7% HBW ICR analysis:

- Street C / Street A – PM peak hour
- Street C/ Street H – PM peak hour

Consequently, under cumulative plus project conditions, no new significant intersection impacts would occur in the Updated 28.7% HBW ICR analysis.

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Table AFA-D: Updated 28.7% HBW ICR Analysis Peak Hour

Intersection	Traffic Control	Peak Hour	Cumulative No Project		Cumulative + Updated 28.7% HBW ICR Project	
			Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	16	B	18	B
		P.M.	16	B	18	B
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	14	B	15	B
		P.M.	20	C	22	C
3. S. Wheeler Ridge Road / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A
		P.M.	4	A	4	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	20	C	17	B
		P.M.	45	D	28	C
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		32	C
		P.M.			52	D
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		49	D
		P.M.			48	D
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		17	B
		P.M.			43	D
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		<u>179</u>	<u>F</u>
		P.M.			<u>134</u>	<u>F</u>
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		14	B
		P.M.			<u>144</u>	<u>F</u>
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		43	D
		P.M.			22	C
11. Street I / Street A ⁴	Side-Street Stop	A.M.	Does Not Exist		25 (0)	C (A)
		P.M.			<u>182 (2)</u>	<u>F (A)</u>

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).

⁴ The shared movement with the greatest

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.

Figure Updated 28.7% HBW ICR 1: Peak Hour Traffic Volumes, Lane Configurations and Levels of Service

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2.4.3.2 UPDATED 28.7% HBW ICR LOCAL ROADWAY SEGMENT IMPACTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS, PM PEAK HOUR

Table AFA E shows the Updated 28.7% HBW ICR analysis impacts to local roadway segments under cumulative plus project conditions during the PM peak hour, the period of heaviest roadway use and when the combination of vehicle trip purposes is at the highest level. All roadway segments would have sufficient capacity to meet demand and would operate at acceptable LOS levels under cumulative plus project conditions except the segment of future Street A between Street D and Street I, which would operate at LOS F. This significant impact is the same as identified in the FEIR analysis. No new significant impacts to local roadways would occur.

Table AFA-E: Updated 28.7% HBW ICR PM Peak Hour Roadway Capacity Evaluation - Cumulative Plus Project Conditions (2040)

Roadway Segment	Classification	Existing Conditions			Cumulative Plus Project		
		P.M. Peak Hour Volume	V/C ¹	LOS ²	P.M. Peak Hour Volume	V/C ¹	LOS ²
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	1,255	0.46	D
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			1,570	0.88	D
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			3,160	0.93	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			960	0.54	D
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			180	0.10	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			780	0.44	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			690	0.39	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			1,530	0.85	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			70	0.04	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			430	0.24	C
11. Dennis McCarthy Rd. : North of Laval Rd	2-lane Collector Street	592	0.36	D	950	0.53	D
12. Street A: Street D to Street I	4-lane Arterial Street	Does Not Exist			3,500	1.03	F

Notes: ¹V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.

²Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.

Source: Fehr & Peers, April 2019.

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2.4.3.3 UPDATED 28.7% HBW ICR ANALYSIS IMPACTS TO LOCAL FREEWAY SEGMENTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table F-AFA summarizes the Updated 28.7% HBW ICR analysis LOS levels on 33 freeway segments in the vicinity of the Project area under cumulative plus project conditions. A total of 31 of 33 freeway mainline, on-ramp merge, and off-ramp diverge segments were determined to operate at acceptable LOS conditions or better during the AM and PM peak hours under cumulative plus project conditions. Two local freeway segments, the Fort Tejon to Base of Grapevine Grade (6% Downgrade) I-5 segment during the PM peak hour, and the Base of Grapevine Grade to Fort Tejon (6% Upgrade) I-5 segment during the AM and PM peak hours, would operate below applicable LOS levels. The impacted local freeway segments are same as in the FEIR analysis impacts.

**Table AFA-F: Updated 28.7% HBW ICR Analysis Peak Hour Freeway Operations -
Cumulative Plus Project Conditions (2040)**

Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
I-5 Northbound						
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	26	D	30	D
		P.M.	<u>44</u>	<u>E</u>	<u>57</u>	<u>F</u>
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	Does Not Exist		22	22
		P.M.			34	34
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	23	C	20*	B*
		P.M.	31	D	27*	C*
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		25	25
		P.M.			27	27
5. Grapevine Slip On-Ramp	Merge	A.M.	20	B	33	D
		P.M.	26	C	30	D
6. Grapevine to Laval Road	Basic	A.M.	18	C	28	D
		P.M.	28	C	31	D
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	27	C	30*	D*
		P.M.	36	E	32*	D*

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8. Laval Road West Off-Ramp	Diverge	A.M.	19	B	28	D
		P.M.	27	C	31	D
9. Laval Road On-Ramp	Merge	A.M.	22	C	29	D
		P.M.	31	D	32	D
10. Laval Road to SR-99	Basic	A.M.	17	B	28	D
		P.M.	27	D	33	D
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	17	B	28	D
		P.M.	27	D	33	D
12. North of SR 99 Junction	Basic	A.M.	17	B	20	C
		P.M.	32	D	21	C
SR 99 Northbound						
13. North of I-5 Junction	Basic	A.M.	12	B	22	C
		P.M.	17	B	29	D
SR 99 Southbound						
1. North of I-5 Junction	Basic	A.M.	13	B	18	B
		P.M.	16	B	24	C
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		24	24
		P.M.			30	30
3. Truck Bypass Off-Ramp ³	Basic (Major Diverge)	A.M.	13	B	15	B
		P.M.	16	B	20	C
4. SR 99 Auto Lanes to I-5 Southbound ³	Basic (2 Lanes)	A.M.	14	B	21	C
		P.M.	17	B	28	D
I-5 Southbound						
5. North of SR 99 Junction	Basic	A.M.	18	B	21	C
		P.M.	23	C	28	D

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6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		10	10
		P.M.			13	13
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		17	17
		P.M.			20	20
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	19	C	19	C
		P.M.	22	C	24	C
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	17	B	16	C
		P.M.	22	C	20	C
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		19	19
		P.M.			26	26
11. SR 99 to Laval Road	Basic	A.M.	19	C	20	C
		P.M.	24	C	26	C
12. Laval Road West Off-Ramp	Diverge	A.M.	24	C	20	C
		P.M.	30	D	26	C
13. Laval Road East Off-Ramp	Diverge	A.M.	20	C	27	C
		P.M.	24	C	33	D
14. Laval Road On-Ramp	Merge	A.M.	23	C	26	C
		P.M.	29	D	29	D
15. Laval Road to Grapevine ⁴	Basic	A.M.	20	C	25	C
		P.M.	25	C	31	D
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	22	C	25*	C*
		P.M.	27	C	29*	D*
17. Grapevine Loop On-Ramp	Merge	A.M.	16	B	22	C
		P.M.	21	C	27	C
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		22	22
		P.M.			27	27
19. Relocated Grapevine Interchange to Base of Grapevine Grade ³	Basic	A.M.	Exists as Laval Road to Grapevine		22	22
		P.M.			28	28
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	32	D	<u>37</u>	<u>E</u>
		P.M.	<u>46</u>	<u>F</u>	<u>60</u>	<u>F</u>

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Notes: ¹Density is reported in passenger car equivalents per mile per lane (pcpmpl).
²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).
³These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.
⁴This table reports the “existing conditions” results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.
⁵Segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.
⁶Segment analysis increases deceleration lane from 170 feet to 500 feet.
*Indicates improved density and LOS.
BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction’s level of service policy.
UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.

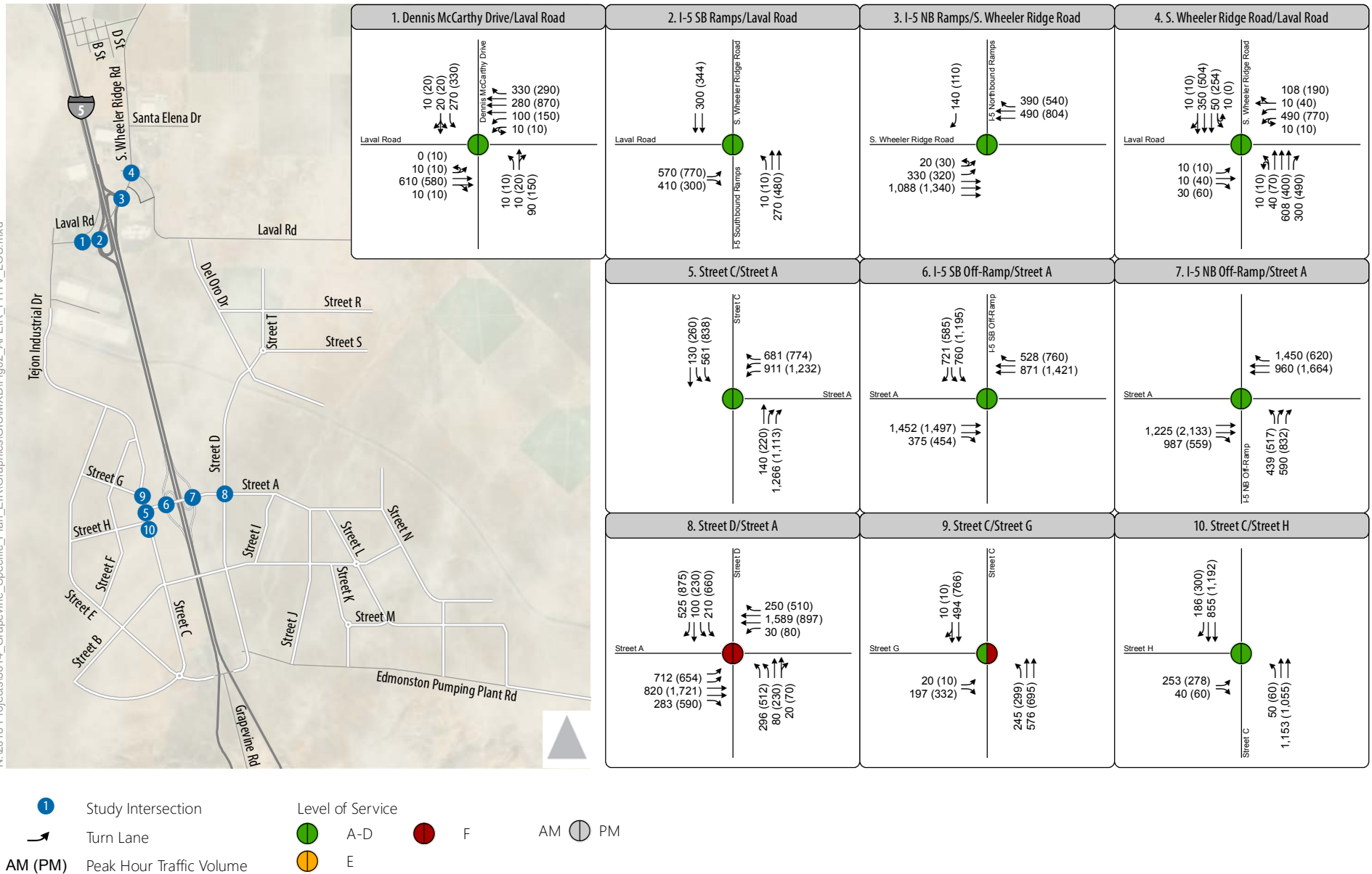


Figure AFEIR-2
Peak Hour Traffic Volumes, Lane Configurations
and Level of Service (LOS) -
AFEIR



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Table AFA-G analyzes the traffic volumes and net new trips generated by the Project during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Updated 28.7% HBW ICR analysis under cumulative plus project conditions. The Updated 28.7% HBW ICR analysis results in northbound traffic volumes about four (4) percent lower than in the FEIR analysis (6,829 versus 6,857 trips). Southbound traffic volumes are about 2.2 percent lower than in the FEIR analysis (5,986 versus 6,124 trips).

**Table AFA-G: Updated 28.7% HBW ICR Analysis PM Peak Hour Grapevine Grade
Traffic Volume by Vehicle Type - Cumulative Plus Project Conditions (2040)**

Segment	Vehicle Type	Cumulative No Project (2040)	Net New Trips	Cumulative Plus Project (2040)
I-5 Northbound				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Autos	4,825	587	5,412
	Trucks	1,340	77	1,417
	Total	6,165	664	6,829
I-5 Southbound				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Autos	4,040	482	4,522
	Trucks	1,400	64	1,464
	Total	5,440	546	5,986

Source: Fehr & Peers, April 2019.

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Table AFA-H analyzes the traffic density in terms of passenger car equivalents per mile per lane (pcpmpl) during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Updated 28.7% HBW ICR analysis under cumulative plus project conditions. Table AFA-H shows that the PM peak hour density in the two inside northbound lanes, which are reserved for passenger vehicles, would be 51 pcpmpl (LOS F). PM peak hour density in the two outside northbound lanes would be 63 pcpmpl (LOS F) under cumulative plus project conditions. These results are slightly lower than the FEIR analysis which were 52 pcpmpl for the two inside northbound lanes and 64 pcpmpl for the two outside northbound lanes. During the PM peak hour, density in the two inside southbound lanes would be 39 pcpmpl (LOS E), lower than the 41 pcpmpl level in the FEIR analysis. Density in the outside two lanes would be 161 pcpmpl (LOS F), lower than the 177 pcpmpl level in the FEIR analysis. The total PM peak hour density for the northbound Grapevine Grade would be 57 pcpmpl (LOS F), slightly lower than the 58 pcpmpl (LOS F) in the FEIR analysis. The total PM peak hour density in the southbound direction under cumulative plus project conditions would be 60 pcpmpl. These results indicate that under cumulative plus project conditions the Updated 28.7% HBW ICR would result in slightly reduced PM peak hour impacts to the Grapevine Grade.

**Table AFA-H: Updated 28.7% HBW ICR PM Peak Hour Grapevine Grade Freeway
Operations - Cumulative Plus Project Conditions with Variant 1 or 2 (2040)**

Segment	Lanes	Vehicle Composition	Cumulative No Project (2040)		Cumulative No Project – All Lanes (2040)		Cumulative Plus Project (2040)		Cumulative Plus Project – All Lanes (2040)	
			Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³
I-5 Northbound										
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos Only	39	E	44	E	51	F	57	F
	Outside Two Lanes	Autos & Trucks	51	F			63	F		
I-5 Southbound										
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos Only	29	D	46	F	39	E	60	F
	Outside Two Lanes	Autos & Trucks	86	F			161	F		

Notes: ¹Results for all lanes applies the HCM methodology to the entire segment, as reported in Table 26 Appendix T, page 161.

²Density is reported in passenger car equivalents per mile per lane (pcpmpl).

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria

Source: Fehr & Peers, April 2019.

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2.4.3.4 UPDATED 28.7% HBW ICR ANALYSIS IMPACTS TO FREEWAY SEGMENTS NORTH AND SOUTH OF THE PROJECT AREA UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table AFA-I analyzes potential Updated 28.7% HBW ICR impacts under cumulative plus project conditions at 15 state freeway and highway segments located to the north of the Project area. Table AFA-J analyzes potential Updated 28.7% HBW ICR impacts under cumulative plus project conditions at 66 freeway and highway segments located to the south of the Project area. Significant impacts were determined to occur at any state freeway or highway segment that was determined to: (a) decline from acceptable to unacceptable LOS standards; or (b) the Project's contribution to the vehicle to capacity ratio at the segment operating at unacceptable LOS standard under cumulative without project conditions was greater than .02 under cumulative with project conditions.

Table I-AFA shows that, in the Updated 28.7% HBW ICR analysis, all of the freeway and highway segments analyzed to the north of the Project area along SR 99 and I-5 would operate at acceptable levels under cumulative plus project conditions. This is the same result as in the FEIR analysis. No new state highway or freeway segments north of the Project area would be significantly impacted in the Updated 28.7% HBW ICR analysis.

Table J1 shows that, in the Updated 28.7% HBW ICR analysis, the following state freeway or highway segments to the south of the Project area along I-5 and SR-138 would be impacted under cumulative plus project conditions:

I-5 Northbound:

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – AM and PM peak hours

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

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SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

The state freeway and highway segments south of the Project impacted in the Updated 28.7% HBW ICR analysis under cumulative plus project conditions are the same as in the FEIR analysis. No new significant impacts to state freeway and highway segments south of the Project would occur in the Updated 28.7% HBW ICR analysis.

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
1	Btw . Jct Rte 58 W and California		4M							4M							LOS E	
	2014 Count	104,110		2,246	8,985	3,848	0.43	6,276	0.70		2,246	8,985	4,004	0.45	6,694	0.75		
	2040 Without Project	127,150		2,246	8,985	4,824	0.54	7,415	0.83		2,246	8,985	5,372	0.60	7,782	0.87		
	2040 With Project	128,876		2,246	8,985	5,017	0.56	7,457	0.83		2,246	8,985	5,458	0.61	7,806	0.87		
	Grapevine Specific Plan Net New Project Impacts	1,726				193	0.02	42	0.00				86	0.01	24	0.00		
2	Btw. California and Jct Rte 58 E		4M							4M							LOS E	
	2014 Count	89,700		2,246	8,985	3,392	0.38	5,263	0.59		2,246	8,985	3,390	0.38	5,895	0.66		
	2040 Without Project	106,340		2,246	8,985	3,950	0.44	6,231	0.69		2,246	8,985	4,326	0.48	6,761	0.75		
	2040 With Project	108,816		2,246	8,985	4,215	0.47	6,287	0.70		2,246	8,985	4,426	0.49	6,835	0.76		
	Grapevine Specific Plan Net New Project Impacts	2,476				265	0.03	56	0.01				100	0.01	74	0.01		
3	Btw. Jct Rte 58 E & Ming Ave		5M							5M							LOS E	
	2014 Count	88,820		2,246	10,107	3,406	0.34	5,478	0.54		2,246	10,107	3,217	0.32	5,663	0.56		
	2040 Without Project	134,395		2,246	10,107	4,865	0.48	7,754	0.77		2,246	10,107	5,602	0.55	8,658	0.86		
	2040 With Project	140,039		2,246	10,107	5,598	0.55	7,857	0.78		2,246	10,107	5,792	0.57	8,761	0.87		
	Grapevine Specific Plan Net New Project Impacts	5,644				733	0.07	103	0.01				190	0.02	103	0.01		
4	Btw. Ming Ave & White Lane		4M							4M							LOS E	
	2014 Count	69,755		2,246	8,985	2,614	0.29	4,435	0.49		2,296	9,186	2,394	0.26	4,508	0.49		
	2040 Without Project	119,800		2,246	8,985	4,994	0.56	7,099	0.79		2,296	9,186	4,737	0.52	7,130	0.78		
	2040 With Project	126,732		2,246	8,985	5,819	0.65	7,250	0.81		2,296	9,186	5,000	0.54	7,278	0.79		
	Grapevine Specific Plan Net New Project Impacts	6,932				825	0.09	151	0.02				263	0.03	148	0.02		
5	Btw. White Lane & Panama Lane		4M							4M							LOS E	
	2014 Count	57,090		2,296	9,186	2,165	0.24	3,616	0.39		2,296	9,186	2,072	0.23	3,565	0.39		
	2040 Without Project	101,775		2,296	9,186	4,191	0.46	6,111	0.67		2,296	9,186	3,793	0.41	6,260	0.68		
	2040 With Project	112,070		2,296	9,186	5,283	0.58	6,311	0.69		2,296	9,186	4,177	0.45	6,642	0.72		
	Grapevine Specific Plan Net New Project Impacts	10,295				1,092	0.12	200	0.02				384	0.04	382	0.04		
6	Btw. Panama Lane & Jct Rte 119 W		4M							4M							LOS E	
	2014 Count	44,450		2,296	9,186	1,622	0.18	2,890	0.31		2,296	9,186	1,797	0.20	2,581	0.28		
	2040 Without Project	84,820		2,296	9,186	3,379	0.37	5,264	0.57		2,296	9,186	3,270	0.36	5,051	0.55		
	2040 With Project	97,406		2,296	9,186	4,590	0.50	5,509	0.60		2,296	9,186	3,710	0.40	5,673	0.62		
	Grapevine Specific Plan Net New Project Impacts	12,586				1,211	0.13	245	0.03				440	0.05	622	0.07		
7	Btw. Jct Rte 119 W & Houghton Rd		3M							3M							LOS D	
	2014 Count	35,470		2,296	6,889	1,229	0.18	2,345	0.34		2,141	6,422	1,533	0.24	1,987	0.31		
	2040 Without Project	62,960		2,296	6,889	2,334	0.34	4,037	0.59		2,141	6,422	2,683	0.42	3,538	0.55		
	2040 With Project	77,039		2,296	6,889	3,646	0.53	4,319	0.63		2,141	6,422	3,184	0.50	4,259	0.66		
	Grapevine Specific Plan Net New Project Impacts	14,079				1,312	0.19	282	0.04				501	0.08	721	0.11		
8	Btw. Houghton Rd & Jct Rte 223 E		3M							3M							LOS D	
	2014 Count	33,360		2,141	6,422	1,158	0.18	2,176	0.34		2,141	6,422	1,473	0.23	1,865	0.29		
	2040 Without Project	60,280		2,141	6,422	2,229	0.35	3,856	0.60		2,141	6,422	2,588	0.40	3,383	0.53		
	2040 With Project	74,721		2,141	6,422	3,576	0.56	4,144	0.65		2,141	6,422	3,106	0.48	4,119	0.64		
	Grapevine Specific Plan Net New Project Impacts	14,441				1,347	0.21	288	0.04				518	0.08	736	0.11		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
9	Btw. Jct Rte 223 E & Old U.S. 99		3M							3M							LOS D	
	2014 Count	27,270		2,141	6,422	945	0.15	1,788	0.28		2,133	6,400	1,233	0.19	1,488	0.23		
	2040 Without Project	54,555		2,141	6,422	1,964	0.31	3,513	0.55		2,133	6,400	2,390	0.37	3,044	0.48		
	2040 With Project	69,690		2,141	6,422	3,319	0.52	3,825	0.60		2,133	6,400	2,922	0.46	3,872	0.61		
	Grapevine Specific Plan Net New Project Impacts	15,135				1,355	0.21	312	0.05				532	0.08	828	0.13		
10	Btw. Old U.S. 99 & Herring Rd		3M							3M							LOS D	
	2014 Count	28,585		2,133	6,400	987	0.15	1,860	0.29		2,133	6,400	1,284	0.20	1,586	0.25		
	2040 Without Project	57,525		2,133	6,400	2,065	0.32	3,664	0.57		2,133	6,400	2,484	0.39	3,292	0.51		
	2040 With Project	74,559		2,133	6,400	3,497	0.55	4,022	0.63		2,133	6,400	3,083	0.48	4,310	0.67		
	Grapevine Specific Plan Net New Project Impacts	17,034				1,432	0.22	358	0.06				599	0.09	1,018	0.16		
11	Btw. Herring Rd & Sandrini Rd.		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	74,219		2,133	6,400	3,484	0.54	3,998	0.62		2,133	6,400	3,073	0.48	4,289	0.67		
	Grapevine Specific Plan Net New Project Impacts	17,084				1,432	0.22	362	0.06				604	0.09	1,019	0.16		
12	Btw. Sandrini Rd & David Rd		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	74,219		2,133	6,400	3,484	0.54	3,998	0.62		2,133	6,400	3,073	0.48	4,289	0.67		
	Grapevine Specific Plan Net New Project Impacts	17,084				1,432	0.22	362	0.06				604	0.09	1,019	0.16		
13	Btw. David Rd & Valpredo		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,133	6,400	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,133	6,400	2,364	0.37	3,104	0.49		
	2040 With Project	72,505		2,133	6,400	3,429	0.54	3,877	0.61		2,133	6,400	3,023	0.47	4,172	0.65		
	Grapevine Specific Plan Net New Project Impacts	17,990				1,466	0.23	405	0.06				659	0.10	1,068	0.17		
14	Btw. Valpredo & Jct Rte 166 W		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,096	6,288	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,096	6,288	2,364	0.38	3,104	0.49		
	2040 With Project	72,505		2,133	6,400	3,429	0.54	3,877	0.61		2,096	6,288	3,023	0.48	4,172	0.66		
	Grapevine Specific Plan Net New Project Impacts	17,990				1,466	0.23	405	0.06				659	0.10	1,068	0.17		
15	Btw. Jct Rte 166 W & Jct I-5		3M							3M							LOS D	
	2014 Count	26,965		2,096	6,288	934	0.15	1,733	0.28		2,054	6,162	1,219	0.20	1,507	0.24		
	2040 Without Project	54,150		2,096	6,288	1,926	0.31	3,373	0.54		2,054	6,162	2,363	0.38	3,168	0.51		
	2040 With Project	75,800		2,096	6,288	3,452	0.55	4,064	0.65		2,054	6,162	3,204	0.52	4,440	0.72		
	Grapevine Specific Plan Net New Project Impacts	21,650				1,526	0.24	691	0.11				841	0.14	1,272	0.21		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

Table AFA-J
Cumulative With Adjusted Final Analysis Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
1	Btw. Fort Tejon Rd & Lebec Rd		4M							4M							LOS D	
	2014 Count	72,000		1,839	7,355	1,390	0.19	2,426	0.33		2,036	8,143	1,346	0.17	2,304	0.28		
	2035 Without Project	119,850		1,839	7,355	2,895	0.39	4,255	0.58		2,036	8,143	3,170	0.39	3,640	0.45		
	2035 With Project	132,155		1,839	7,355	3,492	0.47	4,919	0.67		2,036	8,143	3,824	0.47	4,186	0.51		
	Grapevine Specific Plan Net New Project Impacts	12,305				597	0.08	664	0.09				654	0.08	546	0.07		
2	Btw. Lebec Rd & Frazier Mtn Park		4M							4M							LOS D	
	2014 Count	73,000		1,839	7,355	1,409	0.19	2,460	0.33		2,036	8,143	1,365	0.17	2,336	0.29		
	2035 Without Project	120,850		1,839	7,355	2,915	0.40	4,285	0.58		2,036	8,143	3,190	0.39	3,680	0.45		
	2035 With Project	133,173		1,839	7,355	3,512	0.48	4,952	0.67		2,036	8,143	3,844	0.47	4,227	0.52		
	Grapevine Specific Plan Net New Project Impacts	12,323				597	0.08	667	0.09				654	0.08	547	0.07		
3	Btw. Frazier Mtn Park & Gorman Rd		4M							4M							LOS D	
	2014 Count	70,000		2,036	8,143	1,351	0.17	2,359	0.29		1,401	5,606	1,309	0.23	2,240	0.4		
	2035 Without Project	114,850		2,036	8,143	2,775	0.34	4,015	0.49		1,401	5,606	3,020	0.54	3,380	0.60		
	2035 With Project	127,173		2,036	8,143	3,372	0.41	4,682	0.57		1,401	5,606	3,674	0.66	3,927	0.70		
	Grapevine Specific Plan Net New Project Impacts	12,323				597	0.07	667	0.08				654	0.12	547	0.10		
4	Btw. Gorman Rd & N Jct SR-138		4M							4M							LOS D	
	2014 Count	70,000		1,849	7,398	1,351	0.18	2,359	0.32		2,042	8,169	1,309	0.16	2,240	0.27		
	2035 Without Project	117,850		1,849	7,398	2,745	0.37	4,405	0.60		2,042	8,169	3,280	0.40	3,350	0.41		
	2035 With Project	130,173		1,849	7,398	3,342	0.45	5,072	0.69		2,042	8,169	3,934	0.48	3,897	0.48		
	Grapevine Specific Plan Net New Project Impacts	12,323				597	0.08	667	0.09				654	0.08	547	0.07		
5	Btw. N Jct SR-138 & Quail Lake Rd		4M							4M							LOS D	
	2014 Count	67,000		1,849	7,398	1,293	0.17	2,258	0.31		2,042	8,169	1,253	0.15	2,144	0.26		
	2035 Without Project	89,175		1,849	7,398	1,750	0.24	3,140	0.42		2,042	8,169	2,055	0.25	2,360	0.29		
	2035 With Project	96,808		1,849	7,398	2,113	0.29	3,553	0.48		2,042	8,169	2,467	0.30	2,699	0.33		
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.05	413	0.06				412	0.05	339	0.04		
6	Btw. Quail Lake Rd & S Jct SR-138		4M							4M							LOS D	
	2014 Count	67,000		1,375	5,500	1,293	0.24	2,258	0.41		1,375	5,500	1,253	0.23	2,144	0.39		
	2035 Without Project	90,175		1,375	5,500	1,750	0.32	3,590	0.65		1,375	5,500	2,055	0.37	2,360	0.43		
	2035 With Project	97,808		1,375	5,500	2,113	0.38	4,003	0.73		1,375	5,500	2,467	0.45	2,699	0.49		
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.07	413	0.08				412	0.07	339	0.06		
7	Btw. S Jct SR-138 & Smokey Bear Rd		4M							4M							LOS D	
	2014 Count	69,000		1,375	5,500	1,332	0.24	2,325	0.42		1,375	5,500	1,290	0.23	2,208	0.4		
	2035 Without Project	123,175		1,375	5,500	2,240	0.41	5,170	0.94		1,375	5,500	4,145	0.75	3,240	0.59		Yes
	2035 With Project	130,808		1,375	5,500	2,603	0.47	5,583	1.02		1,375	5,500	4,557	0.83	3,579	0.65		Yes
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.07	413	0.08				412	0.07	339	0.06		
8	Btw. Smokey Bear Rd & Vista Del Lago Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	132,808		1,489	5,957	2,703	0.45	5,673	0.95		1,489	5,957	4,657	0.78	3,719	0.62		Yes
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.06	413	0.07				412	0.07	339	0.06		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
9	Btw. Vista Del Lago Rd & Templin Hwy		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.4		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	132,808		1,489	5,957	2,703	0.45	5,673	0.95		1,489	5,957	4,657	0.78	3,719	0.62		Yes
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.06	413	0.07				412	0.07	339	0.06		
10	Btw. Templin Hwy & Lake Hughes Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	126,175		1,489	5,957	2,380	0.40	5,260	0.88		1,489	5,957	4,205	0.71	3,410	0.57		
	2035 With Project	133,808		1,489	5,957	2,743	0.46	5,673	0.95		1,489	5,957	4,617	0.77	3,749	0.63		Yes
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.06	413	0.07				412	0.07	339	0.06		
11	Btw. Lake Hughes Rd & Parker Rd		4M + 1 AUX							4M + 1 AUX							LOS E	
	2014 Count	73,000		1,856	7,422	1,504	0.2	1,949	0.26		1,856	7,422	1,854	0.25	2,519	0.34		
	2035 Without Project	154,175		1,856	8,422	5,360	0.64	8,080	0.96		1,856	8,422	8,405	1.00	5,050	0.60		
	2035 With Project	161,808		1,856	8,422	5,723	0.68	8,493	1.01		1,856	8,422	8,817	1.05	5,389	0.64		Yes
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.04	413	0.05				412	0.05	339	0.04		
12	Btw. Parker Rd & Hasley Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	108,000		1,856	7,422	2,225	0.30	2,884	0.39		1,856	7,422	2,743	0.37	3,726	0.5		
	2035 Without Project	171,175		1,856	9,022	5,360	0.59	7,030	0.78		1,856	9,022	7,285	0.81	5,120	0.57		
	2035 With Project	178,808		1,856	9,022	5,723	0.63	7,443	0.82		1,856	9,022	7,697	0.85	5,459	0.61		
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.04	413	0.05				412	0.05	339	0.04		
13	Btw. Hasley Cyn Rd & N Jct SR-126 (NB)		4M (+1H +1A)							4M (+1H)							LOS E	
	2014 Count	114,000		1,856	8,422	2,348	0.28	3,044	0.36		1,856	8,422	2,896	0.34	3,933	0.47		
	2035 Without Project	170,175		1,856	10,022	5,180	0.52	6,800	0.68		1,856	9,022	7,085	0.79	5,120	0.57		
	2035 With Project	177,808		1,856	10,022	5,543	0.55	7,213	0.72		1,856	9,022	7,497	0.83	5,459	0.61		
	Grapevine Specific Plan Net New Project Impacts	7,633				363	0.04	413	0.04				412	0.05	339	0.04		
14	Btw. N Jct SR-126 & Rye Cyn Rd		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	130,000		1,867	7,470	2,678	0.36	3,471	0.46		1,867	7,470	3,302	0.44	4,485	0.60		
	2035 Without Project	175,375		1,867	9,070	4,615	0.51	6,450	0.71		1,867	10,070	6,865	0.68	5,565	0.55		
	2035 With Project	182,650		1,867	9,070	4,968	0.55	6,843	0.75		1,867	10,070	7,254	0.72	5,884	0.58		
	Grapevine Specific Plan Net New Project Impacts	7,275				353	0.04	393	0.04				389	0.04	319	0.03		
15	Btw.Rye Cyn Rd & Magic Mountain Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	154,000		1,918	7,670	3,172	0.41	4,112	0.54		1,918	7,670	3,912	0.51	5,313	0.69		
	2035 Without Project	181,375		1,918	9,270	4,615	0.50	6,450	0.70		1,918	10,270	6,875	0.67	5,395	0.53		
	2035 With Project	188,650		1,918	9,270	4,968	0.54	6,843	0.74		1,918	10,270	7,264	0.71	5,714	0.56		
	Grapevine Specific Plan Net New Project Impacts	7,275				353	0.04	393	0.04				389	0.04	319	0.03		
16	Btw. Magic Mountain Pkwy & Valencia Blvd		4M (+1H + 1A)							4M (+1H)							LOS E	
	2014 Count	165,000		1,918	7,670	3,399	0.44	4,406	0.57		1,918	7,670	4,191	0.55	5,693	0.74		
	2035 Without Project	194,375		1,918	10,270	5,615	0.55	6,980	0.68		1,918	9,270	6,815	0.74	5,735	0.62		
	2035 With Project	201,650		1,918	10,270	5,968	0.58	7,373	0.72		1,918	9,270	7,204	0.78	6,054	0.65		
	Grapevine Specific Plan Net New Project Impacts	7,275				353	0.03	393	0.04				389	0.04	319	0.03		
17	Btw. Valencia Blvd & McBean Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	175,000		1,918	7,670	3,605	0.47	4,673	0.61		1,918	7,670	4,445	0.58	6,038	0.79		
	2035 Without Project	218,375		1,918	9,270	6,475	0.70	7,290	0.79		1,918	10,270	8,135	0.79	6,615	0.64		
	2035 With Project	225,650		1,918	9,270	6,828	0.74	7,683	0.83		1,918	10,270	8,524	0.83	6,934	0.68		
	Grapevine Specific Plan Net New Project Impacts	7,275				353	0.04	393	0.04				389	0.04	319	0.03		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold	
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C			
I-5																			
18	Btw. McBeach Pkwy & Lyons Ave/Pico Cyn Rd		4M (+1H)							4M (+1H)							LOS E		
	2014 Count	186,000		1,990	7,960	3,832	0.48	4,966	0.62		1,990	7,960	4,724	0.59	6,417	0.81			
	2035 Without Project	222,375		1,990	9,560	6,555	0.69	8,640	0.90		1,990	9,560	9,105	0.95	6,685	0.70			
	2035 With Project	229,650		1,990	9,560	6,908	0.72	9,033	0.94		1,990	9,560	9,494	0.99	7,004	0.73			
	Grapevine Specific Plan Net New Project Impacts	7,275				353	0.04	393	0.04				389	0.04	319	0.03			
19	Btw. Lyons Ave & Calgrove Blvd		4M (+1H + 1A)							4M (+1H + 1T)							LOS E		
	2014 Count	199,000		1,990	7,960	4,099	0.52	5,313	0.67		1,990	9,560	5,055	0.53	6,866	0.72			
	2035 Without Project	252,375		1,990	10,560	6,855	0.65	10,070	0.95		1,990	11,160	9,175	0.82	6,705	0.60			
	2035 With Project	259,650		1,990	10,560	7,208	0.68	10,463	0.99		1,990	11,160	9,564	0.86	7,024	0.63			
	Grapevine Specific Plan Net New Project Impacts	7,275				353	0.03	393	0.04				389	0.03	319	0.03			
20	Btw. Calgrove Blvd & SR-14		4M (+1H + 1T[C])							4M (+1H + 2T[C])							LOS E		
	2014 Count	200,000		1,990	9,160	4,120	0.45	5,340	0.58		1,990	10,360	5,080	0.49	6,900	0.67			
	2035 Without Project	253,375		1,990	10,760	5,725	0.53	9,190	0.85		1,990	11,960	9,805	0.82	6,845	0.57			
	2035 With Project	260,650		1,990	10,760	6,078	0.56	9,583	0.89		1,990	11,960	10,194	0.85	7,164	0.60			
	Grapevine Specific Plan Net New Project Impacts	7,275				353	0.03	393	0.04				389	0.03	319	0.03			
21	Btw. SR-14 & SR-210		3M (+1H+3A[F]+2T)							4M (+1H+2A[F]+2T)							LOS E		
	2014 Count	329,000		1,997	16,791	7,863	0.47	12,930	0.77			1,997	16,788	14,213	0.85	9,409		0.56	
	2035 Without Project	383,650		1,997	16,791	9,130	0.54	15,005	0.89			1,997	16,788	16,580	0.99	10,885		0.65	
	2035 With Project	388,301		1,997	16,791	9,349	0.56	15,274	0.91			1,997	16,788	16,811	1.00	11,097		0.66	
	Grapevine Specific Plan Net New Project Impacts	4,651				219	0.01	269	0.02					231	0.01	212		0.01	
22	Btw. SR-210 & Roxford St		4M (+1H+ 1A[F])							5M (+1H)							LOS E		
	2014 Count	266,000		2,212	12,449	6,357	0.51	10,454	0.84		2,212	12,661	11,491	0.91	7,608	0.6			
	2035 Without Project	304,650		2,212	12,449	7,240	0.58	11,905	0.96		2,212	12,661	13,170	1.04	8,625	0.68		Yes	
	2035 With Project	309,301		2,212	12,449	7,459	0.60	12,174	0.98		2,212	12,661	13,401	1.05	8,837	0.70			
	Grapevine Specific Plan Net New Project Impacts	4,651				219	0.02	269	0.02				231	0.01	212	0.02			
23	Btw. RoxfoRd St & I-405		5M (+1H+ 1A[F])							5M (+1H+1A[F])							LOS E		
	2014 Count	283,000		2,212	14,661	6,764	0.46	11,122	0.76		2,212	14,661	12,226	0.83	8,094	0.55			
	2035 Without Project	318,650		2,212	14,661	7,580	0.52	12,465	0.85		2,212	14,661	13,790	0.94	9,035	0.62			
	2035 With Project	323,301		2,212	14,661	7,799	0.53	12,734	0.87		2,212	14,661	14,021	0.96	9,247	0.63			
	Grapevine Specific Plan Net New Project Impacts	4,651				219	0.01	269	0.02				231	0.02	212	0.01			
24	Btw. I-405 & San Fernando Mission Blvd		3M (+1H)							3M (+1H)							LOS E		
	2014 Count	141,000		2,190	8,171	3,370	0.41	5,541	0.68		2,190	8,171	6,091	0.75	4,033	0.49			
	2035 Without Project	161,650		2,190	8,171	3,830	0.47	6,295	0.77		2,190	8,171	7,010	0.86	4,545	0.56			
	2035 With Project	166,301		2,190	8,171	4,049	0.50	6,564	0.80		2,190	8,171	7,241	0.89	4,757	0.58			
	Grapevine Specific Plan Net New Project Impacts	4,651				219	0.03	269	0.03				231	0.03	212	0.03			

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
25	Btw Dawn Rd & Rosamond Blvd		2M							2M							LOS D	
	2014 Count	23,000		2,332	4,665	1,083	0.23	849	0.18		2,332	4,665	499	0.11	1,323	0.28		
	2035 Without Project	29,825		2,332	4,665	1,345	0.29	1,095	0.23		2,332	4,665	610	0.13	1,535	0.33		
	2035 With Project	30,163		2,332	4,665	1,355	0.29	1,105	0.24		2,332	4,665	638	0.14	1,555	0.33		
	Grapevine Specific Plan Net New Project Impacts	338				10	0.00	10	0.00				28	0.01	20	0.00		
26	Btw. Rosamond Blvd & Ave A		2M							2M							LOS D	
	2014 Count	30,000		2,339	4,679	1,413	0.3	1,107	0.24		2,339	4,679	651	0.14	1,725	0.37		
	2035 Without Project	34,825		2,339	4,679	1,715	0.37	1,335	0.29		2,339	4,679	720	0.15	1,855	0.40		
	2035 With Project	35,163		2,339	4,679	1,725	0.37	1,345	0.29		2,339	4,679	748	0.16	1,875	0.40		
	Grapevine Specific Plan Net New Project Impacts	338				10	0.00	10	0.00				28	0.01	20	0.00		
27	Ave A & N Jct Rte 138/Ave D		2M							2M							LOS D	
	2014 Count	34,000		2,339	4,679	1,129	0.24	1,261	0.27		2,339	4,679	1,244	0.27	1,567	0.34		
	2035 Without Project	55,825		2,339	4,679	2,115	0.45	2,125	0.45		2,339	4,679	1,950	0.42	2,335	0.50		
	2035 With Project	56,163		2,339	4,679	2,125	0.45	2,135	0.46		2,339	4,679	1,978	0.42	2,355	0.50		
	Grapevine Specific Plan Net New Project Impacts	338				10	0.00	10	0.00				28	0.01	20	0.00		
28	Btw. Jct Rte 138/Ave D & Ave F		2M							2M							LOS D	
	2014 Count	36,000		2,332	4,665	1,195	0.26	1,336	0.29		2,332	4,665	1,318	0.28	1,660	0.36		
	2035 Without Project	87,650		2,332	4,665	3,525	0.76	3,685	0.79		2,332	4,665	3,360	0.72	3,720	0.80		
	2035 With Project	89,264		2,332	4,665	3,595	0.77	3,786	0.81		2,332	4,665	3,445	0.74	3,788	0.81		
	Grapevine Specific Plan Net New Project Impacts	1,614				70	0.01	101	0.02				85	0.02	68	0.01		
29	Btw. Ave F & Ave G		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	102,650		2,332	4,665	4,235	0.91	3,835	0.82		2,332	4,665	3,690	0.79	4,460	0.96		Yes
	2035 With Project	104,264		2,332	4,665	4,305	0.92	3,936	0.84		2,332	4,665	3,775	0.81	4,528	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,614				70	0.01	101	0.02				85	0.02	68	0.01		
30	Btw. Ave G & Ave H		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	107,650		2,332	4,665	4,385	0.94	3,815	0.82		2,332	4,665	3,810	0.82	4,600	0.99		Yes
	2035 With Project	109,264		2,332	4,665	4,455	0.95	3,916	0.84		2,332	4,665	3,895	0.83	4,668	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,614				70	0.01	101	0.02				85	0.02	68	0.01		
31	Btw. Ave H & Ave I		2M							2M							LOS E	
	2014 Count	40,000		2,332	4,665	1,328	0.28	1,484	0.32		2,332	4,665	1,464	0.31	1,844	0.4		
	2035 Without Project	108,650		2,332	4,665	4,345	0.93	4,025	0.86		2,332	4,665	3,880	0.83	4,530	0.97		
	2035 With Project	110,264		2,332	4,665	4,415	0.95	4,126	0.88		2,332	4,665	3,965	0.85	4,598	0.99		
	Grapevine Specific Plan Net New Project Impacts	1,614				70	0.01	101	0.02				85	0.02	68	0.01		
32	Btw. Ave I & Ave J		3M							3M							LOS E	
	2014 Count	47,000		2,332	6,997	1,560	0.22	1,744	0.25		2,332	6,997	1,720	0.25	2,167	0.31		
	2035 Without Project	114,650		2,332	6,997	4,605	0.66	4,365	0.62		2,332	6,997	3,950	0.56	4,890	0.70		
	2035 With Project	117,850		2,332	6,997	4,764	0.68	4,533	0.65		2,332	6,997	4,119	0.59	5,034	0.72		
	Grapevine Specific Plan Net New Project Impacts	3,200				159	0.02	168	0.02				169	0.02	144	0.02		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
33	Btw. Ave J & 20th St W		3M							3M							LOS E	
	2014 Count	42,000		2,339	7,016	1,394	0.2	1,558	0.22		2,339	7,016	1,537	0.22	1,936	0.28		
	2035 Without Project	99,650		2,339	7,016	4,105	0.59	3,905	0.56		2,339	7,016	3,500	0.50	4,370	0.62		
	2035 With Project	102,769		2,339	7,016	4,264	0.61	4,068	0.58		2,339	7,016	3,658	0.52	4,514	0.64		
	Grapevine Specific Plan Net New Project Impacts	3,119				159	0.02	163	0.02				158	0.02	144	0.02		
34	Btw. 20th St W & Ave K		3M							3M							LOS E	
	2014 Count	59,000		2,339	7,016	1,959	0.28	2,189	0.31		2,339	7,016	2,159	0.31	2,720	0.39		
	2035 Without Project	118,650		2,339	7,016	4,715	0.67	4,585	0.65		2,339	7,016	4,160	0.59	5,180	0.74		
	2035 With Project	121,769		2,339	7,016	4,874	0.69	4,748	0.68		2,339	7,016	4,318	0.62	5,324	0.76		
	Grapevine Specific Plan Net New Project Impacts	3,119				159	0.02	163	0.02				158	0.02	144	0.02		
35	Btw. Ave K & Ave L		3M							3M							LOS E	
	2014 Count	74,000		2,339	7,016	2,457	0.35	2,745	0.39		2,339	7,016	2,708	0.39	3,411	0.49		
	2035 Without Project	127,650		2,339	7,016	4,975	0.71	4,835	0.69		2,339	7,016	4,440	0.63	5,650	0.81		
	2035 With Project	130,769		2,339	7,016	5,134	0.73	4,998	0.71		2,339	7,016	4,598	0.66	5,794	0.83		
	Grapevine Specific Plan Net New Project Impacts	3,119				159	0.02	163	0.02				158	0.02	144	0.02		
36	Btw. Ave L & Ave M		3M							3M							LOS E	
	2014 Count	89,000		2,339	7,016	2,955	0.42	3,302	0.47		2,339	7,016	3,257	0.46	4,103	0.58		
	2035 Without Project	100,650		2,339	7,016	3,875	0.55	3,435	0.49		2,339	7,016	3,630	0.52	4,540	0.65		
	2035 With Project	103,333		2,339	7,016	4,014	0.57	3,569	0.51		2,339	7,016	3,765	0.54	4,668	0.67		
	Grapevine Specific Plan Net New Project Impacts	2,683				139	0.02	134	0.02				135	0.02	128	0.02		
37	Btw. Ave M & Ave N		3M							3M							LOS E	
	2014 Count	92,000		2,339	7,016	3,054	0.44	3,413	0.49		2,339	7,016	3,367	0.48	4,241	0.60		
	2035 Without Project	100,650		2,339	7,016	3,895	0.56	3,365	0.48		2,339	7,016	3,550	0.51	4,710	0.67		
	2035 With Project	102,987		2,339	7,016	4,024	0.57	3,471	0.49		2,339	7,016	3,663	0.52	4,830	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,337				129	0.02	106	0.02				113	0.02	120	0.02		
38	Btw. Ave N & 10th St W		3M							3M							LOS E	
	2014 Count	87,000		2,339	7,016	2,888	0.41	3,228	0.46		2,339	7,016	3,184	0.45	4,011	0.57		
	2035 Without Project	98,650		2,339	7,016	4,085	0.58	3,215	0.46		2,339	7,016	3,280	0.47	4,700	0.67		
	2035 With Project	100,899		2,339	7,016	4,214	0.60	3,311	0.47		2,339	7,016	3,393	0.48	4,812	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,249				129	0.02	96	0.01				113	0.02	112	0.02		
39	Btw. 10th St W & Rancho Vista Blvd		3M							3M							LOS E	
	2014 Count	87,000		2,225	6,675	2,888	0.43	3,228	0.48		2,225	6,675	3,184	0.48	4,011	0.60		
	2035 Without Project	93,650		2,225	6,675	3,965	0.59	3,165	0.47		2,225	6,675	3,170	0.47	4,510	0.68		
	2035 With Project	95,600		2,225	6,675	4,084	0.61	3,261	0.49		2,225	6,675	3,249	0.49	4,606	0.69		
	Grapevine Specific Plan Net New Project Impacts	1,950				119	0.02	96	0.01				79	0.01	96	0.01		
40	Btw. Rancho Vista Blvd & S Jct Rte 138		3M							3M							LOS E	
	2014 Count	84,000		2,225	6,675	2,789	0.42	3,116	0.47		2,225	6,675	3,074	0.46	3,872	0.58		
	2035 Without Project	94,650		2,225	6,675	4,015	0.60	3,085	0.46		2,225	6,675	3,140	0.47	4,570	0.68		
	2035 With Project	96,185		2,225	6,675	4,095	0.61	3,181	0.48		2,225	6,675	3,208	0.48	4,634	0.69		
	Grapevine Specific Plan Net New Project Impacts	1,535				80	0.01	96	0.01				68	0.01	64	0.01		
41	Btw. S Jct Rte 138 & Ave S		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	81,000		2,225	6,050	2,689	0.44	3,005	0.5		2,225	8,275	2,965	0.36	3,734	0.45		
	2035 Without Project	91,650		2,225	6,050	3,535	0.58	3,475	0.57		2,225	8,275	3,260	0.39	4,590	0.55		
	2035 With Project	93,048		2,225	6,050	3,605	0.60	3,571	0.59		2,225	8,275	3,322	0.40	4,642	0.56		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.02				62	0.01	52	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
42	Btw. Ave S & Pearlblossom/Sierra Hwy		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	71,000		2,225	6,050	2,357	0.39	2,634	0.44		2,225	8,275	2,599	0.31	3,273	0.4		
	2035 Without Project	75,650		2,225	6,050	3,015	0.50	2,655	0.44		2,225	8,275	2,660	0.32	3,820	0.46		
	2035 With Project	77,048		2,225	6,050	3,085	0.51	2,751	0.45		2,225	8,275	2,722	0.33	3,872	0.47		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.02				62	0.01	52	0.01		
43	Btw. Pearlblossom/Sierra Hwy & Angeles Forest		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	83,000		2,225	6,050	2,756	0.46	3,079	0.51		2,225	8,275	3,038	0.37	3,826	0.46		
	2035 Without Project	88,650		2,225	6,050	3,225	0.53	3,065	0.51		2,225	8,275	3,100	0.37	4,380	0.53		
	2035 With Project	90,048		2,225	6,050	3,295	0.54	3,161	0.52		2,225	8,275	3,162	0.38	4,432	0.54		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.02				62	0.01	52	0.01		
44	Btw. Angeles Forest Hwy & Soledad		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	144,000		2,225	8,275	3,154	0.38	3,525	0.43		2,225	6,050	3,477	0.57	4,380	0.72		
	2035 Without Project	114,650		2,225	8,275	3,845	0.46	3,875	0.47		2,225	6,050	3,620	0.60	6,000	0.99		
	2035 With Project	116,048		2,225	8,275	3,915	0.47	3,971	0.48		2,225	6,050	3,682	0.61	6,052	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.01	52	0.01		
45	Btw. Soledad & Santiago Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	113,650		2,236	6,071	3,845	0.63	3,905	0.64		2,236	6,071	3,430	0.56	5,640	0.93		
	2035 With Project	115,048		2,236	6,071	3,915	0.64	4,001	0.66		2,236	6,071	3,492	0.58	5,692	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.02				62	0.01	52	0.01		
46	Btw. Santiago Rd & Crown Valley Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	94,000		2,236	6,071	3,121	0.51	3,487	0.57		2,236	6,071	3,440	0.57	4,333	0.71		
	2035 Without Project	108,650		2,236	6,071	3,625	0.60	3,955	0.65		2,236	6,071	3,430	0.56	5,420	0.89		
	2035 With Project	110,048		2,236	6,071	3,695	0.61	4,051	0.67		2,236	6,071	3,492	0.58	5,472	0.90		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.02				62	0.01	52	0.01		
47	Btw. Crown Valley Rd & Ward Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	138,650		2,236	6,071	3,765	0.62	3,875	0.64		2,236	6,071	3,460	0.57	5,670	0.93		
	2035 With Project	140,048		2,236	6,071	3,835	0.63	3,971	0.65		2,236	6,071	3,522	0.58	5,722	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.02				62	0.01	52	0.01		
48	Btw. Ward Rd & Escondido Cyn Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	93,000		2,189	8,167	3,088	0.38	3,450	0.42		2,189	5,978	3,404	0.57	4,287	0.72		
	2035 Without Project	115,650		2,189	8,167	3,745	0.46	4,445	0.54		2,189	5,978	3,650	0.61	5,720	0.96		
	2035 With Project	117,048		2,189	8,167	3,815	0.47	4,541	0.56		2,189	5,978	3,712	0.62	5,772	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.01	52	0.01		
49	Btw. Escondido Cyn Rd & Agua Dulce Cyn Rd		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	93,000		2,236	8,307	1,776	0.21	4,669	0.56		2,236	6,071	4994	0.82	2,613	0.43		
	2035 Without Project	114,650		2,236	8,307	2,285	0.28	5,555	0.67		2,236	6,071	5,320	0.88	3,950	0.65		
	2035 With Project	116,048		2,236	8,307	2,355	0.28	5,651	0.68		2,236	6,071	5,382	0.89	4,002	0.66		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.01	52	0.01		
50	Btw. Agua Dulce Cyn Rd & Soledad Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	96,000		2,236	8,307	1,834	0.22	4,819	0.58		2,236	6,071	5,155	0.85	2,698	0.44		
	2035 Without Project	116,850		2,236	8,307	2,415	0.29	5,565	0.67		2,236	6,071	5,220	0.86	4,070	0.67		
	2035 With Project	118,248		2,236	8,307	2,485	0.30	5,661	0.68		2,236	6,071	5,282	0.87	4,122	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.01	52	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
51	Btw. Shadow Pines/Soledad Rd & Sand Cyn Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	99,000		2,236	6,071	1,891	0.31	4,970	0.82		2,236	6,071	5,316	0.88	2,782	0.46		
	2035 Without Project	115,650		2,236	6,071	2,395	0.39	5,205	0.86		2,236	6,071	5,380	0.89	3,820	0.63		
	2035 With Project	117,048		2,236	6,071	2,465	0.41	5,301	0.87		2,236	6,071	5,442	0.90	3,872	0.64		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.02				62	0.01	52	0.01		
52	Btw. Sand Cyn Rd & Via Princessa		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	112,000		2,215	8,246	2,139	0.26	5,622	0.68		2,215	8,246	6,014	0.73	3,147	0.38		
	2035 Without Project	135,650		2,215	8,246	2,575	0.31	6,365	0.77		2,215	8,246	6,840	0.83	4,770	0.58		
	2035 With Project	137,048		2,215	8,246	2,645	0.32	6,461	0.78		2,215	8,246	6,902	0.84	4,822	0.58		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.01	52	0.01		
53	Btw. Via Princessa & Golden Valley Rd		3M (+1H+1A)							3M (+1H+1A)							LOS E	
	2014 Count	144,000		2,215	9,246	2,750	0.3	7,229	0.78		2,215	9,246	7,733	0.84	4,046	0.44		
	2035 Without Project	172,650		2,215	9,246	3,255	0.35	7,895	0.85		2,215	9,246	8,590	0.93	5,470	0.59		
	2035 With Project	174,048		2,215	9,246	3,325	0.36	7,991	0.86		2,215	9,246	8,652	0.94	5,522	0.60		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.01	52	0.01		
54	Btw. Golden Valley Rd & Placerita Cyn Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	144,000		2,215	8,246	2,750	0.33	7,229	0.88		2,215	8,246	7,733	0.94	4,046	0.49		
	2035 Without Project	169,650		2,215	8,246	3,105	0.38	7,645	0.93		2,215	8,246	8,520	1.03	5,140	0.62		Yes
	2035 With Project	171,048		2,215	8,246	3,175	0.38	7,741	0.94		2,215	8,246	8,582	1.04	5,192	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.01	52	0.01		
55	Btw. Placerita Cyn Rd & San Fernando Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	151,000		2,215	8,246	2,884	0.35	7,580	0.92		2,215	8,246	8,109	0.98	4,243	0.51		
	2035 Without Project	173,650		2,215	8,246	3,155	0.38	7,995	0.97		2,215	8,246	8,520	1.03	5,110	0.62		Yes
	2035 With Project	175,048		2,215	8,246	3,225	0.39	8,091	0.98		2,215	8,246	8,582	1.04	5,162	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.01	52	0.01		
56	Btw. San Fernando Rd//Newhall Ave & Jct I-5		5M (+1H)							5M (+1H)							LOS E	
	2014 Count	166,000		2,215	12,676	3,171	0.25	8,333	0.66		2,215	12,676	8,914	0.7	4,665	0.37		
	2035 Without Project	180,650		2,215	12,676	3,145	0.25	8,625	0.68		2,215	12,676	9,310	0.73	5,050	0.40		
	2035 With Project	182,048		2,215	12,676	3,215	0.25	8,721	0.69		2,215	12,676	9,372	0.74	5,102	0.40		
	Grapevine Specific Plan Net New Project Impacts	1,398				70	0.01	96	0.01				62	0.00	52	0.00		
SR-138																		
57	Between Jct I-5 and Gorman Post Rd		2M							2M							LOS D	
	2014 Count	4,500		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	71,675		1,904	3,808	2,525	0.66	3,830	1.01		1,904	3,808	3,855	1.01	2,725	0.72		Yes
	2035 With Project	76,375		1,904	3,808	2,739	0.72	4,079	1.07		1,904	3,808	4,120	1.08	2,937	0.77		Yes
	Grapevine Specific Plan Net New Project Impacts	4,700				214	0.06	249	0.07				265	0.07	212	0.06		
58	Between Gorman Post Rd and Old Ridge Route Rd		1M							1M							LOS D	
	2014 Count	4,900		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	83,675		1,904	1,904	2,785	1.46	4,680	2.46		1,904	1,904	4,525	2.38	3,055	1.60		Yes
	2035 With Project	88,375		1,904	1,904	2,999	1.58	4,929	2.59		1,904	1,904	4,790	2.52	3,267	1.72		Yes
	Grapevine Specific Plan Net New Project Impacts	4,700				214	0.11	249	0.13				265	0.14	212	0.11		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-138																		
59	Between Old Ridge Route Rd and 300th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	87,225		1,904	1,904	2,855	1.50	4,805	2.52		1,904	1,904	4,645	2.44	3,130	1.64		Yes
	2035 With Project	90,774		1,904	1,904	3,014	1.58	4,987	2.62		1,904	1,904	4,854	2.55	3,290	1.73		Yes
	Grapevine Specific Plan Net New Project Impacts	3,549				159	0.08	182	0.10				209	0.11	160	0.08		
60	Between 300th St West and 245TH St		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	152	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	72,225		1,904	1,904	3,495	1.84	2,885	1.52		1,904	1,904	2,915	1.53	3,830	2.01		Yes
	2035 With Project	75,774		1,904	1,904	3,654	1.92	3,067	1.61		1,904	1,904	3,124	1.64	3,990	2.10		Yes
	Grapevine Specific Plan Net New Project Impacts	3,549				159	0.08	182	0.10				209	0.11	160	0.08		
61	Between 245th St West and 190th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	89	0.05	147	0.09			1,700	113	0.07	87	0.05		
	2035 Without Project	62,225		1,904	1,904	2,595	1.36	2,325	1.22		1,904	1,904	2,465	1.29	3,050	1.60		Yes
	2035 With Project	65,774		1,904	1,904	2,754	1.45	2,507	1.32		1,904	1,904	2,674	1.40	3,210	1.69		Yes
	Grapevine Specific Plan Net New Project Impacts	3,549				159	0.08	182	0.10				209	0.11	160	0.08		
62	Between 190th St West and 110th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	53,774		1,962	1,962	2,154	1.10	1,937	0.99		1,962	1,962	2,224	1.13	2,580	1.31		Yes
	Grapevine Specific Plan Net New Project Impacts	3,549				159	0.08	182	0.09				209	0.11	160	0.08		
63	Between 110th St West and 60th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	52,978		1,962	1,962	2,114	1.08	1,899	0.97		1,962	1,962	2,178	1.11	2,544	1.30		Yes
	Grapevine Specific Plan Net New Project Impacts	2,753				119	0.06	144	0.07				163	0.08	124	0.06		
64	Between 60th St West and Jct Rte 14 North		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	141	0.08	177	0.1			1,700	123	0.07	148	0.09		
	2035 Without Project	55,225		1,962	1,962	2,355	1.20	1,895	0.97		1,962	1,962	1,985	1.01	2,700	1.38		Yes
	2035 With Project	57,178		1,962	1,962	2,435	1.24	2,005	1.02		1,962	1,962	2,098	1.07	2,788	1.42		Yes
	Grapevine Specific Plan Net New Project Impacts	1,953				80	0.04	110	0.06				113	0.06	88	0.04		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-126																		
65	Btw. N Jct SR-126 & Henry Mayo Dr		3M							3M							LOS D	
	2014 Count	29,025			6,288	1,264	0.20	1,618	0.26			6,288	1,406	0.22	1,517	0.24		
	2035 Without Project	31,145			6,288	1,369	0.22	1,802	0.29			6,288	1,518	0.24	1,540	0.24		
	2035 With Project	31,503			6,288	1,379	0.22	1,821	0.29			6,288	1,541	0.24	1,560	0.25		
	Project Impact	358			6,288	10	0.00	19	0.00			6,288	23	0.00	20	0.00		
66	Btw. Henry Mayo Dr & Commerce Center Dr		2M							2M							LOS D	
	2014 Count	29,025			4,665	1,264	0.27	1,618	0.35			4,665	1,406	0.30	1,517	0.33		
	2035 Without Project	31,145			4,665	1,369	0.29	1,802	0.39			4,665	1,518	0.33	1,540	0.33		
	2035 With Project	31,503			4,665	1,379	0.30	1,821	0.39			4,665	1,541	0.33	1,560	0.33		
	Grapevine Specific Plan Net New Project Impacts	358			4,665	10	0.00	19	0.00			4,665	23	0.00	20	0.00		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

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2.4.3.5 UPDATED 28.7% HBW ICR ANALYSIS IMPACTS TO INTERIM I-5 ACCESS FACILITIES

As shown in Table A-AFA, the Updated 28.7% HBW ICR analysis results in slightly lower ADT, higher AM peak hour and lower PM peak hour trips than projected under the FEIR analysis (see Table 4 on Page 20). As shown in Table C-AFA to Table J-AFA, the distribution of these trips, and impacts to local and state transportation facilities, is substantially the same as in the FEIR analysis. Consequently, approximately the same amount of development could be constructed under the Updated 28.7% HBW ICR analysis until the applicable LOS standards for the Interim B access facilities would be exceeded (see Figure 2-3). Additional Project development above these levels would require the construction of a new and relocated interchange along I-5, including either interchange Variant 1 or Variant 2 (see Figure 2-5 and Figure 2-6).

2.4.4 UPDATED 28.7% HBW ICR ANALYSIS MITIGATION MEASURES

As shown in Table A-AFA through Table J-AFA, the Updated 28.7% HBW ICR analysis results in slightly lower ADT, higher AM peak hour and lower PM peak hour trips than projected under the FEIR analysis. The distribution of these trips, and impacts to local and regional transportation facilities, is substantially the same as in the FEIR analysis. The FEIR included MM 4.16-1 to MM 4.16-12 to reduce potential project transportation and traffic impacts (see Section 2.2.5 of this report). The location, timing and magnitude of the Updated 28.7% HBW ICR impacts is the same as for the FEIR analysis. The ICRs used in the Updated 28.7% HBW ICR analysis are the same as in the FEIR analysis. Consequently, the mitigation measures identified for the FEIR analysis are applicable without modification to the Updated 28.7% HBW ICR analysis.

2.4.5 UPDATED 28.7% HBW ICR ANALYSIS TRANSPORTATION AND TRAFFIC IMPACT SIGNIFICANCE DETERMINATIONS

Based on the analysis summarized in Table A-AFA through Table J-AFA of this report, the significance of the Updated 28.7% HBW ICR impacts is as follows:

Updated 28.7% HBW ICR impacts to local intersections and roadways, freeways near the Project site, including the Grapevine Grade, and under interim access conditions would be the same as considered under Threshold 1 in the FEIR analysis. Impacts to local intersections would be lower than considered in the FEIR. With the implementation of MM 4.16-1 to MM 4.16-9 these impacts would be less than significant.

Updated 28.7% HBW ICR impacts related to congestion management plans would be the same as considered under Threshold 2 in the FEIR analysis. With the implementation of MM 4.16-2, MM 4.16-3, and MM 4.16-6 through MM 4.16-9, these impacts would be less than significant.

Updated 28.7% HBW ICR impacts related to changed airport traffic patterns would be the same as considered under Threshold 3 of the FEIR analysis. With the implementation of MM 4.16-10 these impacts would be less than significant.

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Updated 28.7% HBW ICR impacts related to design feature or incompatible use hazards would be the same as considered under Threshold 4 in the FEIR analysis. With the implementation of MM 4.16-1 through MM 4.16-7 and MM 4.16-9 these impacts would be less than significant.

Updated 28.7% HBW ICR impacts related to emergency access would be the same as considered under Threshold 5 in the FEIR analysis. With the implementation of MM 4.16-1 and MM 4.16-11 these impacts would be less than significant.

Updated 28.7% HBW ICR impacts related to conflicts with adopted policies, plans, or programs supporting alternative transportation would be the same as considered under Threshold 6 in the FEIR analysis. With the implementation of MM 4.16-2, MM 4.16-6, and MM 4.16-9 these impacts would be less than significant.

Updated 28.7% HBW ICR cumulative impacts would be the same as considered under Threshold 7 in the FEIR analysis. The implementation of MM 4.16-1 to MM 4.16-11 and MM 4.16-12 would avoid potential Project contributions to cumulative traffic and transportation hazards, inadequate emergency access, programs supporting alternative transportation, and impacts to local roadways and intersections (subject to the Kern County General Plan smart growth and multi-modal transportation development goals, policies and implementation measures). The implementation of these mitigation measures would also reduce but not avoid significant impacts to the Grapevine Grade, along I-5 and in Los Angeles County. Although the mitigation measures require that the Project provide fair-share funding to mitigate for potential cumulative impacts to state highway facilities, the County lacks jurisdiction to require the implementation of the required improvements by Caltrans and cumulative impacts to state highway facilities would remain significant and unavoidable.

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3 REDUCED ICR SCENARIO SCREENING ANALYSIS

3.1 SCREENING SCENARIO DEVELOPMENT

A total of 22 screening scenarios were identified by Kern County to evaluate how daily and AM and PM peak hour trip generation rates and VMT could vary with ICRs that were 10 and 20 percent lower than used in the FEIR as required by the NOP. The screening scenarios also include potential development patterns, such as primarily residential or commercial/light industrial development rather than the diverse land uses proposed by the Project that could also affect Project area ICRs. To ensure consistency and the use of the best available information in the 2019 TIA, trip generation and VMT for each of the screening scenarios were developed using the 2016 ITE Manual and screened with reference to the Updated 28.7% HBW ICR analysis. The 22 scenarios include:

- Scenario 1 Proposed project development of 12,000 dwelling units and 5.1 million square feet of commercial/light Industrial land uses with a 10-percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis.
- Scenario 2 Proposed project development of 12,000 dwelling units and 5.1 million square feet of commercial/light Industrial land uses with a 20-percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis.
- Scenario 3 Proposed project development of 75 percent of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses (9,000 dwelling units and 3.825 million square feet of commercial/light industrial land uses) with a 10 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis.
- Scenario 4 Proposed project development of 75 percent of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses (9,000 dwelling units and 3.825 million square feet of commercial/light industrial land uses) with a 20 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis.
- Scenario 5 Proposed project development of 50 percent of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses (6,000 dwelling units and 2.550 million square feet of commercial/light industrial land uses) with a 10 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis.

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- Scenario 6 Proposed project development of 50 percent of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses (6,000 dwelling units and 2.550 million square feet of commercial/light industrial land uses) with a 20 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis..
- Scenario 7 Proposed project development of 25 percent of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses (3,000 dwelling units and 1.275 million square feet of commercial/light industrial land uses) with a 10 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis.
- Scenario 8 Proposed project development of 25 percent of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses (3,000 dwelling units and 1.27 million square feet of commercial/light industrial land uses) with a 20 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis.
- Scenario 9 Development of 14,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.
- Scenario 10 Development of 12,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.
- Scenario 11 Development of 10,500 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.
- Scenario 12 Development of 9,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.
- Scenario 13 Development of 7,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.

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- Scenario 14 Development of 6,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.
- Scenario 15 Development of 5,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.
- Scenario 16 Development of 3,500 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.
- Scenario 17 Development of 3,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses.
- Scenario 18 Development of 5.1 million square feet of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities.
- Scenario 19 Development of 3.825 million square feet of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities.
- Scenario 20 Development of 2.55 million square feet of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities.
- Scenario 21 Development of 1.275 million square feet of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities.
- Scenario 22 Development of 14,000 dwelling units, subject to the reduction of onsite commercial/light industrial uses to about 3.1 million square feet, as permitted under the proposed Project Specific Plan.

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The screening scenarios 1-8 analyze potential Project development with ICRs that are reduced by 10 percentage points and 20 percentage points from the levels in the FEIR and the Updated 28.7% HBW ICR analysis. As discussed in Section 1 of this report, these scenarios were conservatively evaluated by subtracting 10 and 20 percentage points from the FEIR and Updated 28.7% HBW ICR analysis ICR levels. The approach results in the evaluation of actual ICR reductions of about 16-17 percent for the 10 percentage point reduction scenarios and 31-34 percent for the 20 percentage point reduction scenarios. Screening scenarios 9-17 consider the potential development of residential units without complementary onsite amenities and employment-generating land uses. Screening scenarios 18-21 consider the development of new commercial/light industrial land uses without onsite housing. Screening scenario 22 considers full Project development with maximum number of dwelling units (14,000) with reduced commercial/light industrial uses that could occur under the proposed Specific Plan. Screening scenario 9 considers the potential development of 14,000 residential units without complementary onsite amenities and employment-generating land uses.

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3.2 SCREENING SCENARIO CRITERIA AND RESULTS

Daily and peak AM and PM hour trips and average daily VMT were calculated for each of the 22 screening scenarios and compared with the Updated 28.7% HBW ICR daily and peak AM and PM hour trips and average daily VMT. The number of daily and peak hour trips was used as a screening criterion because trip counts directly affect potential transportation system impacts, including the maintenance of acceptable roadway or intersection level of service standards. Average weekday VMT was used as a screening criterion because the amount of VMT is proportional to the number and length of trips that are external to the Project. Scenarios with higher levels of VMT than considered in the FEIR and the Updated 28.7% HBW ICR analysis could result in greater transportation and traffic impacts. Scenarios with higher VMT could also result in greater air quality, greenhouse gas, noise, public health and growth inducing impacts from vehicular use and increased transit external to the Project area.

As discussed in Section 1 of this report, the Updated 28.7% HBW ICR and screening scenario analysis utilizes the 2016 ITE Trip Generation Manual trip generation rates for consistency with the most current version of CalEEMod used to analyze air quality and greenhouse gas impacts. The 2014 Kern COG model was determined to generate more conservative ICRs than the 2018 Kern COG model and was utilized in this report to generate VMT and to analyze potential impacts under cumulative plus project conditions.

Table 5 summarizes the Updated 28.7% HBW ICR analysis daily and peak AM and PM hour trip volumes.

Table 5: Updated 28.7% HBW ICR Analysis Daily and AM and PM Peak Hour Trips

	A.M. Peak Hour	P.M. Peak Hour	Daily Total
	Total	Total	
12,000 Dwelling Units (DUs) and 5.1 Million Square Feet (MSF) of Non-residential Land Uses	18,119	19,699	197,685

Notes: DUs = dwelling units; ksf = thousand square feet

Source: Trip Generation Manual, 10th Edition (Institute of Transportation Engineers, 2016).

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Table 6 summarizes the daily and peak AM and PM hour trip volumes calculated for each of the 22 reduced ICR analysis scenarios and compares the results with the Updated 28.7% HBW ICR analysis trip volumes. As shown in Table 6, none of the scenarios include a mix of land uses that results in a larger volume of daily and peak AM and PM hour trip volumes than projected for the Updated 28.7% HBW ICR scenario.

Table 6: ITE Trip Generation Estimates - Reduced ICR Land Use Scenarios

Land Use Scenario	A.M. Peak Hour	P.M. Peak Hour	Daily Total
	Total	Total	
Scenario 1 – Proposed Project Development of 12,000 Dwelling Units (DUs) and 5.1 Million Square Feet (MSF) of Commercial/light Industrial land uses With a 10% Reduction in Internal Capture Rate	18,119	19,699	197,685
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	No Change	No Change	No Change
Scenario 2 - Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses With a 20% Reduction in Internal Capture Rate	18,119	19,699	197,685
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	No Change	No Change	No Change
Scenario 3 –75% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (9,000 DUs and 3.825 MSF of Non-residential Land Uses) With a 10% Reduction in Internal Capture Rate	13,590	14,775	148,266
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-25%	-25%	-25%

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Scenario 4 – 75% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (9,000 DUs and 3.825 MSF of Non-residential Land Uses) With a 20% Reduction in Internal Capture Rate	13,590	14,775	148,266
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-25%	-25%	-25%
Scenario 5 –50% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (6,000 DUs and 2.550 MSF of Non-residential Land Uses) With a 10% Reduction in Internal Capture Rate	9,060	9,850	98,846
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-50%	-50%	-50%
Scenario 6– 50% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (6,000 DUs and 2.550 MSF of Non-residential Land Uses) With a 20% Reduction in Internal Capture Rate	9,060	9,850	98,846
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-50%	-50%	-50%
Scenario 7 – 25% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (3,000 DUs and 1.270 MSF of Non-residential Land Uses) With a 10% Reduction in Internal Capture Rate	4,530	4,925	49,424
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-75%	-75%	-75%
Scenario 8 – 225% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (3,000 DUs and 1.270 MSF of Non-residential Land Uses) With a 20% Reduction in Internal Capture Rate	4,530	4,925	49,424
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-75%	-75%	-75%

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Scenario 9 – 14,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	16,025	13,863	145,616
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-11.6%	-29.6%	-26.3%
Scenario 10 – 12,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	13,736	11,882	124,814
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-24.2%	-39.7%	-36.9%
Scenario 11 – 10,500 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	12,019	10,397	109,214
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-33.7%	-47.2%	-44.8%
Scenario 12 – 9,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	10,303	8,912	93,612
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-43.1%	-54.8%	-52.6%
Scenario 13 – 7,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	8,013	6,932	72,810
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-55.8%	-64.8%	-62.2%

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Scenario 14 – 6,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	6,868	5,941	62,410
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-62.1%	-69.8%	-68.4%
Scenario 15– 3,500 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	4,007	3,466	36,406
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-77.9%	-82.4%	-81.6%
Scenario 16 – 3,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	3,434	2,971	31,208
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-81.0%	-84.9%	-84.2%
Scenario 17 – 5.1 MSF of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities	4,383	7,817	72,872
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-75.8%	-60.3%	-63.1%
Scenario 18 – 3.825 MSF of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities	3,287	5,863	54,656
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-81.9%	-70.2%	-72.3%
Scenario 19 – 2.550 MSF of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities	2,192	3,909	36,436

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Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-87.9%	-80.1%	-81.6%
Scenario 21 – 1.275 MSF of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities	1,095	1,954	18,218
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-93.9%	-90.1%	-90.8%
Scenario 22 – 14,000 DUs, subject to reduction of onsite commercial/light industrial uses to about 3.1 MSF as permitted under the proposed Project Specific Plan	17,934	18,797	196,797
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-1.0%	-4.5%	-0.4%

Notes: DUs = dwelling units; ksf = thousand square feet

Source: *Trip Generation Manual, 10th Edition* (Institute of Transportation Engineers, 2016).

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The 22 scenarios were next screened by comparing each scenario's average weekday VMT based on the 2016 ITE Manual trip generation rates and the 2014 Kern COG model with the average weekday VMT for the Updated 28.7% HBW ICR analysis (3,114,939 miles). Table 3.3 summarizes the average weekday VMT for each scenario and the percentage decrease or increase in VMT relative to the Updated 28.7% HBW ICR analysis.

Table 7: Average Weekday Vehicle Miles Traveled (VMT) - Reduced ICR Land Use Scenarios

Land Use Scenario	Weekday Daily VMT Total
Scenario 1 – Proposed Project Development of 12,000 Dwelling Units (DUs) and 5.1 Million Square Feet (MSF) of Commercial/light Industrial land uses With a 10% Reduction in Internal Capture Rate	3,881,511
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	+24.6%
Scenario 2 - Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses With a 20% Reduction in Internal Capture Rate	4,587,395
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	+47.3%
Scenario 3 –75% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (9,000 DUs and 3.825 MSF of Non-residential Land Uses) With a 10% Reduction in Internal Capture Rate	2,911,177
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-6.5%

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Scenario 4 – 75% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (9,000 DUs and 3.825 MSF of Non-residential Land Uses) With a 20% Reduction in Internal Capture Rate	3,440,599
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	+10.5%
Scenario 5 –50% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (6,000 DUs and 2.550 MSF of Non-residential Land Uses) With a 10% Reduction in Internal Capture Rate	1,940,395
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-37.7%
Scenario 6– 50% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (6,000 DUs and 2.550 MSF of Non-residential Land Uses) With a 20% Reduction in Internal Capture Rate	2,293,779
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-26.4%
Scenario 7 – 25% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (3,000 DUs and 1.270 MSF of Non-residential Land Uses) With a 10% Reduction in Internal Capture Rate	970,432
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-68.8%
Scenario 8 – 225% of Proposed Project Development of 12,000 DUs and 5.1 MSF of Commercial/light Industrial land uses (3,000 DUs and 1.270 MSF of Non-residential Land Uses) With a 20% Reduction in Internal Capture Rate	1,146,913
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-63.2%

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Scenario 9 – 14,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	4,336,327
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	+39.2%
Scenario 10 – 12,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	3,716,852
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	+19.3%
Scenario 11 – 10,500 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	3,052,247
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-2.0%
Scenario 12 – 9,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	2,787,641
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-10.5%
Scenario 13 – 7,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	2,168,165
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-30.4%
Scenario 14 – 6,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary	1,858,429

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commercial/light industrial amenities or onsite employment-generating land uses	
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-40.3%
Scenario 15– 3,500 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	1,084,083
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-65.2%
Scenario 16 – 3,000 DUs with Legally-required Schools and Parks Schools and Parks and No complementary commercial/light industrial amenities or onsite employment-generating land uses	929,217
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-70.2%
Scenario 17 – 5.1 MSF of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities	2,667,578
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-14.4%
Scenario 18 – 3.825 MSF of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities	2,000,757
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-35.8%
Scenario 19 – 2.550 MSF of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities	1,337,789
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-57.1%

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Scenario 21 – 1.275 MSF of commercial/light industrial uses with no onsite dwelling units and complementary residential school or park amenities	666,895
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-78.6%
Scenario 22 – 14,000 DUs, subject to reduction of onsite commercial/light industrial uses to about 3.1 MSF as permitted under the proposed Project Specific Plan	2,936,475
Percentage Increase or Decrease from Updated 28.7% HBW ICR analysis	-5.7%

Notes: DUs = dwelling units; ksf = thousand square feet

Source: *Trip Generation Manual, 10th Edition* (Institute of Transportation Engineers, 2016).

As shown in Table 7, five of the screening scenarios were found to result in higher average weekday VMT than the Updated 28.7% HBW ICR analysis:

- Scenario 1 Proposed project development of 12,000 dwelling units and 5.1 million square feet of commercial/light Industrial land uses with a 10 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis (average weekday VMT of 3,881,511 miles, 24.6 percent above the Updated 28.7% HBW ICR analysis VMT).

- Scenario 2 Proposed project development of 12,000 dwelling units and 5.1 million square feet of commercial/light Industrial land uses with a 20 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis (average weekday VMT of 4,587,395 miles, 47.3 percent above the Updated 28.7% HBW ICR analysis VMT).

- Scenario 4 Proposed project development of 75 percent of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses (9,000 dwelling units and 3.825 million square feet of commercial/light industrial land uses) with a 20 percentage point reduction in the Project's ICRs from the levels used in the FEIR and Updated 28.7% HBW ICR analysis (average weekday VMT of 3,440,598 miles, 10.5 percent above the Updated 28.7% HBW ICR analysis VMT).

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- Scenario 9 Development of 14,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses (average weekday VMT of 4,336,327 miles, 39.2 percent above the Updated 28.7% HBW ICR analysis VMT).
- Scenario 10 Development of 12,000 dwelling units and schools and parks as required by applicable land use laws and regulations, with no complementary commercial/light industrial amenities or onsite employment-generating land uses (average weekday VMT of 3,716,852 miles, 19.3 percent above the Updated 28.7% HBW ICR analysis VMT).

Although no reduced ICR scenario resulted in a larger number of daily and peak hour trips than the Updated 28.7% HBW ICR analysis, the lower ICRs in Scenario 1, Scenario 2 and Scenario 4, result in a greater number of external trips than in the Updated 28.7% HBW ICR analysis. External trips extend for longer distances than internal trips, and consequently VMT increased above the levels in the Updated 28.7% HBW ICR analysis. Due to the absence of complementary onsite amenities, such as shopping, medical and recreational land uses other than legally-required schools and parks, and lack of onsite employment-generating land uses in Scenario 9 and 10, all trips for work and home-based purposes other than schools parks were external to the Project site. The relatively large number of external trips in these scenarios caused average weekday VMT to increase above the levels in the Updated 28.7% HBW ICR analysis. The higher VMT in the five scenarios could result in greater impacts to transportation and traffic (as well as greater air pollution, greenhouse gases, noise, public health and growth inducing impacts included in the NOP).

Sections 4-8 of this report analyze potential transportation and traffic impacts for each of five reduced ICR scenarios under cumulative plus project conditions and with the same level of detail as the Updated 28.7% HBW ICR analysis described in Section 2.3. Section 9 of this report discusses mitigation measures that would reduce potential impacts that could occur from the reduced ICR scenarios and evaluates the significance of these impacts under the thresholds of significance utilized in the FEIR.

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4 SCENARIO 1 ANALYSIS

This section analyzes the potential transportation and traffic impacts that could occur in Scenario 1. The impact assessment was conducted for cumulative plus project conditions and evaluates the same local intersections, local roadways, local freeway segments, state highway and freeway segments to the north and south of the Project site and interim access impacts considered in the Updated 28.7% HBW ICR analysis summarized in Section 2.3 of this report. Scenario 1 includes proposed Project development of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses with a 10 percentage point reduction in the ICRs used in the FEIR and Updated 28.7% HBW ICR analysis.

4.1 SCENARIO 1 ANALYSIS METHODOLOGY AND ICR ASSUMPTIONS

Table A-1 summarizes the Scenario 1 daily and AM and PM peak hour number of trips generated by proposed Project land uses. The Scenario 1 ADT is also 197,685 trips compared with 197,685 trips in the Updated 28.7% HBW ICR analysis and 201,542 trips in the FEIR analysis. Based on the 2016 ITE Trip Generation Manual trip generation rates and the 2014 Kern COG model, the average weekday VMT in Scenario 1 is 3,881,511 miles compared with 3,114,939 miles in the Updated 28.7% HBW ICR analysis and 3,175,626 miles in the FEIR analysis.

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Table A-1: ITE Trip Generation Estimate - Scenario 1 Analysis

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	In	Out	Total	In	Out	
Residential									
Residential	8,400 DUs	210	6,216	1,554	4,662	8,316	5,239	3,077	79,296
Village Center Residential	3,600 DUs	220	1,656	381	1,275	2,016	1,270	746	26,352
Non-Residential									
Village Center Commercial - Retail ¹	450 ksf	820 ¹	423	262	161	1,715	823	892	16,988
Village Center Commercial - Office ¹	350 ksf	710 ¹	406	349	57	403	64	338	3,410
Freeway Commercial	750 ksf	820	705	437	268	2,858	1,372	1,486	28,314
Office/Research & Development	2,100 ksf	710	2,436	2,095	341	2,415	386	2,029	20,454
Light Industrial/Warehouse ²	1,450 ksf	130/ 150 ²	413	326	87	428	103	325	3,706
Schools & Parks ¹⁰									
Elementary Schools ⁴	4,970 students	520	3,330	1,798	1,532	845	406	439	9,394
Middle Schools ⁴	1,680 students	522	974	526	448	286	140	146	3,578
High Schools ⁴	3,000 students	530	1,560	1,045	515	420	202	218	6,090
Parks ³	132 acres	411							104
Total			18,119	8,774	9,345	19,699	10,004	9,695	197,685

Notes: DUs = dwelling units; ksf = thousand square feet

Trip generation estimates calculated using the trip rates in ITE's Trip Generation Manual, 10th Edition

¹Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)

²Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)

³City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information.

⁴Student enrollment based on number of students anticipated per residential dwelling unit based on discussions with school district

Source: Trip Generation Manual, 10th Edition (Institute of Transportation Engineers, 2016).

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Table B-1 summarizes the ICRs used in Scenario 1. The Scenario 1 ICR for all trips combined in the AM peak hour is 49.8 percent and 54.2 percent in the PM peak hour, which are 10 percentage points lower than in the Updated 28.7% HBW ICR and FEIR analysis. As discussed in the FEIR, Caltrans requested that the ICR for Home-Based Work trips be reduced because these trips can have the greatest impacts on external transportation facilities. Consistent with this approach, the 10 percentage point ICR reduction was first applied to Home-Based Work trips and then to other trips. As shown in Table B-1, the ICR for Home-Based Work trips used to evaluate Scenario 1 is significantly lower than the 28.7 percent ICR level in the FEIR and Updated 28.7% HBW ICR analysis (see Table B-FEIR and Table B-AFA).

Table B-1: Scenario 1 Estimated Project Trip Internalization by Peak Hour

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips ¹	% Internal ²	Total Internalization % ³	% of Trips ¹	% Internal ²	Total Internalization % ³
Home-Based Work	47.8%	7.7%	3.7%	28.1%	0.0%	0%
Home-Based Other/ Non-Home-Based	52.2%	88.3%	46.1%	71.9%	75.4%	54.2%
Total			49.8%			54.2%

Notes: ¹Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17 of Appendix T, page 117.

²Internalization percentage by trip purpose. Home-Based work trip internalization shown in Table 18 of Appendix T, page 118. Home-Based other/non-home-based trip internalization shown in Table 22 of Appendix T, page 139.

³Overall internalization estimate calculation.

Source: Fehr & Peers, April 2019.

The distribution of external trips north and south of the Project site for Scenario 1 were estimated by using the 2014 Kern COG also utilized in the Updated 28.7% HBW ICR and FEIR analysis. Table C-1 summarizes the percentage of trips traveling to the north and south of the Project during the AM and PM peak hours in Scenario 1. About 37.3 percent and 32.7 percent of peak AM and PM Project trips (respectively) would travel to and from the north (i.e. Bakersfield, Arvin-Lamont and Eastern Kern County) and 12.9 percent and 13.1 percent of peak AM and PM Project trips (respectively) would travel to and from the south (i.e. southern Kern County, Antelope Valley, Santa Clarita valley and metropolitan Los Angeles).

The percentage of all Scenario 1 trips to the north is 9 percentage points or 32 percent greater during the AM peak hour and 8.4 percentage points or 35 percent greater during the PM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. The share of all Scenario 1 trips to the south is 1 percentage point or 8 percent greater during the AM peak hour and 1.6 percentage points or 14 percent greater during the PM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis see Table C-FEIR and Table C-AFA.

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**Table C-1: Scenario 1 Build-out Trip Distribution Estimate -
Cumulative Plus Project Conditions (2040)**

Origin/Destination	Trip Distribution Estimate	
	A.M. Peak Hour	P.M. Peak Hour
Project Area	49.8%	54.2%
North of Grapevine	37.3%	32.7%
West Bakersfield via I-5	4.0%	3.5%
North of Bakersfield via I-5	2.0%	1.8%
Bakersfield Metropolitan Area via SR 99	21.5%	18.8%
North of Bakersfield via SR 99	2.0%	1.7%
Arvin-Lamont Area	5.8%	5.2%
Eastern Kern County via SR 58	2.0%	1.7%
South of Grapevine	12.9%	13.1%
Southern Kern County (Frazier Park/Tejon Mountain Village)	1.6%	1.5%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	4.8%	4.3%
Santa Clarita Valley Area1	3.3%	3.0%
Los Angeles Basin/Orange County/Inland Empire	3.2%	4.3%

Source: Fehr & Peers, April 2019.

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4.2 SCENARIO 1 ANALYSIS OF IMPACTS TO LOCAL INTERSECTIONS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

As shown in Table D-1, Scenario 1 would result in a new significant impact to the following intersection compared with the Updated 28.7% HBW ICR and FEIR analyses:

- Street C / Street H – AM Peak Hour

Two (2) intersections that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 1 under cumulative plus project conditions:

- Street D / Street A – AM and PM Peak Hours
- Street I / Street A – PM Peak Hour

Three (3) local intersections that are significantly impacted in either the Updated 28.7% HBW ICR or FEIR analyses would not be significantly impacted and would operate at acceptable LOS levels in in Scenario 1 under cumulative plus project conditions:

- Street C / Street A – PM Peak Hour
- Street C / Street G – PM Peak Hour
- Street C / Street H – PM Peak Hour

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Table D-1: Scenario 1 Analysis Peak Hour Intersection Operations - Cumulative Plus Project Conditions (2040)

Intersection	Traffic Control	Peak Hour	Cumulative No Project		Cumulative + Scenario 1 Project	
			Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	16	B	17	B
		P.M.	16	B	18	B
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	14	B	16	B
		P.M.	20	C	26	C
3. S. Wheeler Ridge Road / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A
		P.M.	4	A	4	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	20	C	20	B
		P.M.	45	D	38	D
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		41	D
		P.M.			38	D
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		51	D
		P.M.			31	C
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		18	B
		P.M.			34	C
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		<u>224</u>	<u>F</u>
		P.M.			<u>185</u>	<u>F</u>
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		21	C
		P.M.			40	D
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		<u>132</u>	<u>F</u>
		P.M.			11	B
11. Street I / Street A ⁴	Side-Street Stop	A.M.	Does Not Exist		0 (22)	A (C)
		P.M.			<u>2 (140)</u>	<u>A (F)</u>

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.

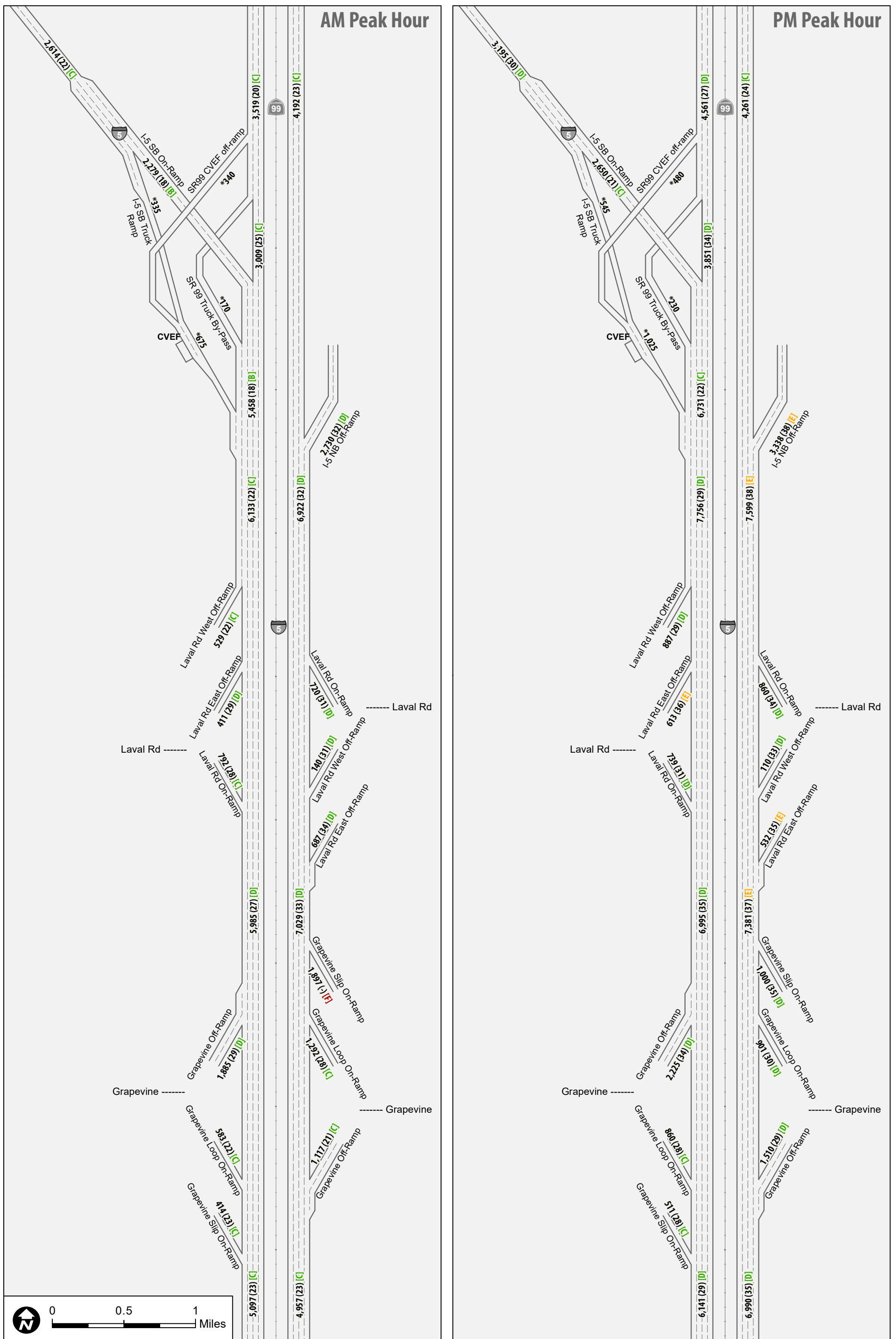
³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).

⁴ The shared movement with the greatest

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.



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4.3 SCENARIO 1 LOCAL ROADWAY IMPACTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS, PM PEAK HOUR

Table E-1 shows the Scenario 1 impacts to local roadway segments under cumulative plus project conditions during the PM peak hour, the period of heaviest roadway use and when the combination of vehicle trip purposes is at the highest level.

Scenario 1 would result in a new significant impact to the following local roadway compared with the Updated 28.7% HBW ICR and FEIR analyses:

- Wheeler Ridge Road: North of Santa Elena Drive

The following local roadway that is significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 1 under cumulative plus project conditions:

- Future Street A between Street D and Street I

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Table E-1: Scenario 1 PM Peak Hour Roadway Capacity Evaluation – Cumulative Plus Project Conditions (2040)

Roadway Segment	Classification	Existing Conditions			Cumulative Plus Scenario 1 Project		
		P.M. Peak Hour Volume	V/C ¹	LOS ²	P.M. Peak Hour Volume	V/C ¹	LOS ²
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	<u>1,630</u>	<u>0.60</u>	<u>E</u>
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			1,680	0.94	D
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			3,220	0.94	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			900	0.50	C
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			170	0.09	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			740	0.41	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			650	0.36	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			1,450	0.81	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			70	0.04	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			420	0.23	C
11. Dennis McCarthy Rd. : North of Laval Rd	2-lane Collector Street	592	0.36	D	940	0.53	D
12. Street A: Street D to Street I	4-lane Arterial Street	Does Not Exist			<u>3,471</u>	<u>1.02</u>	<u>F</u>

Notes: ¹V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.

²Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.

Source: Fehr & Peers, April 2019.

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4.4 SCENARIO 1 IMPACTS TO LOCAL FREEWAY SEGMENTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table F-1 summarizes the Scenario 1 LOS levels on 33 local freeway segments in the vicinity of the Project area under cumulative plus project conditions.

Scenario 1 would result in new significant impacts to the following local freeway segments compared with the Updated 28.7% HBW ICR and FEIR analyses:

- I-5 Northbound – Grapevine Slip On-Ramp - AM Peak Hour
- I-5 Northbound – Grapevine Slip On-Ramp to Laval Road East Off-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road East Off-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road On-Ramp to SR 99 Off-Ramp - PM Peak Hour
- I-5 Northbound – I-5 Northbound Off-ramp - PM Peak Hour
- I-5 Southbound – Laval Road East Off-Ramp - PM Peak Hour

The following local freeway segments that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 1 under cumulative plus project conditions:

- Fort Tejon to Base of Grapevine Grade (6% Downgrade) I-5 - PM Peak Hour
- Base of Grapevine Grade to Fort Tejon (6% Upgrade) - AM and PM Peak Hours

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Table F-1: Scenario 1 Analysis Peak Hour Freeway Operations – Cumulative Plus Project Conditions (2040)

Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
I-5 Northbound						
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	26	D	31	D
		P.M.	<u>44</u>	<u>E</u>	<u>61</u>	<u>F</u>
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	Does Not Exist		23	C
		P.M.			35	D
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	23	C	21*	C*
		P.M.	31	D	29*	D*
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		28	C
		P.M.			30	D
5. Grapevine Slip On-Ramp	Merge	A.M.	20	B	-	<u>F</u>
		P.M.	26	C	35	D
6. Grapevine to Laval Road	Basic	A.M.	18	C	33	D
		P.M.	28	C	<u>37</u>	<u>E</u>
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	27	C	34*	D*
		P.M.	36	E	<u>35*</u>	<u>E*</u>
8. Laval Road West Off-Ramp	Diverge	A.M.	19	B	31	D
		P.M.	27	C	33	D
9. Laval Road On-Ramp	Merge	A.M.	22	C	31	D
		P.M.	31	D	34	D
10. Laval Road to SR-99	Basic	A.M.	17	B	32	D
		P.M.	27	D	<u>38</u>	<u>E</u>
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	17	B	32	D
		P.M.	27	D	<u>38</u>	<u>E</u>

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
12. North of SR 99 Junction	Basic	A.M.	17	B	23	C
		P.M.	32	D	24	C
SR 99 Northbound						
13. North of I-5 Junction	Basic	A.M.	12	B	24	C
		P.M.	17	B	31	D
SR 99 Southbound						
1. North of I-5 Junction	Basic	A.M.	13	B	20	C
		P.M.	16	B	27	D
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		26	C
		P.M.			32	D
3. Truck Bypass Off-Ramp ³	Basic (Major Diverge)	A.M.	13	B	18	B
		P.M.	16	B	23	C
4. SR 99 Auto Lanes to I-5 Southbound ³	Basic (2 Lanes)	A.M.	14	B	25	C
		P.M.	17	B	34	D
I-5 Southbound						
5. North of SR 99 Junction	Basic	A.M.	18	B	22	C
		P.M.	23	C	30	D
6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		11	A
		P.M.			14	B
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		18	B
		P.M.			21	C
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	19	C	21	C
		P.M.	22	C	27	D
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	17	B	18	B
		P.M.	22	C	22	C
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		20	C
		P.M.			27	C

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
11. SR 99 to Laval Road	Basic	A.M.	19	C	22	C
		P.M.	24	C	29	D
12. Laval Road West Off-Ramp	Diverge	A.M.	24	C	22	C
		P.M.	30	D	29	D
13. Laval Road East Off-Ramp	Diverge	A.M.	20	C	29	D
		P.M.	24	C	36	E
14. Laval Road On-Ramp	Merge	A.M.	23	C	28	C
		P.M.	29	D	31	D
15. Laval Road to Grapevine ⁴	Basic	A.M.	20	C	27	D
		P.M.	25	C	35	D
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	22	C	29*	D*
		P.M.	27	C	34*	D*
17. Grapevine Loop On-Ramp	Merge	A.M.	16	B	22	C
		P.M.	21	C	28	C
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		23	C
		P.M.			28	C
19. Relocated Grapevine Interchange to Base of Grapevine Grade ³	Basic	A.M.	Exists as Laval Road to Grapevine		23	C
		P.M.			29	D
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	32	D	38	E
		P.M.	46	F	-	F

Notes: ¹Density is reported in passenger car equivalents per mile per lane (pcpmpl).

²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

³These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.

⁴This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.

⁵Segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.

⁶Segment analysis increases deceleration lane from 170 feet to 500 feet.

*Indicates improved density and LOS.

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.

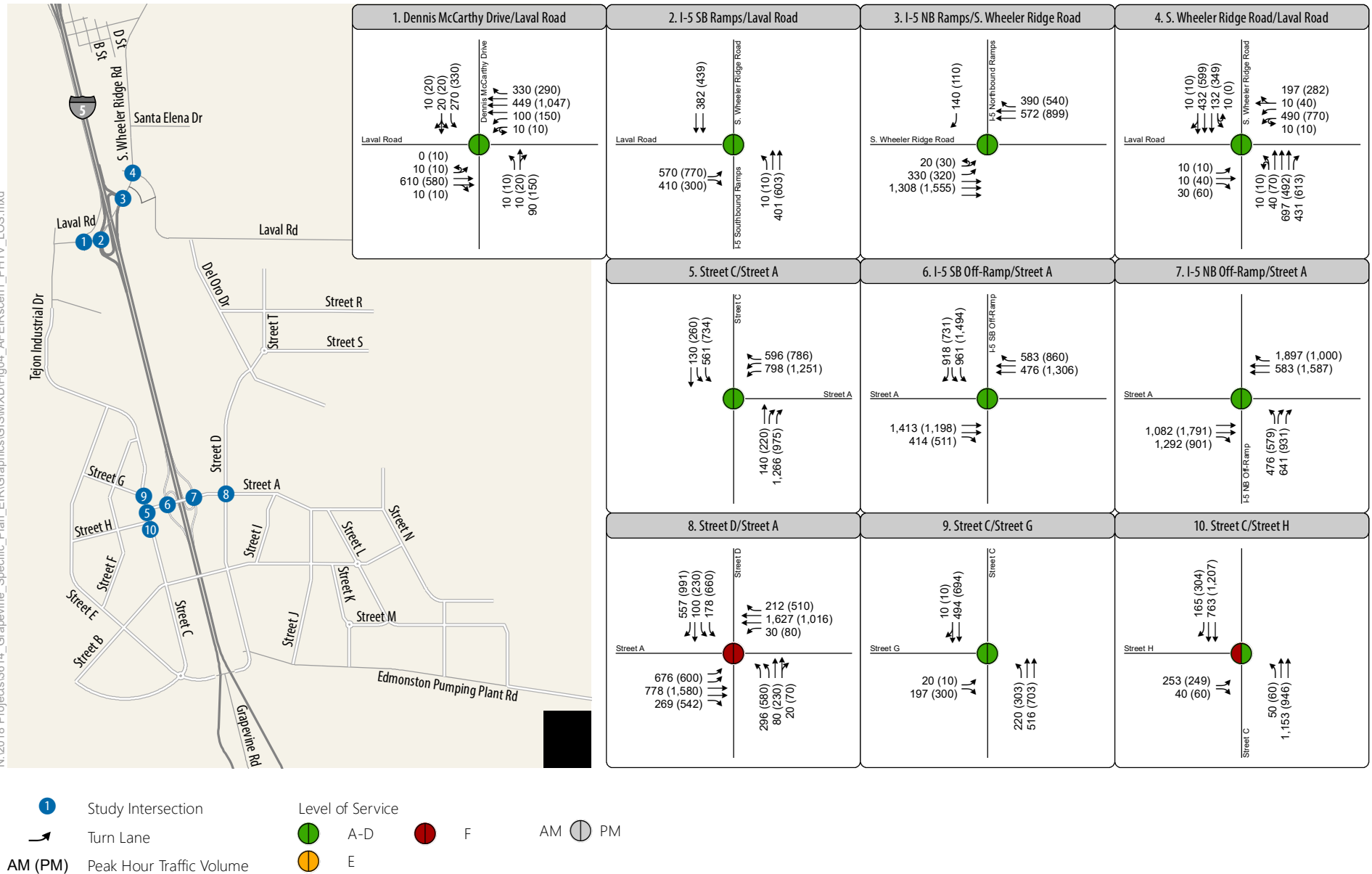


Figure 1-2
Peak Hour Traffic Volumes, Lane Configurations
and Level of Service (LOS) -
Scenario 1

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Table G-1 analyzes the traffic volumes and net new trips generated by Scenario 1 during the PM peak hour on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Scenario 1 analysis under cumulative plus project conditions. Scenario 1 results in northbound traffic volumes about 1.9 percent higher than in the FEIR analysis (6,990 versus 6,857 trips). Southbound traffic volumes are about 0.2 percent higher than in the FEIR analysis (6,141 versus 6,124 trips). Scenario 1 results in northbound traffic volumes about 2.4 percent higher (6,990 versus 6,829 trips) and southbound traffic volumes about 2.6 percent higher (6,141 versus 5,986 trips) than in the Updated 28.7% HBW ICR analysis.

Table G-1: Scenario 1 Analysis PM Peak Hour Grapevine Grade Traffic Volume by Vehicle Type - Cumulative Plus Project Conditions (2040)

Segment	Vehicle Type	Cumulative No Project (2040)	Net New Trips	Cumulative Plus Project (2040)
<i>I-5 Northbound</i>				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Autos	4,825	730	5,555
	Trucks	1,340	95	1,435
	Total	6,165	825	6,990
<i>I-5 Southbound</i>				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Autos	4,040	619	4,659
	Trucks	1,400	82	1,482
	Total	5,440	701	6,141

Source: Fehr & Peers, April 2019.

Table H-1 analyzes Scenario 1 traffic density in terms of passenger car equivalents per mile per lane (pcpmpl) during the PM peak hour on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade under cumulative plus project conditions. Table H-1 shows that the PM peak hour density in the two inside northbound lanes, which are reserved for passenger vehicles, would be 55 pcpmpl (LOS F). PM peak hour density in the two outside northbound lanes would be 67 pcpmpl (LOS F) under cumulative plus project conditions. These results are higher than in the FEIR and Updated 28.7% HBW ICR analysis.

Density in the two inside southbound lanes would be 41 pcpmpl (LOS E) the same as in the FEIR analysis and higher than in the Updated 28.7% HBW ICR analysis. Density in the outside two lanes would be 179 pcpmpl (LOS F), higher than the in the FEIR analysis and in the Updated 28.7% HBW ICR analysis.

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The total PM peak hour density for the northbound Grapevine Grade under Scenario 1 would be 61 pcpmpl (LOS F) compared with 58 pcpmpl (LOS F) in the FEIR analysis and 57 pcpmpl (LOS F) in the Updated 28.7% HBW ICR analysis. The total PM peak hour density in the southbound direction under Scenario 1 would be 65 pcpmpl (LOS F), compared with 64 pcpmpl (LOS F) in the FEIR analysis and 60 (LOS F) in the Updated 28.7% HBW ICR analysis. These results indicate that Scenario 1 would contribute to a higher level of PM peak hour impacts to the Grapevine Grade under cumulative plus project conditions than would occur in the FEIR and Updated 28.7% HBW ICR analysis.

Table H-1: Scenario 1 PM Peak Hour Grapevine Grade Freeway Operations – Cumulative Plus Project Conditions with Variant 1 or 2 (2040)

Segment	Lanes	Vehicle Composition	Cumulative No Project (2040)		Cumulative No Project – All Lanes (2040)		Cumulative Plus Project (2040)		Cumulative Plus Project – All Lanes (2040)	
			Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³
I-5 Northbound										
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos Only	39	E	44	E	55	F	61	F
	Outside Two Lanes	Autos & Trucks	51	F			67	F		
I-5 Southbound										
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos Only	29	D	46	F	41	E	65	F
	Outside Two Lanes	Autos & Trucks	86	F			179	F		

Notes: ¹Results for all lanes applies the HCM methodology to the entire segment, as reported in Table 26 Appendix T, page 161.

²Density is reported in passenger car equivalents per mile per lane (pcpmpl).

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria

Source: Fehr & Peers, April 2019.

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4.5 SCENARIO 1 FREEWAY IMPACTS TO STATE HIGHWAY AND FREEWAY SEGMENTS NORTH AND SOUTH OF THE PROJECT AREA UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table I-1 analyzes potential Scenario 1 impacts under cumulative plus project conditions at 15 state freeway and highway segments located to the north of the Project area. Table J-1 analyzes potential Updated 28.7% HBW ICR impacts under cumulative plus project conditions at 66 freeway and highway segments located to the south of the Project area. Significant impacts were determined to occur at any state freeway or highway segment that was determined to: (a) decline from acceptable to unacceptable LOS standards; or (b) the Project's contribution to the vehicle to capacity ratio at the segment operating at unacceptable LOS standard under cumulative without project conditions was greater than .02 under cumulative with project conditions.

Table I-1 shows that, in the Scenario 1 analysis, all of the freeway and highway segments analyzed to the north of the Project area along SR 99 and I-5 would operate at acceptable levels under cumulative plus project conditions. This result is the same as in the FEIR and Updated 28.7% HBW ICR analysis, and no new significant impacts would occur.

Table J-1 shows that, in the Scenario 1 analysis, the following freeway and highway segments to the south of the Project area along I-5 and SR-138 would be impacted under cumulative plus project conditions:

I-5 Northbound:

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – AM and PM peak hours

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

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SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

The freeway and highway segments south of the Project significantly impacted in the Scenario 1 analysis under cumulative plus project conditions are the same as in the FEIR and Updated 28.7% HBW ICR analysis. No new significant impacts at these locations would occur.

4.6 SCENARIO 1 IMPACTS TO INTERIM I-5 ACCESS FACILITIES

As shown in Table A-1, Scenario 1 results in 18,119 and 19,699 average weekday AM and PM peak hour trips, respectively, the same as in the Updated 28.7% HBW ICR analysis. As shown in Table B-1, the volume of traffic using interim Project access facilities would be higher at comparable Project development levels higher because the ICR for Scenario 1 is 10 percentage points and 16-17 percent lower than in the Updated 28.7% HBW ICR and FEIR analysis. Consequently, applicable Interim B access LOS standards could be exceeded at a lower level of development than identified in the Updated 28.7% HBW ICR and FEIR analysis. The construction of a new and relocated interchange along I-5, including either interchange Variant 1 or Variant 2 (see Figure 2-5 and Figure 2-5) would likely be required earlier under Scenario 1 than in the Updated 28.7% HBW ICR and FEIR analysis.

Table I-1
Cumulative With Scenario 1 Analysis Freeway Level of Service Analysis– North of Project Area

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
1	Btw . Jct Rte 58 W and California		4M							4M							LOS E	
	2014 Count	104,110		2,246	8,985	3,848	0.43	6,276	0.70		2,246	8,985	4,004	0.45	6,694	0.75		
	2040 Without Project	127,150		2,246	8,985	4,824	0.54	7,415	0.83		2,246	8,985	5,372	0.60	7,782	0.87		
	2040 With Project	129,655		2,246	8,985	5,083	0.57	7,487	0.83		2,246	8,985	5,508	0.61	7,816	0.87		
	Grapevine Specific Plan Net New Project Impacts	2,505				259	0.03	72	0.01				136	0.02	34	0.00		
2	Btw. California and Jct Rte 58 E		4M							4M							LOS E	
	2014 Count	89,700		2,246	8,985	3,392	0.38	5,263	0.59		2,246	8,985	3,390	0.38	5,895	0.66		
	2040 Without Project	106,340		2,246	8,985	3,950	0.44	6,231	0.69		2,246	8,985	4,326	0.48	6,761	0.75		
	2040 With Project	109,911		2,246	8,985	4,306	0.48	6,327	0.70		2,246	8,985	4,484	0.50	6,865	0.76		
	Grapevine Specific Plan Net New Project Impacts	3,571				356	0.04	96	0.01				158	0.02	104	0.01		
3	Btw. Jct Rte 58 E & Ming Ave		5M							5M							LOS E	
	2014 Count	88,820		2,246	10,107	3,406	0.34	5,478	0.54		2,246	10,107	3,217	0.32	5,663	0.56		
	2040 Without Project	134,395		2,246	10,107	4,865	0.48	7,754	0.77		2,246	10,107	5,602	0.55	8,658	0.86		
	2040 With Project	142,424		2,246	10,107	5,849	0.58	7,931	0.78		2,246	10,107	5,902	0.58	8,803	0.87		
	Grapevine Specific Plan Net New Project Impacts	8,029				984	0.10	177	0.02				300	0.03	145	0.01		
4	Btw. Ming Ave & White Lane		4M							4M							LOS E	
	2014 Count	69,755		2,246	8,985	2,614	0.29	4,435	0.49		2,296	9,186	2,394	0.26	4,508	0.49		
	2040 Without Project	119,800		2,246	8,985	4,994	0.56	7,099	0.79		2,296	9,186	4,737	0.52	7,130	0.78		
	2040 With Project	129,749		2,246	8,985	6,101	0.68	7,357	0.82		2,296	9,186	5,154	0.56	7,337	0.80		
	Grapevine Specific Plan Net New Project Impacts	9,949				1,107	0.12	258	0.03				417	0.05	207	0.02		
5	Btw. White Lane & Panama Lane		4M							4M							LOS E	
	2014 Count	57,090		2,296	9,186	2,165	0.24	3,616	0.39		2,296	9,186	2,072	0.23	3,565	0.39		
	2040 Without Project	101,775		2,296	9,186	4,191	0.46	6,111	0.67		2,296	9,186	3,793	0.41	6,260	0.68		
	2040 With Project	116,546		2,296	9,186	5,657	0.62	6,455	0.70		2,296	9,186	4,401	0.48	6,796	0.74		
	Grapevine Specific Plan Net New Project Impacts	14,771				1,466	0.16	344	0.04				608	0.07	536	0.06		
6	Btw. Panama Lane & Jct Rte 119 W		4M							4M							LOS E	
	2014 Count	44,450		2,296	9,186	1,622	0.18	2,890	0.31		2,296	9,186	1,797	0.20	2,581	0.28		
	2040 Without Project	84,820		2,296	9,186	3,379	0.37	5,264	0.57		2,296	9,186	3,270	0.36	5,051	0.55		
	2040 With Project	102,886		2,296	9,186	5,005	0.54	5,683	0.62		2,296	9,186	3,967	0.43	5,922	0.64		
	Grapevine Specific Plan Net New Project Impacts	18,066				1,626	0.18	419	0.05				697	0.08	871	0.09		
7	Btw. Jct Rte 119 W & Houghton Rd		3M							3M							LOS D	
	2014 Count	35,470		2,296	6,889	1,229	0.18	2,345	0.34		2,141	6,422	1,533	0.24	1,987	0.31		
	2040 Without Project	62,960		2,296	6,889	2,334	0.34	4,037	0.59		2,141	6,422	2,683	0.42	3,538	0.55		
	2040 With Project	83,203		2,296	6,889	4,096	0.59	4,520	0.66		2,141	6,422	3,476	0.54	4,548	0.71		
	Grapevine Specific Plan Net New Project Impacts	20,243				1,762	0.26	483	0.07				793	0.12	1,010	0.16		
8	Btw. Houghton Rd & Jct Rte 223 E		3M							3M							LOS D	
	2014 Count	33,360		2,141	6,422	1,158	0.18	2,176	0.34		2,141	6,422	1,473	0.23	1,865	0.29		
	2040 Without Project	60,280		2,141	6,422	2,229	0.35	3,856	0.60		2,141	6,422	2,588	0.40	3,383	0.53		
	2040 With Project	81,045		2,141	6,422	4,037	0.63	4,350	0.68		2,141	6,422	3,408	0.53	4,414	0.69		
	Grapevine Specific Plan Net New Project Impacts	20,765				1,808	0.28	494	0.08				820	0.13	1,031	0.16		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
9	Btw. Jct Rte 223 E & Old U.S. 99		3M							3M							LOS D	
	2014 Count	27,270		2,141	6,422	945	0.15	1,788	0.28		2,133	6,400	1,233	0.19	1,488	0.23		
	2040 Without Project	54,555		2,141	6,422	1,964	0.31	3,513	0.55		2,133	6,400	2,390	0.37	3,044	0.48		
	2040 With Project	76,339		2,141	6,422	3,784	0.59	4,047	0.63		2,133	6,400	3,232	0.51	4,204	0.66		
	Grapevine Specific Plan Net New Project Impacts	21,784				1,820	0.28	534	0.08				842	0.13	1,160	0.18		
10	Btw. Old U.S. 99 & Herring Rd		3M							3M							LOS D	
	2014 Count	28,585		2,133	6,400	987	0.15	1,860	0.29		2,133	6,400	1,284	0.20	1,586	0.25		
	2040 Without Project	57,525		2,133	6,400	2,065	0.32	3,664	0.57		2,133	6,400	2,484	0.39	3,292	0.51		
	2040 With Project	82,081		2,133	6,400	3,988	0.62	4,278	0.67		2,133	6,400	3,432	0.54	4,718	0.74		
	Grapevine Specific Plan Net New Project Impacts	24,556				1,923	0.30	614	0.10				948	0.15	1,426	0.22		
11	Btw. Herring Rd & Sandrini Rd.		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	81,771		2,133	6,400	3,975	0.62	4,257	0.67		2,133	6,400	3,425	0.54	4,698	0.73		
	Grapevine Specific Plan Net New Project Impacts	24,636				1,923	0.30	621	0.10				956	0.15	1,428	0.22		
12	Btw. Sandrini Rd & David Rd		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	81,771		2,133	6,400	3,975	0.62	4,257	0.67		2,133	6,400	3,425	0.54	4,698	0.73		
	Grapevine Specific Plan Net New Project Impacts	24,636				1,923	0.30	621	0.10				956	0.15	1,428	0.22		
13	Btw. David Rd & Valpredo		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,133	6,400	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,133	6,400	2,364	0.37	3,104	0.49		
	2040 With Project	80,531		2,133	6,400	3,931	0.61	4,167	0.65		2,133	6,400	3,408	0.53	4,600	0.72		
	Grapevine Specific Plan Net New Project Impacts	26,016				1,968	0.31	695	0.11				1,044	0.16	1,496	0.23		
14	Btw. Valpredo & Jct Rte 166 W		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,096	6,288	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,096	6,288	2,364	0.38	3,104	0.49		
	2040 With Project	80,531		2,133	6,400	3,931	0.61	4,167	0.65		2,096	6,288	3,408	0.54	4,600	0.73		
	Grapevine Specific Plan Net New Project Impacts	26,016				1,968	0.31	695	0.11				1,044	0.17	1,496	0.24		
15	Btw. Jct Rte 166 W & Jct I-5		3M							3M							LOS D	
	2014 Count	26,965		2,096	6,288	934	0.15	1,733	0.28		2,054	6,162	1,219	0.20	1,507	0.24		
	2040 Without Project	54,150		2,096	6,288	1,926	0.31	3,373	0.54		2,054	6,162	2,363	0.38	3,168	0.51		
	2040 With Project	85,890		2,096	6,288	3,975	0.63	4,558	0.72		2,054	6,162	3,695	0.60	4,950	0.80		
	Grapevine Specific Plan Net New Project Impacts	31,740				2,049	0.33	1,185	0.19				1,332	0.22	1,782	0.29		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

Table J-1
Cumulative With Scenario 1 Analysis Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold	
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C			
I-5																			
1	Btw. Fort Tejon Rd & Lebec Rd		4M							4M							LOS D		
	2014 Count	72,000		1,839	7,355	1,390	0.19	2,426	0.33			2,036	8,143	1,346	0.17	2,304		0.28	
	2035 Without Project	119,850		1,839	7,355	2,895	0.39	4,255	0.58			2,036	8,143	3,170	0.39	3,640		0.45	
	2035 With Project	134,645		1,839	7,355	3,580	0.49	5,080	0.69			2,036	8,143	3,918	0.48	4,341		0.53	
	Grapevine Specific Plan Net New Project Impacts	14,795				685	0.09	825	0.11					748	0.09	701		0.09	
2	Btw. Lebec Rd & Frazier Mtn Park		4M							4M							LOS D		
	2014 Count	73,000		1,839	7,355	1,409	0.19	2,460	0.33			2,036	8,143	1,365	0.17	2,336		0.29	
	2035 Without Project	120,850		1,839	7,355	2,915	0.40	4,285	0.58			2,036	8,143	3,190	0.39	3,680		0.45	
	2035 With Project	135,668		1,839	7,355	3,600	0.49	5,114	0.70			2,036	8,143	3,938	0.48	4,382		0.54	
	Grapevine Specific Plan Net New Project Impacts	14,818				685	0.09	829	0.11					748	0.09	702		0.09	
3	Btw. Frazier Mtn Park & Gorman Rd		4M							4M							LOS D		
	2014 Count	70,000		2,036	8,143	1,351	0.17	2,359	0.29			1,401	5,606	1,309	0.23	2,240		0.4	
	2035 Without Project	114,850		2,036	8,143	2,775	0.34	4,015	0.49			1,401	5,606	3,020	0.54	3,380		0.60	
	2035 With Project	129,668		2,036	8,143	3,460	0.42	4,844	0.59			1,401	5,606	3,768	0.67	4,082		0.73	
	Grapevine Specific Plan Net New Project Impacts	14,818				685	0.08	829	0.10					748	0.13	702		0.13	
4	Btw. Gorman Rd & N Jct SR-138		4M							4M							LOS D		
	2014 Count	70,000		1,849	7,398	1,351	0.18	2,359	0.32			2,042	8,169	1,309	0.16	2,240		0.27	
	2035 Without Project	117,850		1,849	7,398	2,745	0.37	4,405	0.60			2,042	8,169	3,280	0.40	3,350		0.41	
	2035 With Project	132,668		1,849	7,398	3,430	0.46	5,234	0.71			2,042	8,169	4,028	0.49	4,052		0.50	
	Grapevine Specific Plan Net New Project Impacts	14,818				685	0.09	829	0.11					748	0.09	702		0.09	
5	Btw. N Jct SR-138 & Quail Lake Rd		4M							4M							LOS D		
	2014 Count	67,000		1,849	7,398	1,293	0.17	2,258	0.31			2,042	8,169	1,253	0.15	2,144		0.26	
	2035 Without Project	89,175		1,849	7,398	1,750	0.24	3,140	0.42			2,042	8,169	2,055	0.25	2,360		0.29	
	2035 With Project	98,353		1,849	7,398	2,167	0.29	3,653	0.49			2,042	8,169	2,526	0.31	2,796		0.34	
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.06	513	0.07					471	0.06	436		0.05	
6	Btw. Quail Lake Rd & S Jct SR-138		4M							4M							LOS D		
	2014 Count	67,000		1,375	5,500	1,293	0.24	2,258	0.41			1,375	5,500	1,253	0.23	2,144		0.39	
	2035 Without Project	90,175		1,375	5,500	1,750	0.32	3,590	0.65			1,375	5,500	2,055	0.37	2,360		0.43	
	2035 With Project	99,353		1,375	5,500	2,167	0.39	4,103	0.75			1,375	5,500	2,526	0.46	2,796		0.51	
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.08	513	0.09					471	0.09	436		0.08	
7	Btw. S Jct SR-138 & Smokey Bear Rd		4M							4M							LOS D		
	2014 Count	69,000		1,375	5,500	1,332	0.24	2,325	0.42			1,375	5,500	1,290	0.23	2,208		0.4	
	2035 Without Project	123,175		1,375	5,500	2,240	0.41	5,170	0.94			1,375	5,500	4,145	0.75	3,240		0.59	Yes
	2035 With Project	132,353		1,375	5,500	2,657	0.48	5,683	1.03			1,375	5,500	4,616	0.84	3,676		0.67	Yes
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.08	513	0.09					471	0.09	436		0.08	
8	Btw. Smokey Bear Rd & Vista Del Lago Rd		4M							4M							LOS D		
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40			1,489	5,957	1,309	0.22	2,240		0.38	
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88			1,489	5,957	4,245	0.71	3,380		0.57	
	2035 With Project	134,353		1,489	5,957	2,757	0.46	5,773	0.97			1,489	5,957	4,716	0.79	3,816		0.64	Yes
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.07	513	0.09					471	0.08	436		0.07	

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
9	Btw. Vista Del Lago Rd & Templin Hwy		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.4		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	134,353		1,489	5,957	2,757	0.46	5,773	0.97		1,489	5,957	4,716	0.79	3,816	0.64		Yes
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.07	513	0.09				471	0.08	436	0.07		
10	Btw. Templin Hwy & Lake Hughes Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	126,175		1,489	5,957	2,380	0.40	5,260	0.88		1,489	5,957	4,205	0.71	3,410	0.57		
	2035 With Project	135,353		1,489	5,957	2,797	0.47	5,773	0.97		1,489	5,957	4,676	0.78	3,846	0.65		Yes
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.07	513	0.09				471	0.08	436	0.07		
11	Btw. Lake Hughes Rd & Parker Rd		4M + 1 AUX							4M + 1 AUX							LOS E	
	2014 Count	73,000		1,856	7,422	1,504	0.2	1,949	0.26		1,856	7,422	1,854	0.25	2,519	0.34		
	2035 Without Project	154,175		1,856	8,422	5,360	0.64	8,080	0.96		1,856	8,422	8,405	1.00	5,050	0.60		
	2035 With Project	163,353		1,856	8,422	5,777	0.69	8,593	1.02		1,856	8,422	8,876	1.05	5,486	0.65		Yes
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.05	513	0.06				471	0.06	436	0.05		
12	Btw. Parker Rd & Hasley Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	108,000		1,856	7,422	2,225	0.30	2,884	0.39		1,856	7,422	2,743	0.37	3,726	0.5		
	2035 Without Project	171,175		1,856	9,022	5,360	0.59	7,030	0.78		1,856	9,022	7,285	0.81	5,120	0.57		
	2035 With Project	180,353		1,856	9,022	5,777	0.64	7,543	0.84		1,856	9,022	7,756	0.86	5,556	0.62		
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.05	513	0.06				471	0.05	436	0.05		
13	Btw. Hasley Cyn Rd & N Jct SR-126 (NB)		4M (+1H +1A)							4M (+1H)							LOS E	
	2014 Count	114,000		1,856	8,422	2,348	0.28	3,044	0.36		1,856	8,422	2,896	0.34	3,933	0.47		
	2035 Without Project	170,175		1,856	10,022	5,180	0.52	6,800	0.68		1,856	9,022	7,085	0.79	5,120	0.57		
	2035 With Project	179,353		1,856	10,022	5,597	0.56	7,313	0.73		1,856	9,022	7,556	0.84	5,556	0.62		
	Grapevine Specific Plan Net New Project Impacts	9,178				417	0.04	513	0.05				471	0.05	436	0.05		
14	Btw. N Jct SR-126 & Rye Cyn Rd		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	130,000		1,867	7,470	2,678	0.36	3,471	0.46		1,867	7,470	3,302	0.44	4,485	0.60		
	2035 Without Project	175,375		1,867	9,070	4,615	0.51	6,450	0.71		1,867	10,070	6,865	0.68	5,565	0.55		
	2035 With Project	184,120		1,867	9,070	5,020	0.55	6,939	0.77		1,867	10,070	7,310	0.73	5,975	0.59		
	Grapevine Specific Plan Net New Project Impacts	8,745				405	0.04	489	0.05				445	0.04	410	0.04		
15	Btw.Rye Cyn Rd & Magic Mountain Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	154,000		1,918	7,670	3,172	0.41	4,112	0.54		1,918	7,670	3,912	0.51	5,313	0.69		
	2035 Without Project	181,375		1,918	9,270	4,615	0.50	6,450	0.70		1,918	10,270	6,875	0.67	5,395	0.53		
	2035 With Project	190,120		1,918	9,270	5,020	0.54	6,939	0.75		1,918	10,270	7,320	0.71	5,805	0.57		
	Grapevine Specific Plan Net New Project Impacts	8,745				405	0.04	489	0.05				445	0.04	410	0.04		
16	Btw. Magic Mountain Pkwy & Valencia Blvd		4M (+1H + 1A)							4M (+1H)							LOS E	
	2014 Count	165,000		1,918	7,670	3,399	0.44	4,406	0.57		1,918	7,670	4,191	0.55	5,693	0.74		
	2035 Without Project	194,375		1,918	10,270	5,615	0.55	6,980	0.68		1,918	9,270	6,815	0.74	5,735	0.62		
	2035 With Project	203,120		1,918	10,270	6,020	0.59	7,469	0.73		1,918	9,270	7,260	0.78	6,145	0.66		
	Grapevine Specific Plan Net New Project Impacts	8,745				405	0.04	489	0.05				445	0.05	410	0.04		
17	Btw. Valencia Blvd & McBean Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	175,000		1,918	7,670	3,605	0.47	4,673	0.61		1,918	7,670	4,445	0.58	6,038	0.79		
	2035 Without Project	218,375		1,918	9,270	6,475	0.70	7,290	0.79		1,918	10,270	8,135	0.79	6,615	0.64		
	2035 With Project	227,120		1,918	9,270	6,880	0.74	7,779	0.84		1,918	10,270	8,580	0.84	7,025	0.68		
	Grapevine Specific Plan Net New Project Impacts	8,745				405	0.04	489	0.05				445	0.04	410	0.04		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold	
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C			
I-5																			
18	Btw. McBeacn Pkwy & Lyons Ave/Pico Cyn Rd		4M (+1H)							4M (+1H)							LOS E		
	2014 Count	186,000		1,990	7,960	3,832	0.48	4,966	0.62		1,990	7,960	4,724	0.59	6,417	0.81			
	2035 Without Project	222,375		1,990	9,560	6,555	0.69	8,640	0.90		1,990	9,560	9,105	0.95	6,685	0.70			
	2035 With Project	231,120		1,990	9,560	6,960	0.73	9,129	0.95		1,990	9,560	9,550	1.00	7,095	0.74			
	Grapevine Specific Plan Net New Project Impacts	8,745				405	0.04	489	0.05				445	0.05	410	0.04			
19	Btw. Lyons Ave & Calgrove Blvd		4M (+1H + 1A)							4M (+1H + 1T)							LOS E		
	2014 Count	199,000		1,990	7,960	4,099	0.52	5,313	0.67		1,990	9,560	5,055	0.53	6,866	0.72			
	2035 Without Project	252,375		1,990	10,560	6,855	0.65	10,070	0.95		1,990	11,160	9,175	0.82	6,705	0.60			
	2035 With Project	261,120		1,990	10,560	7,260	0.69	10,559	1.00		1,990	11,160	9,620	0.86	7,115	0.64			
	Grapevine Specific Plan Net New Project Impacts	8,745				405	0.04	489	0.05				445	0.04	410	0.04			
20	Btw. Calgrove Blvd & SR-14		4M (+1H + 1T[C])							4M (+1H + 2T[C])							LOS E		
	2014 Count	200,000		1,990	9,160	4,120	0.45	5,340	0.58		1,990	10,360	5,080	0.49	6,900	0.67			
	2035 Without Project	253,375		1,990	10,760	5,725	0.53	9,190	0.85		1,990	11,960	9,805	0.82	6,845	0.57			
	2035 With Project	262,120		1,990	10,760	6,130	0.57	9,679	0.90		1,990	11,960	10,250	0.86	7,255	0.61			
	Grapevine Specific Plan Net New Project Impacts	8,745				405	0.04	489	0.05				445	0.04	410	0.03			
21	Btw. SR-14 & SR-210		3M (+1H+3A[F]+2T)							4M (+1H+2A[F]+2T)							LOS E		
	2014 Count	329,000		1,997	16,791	7,863	0.47	12,930	0.77			1,997	16,788	14,213	0.85	9,409		0.56	
	2035 Without Project	383,650		1,997	16,791	9,130	0.54	15,005	0.89			1,997	16,788	16,580	0.99	10,885		0.65	
	2035 With Project	389,255		1,997	16,791	9,381	0.56	15,339	0.91			1,997	16,788	16,844	1.00	11,157		0.66	
	Grapevine Specific Plan Net New Project Impacts	5,605				251	0.01	334	0.02					264	0.02	272		0.02	
22	Btw. SR-210 & Roxford St		4M (+1H+ 1A[F])							5M (+1H)							LOS E		
	2014 Count	266,000		2,212	12,449	6,357	0.51	10,454	0.84		2,212	12,661	11,491	0.91	7,608	0.6			
	2035 Without Project	304,650		2,212	12,449	7,240	0.58	11,905	0.96		2,212	12,661	13,170	1.04	8,625	0.68		Yes	
	2035 With Project	310,255		2,212	12,449	7,491	0.60	12,239	0.98		2,212	12,661	13,434	1.06	8,897	0.70			
	Grapevine Specific Plan Net New Project Impacts	5,605				251	0.02	334	0.03				264	0.02	272	0.02			
23	Btw. RoxfoRd St & I-405		5M (+1H+ 1A[F])							5M (+1H+1A[F])							LOS E		
	2014 Count	283,000		2,212	14,661	6,764	0.46	11,122	0.76		2,212	14,661	12,226	0.83	8,094	0.55			
	2035 Without Project	318,650		2,212	14,661	7,580	0.52	12,465	0.85		2,212	14,661	13,790	0.94	9,035	0.62			
	2035 With Project	324,255		2,212	14,661	7,831	0.53	12,799	0.87		2,212	14,661	14,054	0.96	9,307	0.63			
	Grapevine Specific Plan Net New Project Impacts	5,605				251	0.02	334	0.02				264	0.02	272	0.02			
24	Btw. I-405 & San Fernando Mission Blvd		3M (+1H)							3M (+1H)							LOS E		
	2014 Count	141,000		2,190	8,171	3,370	0.41	5,541	0.68		2,190	8,171	6,091	0.75	4,033	0.49			
	2035 Without Project	161,650		2,190	8,171	3,830	0.47	6,295	0.77		2,190	8,171	7,010	0.86	4,545	0.56			
	2035 With Project	167,255		2,190	8,171	4,081	0.50	6,629	0.81		2,190	8,171	7,274	0.89	4,817	0.59			
	Grapevine Specific Plan Net New Project Impacts	5,605				251	0.03	334	0.04				264	0.03	272	0.03			

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
25	Btw Dawn Rd & Rosamond Blvd		2M							2M							LOS D	
	2014 Count	23,000		2,332	4,665	1,083	0.23	849	0.18		2,332	4,665	499	0.11	1,323	0.28		
	2035 Without Project	29,825		2,332	4,665	1,345	0.29	1,095	0.23		2,332	4,665	610	0.13	1,535	0.33		
	2035 With Project	30,231		2,332	4,665	1,356	0.29	1,107	0.24		2,332	4,665	642	0.14	1,561	0.33		
	Grapevine Specific Plan Net New Project Impacts	406				11	0.00	12	0.00				32	0.01	26	0.01		
26	Btw. Rosamond Blvd & Ave A		2M							2M							LOS D	
	2014 Count	30,000		2,339	4,679	1,413	0.3	1,107	0.24		2,339	4,679	651	0.14	1,725	0.37		
	2035 Without Project	34,825		2,339	4,679	1,715	0.37	1,335	0.29		2,339	4,679	720	0.15	1,855	0.40		
	2035 With Project	35,231		2,339	4,679	1,726	0.37	1,347	0.29		2,339	4,679	752	0.16	1,881	0.40		
	Grapevine Specific Plan Net New Project Impacts	406				11	0.00	12	0.00				32	0.01	26	0.01		
27	Ave A & N Jct Rte 138/Ave D		2M							2M							LOS D	
	2014 Count	34,000		2,339	4,679	1,129	0.24	1,261	0.27		2,339	4,679	1,244	0.27	1,567	0.34		
	2035 Without Project	55,825		2,339	4,679	2,115	0.45	2,125	0.45		2,339	4,679	1,950	0.42	2,335	0.50		
	2035 With Project	56,231		2,339	4,679	2,126	0.45	2,137	0.46		2,339	4,679	1,982	0.42	2,361	0.50		
	Grapevine Specific Plan Net New Project Impacts	406				11	0.00	12	0.00				32	0.01	26	0.01		
28	Btw. Jct Rte 138/Ave D & Ave F		2M							2M							LOS D	
	2014 Count	36,000		2,332	4,665	1,195	0.26	1,336	0.29		2,332	4,665	1,318	0.28	1,660	0.36		
	2035 Without Project	87,650		2,332	4,665	3,525	0.76	3,685	0.79		2,332	4,665	3,360	0.72	3,720	0.80		
	2035 With Project	89,595		2,332	4,665	3,605	0.77	3,810	0.82		2,332	4,665	3,457	0.74	3,807	0.82		
	Grapevine Specific Plan Net New Project Impacts	1,945				80	0.02	125	0.03				97	0.02	87	0.02		
29	Btw. Ave F & Ave G		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	102,650		2,332	4,665	4,235	0.91	3,835	0.82		2,332	4,665	3,690	0.79	4,460	0.96		
	2035 With Project	104,595		2,332	4,665	4,315	0.92	3,960	0.85		2,332	4,665	3,787	0.81	4,547	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,945				80	0.01	125	0.03				97	0.02	87	0.01		
30	Btw. Ave G & Ave H		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	107,650		2,332	4,665	4,385	0.94	3,815	0.82		2,332	4,665	3,810	0.82	4,600	0.99		
	2035 With Project	109,595		2,332	4,665	4,465	0.95	3,940	0.84		2,332	4,665	3,907	0.84	4,687	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,945				80	0.01	125	0.03				97	0.02	87	0.01		
31	Btw. Ave H & Ave I		2M							2M							LOS E	
	2014 Count	40,000		2,332	4,665	1,328	0.28	1,484	0.32		2,332	4,665	1,464	0.31	1,844	0.4		
	2035 Without Project	108,650		2,332	4,665	4,345	0.93	4,025	0.86		2,332	4,665	3,880	0.83	4,530	0.97		
	2035 With Project	110,595		2,332	4,665	4,425	0.95	4,150	0.89		2,332	4,665	3,977	0.85	4,617	0.99		
	Grapevine Specific Plan Net New Project Impacts	1,945				80	0.02	125	0.03				97	0.02	87	0.02		
32	Btw. Ave I & Ave J		3M							3M							LOS E	
	2014 Count	47,000		2,332	6,997	1,560	0.22	1,744	0.25		2,332	6,997	1,720	0.25	2,167	0.31		
	2035 Without Project	114,650		2,332	6,997	4,605	0.66	4,365	0.62		2,332	6,997	3,950	0.56	4,890	0.70		
	2035 With Project	118,496		2,332	6,997	4,788	0.68	4,574	0.65		2,332	6,997	4,143	0.59	5,074	0.73		
	Grapevine Specific Plan Net New Project Impacts	3,846				183	0.03	209	0.03				193	0.03	184	0.03		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
33	Btw. Ave J & 20th St W		3M							3M							LOS E	
	2014 Count	42,000		2,339	7,016	1,394	0.2	1,558	0.22		2,339	7,016	1,537	0.22	1,936	0.28		
	2035 Without Project	99,650		2,339	7,016	4,105	0.59	3,905	0.56		2,339	7,016	3,500	0.50	4,370	0.62		
	2035 With Project	103,402		2,339	7,016	4,288	0.61	4,108	0.59		2,339	7,016	3,681	0.52	4,554	0.65		
	Grapevine Specific Plan Net New Project Impacts	3,752				183	0.03	203	0.03				181	0.03	184	0.03		
34	Btw. 20th St W & Ave K		3M							3M							LOS E	
	2014 Count	59,000		2,339	7,016	1,959	0.28	2,189	0.31		2,339	7,016	2,159	0.31	2,720	0.39		
	2035 Without Project	118,650		2,339	7,016	4,715	0.67	4,585	0.65		2,339	7,016	4,160	0.59	5,180	0.74		
	2035 With Project	122,402		2,339	7,016	4,898	0.70	4,788	0.68		2,339	7,016	4,341	0.62	5,364	0.76		
	Grapevine Specific Plan Net New Project Impacts	3,752				183	0.03	203	0.03				181	0.03	184	0.03		
35	Btw. Ave K & Ave L		3M							3M							LOS E	
	2014 Count	74,000		2,339	7,016	2,457	0.35	2,745	0.39		2,339	7,016	2,708	0.39	3,411	0.49		
	2035 Without Project	127,650		2,339	7,016	4,975	0.71	4,835	0.69		2,339	7,016	4,440	0.63	5,650	0.81		
	2035 With Project	131,402		2,339	7,016	5,158	0.74	5,038	0.72		2,339	7,016	4,621	0.66	5,834	0.83		
	Grapevine Specific Plan Net New Project Impacts	3,752				183	0.03	203	0.03				181	0.03	184	0.03		
36	Btw. Ave L & Ave M		3M							3M							LOS E	
	2014 Count	89,000		2,339	7,016	2,955	0.42	3,302	0.47		2,339	7,016	3,257	0.46	4,103	0.58		
	2035 Without Project	100,650		2,339	7,016	3,875	0.55	3,435	0.49		2,339	7,016	3,630	0.52	4,540	0.65		
	2035 With Project	103,877		2,339	7,016	4,035	0.58	3,602	0.51		2,339	7,016	3,785	0.54	4,704	0.67		
	Grapevine Specific Plan Net New Project Impacts	3,227				160	0.02	167	0.02				155	0.02	164	0.02		
37	Btw. Ave M & Ave N		3M							3M							LOS E	
	2014 Count	92,000		2,339	7,016	3,054	0.44	3,413	0.49		2,339	7,016	3,367	0.48	4,241	0.60		
	2035 Without Project	100,650		2,339	7,016	3,895	0.56	3,365	0.48		2,339	7,016	3,550	0.51	4,710	0.67		
	2035 With Project	103,461		2,339	7,016	4,043	0.58	3,496	0.50		2,339	7,016	3,679	0.52	4,864	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,811				148	0.02	131	0.02				129	0.02	154	0.02		
38	Btw. Ave N & 10th St W		3M							3M							LOS E	
	2014 Count	87,000		2,339	7,016	2,888	0.41	3,228	0.46		2,339	7,016	3,184	0.45	4,011	0.57		
	2035 Without Project	98,650		2,339	7,016	4,085	0.58	3,215	0.46		2,339	7,016	3,280	0.47	4,700	0.67		
	2035 With Project	101,350		2,339	7,016	4,233	0.60	3,334	0.48		2,339	7,016	3,409	0.49	4,843	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,700				148	0.02	119	0.02				129	0.02	143	0.02		
39	Btw. 10th St W & Rancho Vista Blvd		3M							3M							LOS E	
	2014 Count	87,000		2,225	6,675	2,888	0.43	3,228	0.48		2,225	6,675	3,184	0.48	4,011	0.60		
	2035 Without Project	93,650		2,225	6,675	3,965	0.59	3,165	0.47		2,225	6,675	3,170	0.47	4,510	0.68		
	2035 With Project	95,997		2,225	6,675	4,102	0.61	3,284	0.49		2,225	6,675	3,260	0.49	4,633	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,347				137	0.02	119	0.02				90	0.01	123	0.02		
40	Btw. Rancho Vista Blvd & S Jct Rte 138		3M							3M							LOS E	
	2014 Count	84,000		2,225	6,675	2,789	0.42	3,116	0.47		2,225	6,675	3,074	0.46	3,872	0.58		
	2035 Without Project	94,650		2,225	6,675	4,015	0.60	3,085	0.46		2,225	6,675	3,140	0.47	4,570	0.68		
	2035 With Project	96,500		2,225	6,675	4,106	0.62	3,204	0.48		2,225	6,675	3,217	0.48	4,652	0.70		
	Grapevine Specific Plan Net New Project Impacts	1,850				91	0.01	119	0.02				77	0.01	82	0.01		
41	Btw. S Jct Rte 138 & Ave S		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	81,000		2,225	6,050	2,689	0.44	3,005	0.5		2,225	8,275	2,965	0.36	3,734	0.45		
	2035 Without Project	91,650		2,225	6,050	3,535	0.58	3,475	0.57		2,225	8,275	3,260	0.39	4,590	0.55		
	2035 With Project	93,333		2,225	6,050	3,615	0.60	3,594	0.59		2,225	8,275	3,331	0.40	4,657	0.56		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.02				71	0.01	67	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
42	Btw. Ave S & Pearlblossom/Sierra Hwy		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	71,000		2,225	6,050	2,357	0.39	2,634	0.44		2,225	8,275	2,599	0.31	3,273	0.4		
	2035 Without Project	75,650		2,225	6,050	3,015	0.50	2,655	0.44		2,225	8,275	2,660	0.32	3,820	0.46		
	2035 With Project	77,333		2,225	6,050	3,095	0.51	2,774	0.46		2,225	8,275	2,731	0.33	3,887	0.47		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.02				71	0.01	67	0.01		
43	Btw. Pearblossom/Sierra Hwy & Angeles Forest		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	83,000		2,225	6,050	2,756	0.46	3,079	0.51		2,225	8,275	3,038	0.37	3,826	0.46		
	2035 Without Project	88,650		2,225	6,050	3,225	0.53	3,065	0.51		2,225	8,275	3,100	0.37	4,380	0.53		
	2035 With Project	90,333		2,225	6,050	3,305	0.55	3,184	0.53		2,225	8,275	3,171	0.38	4,447	0.54		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.02				71	0.01	67	0.01		
44	Btw. Angeles Forest Hwy & Soledad		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	144,000		2,225	8,275	3,154	0.38	3,525	0.43		2,225	6,050	3,477	0.57	4,380	0.72		
	2035 Without Project	114,650		2,225	8,275	3,845	0.46	3,875	0.47		2,225	6,050	3,620	0.60	6,000	0.99		
	2035 With Project	116,333		2,225	8,275	3,925	0.47	3,994	0.48		2,225	6,050	3,691	0.61	6,067	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		
45	Btw. Soledad & Santiago Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	113,650		2,236	6,071	3,845	0.63	3,905	0.64		2,236	6,071	3,430	0.56	5,640	0.93		
	2035 With Project	115,333		2,236	6,071	3,925	0.65	4,024	0.66		2,236	6,071	3,501	0.58	5,707	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.02				71	0.01	67	0.01		
46	Btw. Santiago Rd & Crown Valley Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	94,000		2,236	6,071	3,121	0.51	3,487	0.57		2,236	6,071	3,440	0.57	4,333	0.71		
	2035 Without Project	108,650		2,236	6,071	3,625	0.60	3,955	0.65		2,236	6,071	3,430	0.56	5,420	0.89		
	2035 With Project	110,333		2,236	6,071	3,705	0.61	4,074	0.67		2,236	6,071	3,501	0.58	5,487	0.90		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.02				71	0.01	67	0.01		
47	Btw. Crown Valley Rd & Ward Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	138,650		2,236	6,071	3,765	0.62	3,875	0.64		2,236	6,071	3,460	0.57	5,670	0.93		
	2035 With Project	140,333		2,236	6,071	3,845	0.63	3,994	0.66		2,236	6,071	3,531	0.58	5,737	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.02				71	0.01	67	0.01		
48	Btw. Ward Rd & Escondido Cyn Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	93,000		2,189	8,167	3,088	0.38	3,450	0.42		2,189	5,978	3,404	0.57	4,287	0.72		
	2035 Without Project	115,650		2,189	8,167	3,745	0.46	4,445	0.54		2,189	5,978	3,650	0.61	5,720	0.96		
	2035 With Project	117,333		2,189	8,167	3,825	0.47	4,564	0.56		2,189	5,978	3,721	0.62	5,787	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		
49	Btw. Escondido Cyn Rd & Agua Dulce Cyn Rd		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	93,000		2,236	8,307	1,776	0.21	4,669	0.56		2,236	6,071	4994	0.82	2,613	0.43		
	2035 Without Project	114,650		2,236	8,307	2,285	0.28	5,555	0.67		2,236	6,071	5,320	0.88	3,950	0.65		
	2035 With Project	116,333		2,236	8,307	2,365	0.28	5,674	0.68		2,236	6,071	5,391	0.89	4,017	0.66		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		
50	Btw. Agua Dulce Cyn Rd & Soledad Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	96,000		2,236	8,307	1,834	0.22	4,819	0.58		2,236	6,071	5,155	0.85	2,698	0.44		
	2035 Without Project	116,850		2,236	8,307	2,415	0.29	5,565	0.67		2,236	6,071	5,220	0.86	4,070	0.67		
	2035 With Project	118,533		2,236	8,307	2,495	0.30	5,684	0.68		2,236	6,071	5,291	0.87	4,137	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
51	Btw. Shadow Pines/Soledad Rd & Sand Cyn Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	99,000		2,236	6,071	1,891	0.31	4,970	0.82		2,236	6,071	5,316	0.88	2,782	0.46		
	2035 Without Project	115,650		2,236	6,071	2,395	0.39	5,205	0.86		2,236	6,071	5,380	0.89	3,820	0.63		
	2035 With Project	117,333		2,236	6,071	2,475	0.41	5,324	0.88		2,236	6,071	5,451	0.90	3,887	0.64		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.02				71	0.01	67	0.01		
52	Btw. Sand Cyn Rd & Via Princessa		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	112,000		2,215	8,246	2,139	0.26	5,622	0.68		2,215	8,246	6,014	0.73	3,147	0.38		
	2035 Without Project	135,650		2,215	8,246	2,575	0.31	6,365	0.77		2,215	8,246	6,840	0.83	4,770	0.58		
	2035 With Project	137,333		2,215	8,246	2,655	0.32	6,484	0.79		2,215	8,246	6,911	0.84	4,837	0.59		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		
53	Btw. Via Princessa & Golden Valley Rd		3M (+1H+1A)							3M (+1H+1A)							LOS E	
	2014 Count	144,000		2,215	9,246	2,750	0.3	7,229	0.78		2,215	9,246	7,733	0.84	4,046	0.44		
	2035 Without Project	172,650		2,215	9,246	3,255	0.35	7,895	0.85		2,215	9,246	8,590	0.93	5,470	0.59		
	2035 With Project	174,333		2,215	9,246	3,335	0.36	8,014	0.87		2,215	9,246	8,661	0.94	5,537	0.60		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		
54	Btw. Golden Valley Rd & Placerita Cyn Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	144,000		2,215	8,246	2,750	0.33	7,229	0.88		2,215	8,246	7,733	0.94	4,046	0.49		
	2035 Without Project	169,650		2,215	8,246	3,105	0.38	7,645	0.93		2,215	8,246	8,520	1.03	5,140	0.62		
	2035 With Project	171,333		2,215	8,246	3,185	0.39	7,764	0.94		2,215	8,246	8,591	1.04	5,207	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		
55	Btw. Placerita Cyn Rd & San Fernando Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	151,000		2,215	8,246	2,884	0.35	7,580	0.92		2,215	8,246	8,109	0.98	4,243	0.51		
	2035 Without Project	173,650		2,215	8,246	3,155	0.38	7,995	0.97		2,215	8,246	8,520	1.03	5,110	0.62		
	2035 With Project	175,333		2,215	8,246	3,235	0.39	8,114	0.98		2,215	8,246	8,591	1.04	5,177	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		
56	Btw. San Fernando Rd//Newhall Ave & Jct I-5		5M (+1H)							5M (+1H)							LOS E	
	2014 Count	166,000		2,215	12,676	3,171	0.25	8,333	0.66		2,215	12,676	8,914	0.7	4,665	0.37		
	2035 Without Project	180,650		2,215	12,676	3,145	0.25	8,625	0.68		2,215	12,676	9,310	0.73	5,050	0.40		
	2035 With Project	182,333		2,215	12,676	3,225	0.25	8,744	0.69		2,215	12,676	9,381	0.74	5,117	0.40		
	Grapevine Specific Plan Net New Project Impacts	1,683				80	0.01	119	0.01				71	0.01	67	0.01		
SR-138																		
57	Between Jct I-5 and Gorman Post Rd		2M							2M							LOS D	
	2014 Count	4,500		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	71,675		1,904	3,808	2,525	0.66	3,830	1.01		1,904	3,808	3,855	1.01	2,725	0.72		
	2035 With Project	77,325		1,904	3,808	2,770	0.73	4,140	1.09		1,904	3,808	4,158	1.09	2,997	0.79		
	Grapevine Specific Plan Net New Project Impacts	5,650				245	0.06	310	0.08				303	0.08	272	0.07		
58	Between Gorman Post Rd and Old Ridge Route Rd		1M							1M							LOS D	
	2014 Count	4,900		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	83,675		1,904	1,904	2,785	1.46	4,680	2.46		1,904	1,904	4,525	2.38	3,055	1.60		
	2035 With Project	89,325		1,904	1,904	3,030	1.59	4,990	2.62		1,904	1,904	4,828	2.54	3,327	1.75		
	Grapevine Specific Plan Net New Project Impacts	5,650				245	0.13	310	0.16				303	0.16	272	0.14		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-138																		
59	Between Old Ridge Route Rd and 300th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	87,225		1,904	1,904	2,855	1.50	4,805	2.52		1,904	1,904	4,645	2.44	3,130	1.64		Yes
	2035 With Project	91,489		1,904	1,904	3,038	1.60	5,032	2.64		1,904	1,904	4,884	2.56	3,335	1.75		Yes
	Grapevine Specific Plan Net New Project Impacts	4,264				183	0.10	227	0.12				239	0.13	205	0.11		
60	Between 300th St West and 245TH St		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	152	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	72,225		1,904	1,904	3,495	1.84	2,885	1.52		1,904	1,904	2,915	1.53	3,830	2.01		Yes
	2035 With Project	76,489		1,904	1,904	3,678	1.93	3,112	1.63		1,904	1,904	3,154	1.66	4,035	2.12		Yes
	Grapevine Specific Plan Net New Project Impacts	4,264				183	0.10	227	0.12				239	0.13	205	0.11		
61	Between 245th St West and 190th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	89	0.05	147	0.09			1,700	113	0.07	87	0.05		
	2035 Without Project	62,225		1,904	1,904	2,595	1.36	2,325	1.22		1,904	1,904	2,465	1.29	3,050	1.60		Yes
	2035 With Project	66,489		1,904	1,904	2,778	1.46	2,552	1.34		1,904	1,904	2,704	1.42	3,255	1.71		Yes
	Grapevine Specific Plan Net New Project Impacts	4,264				183	0.10	227	0.12				239	0.13	205	0.11		
62	Between 190th St West and 110th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	54,489		1,962	1,962	2,178	1.11	1,982	1.01		1,962	1,962	2,254	1.15	2,625	1.34		Yes
	Grapevine Specific Plan Net New Project Impacts	4,264				183	0.09	227	0.12				239	0.12	205	0.10		
63	Between 110th St West and 60th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	53,533		1,962	1,962	2,132	1.09	1,934	0.99		1,962	1,962	2,202	1.12	2,579	1.31		Yes
	Grapevine Specific Plan Net New Project Impacts	3,308				137	0.07	179	0.09				187	0.10	159	0.08		
64	Between 60th St West and Jct Rte 14 North		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	141	0.08	177	0.1			1,700	123	0.07	148	0.09		
	2035 Without Project	55,225		1,962	1,962	2,355	1.20	1,895	0.97		1,962	1,962	1,985	1.01	2,700	1.38		Yes
	2035 With Project	57,576		1,962	1,962	2,446	1.25	2,032	1.04		1,962	1,962	2,114	1.08	2,813	1.43		Yes
	Grapevine Specific Plan Net New Project Impacts	2,351				91	0.05	137	0.07				129	0.07	113	0.06		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-126																		
65	Btw. N Jct SR-126 & Henry Mayo Dr		3M							3M							LOS D	
	2014 Count	29,025			6,288	1,264	0.20	1,618	0.26			6,288	1,406	0.22	1,517	0.24		
	2035 Without Project	31,145			6,288	1,369	0.22	1,802	0.29			6,288	1,518	0.24	1,540	0.24		
	2035 With Project	31,578			6,288	1,380	0.22	1,826	0.29			6,288	1,544	0.25	1,566	0.25		
	Project Impact	433			6,288	11	0.00	24	0.00			6,288	26	0.00	26	0.00		
66	Btw. Henry Mayo Dr & Commerce Center Dr		2M							2M							LOS D	
	2014 Count	29,025			4,665	1,264	0.27	1,618	0.35			4,665	1,406	0.30	1,517	0.33		
	2035 Without Project	31,145			4,665	1,369	0.29	1,802	0.39			4,665	1,518	0.33	1,540	0.33		
	2035 With Project	31,578			4,665	1,380	0.30	1,826	0.39			4,665	1,544	0.33	1,566	0.34		
	Grapevine Specific Plan Net New Project Impacts	433			4,665	11	0.00	24	0.01			4,665	26	0.01	26	0.01		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	> 1		

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5 SCENARIO 2 ANALYSIS

This section analyzes the potential transportation and traffic impacts that could occur in Scenario 2. The impact assessment was conducted for cumulative plus project conditions and evaluates the same local intersections, local roadways, local freeway segments, state highway and freeway segments to the north and south of the Project site and interim access impacts considered in the Updated 28.7% HBW ICR analysis summarized in Section 2.3 of this report. Scenario 2 includes proposed Project development of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses with a 20 percentage point reduction in the ICRs used in the FEIR and Updated 28.7% HBW ICR analysis.

5.1 SCENARIO 2 ANALYSIS METHODOLOGY AND ICR ASSUMPTIONS

Table A-2 summarizes the Scenario 2 daily and AM and PM peak hour number of trips generated by proposed Project land uses. The Scenario 2 ADT is 197,685 trips compared with 197,685 trips in the Updated 28.7% HBW ICR analysis and 201,542 trips in the FEIR analysis. Based on the 2016 ITE Manual trip generation rates and the 2014 Kern COG model, the average weekday VMT is 4,587,395 miles in Scenario 2 compared with 3,114,939 miles in the Updated 28.7% HBW ICR analysis and 3,175,626 miles in the FEIR analysis.

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Table A-2: ITE Trip Generation Estimate – Scenario 2 Analysis

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	In	Out	Total	In	Out	
Residential									
Residential	8,400 DUs	210	6,216	1,554	4,662	8,316	5,239	3,077	79,296
Village Center Residential	3,600 DUs	220	1,656	381	1,275	2,016	1,270	746	26,352
Non-Residential									
Village Center Commercial - Retail ¹	450 ksf	820 ¹	423	262	161	1,715	823	892	16,988
Village Center Commercial - Office ¹	350 ksf	710 ¹	406	349	57	403	64	338	3,410
Freeway Commercial	750 ksf	820	705	437	268	2,858	1,372	1,486	28,314
Office/Research & Development	2,100 ksf	710	2,436	2,095	341	2,415	386	2,029	20,454
Light Industrial/Warehouse ²	1,450 ksf	130/ 150 ²	413	326	87	428	103	325	3,706
Schools & Parks									
Elementary Schools ⁴	4,970 students	520	3,330	1,798	1,532	845	406	439	9,394
Middle Schools ⁴	1,680 students	522	974	526	448	286	140	146	3,578
High Schools ⁴	3,000 students	530	1,560	1,045	515	420	202	218	6,090
Parks ³	132 acres	411							104
Total			18,119	8,774	9,345	19,699	10,004	9,695	197,685

Notes: DUs = dwelling units; ksf = thousand square feet

Trip generation estimates calculated using the trip rates in ITE's Trip Generation Manual, 10th Edition

¹Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)

²Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)

³City Park land use (ITE Code 411) in ITE's Trip Generation Manual only includes daily trip information.

⁴Student enrollment based on number of students anticipated per residential dwelling unit based on discussions with school district

Source: Trip Generation Manual, 10th Edition (Institute of Transportation Engineers, 2016).

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Table B-2 summarizes the ICRs used in Scenario 2. The Scenario 2 ICR for all trips combined is 39.8 percent in the AM peak hour and 44.2 percent in the PM peak hour, which are 20 percentage points lower than in the Updated 28.7% HBW ICR and FEIR analysis. As discussed in the FEIR, Caltrans requested that the ICR for Home-Based Work trips be reduced because these trips can have the greatest impacts on external transportation facilities. Consistent with this approach, the 20 percentage point ICR reduction was first applied to Home-Based Work trips and then to other trips. As shown in Table B-2, the ICR for Home-Based Work trips used to evaluate Scenario 2 is significantly lower (i.e., 100 percent of Home-Based Work trips are assumed to be external during the AM and PM peak hours) than the 28.7 percent level in the FEIR and Updated 28.7% HBW ICR analysis. All work-related transportation in Scenario 2 would require external trips to offsite locations.

Table B-2: Scenario 2 Estimated Project Trip Internalization by Peak Hour

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips ¹	% Internal ²	Total Internalization % ³	% of Trips ¹	% Internal ²	Total Internalization % ³
Home-Based Work	47.8%	0.0%	0.0%	28.1%	0.0%	0.0%
Home-Based Other/ Non-Home-Based	52.2%	76.2%	39.8%	71.9%	61.5%	44.2%
Total			39.8%			44.2%

Notes: ¹Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17 of Appendix T, page 117.

²Internalization percentage by trip purpose. Home-Based work trip internalization shown in Table 18 of Appendix T, page 118. Home-Based other/non-home-based trip internalization shown in Table 22 of Appendix T, page 139.

³Overall internalization estimate calculation.

Source: Fehr & Peers, April 2019.

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Table C-2 summarizes the percentage of trips traveling to the north and south of the Project during the AM and PM peak hours in Scenario 2. About 46.3 percent and 42.3 percent of peak AM and PM Project trips (respectively) would travel to and from the north (i.e. Bakersfield, Arvin-Lamont and Eastern Kern County) and 13.9 percent and 13.5 percent of peak AM and PM Project trips (respectively) would travel to and from the south (i.e. southern Kern County, Antelope Valley, Santa Clarita valley and metropolitan Los Angeles).

The percentage of all Scenario 2 trips to the north is 18 percentage points or 64 percent greater during the AM peak hour and 18 percentage points or 74 percent greater during the PM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. The share of all Scenario 2 trips to the south is 2 percentage points or 17 percent greater during both AM and PM peak hours than in the Updated 28.7% HBW ICR and FEIR analysis (see Table C-FEIR and C-AFA).

**Table C-2: Scenario 2 Build-out Trip Distribution Estimate -
Cumulative Plus Project Conditions (2040)**

Origin/Destination	Trip Distribution Estimate	
	<i>A.M. Peak Hour</i>	<i>P.M. Peak Hour</i>
Project Area	39.8%	44.2%
North of Grapevine	46.3%	42.3%
West Bakersfield via I-5	4.9%	4.5%
North of Bakersfield via I-5	2.5%	2.3%
Bakersfield Metropolitan Area via SR 99	26.6%	24.4%
North of Bakersfield via SR 99	2.5%	2.3%
Arvin-Lamont Area	7.3%	6.5%
Eastern Kern County via SR 58	2.5%	2.3%
South of Grapevine	13.9%	13.5%
Southern Kern County (Frazier Park/Tejon Mountain Village)	1.8%	1.5%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	5.1%	4.5%
Santa Clarita Valley Area ¹	3.5%	3.1%
Los Angeles Basin/Orange County/Inland Empire	3.5%	4.4%

Source: Fehr & Peers, April 2019

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5.2 SCENARIO 2 ANALYSIS OF IMPACTS TO LOCAL INTERSECTIONS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

As shown in Table D-2, Scenario 2 would result in new significant impacts to the following intersections compared with the Updated 28.7% HBW ICR and FEIR analyses:

- S. Wheeler Ridge Road / Laval Road – PM Peak Hour
- Street C / Street H – AM Peak Hour

Three (3) intersections that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 2 under cumulative plus project conditions:

- Street D / Street A – AM and PM Peak Hours
- Street C / Street G – PM Peak Hour
- Street I / Street A – PM Peak Hour

One (1) local intersections that is significantly impacted in either the Updated 28.7% HBW ICR or FEIR analyses would not be significantly impacted and would operate at acceptable LOS levels in in Scenario 2 under cumulative plus project conditions:

- Street C / Street A – PM Peak Hour

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Table D-2: Scenario 2 Analysis Peak Hour Intersection Operations - Cumulative Plus Project Conditions (2040)

Intersection	Traffic Control	Peak Hour	Cumulative No Project		Cumulative + Scenario 2 Project	
			Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	16	B	17	B
		P.M.	16	B	18	B
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	14	B	18	B
		P.M.	20	C	30	C
3. S. Wheeler Ridge Road / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A
		P.M.	4	A	4	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	20	C	24	C
		P.M.	45	D	60	E
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		43	D
		P.M.			54	D
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		51	D
		P.M.			42	D
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		19	B
		P.M.			38	D
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		283	F
		P.M.			120	F
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		14	B
		P.M.			216	F
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		218	F
		P.M.			59	E
11. Street I / Street A ⁴	Side-Street Stop	A.M.	Does Not Exist		0 (21)	A (C)
		P.M.			3 (240)	A (F)

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.

³Level of Service based on Highway Capacity Manual (Transportation Research Board, 2000/2010).

⁴ The shared movement with the greatest

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.

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5.3 SCENARIO 2 LOCAL ROADWAY IMPACTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS, PM PEAK HOUR

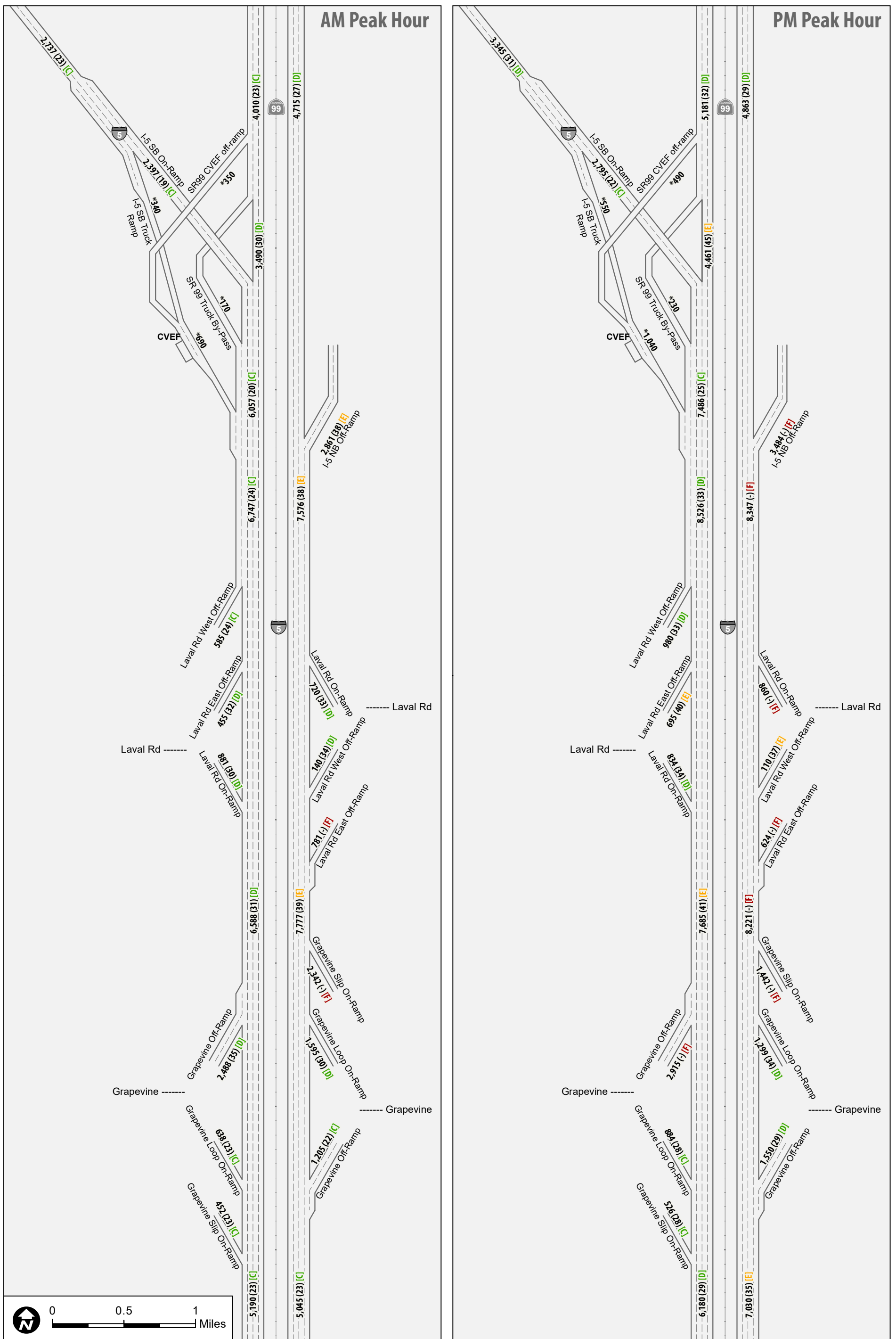
Table E-2 shows the Scenario 2 impacts to local roadway segments under cumulative plus project conditions during the PM peak hour, the period of heaviest roadway use and when the combination of vehicle trip purposes is at the highest level.

As shown in Table E-2, Scenario 2 would result in two (2) new significant impacts to the following local roadways compared with the Updated 28.7% HBW ICR and FEIR analyses:

- Wheeler Ridge Road: North of Santa Elena Drive
- Street C: Aqueduct Crossing to E Street

One (1) local roadway that is significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 2 under cumulative plus project conditions:

- Future Street A between Street D and Street I



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Table E-2: Scenario 2 PM Peak Hour Roadway Capacity Evaluation – Cumulative Plus Project Conditions (2040)

Roadway Segment	Classification	Existing Conditions			Cumulative Plus Scenario 2 Project		
		P.M. Peak Hour Volume	V/C ¹	LOS ²	P.M. Peak Hour Volume	V/C ¹	LOS ²
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	<u>2,000</u>	<u>0.74</u>	<u>E</u>
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			<u>1,920</u>	<u>1.07</u>	<u>E</u>
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			3,300	0.97	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			900	0.50	C
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			170	0.09	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			740	0.41	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			650	0.36	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			1,450	0.81	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			70	0.04	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			420	0.23	C
11. Dennis McCarthy Rd. : North of Laval Rd	2-lane Collector Street	592	0.36	D	940	0.53	D
12. Street A: Street D to Street I	4-lane Arterial Street	Does Not Exist			<u>3,665</u>	<u>1.07</u>	<u>F</u>

Notes: ¹V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.

²Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.

Source: Fehr & Peers, April 2019.

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5.4 SCENARIO 2 IMPACTS TO LOCAL FREEWAY SEGMENTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table F-2 summarizes the Scenario 2 LOS levels on 33 freeway segments in the vicinity of the Project area under cumulative plus project conditions.

Scenario 2 would result in new significant impacts to the following local freeway segments in Scenario 2 under cumulative plus project conditions:

- I-5 Northbound – Base of Grapevine Grade to Relocated Grapevine Interchange - PM Peak Hour
- I-5 Northbound – Grapevine Slip On-Ramp - AM and PM Peak Hour
- I-5 Northbound – Grapevine Slip On-Ramp to Laval Road East Off-Ramp – PM Peak Hour
- I-5 Northbound – Laval Road East Off-Ramp - AM and PM Peak Hour
- I-5 Northbound – Laval Road West Off-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road On-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road On-Ramp to SR 99 Off-Ramp - AM and PM Peak Hour
- I-5 Northbound – I-5 Northbound Off-ramp - AM and PM Peak Hour
- SR 99 Southbound – SR 99 Auto Lanes to I-5 Southbound - PM Peak Hour
- I-5 Southbound – Laval Road East Off-Ramp - PM Peak Hour
- I-5 Southbound – Laval Road to Grapevine - PM Peak Hour
- I-5 Southbound – Grapevine Off-Ramp - PM Peak Hour

The following local freeway segments that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 2 under cumulative plus project conditions:

- Fort Tejon to Base of Grapevine Grade (6% Downgrade) I-5 - PM Peak Hour
- Base of Grapevine Grade to Fort Tejon (6% Upgrade) - AM and PM Peak Hours

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Table F-2: Scenario 2 Analysis Peak Hour Freeway Operations – Cumulative Plus Project Conditions (2040)

Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
I-5 Northbound						
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	26	D	32	D
		P.M.	<u>44</u>	<u>E</u>	-	<u>F</u>
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	Does Not Exist		23	C
		P.M.			35	D
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	23	C	22*	C*
		P.M.	31	D	29*	D*
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		30	D
		P.M.			34	D
5. Grapevine Slip On-Ramp	Merge	A.M.	20	B	-	<u>F</u>
		P.M.	26	C	-	<u>F</u>
6. Grapevine to Laval Road	Basic	A.M.	18	C	<u>39</u>	<u>E</u>
		P.M.	28	C	-	<u>F</u>
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	27	C	-	<u>F*</u>
		P.M.	36	E	-	<u>F*</u>
8. Laval Road West Off-Ramp	Diverge	A.M.	19	B	34	D
		P.M.	27	C	<u>37</u>	<u>E</u>
9. Laval Road On-Ramp	Merge	A.M.	22	C	33	D
		P.M.	31	D	-	<u>F</u>
10. Laval Road to SR-99	Basic	A.M.	17	B	<u>38</u>	<u>E</u>
		P.M.	27	D	-	<u>F</u>
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	17	B	<u>38</u>	<u>E</u>
		P.M.	27	D	-	<u>F</u>

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
12. North of SR 99 Junction	Basic	A.M.	17	B	27	D
		P.M.	32	D	29	D
SR 99 Northbound						
13. North of I-5 Junction	Basic	A.M.	12	B	25	C
		P.M.	17	B	34	D
SR 99 Southbound						
1. North of I-5 Junction	Basic	A.M.	13	B	23	C
		P.M.	16	B	32	D
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		29	D
		P.M.			35	D
3. Truck Bypass Off-Ramp ³	Basic (Major Diverge)	A.M.	13	B	20	C
		P.M.	16	B	26	D
4. SR 99 Auto Lanes to I-5 Southbound ³	Basic (2 Lanes)	A.M.	14	B	30	D
		P.M.	17	B	<u>45</u>	<u>E</u>
I-5 Southbound						
5. North of SR 99 Junction	Basic	A.M.	18	B	23	C
		P.M.	23	C	31	D
6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		11	B
		P.M.			14	B
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		19	C
		P.M.			22	C
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	19	C	24	C
		P.M.	22	C	31	D
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	17	B	20	C
		P.M.	22	C	25	C
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		22	C
		P.M.			29	D

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
11. SR 99 to Laval Road	Basic	A.M.	19	C	24	C
		P.M.	24	C	33	D
12. Laval Road West Off-Ramp	Diverge	A.M.	24	C	24	C
		P.M.	30	D	33	D
13. Laval Road East Off-Ramp	Diverge	A.M.	20	C	32	D
		P.M.	24	C	<u>40</u>	<u>E</u>
14. Laval Road On-Ramp	Merge	A.M.	23	C	30	D
		P.M.	29	D	34	D
15. Laval Road to Grapevine ⁴	Basic	A.M.	20	C	31	D
		P.M.	25	C	<u>41</u>	<u>E</u>
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	22	C	35*	D*
		P.M.	27	C	-	<u>F*</u>
17. Grapevine Loop On-Ramp	Merge	A.M.	16	B	23	C
		P.M.	21	C	28	C
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		23	C
		P.M.			28	C
19. Relocated Grapevine Interchange to Base of Grapevine Grade ³	Basic	A.M.	Exists as Laval Road to Grapevine		23	C
		P.M.			29	D
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	32	D	<u>39</u>	<u>E</u>
		P.M.	<u>46</u>	<u>F</u>	-	<u>F</u>

Notes: ¹Density is reported in passenger car equivalents per mile per lane (pcpmpl).

²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

³These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.

⁴This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.

⁵Segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.

⁶Segment analysis increases deceleration lane from 170 feet to 500 feet.

*Indicates improved density and LOS.

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.

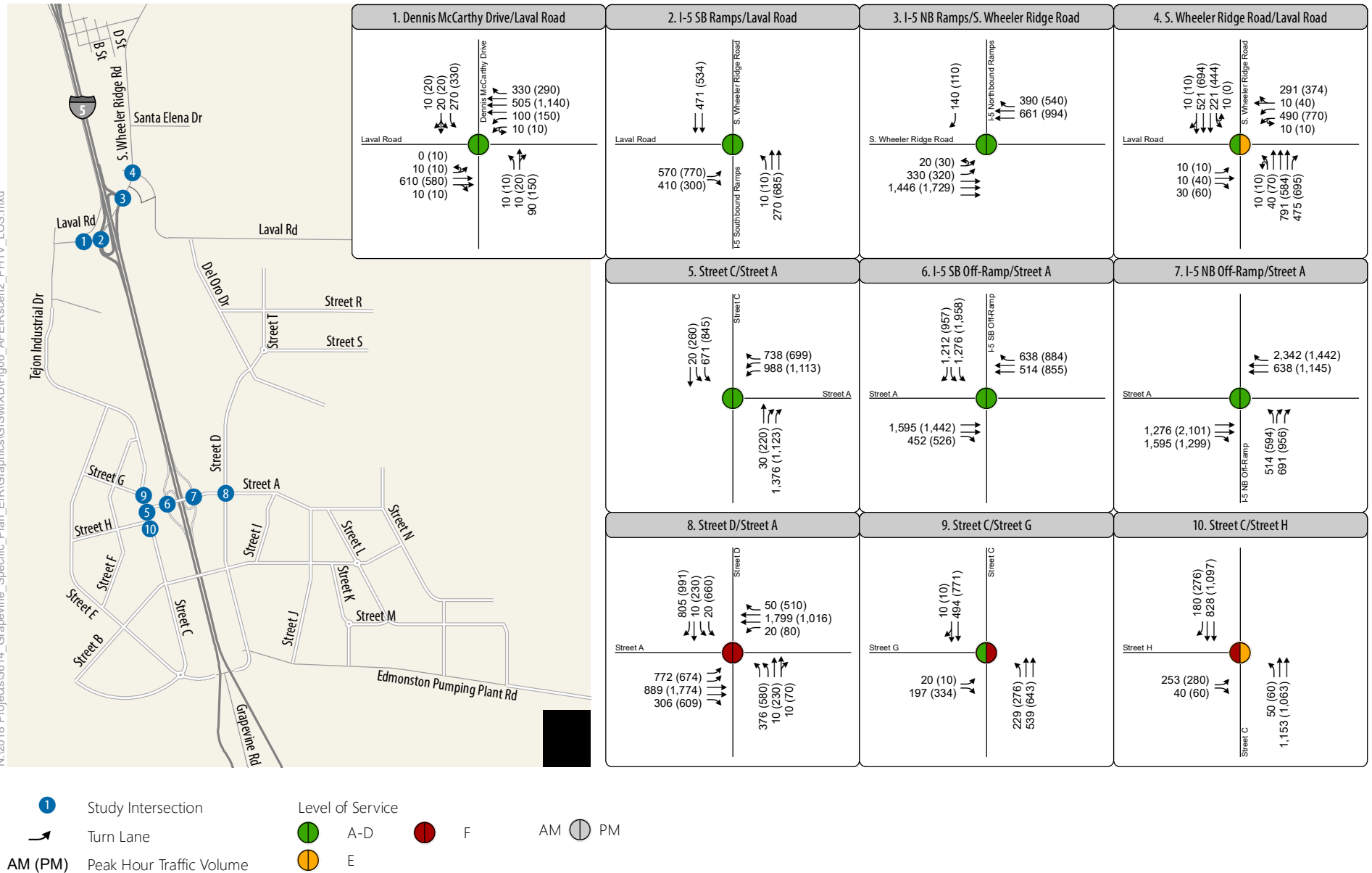


Figure 2-2
 Peak Hour Traffic Volumes, Lane Configurations
 and Level of Service (LOS) -
 Scenario 2

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Table G-2 analyzes the traffic volumes and net new trips generated by Scenario 2 during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in Scenario 2 under cumulative plus project conditions. Scenario 2 results in northbound traffic volumes about 2.3 percent higher than in the FEIR analysis (7,030 versus 6,857 trips). Southbound traffic volumes are about 0.9 percent higher than in the FEIR analysis (6,180 versus 6,124 trips). Scenario 2 results in northbound traffic volumes about 2.9 percent higher (7,030 versus 6,829 trips) and southbound traffic volumes about 3.2 percent higher (6,180 versus 5,986 trips) than in the Updated 28.7% HBW ICR analysis.

Table G-2: Scenario 2 Analysis PM Peak Hour Grapevine Grade Traffic Volume by Vehicle Type – Cumulative Plus Project Conditions (2040)

Segment	Vehicle Type	Cumulative No Project (2040)	Net New Trips	Cumulative Plus Project (2040)
<i>I-5 Northbound</i>				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Autos	4,825	765	5,590
	Trucks	1,340	100	1,440
	Total	6,165	865	7,030
<i>I-5 Southbound</i>				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Autos	4,040	653	4,693
	Trucks	1,400	87	1,487
	Total	5,440	740	6,180

Source: Fehr & Peers, April 2019.

Table H-2 analyzes the Scenario 2 traffic density in terms of passenger car equivalents per mile per lane (pcpmpl) during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Updated 28.7% HBW ICR analysis under cumulative plus project conditions. Table H-2 shows that the PM peak hour density in the two inside northbound lanes, which are reserved for passenger vehicles, would be 56 pcpmpl (LOS F). PM peak hour density in the two outside northbound lanes would be 67 pcpmpl (LOS F) under cumulative plus project conditions. These results are higher than the FEIR and the Updated 28.7% HBW ICR analysis.

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During the PM peak hour, density in the two inside southbound lanes would be 41 pcpmpl (LOS E) the same as in the FEIR analysis and higher than in the Updated 28.7% HBW ICR analysis. Density in the outside two lanes would be 196 pcpmpl (LOS F), higher than the FEIR analysis and the Updated 28.7% HBW ICR analysis.

The total PM peak hour density for the northbound Grapevine Grade under Scenario 2 would be 60 pcpmpl (LOS F), higher than the 58 pcpmpl (LOS F) in the FEIR analysis and higher than the 57 pcpmpl (LOS F) in the Updated 28.7% HBW ICR analysis. The total PM peak hour density in the southbound direction under Scenario 2 would be 67 pcpmpl (LOS F), higher than the 64 pcpmpl (LOS F) in the FEIR analysis and higher than 60 (LOS F) in the Updated 28.7% HBW ICR analysis. These results indicate that Scenario 2 would contribute to a higher level of impacts to the Grapevine Grade during the OM peak hour under cumulative plus project conditions than would occur in the FEIR and Updated 28.7% HBW ICR analysis.

Table H-2: Scenario 2 PM Peak Hour Grapevine Grade Freeway Operations - Cumulative Plus Project Conditions with Variant 1 or 2 (2040)

Segment	Lanes	Vehicle Composition	Cumulative No Project (2040)		Cumulative No Project – All Lanes (2040)		Cumulative Plus Project (2040)		Cumulative Plus Project – All Lanes (2040)	
			Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³
I-5 Northbound										
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos Only	39	E	44	E	56	F	60	F
	Outside Two Lanes	Autos & Trucks	51	F			67	F		
I-5 Southbound										
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos Only	29	D	46	F	41	E	67	F
	Outside Two Lanes	Autos & Trucks	86	F			196	F		

Notes: ¹Results for all lanes applies the HCM methodology to the entire segment, as reported in Table 26 Appendix T, page 161.

²Density is reported in passenger car equivalents per mile per lane (pcpmpl).

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria

Source: Fehr & Peers, April 2019.

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5.5 SCENARIO 2 FREEWAY IMPACTS TO STATE HIGHWAY AND FREEWAY SEGMENTS NORTH AND SOUTH OF THE PROJECT AREA UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table I-2 analyzes potential Scenario 2 impacts under cumulative plus project conditions at 15 state freeway and highway segments located to the north of the Project area. Table J-12 analyzes potential Updated 28.7% HBW ICR impacts under cumulative plus project conditions at 66 freeway and highway segments located to the south of the Project area. Significant impacts were determined to occur at any state freeway or highway segment that was determined to: (a) decline from acceptable to unacceptable LOS standards; or (b) the Project's contribution to the vehicle to capacity ratio at the segment operating at unacceptable LOS standard under cumulative without project conditions was greater than .02 under cumulative with project conditions.

Table I- 2 shows that, in the Scenario 2 analysis, all of the freeway and highway segments analyzed to the north of the Project area along SR 99 and I-5 would operate at acceptable levels under cumulative plus project conditions. This result is the same as in the FEIR and Updated 28.7% HBW ICR analysis. No new significant impacts would occur.

Table J-2 shows that, in the Scenario 2 analysis new significant impacts would occur to the following freeway and highway segments south of the Project site:

I-5 Northbound:

- Lyons Avenue to Calgrove Boulevard – PM Peak hour

I-5 Southbound:

- McBean Parkway to Lyons Avenue / Pico Canyon Road – AM peak hour
- SR 120 to Roxford Street – AM peak hour

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The following freeway and highway segments to the south of the Project area that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 2 under cumulative plus project conditions:

I-5 Northbound:

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – AM and PM peak hours

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

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5.6 SCENARIO 2 IMPACTS TO INTERIM I-5 ACCESS FACILITIES

As shown in Table A-2, Scenario 2 results in 18,119 and 19,699 average weekday AM and PM peak hour trips, respectively, the same as in the Updated 28.7% HBW ICR analysis. As shown in Table B-2, the volume of traffic using interim Project access facilities would be higher at comparable Project development levels higher because the ICR for Scenario 2 is 20 percentage points and 31-33 percent lower than in the Updated 28.7% HBW ICR and FEIR analysis. Consequently, applicable Interim B access LOS standards could be exceeded at a lower level of development than identified in the Updated 28.7% HBW ICR and FEIR analysis. The construction of a new and relocated interchange along I-5, including either interchange Variant 1 or Variant 2 (see Figure 2-5 and Figure 2-6) would likely be required earlier under Scenario 2 than in the Updated 28.7% HBW ICR and FEIR analysis.

Table I-2
Cumulative With Scenario 2 Analysis Freeway Level of Service Analysis– North of Project Area

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
1	Btw . Jct Rte 58 W and California		4M							4M							LOS E	
	2014 Count	104,110		2,246	8,985	3,848	0.43	6,276	0.70		2,246	8,985	4,004	0.45	6,694	0.75		
	2040 Without Project	127,150		2,246	8,985	4,824	0.54	7,415	0.83		2,246	8,985	5,372	0.60	7,782	0.87		
	2040 With Project	130,478		2,246	8,985	5,150	0.57	7,523	0.84		2,246	8,985	5,558	0.62	7,828	0.87		
	Grapevine Specific Plan Net New Project Impacts	3,328				326	0.04	108	0.01				186	0.02	46	0.01		
2	Btw. California and Jct Rte 58 E		4M							4M							LOS E	
	2014 Count	89,700		2,246	8,985	3,392	0.38	5,263	0.59		2,246	8,985	3,390	0.38	5,895	0.66		
	2040 Without Project	106,340		2,246	8,985	3,950	0.44	6,231	0.69		2,246	8,985	4,326	0.48	6,761	0.75		
	2040 With Project	111,081		2,246	8,985	4,397	0.49	6,376	0.71		2,246	8,985	4,542	0.51	6,901	0.77		
	Grapevine Specific Plan Net New Project Impacts	4,741				447	0.05	145	0.02				216	0.02	140	0.02		
3	Btw. Jct Rte 58 E & Ming Ave		5M							5M							LOS E	
	2014 Count	88,820		2,246	10,107	3,406	0.34	5,478	0.54		2,246	10,107	3,217	0.32	5,663	0.56		
	2040 Without Project	134,395		2,246	10,107	4,865	0.48	7,754	0.77		2,246	10,107	5,602	0.55	8,658	0.86		
	2040 With Project	144,935		2,246	10,107	6,100	0.60	8,021	0.79		2,246	10,107	6,013	0.59	8,853	0.88		
	Grapevine Specific Plan Net New Project Impacts	10,540				1,235	0.12	267	0.03				411	0.04	195	0.02		
4	Btw. Ming Ave & White Lane		4M							4M							LOS E	
	2014 Count	69,755		2,246	8,985	2,614	0.29	4,435	0.49		2,296	9,186	2,394	0.26	4,508	0.49		
	2040 Without Project	119,800		2,246	8,985	4,994	0.56	7,099	0.79		2,296	9,186	4,737	0.52	7,130	0.78		
	2040 With Project	132,948		2,246	8,985	6,384	0.71	7,489	0.83		2,296	9,186	5,308	0.58	7,409	0.81		
	Grapevine Specific Plan Net New Project Impacts	13,148				1,390	0.15	390	0.04				571	0.06	279	0.03		
5	Btw. White Lane & Panama Lane		4M							4M							LOS E	
	2014 Count	57,090		2,296	9,186	2,165	0.24	3,616	0.39		2,296	9,186	2,072	0.23	3,565	0.39		
	2040 Without Project	101,775		2,296	9,186	4,191	0.46	6,111	0.67		2,296	9,186	3,793	0.41	6,260	0.68		
	2040 With Project	121,344		2,296	9,186	6,032	0.66	6,629	0.72		2,296	9,186	4,626	0.50	6,982	0.76		
	Grapevine Specific Plan Net New Project Impacts	19,569				1,841	0.20	518	0.06				833	0.09	722	0.08		
6	Btw. Panama Lane & Jct Rte 119 W		4M							4M							LOS E	
	2014 Count	44,450		2,296	9,186	1,622	0.18	2,890	0.31		2,296	9,186	1,797	0.20	2,581	0.28		
	2040 Without Project	84,820		2,296	9,186	3,379	0.37	5,264	0.57		2,296	9,186	3,270	0.36	5,051	0.55		
	2040 With Project	108,826		2,296	9,186	5,420	0.59	5,896	0.64		2,296	9,186	4,224	0.46	6,225	0.68		
	Grapevine Specific Plan Net New Project Impacts	24,006				2,041	0.22	632	0.07				954	0.10	1,174	0.13		
7	Btw. Jct Rte 119 W & Houghton Rd		3M							3M							LOS D	
	2014 Count	35,470		2,296	6,889	1,229	0.18	2,345	0.34		2,141	6,422	1,533	0.24	1,987	0.31		
	2040 Without Project	62,960		2,296	6,889	2,334	0.34	4,037	0.59		2,141	6,422	2,683	0.42	3,538	0.55		
	2040 With Project	89,898		2,296	6,889	4,546	0.66	4,765	0.69		2,141	6,422	3,769	0.59	4,900	0.76		
	Grapevine Specific Plan Net New Project Impacts	26,938				2,212	0.32	728	0.11				1,086	0.17	1,362	0.21		
8	Btw. Houghton Rd & Jct Rte 223 E		3M							3M							LOS D	
	2014 Count	33,360		2,141	6,422	1,158	0.18	2,176	0.34		2,141	6,422	1,473	0.23	1,865	0.29		
	2040 Without Project	60,280		2,141	6,422	2,229	0.35	3,856	0.60		2,141	6,422	2,588	0.40	3,383	0.53		
	2040 With Project	87,912		2,141	6,422	4,499	0.70	4,601	0.72		2,141	6,422	3,710	0.58	4,772	0.74		
	Grapevine Specific Plan Net New Project Impacts	27,632				2,270	0.35	745	0.12				1,122	0.17	1,389	0.22		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
9	Btw. Jct Rte 223 E & Old U.S. 99		3M							3M							LOS D	
	2014 Count	27,270		2,141	6,422	945	0.15	1,788	0.28		2,133	6,400	1,233	0.19	1,488	0.23		
	2040 Without Project	54,555		2,141	6,422	1,964	0.31	3,513	0.55		2,133	6,400	2,390	0.37	3,044	0.48		
	2040 With Project	83,590		2,141	6,422	4,249	0.66	4,319	0.67		2,133	6,400	3,543	0.55	4,608	0.72		
	Grapevine Specific Plan Net New Project Impacts	29,035				2,285	0.36	806	0.13				1,153	0.18	1,564	0.24		
10	Btw. Old U.S. 99 & Herring Rd		3M							3M							LOS D	
	2014 Count	28,585		2,133	6,400	987	0.15	1,860	0.29		2,133	6,400	1,284	0.20	1,586	0.25		
	2040 Without Project	57,525		2,133	6,400	2,065	0.32	3,664	0.57		2,133	6,400	2,484	0.39	3,292	0.51		
	2040 With Project	90,324		2,133	6,400	4,479	0.70	4,590	0.72		2,133	6,400	3,782	0.59	5,214	0.81		
	Grapevine Specific Plan Net New Project Impacts	32,799				2,414	0.38	926	0.14				1,298	0.20	1,922	0.30		
11	Btw. Herring Rd & Sandrini Rd.		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	90,048		2,133	6,400	4,466	0.70	4,572	0.71		2,133	6,400	3,777	0.59	5,194	0.81		
	Grapevine Specific Plan Net New Project Impacts	32,913				2,414	0.38	936	0.15				1,308	0.20	1,924	0.30		
12	Btw. Sandrini Rd & David Rd		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	90,048		2,133	6,400	4,466	0.70	4,572	0.71		2,133	6,400	3,777	0.59	5,194	0.81		
	Grapevine Specific Plan Net New Project Impacts	32,913				2,414	0.38	936	0.15				1,308	0.20	1,924	0.30		
13	Btw. David Rd & Valpredo		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,133	6,400	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,133	6,400	2,364	0.37	3,104	0.49		
	2040 With Project	89,336		2,133	6,400	4,433	0.69	4,521	0.71		2,133	6,400	3,793	0.59	5,120	0.80		
	Grapevine Specific Plan Net New Project Impacts	34,821				2,470	0.39	1,049	0.16				1,429	0.22	2,016	0.32		
14	Btw. Valpredo & Jct Rte 166 W		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,096	6,288	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,096	6,288	2,364	0.38	3,104	0.49		
	2040 With Project	89,336		2,133	6,400	4,433	0.69	4,521	0.71		2,096	6,288	3,793	0.60	5,120	0.81		
	Grapevine Specific Plan Net New Project Impacts	34,821				2,470	0.39	1,049	0.16				1,429	0.23	2,016	0.32		
15	Btw. Jct Rte 166 W & Jct I-5		3M							3M							LOS D	
	2014 Count	26,965		2,096	6,288	934	0.15	1,733	0.28		2,054	6,162	1,219	0.20	1,507	0.24		
	2040 Without Project	54,150		2,096	6,288	1,926	0.31	3,373	0.54		2,054	6,162	2,363	0.38	3,168	0.51		
	2040 With Project	97,070		2,096	6,288	4,498	0.72	5,160	0.82		2,054	6,162	4,186	0.68	5,570	0.90		
	Grapevine Specific Plan Net New Project Impacts	42,920				2,572	0.41	1,787	0.28				1,823	0.30	2,402	0.39		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

Table J-2
Cumulative With Scenario 2 Analysis Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
1	Btw. Fort Tejon Rd & Lebec Rd		4M							4M							LOS D	
	2014 Count	72,000		1,839	7,355	1,390	0.19	2,426	0.33		2,036	8,143	1,346	0.17	2,304	0.28		
	2035 Without Project	119,850		1,839	7,355	2,895	0.39	4,255	0.58		2,036	8,143	3,170	0.39	3,640	0.45		
	2035 With Project	135,945		1,839	7,355	3,668	0.50	5,120	0.70		2,036	8,143	4,011	0.49	4,380	0.54		
	Grapevine Specific Plan Net New Project Impacts	16,095				773	0.11	865	0.12				841	0.10	740	0.09		
2	Btw. Lebec Rd & Frazier Mtn Park		4M							4M							LOS D	
	2014 Count	73,000		1,839	7,355	1,409	0.19	2,460	0.33		2,036	8,143	1,365	0.17	2,336	0.29		
	2035 Without Project	120,850		1,839	7,355	2,915	0.40	4,285	0.58		2,036	8,143	3,190	0.39	3,680	0.45		
	2035 With Project	136,969		1,839	7,355	3,688	0.50	5,154	0.70		2,036	8,143	4,031	0.50	4,421	0.54		
	Grapevine Specific Plan Net New Project Impacts	16,119				773	0.11	869	0.12				841	0.10	741	0.09		
3	Btw. Frazier Mtn Park & Gorman Rd		4M							4M							LOS D	
	2014 Count	70,000		2,036	8,143	1,351	0.17	2,359	0.29		1,401	5,606	1,309	0.23	2,240	0.4		
	2035 Without Project	114,850		2,036	8,143	2,775	0.34	4,015	0.49		1,401	5,606	3,020	0.54	3,380	0.60		
	2035 With Project	130,969		2,036	8,143	3,548	0.44	4,884	0.60		1,401	5,606	3,861	0.69	4,121	0.74		
	Grapevine Specific Plan Net New Project Impacts	16,119				773	0.09	869	0.11				841	0.15	741	0.13		
4	Btw. Gorman Rd & N Jct SR-138		4M							4M							LOS D	
	2014 Count	70,000		1,849	7,398	1,351	0.18	2,359	0.32		2,042	8,169	1,309	0.16	2,240	0.27		
	2035 Without Project	117,850		1,849	7,398	2,745	0.37	4,405	0.60		2,042	8,169	3,280	0.40	3,350	0.41		
	2035 With Project	133,969		1,849	7,398	3,518	0.48	5,274	0.71		2,042	8,169	4,121	0.50	4,091	0.50		
	Grapevine Specific Plan Net New Project Impacts	16,119				773	0.10	869	0.12				841	0.10	741	0.09		
5	Btw. N Jct SR-138 & Quail Lake Rd		4M							4M							LOS D	
	2014 Count	67,000		1,849	7,398	1,293	0.17	2,258	0.31		2,042	8,169	1,253	0.15	2,144	0.26		
	2035 Without Project	89,175		1,849	7,398	1,750	0.24	3,140	0.42		2,042	8,169	2,055	0.25	2,360	0.29		
	2035 With Project	99,159		1,849	7,398	2,220	0.30	3,678	0.50		2,042	8,169	2,584	0.32	2,820	0.35		
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.06	538	0.07				529	0.06	460	0.06		
6	Btw. Quail Lake Rd & S Jct SR-138		4M							4M							LOS D	
	2014 Count	67,000		1,375	5,500	1,293	0.24	2,258	0.41		1,375	5,500	1,253	0.23	2,144	0.39		
	2035 Without Project	90,175		1,375	5,500	1,750	0.32	3,590	0.65		1,375	5,500	2,055	0.37	2,360	0.43		
	2035 With Project	100,159		1,375	5,500	2,220	0.40	4,128	0.75		1,375	5,500	2,584	0.47	2,820	0.51		
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.09	538	0.10				529	0.10	460	0.08		
7	Btw. S Jct SR-138 & Smokey Bear Rd		4M							4M							LOS D	
	2014 Count	69,000		1,375	5,500	1,332	0.24	2,325	0.42		1,375	5,500	1,290	0.23	2,208	0.4		
	2035 Without Project	123,175		1,375	5,500	2,240	0.41	5,170	0.94		1,375	5,500	4,145	0.75	3,240	0.59		Yes
	2035 With Project	133,159		1,375	5,500	2,710	0.49	5,708	1.04		1,375	5,500	4,674	0.85	3,700	0.67		Yes
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.09	538	0.10				529	0.10	460	0.08		
8	Btw. Smokey Bear Rd & Vista Del Lago Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	135,159		1,489	5,957	2,810	0.47	5,798	0.97		1,489	5,957	4,774	0.80	3,840	0.64		Yes
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.08	538	0.09				529	0.09	460	0.08		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
9	Btw. Vista Del Lago Rd & Templin Hwy		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.4		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	135,159		1,489	5,957	2,810	0.47	5,798	0.97		1,489	5,957	4,774	0.80	3,840	0.64		Yes
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.08	538	0.09				529	0.09	460	0.08		
10	Btw. Templin Hwy & Lake Hughes Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	126,175		1,489	5,957	2,380	0.40	5,260	0.88		1,489	5,957	4,205	0.71	3,410	0.57		
	2035 With Project	136,159		1,489	5,957	2,850	0.48	5,798	0.97		1,489	5,957	4,734	0.79	3,870	0.65		Yes
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.08	538	0.09				529	0.09	460	0.08		
11	Btw. Lake Hughes Rd & Parker Rd		4M + 1 AUX							4M + 1 AUX							LOS E	
	2014 Count	73,000		1,856	7,422	1,504	0.2	1,949	0.26		1,856	7,422	1,854	0.25	2,519	0.34		
	2035 Without Project	154,175		1,856	8,422	5,360	0.64	8,080	0.96		1,856	8,422	8,405	1.00	5,050	0.60		
	2035 With Project	164,159		1,856	8,422	5,830	0.69	8,618	1.02		1,856	8,422	8,934	1.06	5,510	0.65		Yes
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.06	538	0.06				529	0.06	460	0.05		
12	Btw. Parker Rd & Hasley Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	108,000		1,856	7,422	2,225	0.30	2,884	0.39		1,856	7,422	2,743	0.37	3,726	0.5		
	2035 Without Project	171,175		1,856	9,022	5,360	0.59	7,030	0.78		1,856	9,022	7,285	0.81	5,120	0.57		
	2035 With Project	181,159		1,856	9,022	5,830	0.65	7,568	0.84		1,856	9,022	7,814	0.87	5,580	0.62		
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.05	538	0.06				529	0.06	460	0.05		
13	Btw. Hasley Cyn Rd & N Jct SR-126 (NB)		4M (+1H +1A)							4M (+1H)							LOS E	
	2014 Count	114,000		1,856	8,422	2,348	0.28	3,044	0.36		1,856	8,422	2,896	0.34	3,933	0.47		
	2035 Without Project	170,175		1,856	10,022	5,180	0.52	6,800	0.68		1,856	9,022	7,085	0.79	5,120	0.57		
	2035 With Project	180,159		1,856	10,022	5,650	0.56	7,338	0.73		1,856	9,022	7,614	0.84	5,580	0.62		
	Grapevine Specific Plan Net New Project Impacts	9,984				470	0.05	538	0.05				529	0.06	460	0.05		
14	Btw. N Jct SR-126 & Rye Cyn Rd		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	130,000		1,867	7,470	2,678	0.36	3,471	0.46		1,867	7,470	3,302	0.44	4,485	0.60		
	2035 Without Project	175,375		1,867	9,070	4,615	0.51	6,450	0.71		1,867	10,070	6,865	0.68	5,565	0.55		
	2035 With Project	184,889		1,867	9,070	5,072	0.56	6,963	0.77		1,867	10,070	7,365	0.73	5,998	0.60		
	Grapevine Specific Plan Net New Project Impacts	9,514				457	0.05	513	0.06				500	0.05	433	0.04		
15	Btw.Rye Cyn Rd & Magic Mountain Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	154,000		1,918	7,670	3,172	0.41	4,112	0.54		1,918	7,670	3,912	0.51	5,313	0.69		
	2035 Without Project	181,375		1,918	9,270	4,615	0.50	6,450	0.70		1,918	10,270	6,875	0.67	5,395	0.53		
	2035 With Project	190,889		1,918	9,270	5,072	0.55	6,963	0.75		1,918	10,270	7,375	0.72	5,828	0.57		
	Grapevine Specific Plan Net New Project Impacts	9,514				457	0.05	513	0.06				500	0.05	433	0.04		
16	Btw. Magic Mountain Pkwy & Valencia Blvd		4M (+1H + 1A)							4M (+1H)							LOS E	
	2014 Count	165,000		1,918	7,670	3,399	0.44	4,406	0.57		1,918	7,670	4,191	0.55	5,693	0.74		
	2035 Without Project	194,375		1,918	10,270	5,615	0.55	6,980	0.68		1,918	9,270	6,815	0.74	5,735	0.62		
	2035 With Project	203,889		1,918	10,270	6,072	0.59	7,493	0.73		1,918	9,270	7,315	0.79	6,168	0.67		
	Grapevine Specific Plan Net New Project Impacts	9,514				457	0.04	513	0.05				500	0.05	433	0.05		
17	Btw. Valencia Blvd & McBean Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	175,000		1,918	7,670	3,605	0.47	4,673	0.61		1,918	7,670	4,445	0.58	6,038	0.79		
	2035 Without Project	218,375		1,918	9,270	6,475	0.70	7,290	0.79		1,918	10,270	8,135	0.79	6,615	0.64		
	2035 With Project	227,889		1,918	9,270	6,932	0.75	7,803	0.84		1,918	10,270	8,635	0.84	7,048	0.69		
	Grapevine Specific Plan Net New Project Impacts	9,514				457	0.05	513	0.06				500	0.05	433	0.04		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
18	Btw. McBeach Pkwy & Lyons Ave/Pico Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	186,000		1,990	7,960	3,832	0.48	4,966	0.62		1,990	7,960	4,724	0.59	6,417	0.81		
	2035 Without Project	222,375		1,990	9,560	6,555	0.69	8,640	0.90		1,990	9,560	9,105	0.95	6,685	0.70		
	2035 With Project	231,889		1,990	9,560	7,012	0.73	9,153	0.96		1,990	9,560	9,605	1.00	7,118	0.74		
	Grapevine Specific Plan Net New Project Impacts	9,514			457	0.05	513	0.05			500	0.05	433	0.05				
19	Btw. Lyons Ave & Calgrove Blvd		4M (+1H + 1A)							4M (+1H + 1T)							LOS E	
	2014 Count	199,000		1,990	7,960	4,099	0.52	5,313	0.67		1,990	9,560	5,055	0.53	6,866	0.72		
	2035 Without Project	252,375		1,990	10,560	6,855	0.65	10,070	0.95		1,990	11,160	9,175	0.82	6,705	0.60		
	2035 With Project	261,889		1,990	10,560	7,312	0.69	10,583	1.00		1,990	11,160	9,675	0.87	7,138	0.64		
	Grapevine Specific Plan Net New Project Impacts	9,514			457	0.04	513	0.05			500	0.04	433	0.04				
20	Btw. Calgrove Blvd & SR-14		4M (+1H + 1T[C])							4M (+1H + 2T[C])							LOS E	
	2014 Count	200,000		1,990	9,160	4,120	0.45	5,340	0.58		1,990	10,360	5,080	0.49	6,900	0.67		
	2035 Without Project	253,375		1,990	10,760	5,725	0.53	9,190	0.85		1,990	11,960	9,805	0.82	6,845	0.57		
	2035 With Project	262,889		1,990	10,760	6,182	0.57	9,703	0.90		1,990	11,960	10,305	0.86	7,278	0.61		
	Grapevine Specific Plan Net New Project Impacts	9,514			457	0.04	513	0.05			500	0.04	433	0.04				
21	Btw. SR-14 & SR-210		3M (+1H+3A[F]+2T)							4M (+1H+2A[F]+2T)							LOS E	
	2014 Count	329,000		1,997	16,791	7,863	0.47	12,930	0.77			1,997	16,788	14,213	0.85	9,409		0.56
	2035 Without Project	383,650		1,997	16,791	9,130	0.54	15,005	0.89			1,997	16,788	16,580	0.99	10,885		0.65
	2035 With Project	389,737		1,997	16,791	9,413	0.56	15,355	0.91			1,997	16,788	16,877	1.01	11,172		0.67
	Grapevine Specific Plan Net New Project Impacts	6,087			283	0.02	350	0.02				297	0.02	287	0.02			
22	Btw. SR-210 & Roxford St		4M (+1H+ 1A[F])							5M (+1H)							LOS E	
	2014 Count	266,000		2,212	12,449	6,357	0.51	10,454	0.84		2,212	12,661	11,491	0.91	7,608	0.6		
	2035 Without Project	304,650		2,212	12,449	7,240	0.58	11,905	0.96		2,212	12,661	13,170	1.04	8,625	0.68		
	2035 With Project	310,737		2,212	12,449	7,523	0.60	12,255	0.98		2,212	12,661	13,467	1.06	8,912	0.70		
	Grapevine Specific Plan Net New Project Impacts	6,087			283	0.02	350	0.03			297	0.02	287	0.02				
23	Btw. Roxford St & I-405		5M (+1H+ 1A[F])							5M (+1H+1A[F])							LOS E	
	2014 Count	283,000		2,212	14,661	6,764	0.46	11,122	0.76		2,212	14,661	12,226	0.83	8,094	0.55		
	2035 Without Project	318,650		2,212	14,661	7,580	0.52	12,465	0.85		2,212	14,661	13,790	0.94	9,035	0.62		
	2035 With Project	324,737		2,212	14,661	7,863	0.54	12,815	0.87		2,212	14,661	14,087	0.96	9,322	0.64		
	Grapevine Specific Plan Net New Project Impacts	6,087			283	0.02	350	0.02			297	0.02	287	0.02				
24	Btw. I-405 & San Fernando Mission Blvd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	141,000		2,190	8,171	3,370	0.41	5,541	0.68		2,190	8,171	6,091	0.75	4,033	0.49		
	2035 Without Project	161,650		2,190	8,171	3,830	0.47	6,295	0.77		2,190	8,171	7,010	0.86	4,545	0.56		
	2035 With Project	167,737		2,190	8,171	4,113	0.50	6,645	0.81		2,190	8,171	7,307	0.89	4,832	0.59		
	Grapevine Specific Plan Net New Project Impacts	6,087			283	0.03	350	0.04			297	0.04	287	0.04				

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
25	Btw Dawn Rd & Rosamond Blvd		2M							2M							LOS D	
	2014 Count	23,000		2,332	4,665	1,083	0.23	849	0.18		2,332	4,665	499	0.11	1,323	0.28		
	2035 Without Project	29,825		2,332	4,665	1,345	0.29	1,095	0.23		2,332	4,665	610	0.13	1,535	0.33		
	2035 With Project	30,268		2,332	4,665	1,358	0.29	1,108	0.24		2,332	4,665	646	0.14	1,562	0.33		
	Grapevine Specific Plan Net New Project Impacts	443				13	0.00	13	0.00				36	0.01	27	0.01		
26	Btw. Rosamond Blvd & Ave A		2M							2M							LOS D	
	2014 Count	30,000		2,339	4,679	1,413	0.3	1,107	0.24		2,339	4,679	651	0.14	1,725	0.37		
	2035 Without Project	34,825		2,339	4,679	1,715	0.37	1,335	0.29		2,339	4,679	720	0.15	1,855	0.40		
	2035 With Project	35,268		2,339	4,679	1,728	0.37	1,348	0.29		2,339	4,679	756	0.16	1,882	0.40		
	Grapevine Specific Plan Net New Project Impacts	443				13	0.00	13	0.00				36	0.01	27	0.01		
27	Ave A & N Jct Rte 138/Ave D		2M							2M							LOS D	
	2014 Count	34,000		2,339	4,679	1,129	0.24	1,261	0.27		2,339	4,679	1,244	0.27	1,567	0.34		
	2035 Without Project	55,825		2,339	4,679	2,115	0.45	2,125	0.45		2,339	4,679	1,950	0.42	2,335	0.50		
	2035 With Project	56,268		2,339	4,679	2,128	0.45	2,138	0.46		2,339	4,679	1,986	0.42	2,362	0.50		
	Grapevine Specific Plan Net New Project Impacts	443				13	0.00	13	0.00				36	0.01	27	0.01		
28	Btw. Jct Rte 138/Ave D & Ave F		2M							2M							LOS D	
	2014 Count	36,000		2,332	4,665	1,195	0.26	1,336	0.29		2,332	4,665	1,318	0.28	1,660	0.36		
	2035 Without Project	87,650		2,332	4,665	3,525	0.76	3,685	0.79		2,332	4,665	3,360	0.72	3,720	0.80		
	2035 With Project	89,761		2,332	4,665	3,615	0.77	3,816	0.82		2,332	4,665	3,469	0.74	3,812	0.82		
	Grapevine Specific Plan Net New Project Impacts	2,111				90	0.02	131	0.03				109	0.02	92	0.02		
29	Btw. Ave F & Ave G		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	102,650		2,332	4,665	4,235	0.91	3,835	0.82		2,332	4,665	3,690	0.79	4,460	0.96		Yes
	2035 With Project	104,761		2,332	4,665	4,325	0.93	3,966	0.85		2,332	4,665	3,799	0.81	4,552	0.98		
	Grapevine Specific Plan Net New Project Impacts	2,111				90	0.02	131	0.03				109	0.02	92	0.02		
30	Btw. Ave G & Ave H		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	107,650		2,332	4,665	4,385	0.94	3,815	0.82		2,332	4,665	3,810	0.82	4,600	0.99		Yes
	2035 With Project	109,761		2,332	4,665	4,475	0.96	3,946	0.85		2,332	4,665	3,919	0.84	4,692	1.01		
	Grapevine Specific Plan Net New Project Impacts	2,111				90	0.02	131	0.03				109	0.02	92	0.02		
31	Btw. Ave H & Ave I		2M							2M							LOS E	
	2014 Count	40,000		2,332	4,665	1,328	0.28	1,484	0.32		2,332	4,665	1,464	0.31	1,844	0.4		
	2035 Without Project	108,650		2,332	4,665	4,345	0.93	4,025	0.86		2,332	4,665	3,880	0.83	4,530	0.97		
	2035 With Project	110,761		2,332	4,665	4,435	0.95	4,156	0.89		2,332	4,665	3,989	0.86	4,622	0.99		
	Grapevine Specific Plan Net New Project Impacts	2,111				90	0.02	131	0.03				109	0.02	92	0.02		
32	Btw. Ave I & Ave J		3M							3M							LOS E	
	2014 Count	47,000		2,332	6,997	1,560	0.22	1,744	0.25		2,332	6,997	1,720	0.25	2,167	0.31		
	2035 Without Project	114,650		2,332	6,997	4,605	0.66	4,365	0.62		2,332	6,997	3,950	0.56	4,890	0.70		
	2035 With Project	118,836		2,332	6,997	4,811	0.69	4,584	0.66		2,332	6,997	4,168	0.60	5,085	0.73		
	Grapevine Specific Plan Net New Project Impacts	4,186				206	0.03	219	0.03				218	0.03	195	0.03		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
33	Btw. Ave J & 20th St W		3M							3M							LOS E	
	2014 Count	42,000		2,339	7,016	1,394	0.2	1,558	0.22		2,339	7,016	1,537	0.22	1,936	0.28		
	2035 Without Project	99,650		2,339	7,016	4,105	0.59	3,905	0.56		2,339	7,016	3,500	0.50	4,370	0.62		
	2035 With Project	103,732		2,339	7,016	4,311	0.61	4,118	0.59		2,339	7,016	3,703	0.53	4,565	0.65		
	Grapevine Specific Plan Net New Project Impacts	4,082				206	0.03	213	0.03				203	0.03	195	0.03		
34	Btw. 20th St W & Ave K		3M							3M							LOS E	
	2014 Count	59,000		2,339	7,016	1,959	0.28	2,189	0.31		2,339	7,016	2,159	0.31	2,720	0.39		
	2035 Without Project	118,650		2,339	7,016	4,715	0.67	4,585	0.65		2,339	7,016	4,160	0.59	5,180	0.74		
	2035 With Project	122,732		2,339	7,016	4,921	0.70	4,798	0.68		2,339	7,016	4,363	0.62	5,375	0.77		
	Grapevine Specific Plan Net New Project Impacts	4,082				206	0.03	213	0.03				203	0.03	195	0.03		
35	Btw. Ave K & Ave L		3M							3M							LOS E	
	2014 Count	74,000		2,339	7,016	2,457	0.35	2,745	0.39		2,339	7,016	2,708	0.39	3,411	0.49		
	2035 Without Project	127,650		2,339	7,016	4,975	0.71	4,835	0.69		2,339	7,016	4,440	0.63	5,650	0.81		
	2035 With Project	131,732		2,339	7,016	5,181	0.74	5,048	0.72		2,339	7,016	4,643	0.66	5,845	0.83		
	Grapevine Specific Plan Net New Project Impacts	4,082				206	0.03	213	0.03				203	0.03	195	0.03		
36	Btw. Ave L & Ave M		3M							3M							LOS E	
	2014 Count	89,000		2,339	7,016	2,955	0.42	3,302	0.47		2,339	7,016	3,257	0.46	4,103	0.58		
	2035 Without Project	100,650		2,339	7,016	3,875	0.55	3,435	0.49		2,339	7,016	3,630	0.52	4,540	0.65		
	2035 With Project	104,162		2,339	7,016	4,055	0.58	3,610	0.51		2,339	7,016	3,804	0.54	4,713	0.67		
	Grapevine Specific Plan Net New Project Impacts	3,512				180	0.03	175	0.02				174	0.02	173	0.02		
37	Btw. Ave M & Ave N		3M							3M							LOS E	
	2014 Count	92,000		2,339	7,016	3,054	0.44	3,413	0.49		2,339	7,016	3,367	0.48	4,241	0.60		
	2035 Without Project	100,650		2,339	7,016	3,895	0.56	3,365	0.48		2,339	7,016	3,550	0.51	4,710	0.67		
	2035 With Project	103,711		2,339	7,016	4,062	0.58	3,503	0.50		2,339	7,016	3,695	0.53	4,872	0.69		
	Grapevine Specific Plan Net New Project Impacts	3,061				167	0.02	138	0.02				145	0.02	162	0.02		
38	Btw. Ave N & 10th St W		3M							3M							LOS E	
	2014 Count	87,000		2,339	7,016	2,888	0.41	3,228	0.46		2,339	7,016	3,184	0.45	4,011	0.57		
	2035 Without Project	98,650		2,339	7,016	4,085	0.58	3,215	0.46		2,339	7,016	3,280	0.47	4,700	0.67		
	2035 With Project	101,595		2,339	7,016	4,252	0.61	3,340	0.48		2,339	7,016	3,425	0.49	4,851	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,945				167	0.02	125	0.02				145	0.02	151	0.02		
39	Btw. 10th St W & Rancho Vista Blvd		3M							3M							LOS E	
	2014 Count	87,000		2,225	6,675	2,888	0.43	3,228	0.48		2,225	6,675	3,184	0.48	4,011	0.60		
	2035 Without Project	93,650		2,225	6,675	3,965	0.59	3,165	0.47		2,225	6,675	3,170	0.47	4,510	0.68		
	2035 With Project	96,205		2,225	6,675	4,120	0.62	3,290	0.49		2,225	6,675	3,272	0.49	4,640	0.70		
	Grapevine Specific Plan Net New Project Impacts	2,555				155	0.02	125	0.02				102	0.02	130	0.02		
40	Btw. Rancho Vista Blvd & S Jct Rte 138		3M							3M							LOS E	
	2014 Count	84,000		2,225	6,675	2,789	0.42	3,116	0.47		2,225	6,675	3,074	0.46	3,872	0.58		
	2035 Without Project	94,650		2,225	6,675	4,015	0.60	3,085	0.46		2,225	6,675	3,140	0.47	4,570	0.68		
	2035 With Project	96,658		2,225	6,675	4,118	0.62	3,210	0.48		2,225	6,675	3,227	0.48	4,657	0.70		
	Grapevine Specific Plan Net New Project Impacts	2,008				103	0.02	125	0.02				87	0.01	87	0.01		
41	Btw. S Jct Rte 138 & Ave S		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	81,000		2,225	6,050	2,689	0.44	3,005	0.5		2,225	8,275	2,965	0.36	3,734	0.45		
	2035 Without Project	91,650		2,225	6,050	3,535	0.58	3,475	0.57		2,225	8,275	3,260	0.39	4,590	0.55		
	2035 With Project	93,476		2,225	6,050	3,625	0.60	3,600	0.60		2,225	8,275	3,340	0.40	4,660	0.56		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
42	Btw. Ave S & Pearlblossom/Sierra Hwy		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	71,000		2,225	6,050	2,357	0.39	2,634	0.44		2,225	8,275	2,599	0.31	3,273	0.4		
	2035 Without Project	75,650		2,225	6,050	3,015	0.50	2,655	0.44		2,225	8,275	2,660	0.32	3,820	0.46		
	2035 With Project	77,476		2,225	6,050	3,105	0.51	2,780	0.46		2,225	8,275	2,740	0.33	3,890	0.47		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
43	Btw. Pearlblossom/Sierra Hwy & Angeles Forest		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	83,000		2,225	6,050	2,756	0.46	3,079	0.51		2,225	8,275	3,038	0.37	3,826	0.46		
	2035 Without Project	88,650		2,225	6,050	3,225	0.53	3,065	0.51		2,225	8,275	3,100	0.37	4,380	0.53		
	2035 With Project	90,476		2,225	6,050	3,315	0.55	3,190	0.53		2,225	8,275	3,180	0.38	4,450	0.54		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
44	Btw. Angeles Forest Hwy & Soledad		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	144,000		2,225	8,275	3,154	0.38	3,525	0.43		2,225	6,050	3,477	0.57	4,380	0.72		
	2035 Without Project	114,650		2,225	8,275	3,845	0.46	3,875	0.47		2,225	6,050	3,620	0.60	6,000	0.99		
	2035 With Project	116,476		2,225	8,275	3,935	0.48	4,000	0.48		2,225	6,050	3,700	0.61	6,070	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
45	Btw. Soledad & Santiago Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	113,650		2,236	6,071	3,845	0.63	3,905	0.64		2,236	6,071	3,430	0.56	5,640	0.93		
	2035 With Project	115,476		2,236	6,071	3,935	0.65	4,030	0.66		2,236	6,071	3,510	0.58	5,710	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
46	Btw. Santiago Rd & Crown Valley Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	94,000		2,236	6,071	3,121	0.51	3,487	0.57		2,236	6,071	3,440	0.57	4,333	0.71		
	2035 Without Project	108,650		2,236	6,071	3,625	0.60	3,955	0.65		2,236	6,071	3,430	0.56	5,420	0.89		
	2035 With Project	110,476		2,236	6,071	3,715	0.61	4,080	0.67		2,236	6,071	3,510	0.58	5,490	0.90		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
47	Btw. Crown Valley Rd & Ward Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	138,650		2,236	6,071	3,765	0.62	3,875	0.64		2,236	6,071	3,460	0.57	5,670	0.93		
	2035 With Project	140,476		2,236	6,071	3,855	0.64	4,000	0.66		2,236	6,071	3,540	0.58	5,740	0.95		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
48	Btw. Ward Rd & Escondido Cyn Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	93,000		2,189	8,167	3,088	0.38	3,450	0.42		2,189	5,978	3,404	0.57	4,287	0.72		
	2035 Without Project	115,650		2,189	8,167	3,745	0.46	4,445	0.54		2,189	5,978	3,650	0.61	5,720	0.96		
	2035 With Project	117,476		2,189	8,167	3,835	0.47	4,570	0.56		2,189	5,978	3,730	0.62	5,790	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
49	Btw. Escondido Cyn Rd & Agua Dulce Cyn Rd		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	93,000		2,236	8,307	1,776	0.21	4,669	0.56		2,236	6,071	4994	0.82	2,613	0.43		
	2035 Without Project	114,650		2,236	8,307	2,285	0.28	5,555	0.67		2,236	6,071	5,320	0.88	3,950	0.65		
	2035 With Project	116,476		2,236	8,307	2,375	0.29	5,680	0.68		2,236	6,071	5,400	0.89	4,020	0.66		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
50	Btw. Agua Dulce Cyn Rd & Soledad Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	96,000		2,236	8,307	1,834	0.22	4,819	0.58		2,236	6,071	5,155	0.85	2,698	0.44		
	2035 Without Project	116,850		2,236	8,307	2,415	0.29	5,565	0.67		2,236	6,071	5,220	0.86	4,070	0.67		
	2035 With Project	118,676		2,236	8,307	2,505	0.30	5,690	0.68		2,236	6,071	5,300	0.87	4,140	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
51	Btw. Shadow Pines/Soledad Rd & Sand Cyn Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	99,000		2,236	6,071	1,891	0.31	4,970	0.82		2,236	6,071	5,316	0.88	2,782	0.46		
	2035 Without Project	115,650		2,236	6,071	2,395	0.39	5,205	0.86		2,236	6,071	5,380	0.89	3,820	0.63		
	2035 With Project	117,476		2,236	6,071	2,485	0.41	5,330	0.88		2,236	6,071	5,460	0.90	3,890	0.64		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
52	Btw. Sand Cyn Rd & Via Princessa		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	112,000		2,215	8,246	2,139	0.26	5,622	0.68		2,215	8,246	6,014	0.73	3,147	0.38		
	2035 Without Project	135,650		2,215	8,246	2,575	0.31	6,365	0.77		2,215	8,246	6,840	0.83	4,770	0.58		
	2035 With Project	137,476		2,215	8,246	2,665	0.32	6,490	0.79		2,215	8,246	6,920	0.84	4,840	0.59		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
53	Btw. Via Princessa & Golden Valley Rd		3M (+1H+1A)							3M (+1H+1A)							LOS E	
	2014 Count	144,000		2,215	9,246	2,750	0.3	7,229	0.78		2,215	9,246	7,733	0.84	4,046	0.44		
	2035 Without Project	172,650		2,215	9,246	3,255	0.35	7,895	0.85		2,215	9,246	8,590	0.93	5,470	0.59		
	2035 With Project	174,476		2,215	9,246	3,345	0.36	8,020	0.87		2,215	9,246	8,670	0.94	5,540	0.60		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.01				80	0.01	70	0.01		
54	Btw. Golden Valley Rd & Placerita Cyn Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	144,000		2,215	8,246	2,750	0.33	7,229	0.88		2,215	8,246	7,733	0.94	4,046	0.49		
	2035 Without Project	169,650		2,215	8,246	3,105	0.38	7,645	0.93		2,215	8,246	8,520	1.03	5,140	0.62		
	2035 With Project	171,476		2,215	8,246	3,195	0.39	7,770	0.94		2,215	8,246	8,600	1.04	5,210	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
55	Btw. Placerita Cyn Rd & San Fernando Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	151,000		2,215	8,246	2,884	0.35	7,580	0.92		2,215	8,246	8,109	0.98	4,243	0.51		
	2035 Without Project	173,650		2,215	8,246	3,155	0.38	7,995	0.97		2,215	8,246	8,520	1.03	5,110	0.62		
	2035 With Project	175,476		2,215	8,246	3,245	0.39	8,120	0.98		2,215	8,246	8,600	1.04	5,180	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.02				80	0.01	70	0.01		
56	Btw. San Fernando Rd//Newhall Ave & Jct I-5		5M (+1H)							5M (+1H)							LOS E	
	2014 Count	166,000		2,215	12,676	3,171	0.25	8,333	0.66		2,215	12,676	8,914	0.7	4,665	0.37		
	2035 Without Project	180,650		2,215	12,676	3,145	0.25	8,625	0.68		2,215	12,676	9,310	0.73	5,050	0.40		
	2035 With Project	182,476		2,215	12,676	3,235	0.26	8,750	0.69		2,215	12,676	9,390	0.74	5,120	0.40		
	Grapevine Specific Plan Net New Project Impacts	1,826				90	0.01	125	0.01				80	0.01	70	0.01		
SR-138																		
57	Between Jct I-5 and Gorman Post Rd		2M							2M							LOS D	
	2014 Count	4,500		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	71,675		1,904	3,808	2,525	0.66	3,830	1.01		1,904	3,808	3,855	1.01	2,725	0.72		
	2035 With Project	77,822		1,904	3,808	2,802	0.74	4,155	1.09		1,904	3,808	4,196	1.10	3,012	0.79		
	Grapevine Specific Plan Net New Project Impacts	6,147				277	0.07	325	0.08				341	0.09	287	0.08		
58	Between Gorman Post Rd and Old Ridge Route Rd		1M							1M							LOS D	
	2014 Count	4,900		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	83,675		1,904	1,904	2,785	1.46	4,680	2.46		1,904	1,904	4,525	2.38	3,055	1.60		
	2035 With Project	89,822		1,904	1,904	3,062	1.61	5,005	2.63		1,904	1,904	4,866	2.56	3,342	1.76		
	Grapevine Specific Plan Net New Project Impacts	6,147				277	0.15	325	0.17				341	0.18	287	0.16		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-138																		
59	Between Old Ridge Route Rd and 300th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	87,225		1,904	1,904	2,855	1.50	4,805	2.52		1,904	1,904	4,645	2.44	3,130	1.64		Yes
	2035 With Project	91,866		1,904	1,904	3,061	1.61	5,043	2.65		1,904	1,904	4,913	2.58	3,346	1.76		Yes
	Grapevine Specific Plan Net New Project Impacts	4,641				206	0.11	238	0.13				268	0.14	216	0.12		
60	Between 300th St West and 245TH St		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	152	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	72,225		1,904	1,904	3,495	1.84	2,885	1.52		1,904	1,904	2,915	1.53	3,830	2.01		Yes
	2035 With Project	76,866		1,904	1,904	3,701	1.94	3,123	1.64		1,904	1,904	3,183	1.67	4,046	2.13		Yes
	Grapevine Specific Plan Net New Project Impacts	4,641				206	0.10	238	0.12				268	0.14	216	0.12		
61	Between 245th St West and 190th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	89	0.05	147	0.09			1,700	113	0.07	87	0.05		
	2035 Without Project	62,225		1,904	1,904	2,595	1.36	2,325	1.22		1,904	1,904	2,465	1.29	3,050	1.60		Yes
	2035 With Project	66,866		1,904	1,904	2,801	1.47	2,563	1.35		1,904	1,904	2,733	1.44	3,266	1.72		Yes
	Grapevine Specific Plan Net New Project Impacts	4,641				206	0.11	238	0.13				268	0.15	216	0.12		
62	Between 190th St West and 110th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	54,866		1,962	1,962	2,201	1.12	1,993	1.02		1,962	1,962	2,283	1.16	2,636	1.34		Yes
	Grapevine Specific Plan Net New Project Impacts	4,641				206	0.10	238	0.13				268	0.13	216	0.11		
63	Between 110th St West and 60th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	53,825		1,962	1,962	2,150	1.10	1,943	0.99		1,962	1,962	2,225	1.13	2,588	1.32		Yes
	Grapevine Specific Plan Net New Project Impacts	3,600				155	0.08	188	0.10				210	0.10	168	0.09		
64	Between 60th St West and Jct Rte 14 North		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	141	0.08	177	0.1			1,700	123	0.07	148	0.09		
	2035 Without Project	55,225		1,962	1,962	2,355	1.20	1,895	0.97		1,962	1,962	1,985	1.01	2,700	1.38		Yes
	2035 With Project	57,779		1,962	1,962	2,458	1.25	2,039	1.04		1,962	1,962	2,130	1.09	2,819	1.44		Yes
	Grapevine Specific Plan Net New Project Impacts	2,554				103	0.05	144	0.07				145	0.08	119	0.06		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-126																		
65	Btw. N Jct SR-126 & Henry Mayo Dr		3M							3M							LOS D	
	2014 Count	29,025			6,288	1,264	0.20	1,618	0.26			6,288	1,406	0.22	1,517	0.24		
	2035 Without Project	31,145			6,288	1,369	0.22	1,802	0.29			6,288	1,518	0.24	1,540	0.24		
	2035 With Project	31,615			6,288	1,382	0.22	1,827	0.29			6,288	1,547	0.25	1,567	0.25		
	Project Impact	470			6,288	13	0.00	25	0.00			6,288	29	0.00	27	0.00		
66	Btw. Henry Mayo Dr & Commerce Center Dr		2M							2M							LOS D	
	2014 Count	29,025			4,665	1,264	0.27	1,618	0.35			4,665	1,406	0.30	1,517	0.33		
	2035 Without Project	31,145			4,665	1,369	0.29	1,802	0.39			4,665	1,518	0.33	1,540	0.33		
	2035 With Project	31,615			4,665	1,382	0.30	1,827	0.39			4,665	1,547	0.33	1,567	0.34		
	Grapevine Specific Plan Net New Project Impacts	470			4,665	13	0.00	25	0.01			4,665	29	0.01	27	0.01		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

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6 SCENARIO 4 ANALYSIS

This section analyzes the potential transportation and traffic impacts that could occur in Scenario 4. The impact assessment was conducted for cumulative plus project conditions and evaluates the same local intersections, local roadways, local freeway segments, state highway and freeway segments to the north and south of the Project site and interim access impacts considered in the Updated 28.7% HBW ICR analysis summarized in Section 2.3 of this report. Scenario 4 includes 75 percent of the proposed Project development of 12,000 dwelling units and 5.1 million square feet of commercial/light industrial land uses (9,000 dwelling units and 3.825 million square feet of commercial/light industrial land uses) with a 20 percentage point reduction in the ICRs used in the FEIR and Updated 28.7% HBW ICR analysis.

6.1 SCENARIO 4 ANALYSIS METHODOLOGY AND ICR ASSUMPTIONS

Table A-3 summarizes the Scenario 4 daily and AM and PM peak hour number of trips generated by proposed Project land uses. The Scenario 4 ADT is 148,266 trips compared with 197,685 trips in the Updated 28.7% HBW ICR analysis and 201,542 trips in the FEIR analysis. Based on the 2016 ITE Manual trip generation rates and the 2014 Kern COG model, the average weekday VMT in Scenario 4 is 3,440,599 miles compared with 3,114,939 miles in the Updated 28.7% HBW ICR analysis and 3,175,626 miles in the FEIR analysis.

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Table A-3: ITE Trip Generation Estimate - Scenario 4 Analysis

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	In	Out	Total	In	Out	
Residential									
Residential	6,300 DUs	210	4,662	1,166	3,497	6,237	3,929	2,308	59,472
Village Center Residential	2,700 DUs	220	1,242	286	956	1,512	953	559	19,764
Non-Residential									
Village Center Commercial - Retail ¹	337.5 ksf	820 ¹	317	197	121	1,286	617	669	12,742
Village Center Commercial - Office ¹	262.5 ksf	710 ¹	305	262	43	302	48	254	2,558
Freeway Commercial	562.5 ksf	820	529	328	201	2,143	1,029	1,114	21,234
Office/Research & Development	1,575 ksf	710	1,827	1,571	256	1,811	290	1,521	15,342
Light Industrial/Warehouse ²	1,087.5 ksf	130/150 ²	310	245	65	321	77	244	2,780
Schools & Parks									
Elementary Schools ⁴	3,728 students	520	2,497	1,349	1,149	634	304	330	7,046
Middle Schools ⁴	1,260 students	522	731	395	336	214	105	109	2,684
High Schools ⁴	2,250 students	530	1,170	784	386	315	151	164	4,568
Parks ³	99 acres	411							78
Total			13,590	6,581	7,009	14,775	7,503	7,272	148,266

Notes: DUs = dwelling units; ksf = thousand square feet

Trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 10th Edition*

¹Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)

²Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)

³City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information.

⁴Student enrollment based on number of students anticipated per residential dwelling unit based on discussions with school district

Source: Trip Generation Manual, 10th Edition (Institute of Transportation Engineers, 2016).

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Table B-3 summarizes the ICRs used in Scenario 4. The Scenario 4 ICR for all trips combined is 39.8 percent in the AM peak hour and 44.2 percent in the PM peak hour, which are 20 percentage points lower than in the Updated 28.7% HBW ICR and FEIR analysis. As discussed in the FEIR, Caltrans requested that the ICR for Home-Based Work trips be reduced because these trips can have the greatest impacts on external transportation facilities. Consistent with this approach, the 20 percentage point ICR reduction was first applied to Home-Based Work trips and then to other trips. As shown in Table B-2, the ICR for Home-Based Work trips used to evaluate Scenario 4 is significantly lower (i.e., 100 percent of Home-Based Work trips are assumed to be external during both AM and PM peak hours) than the 28.7 percent level in the FEIR and Updated 28.7% HBW ICR analysis. All work-related transportation in Scenario 2 would require external trips to offsite locations.

Table B-3: Scenario 4 Estimated Project Trip Internalization by Peak Hour

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips ¹	% Internal ²	Total Internalization % ³	% of Trips ¹	% Internal ²	Total Internalization % ³
Home-Based Work	47.8%	0.0%	0.0%	28.1%	0.0%	0.0%
Home-Based Other/ Non-Home-Based	52.2%	76.2%	39.8%	71.9%	61.5%	44.2%
Total			39.8%			44.2%

Notes: ¹Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17 of Appendix T, page 117.

²Internalization percentage by trip purpose. Home-Based work trip internalization shown in Table 18 of Appendix T, page 118. Home-Based other/non-home-based trip internalization shown in Table 22 of Appendix T, page 139.

³Overall internalization estimate calculation.

Source: Fehr & Peers, April 2019.

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Table C-3 summarizes the percentage of trips traveling to the north and south of the Project during the AM and PM peak hours in Scenario 4. About 46.3 percent and 42.3 percent of peak AM and PM Project trips (respectively) would travel to and from the north (i.e. Bakersfield, Arvin-Lamont and Eastern Kern County) and 13.9 percent and 13.5 percent of peak AM and PM Project trips (respectively) would travel to and from the south (i.e. southern Kern County, Antelope Valley, Santa Clarita valley and metropolitan Los Angeles).

The percentage of all Scenario 4 trips to the north is 18 percentage points or 64 percent greater during the AM peak hour and 18 percentage points or 74 percent greater during the PM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. The share of all Scenario 4 trips to the south is 2 percentage point or 17 percent greater during both AM and PM peak hours than in the Updated 28.7% HBW ICR and FEIR analysis (see Table C-FEIR and Table C-AFA).

**Table C-3: Scenario 4 Build-out Trip Distribution Estimate -
Cumulative Plus Project Conditions (2040)**

Origin/Destination	Trip Distribution Estimate	
	A.M. Peak Hour	P.M. Peak Hour
Project Area	39.8%	44.2%
North of Grapevine	46.3%	42.3%
West Bakersfield via I-5	4.9%	4.5%
North of Bakersfield via I-5	2.5%	2.3%
Bakersfield Metropolitan Area via SR 99	26.6%	24.4%
North of Bakersfield via SR 99	2.5%	2.3%
Arvin-Lamont Area	7.3%	6.5%
Eastern Kern County via SR 58	2.5%	2.3%
South of Grapevine	13.9%	13.5%
Southern Kern County (Frazier Park/Tejon Mountain Village)	1.8%	1.5%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	5.1%	4.5%
Santa Clarita Valley Area ¹	3.5%	3.1%
Los Angeles Basin/Orange County/Inland Empire	3.5%	4.4%

Source: Fehr & Peers, August 2016

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6.2 SCENARIO 4 ANALYSIS OF IMPACTS TO LOCAL INTERSECTIONS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

As shown in Table D-3, Scenario 4 would result in a new significant impact to the following intersection compared with the Updated 28.7% HBW ICR and FEIR analyses:

- Street C / Street H – AM Peak Hour

Three (3) local intersections that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 4 under cumulative plus project conditions:

- Street D / Street A – AM and PM Peak Hours
- Street I / Street A – PM Peak Hour
- Street I / Street A – PM Peak Hour

Two (2) local intersections that are significantly impacted in either the Updated 28.7% HBW ICR or FEIR analyses would not be significantly impacted and would operate at acceptable LOS levels in Scenario 4 under cumulative plus project conditions:

- Street C / Street A – PM Peak Hour
- Street C / Street H – PM Peak Hour

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Table D-3: Scenario 4 Analysis Peak Hour Intersection Operations Cumulative Plus Project Conditions (2040)

Intersection	Traffic Control	Peak Hour	Cumulative No Project		Cumulative + Scenario 4 Project	
			Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	16	B	16	B
		P.M.	16	B	18	B
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	14	B	15	B
		P.M.	20	C	24	C
3. S. Wheeler Ridge Road / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A
		P.M.	4	A	4	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	20	C	18	B
		P.M.	45	D	36	D
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		34	C
		P.M.			48	D
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		52	D
		P.M.			41	D
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		16	B
		P.M.			20	C
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		<u>216</u>	<u>F</u>
		P.M.			<u>165</u>	<u>F</u>
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		13	B
		P.M.			<u>140</u>	<u>F</u>
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		<u>66</u>	<u>E</u>
		P.M.			17	B
11. Street I / Street A ⁴	Side-Street Stop	A.M.	Does Not Exist		0 (17)	A (C)
		P.M.			<u>1 (109)</u>	<u>A (F)</u>

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.

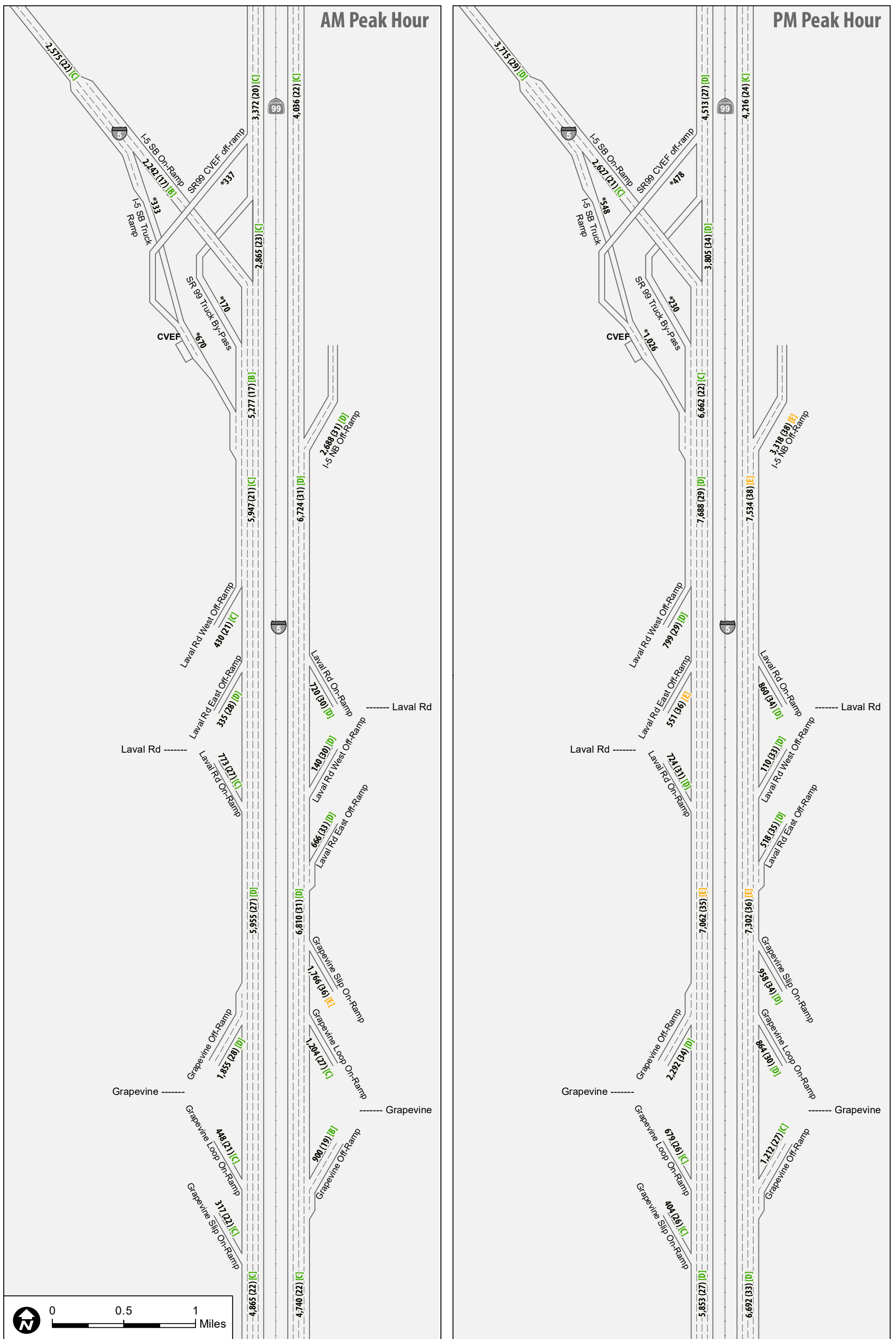
³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).

⁴ The shared movement with the greatest

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.



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6.3 SCENARIO 4 LOCAL ROADWAY IMPACTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS, PM PEAK HOUR

Table E-3 shows the Scenario 4 impacts to local roadway segments under cumulative plus project conditions during the PM peak hour, the period of heaviest roadway use and when the combination of vehicle trip purposes is at the highest level.

As shown in Table D-4, Scenario 4 would result in new significant impacts to the following two (2) intersections compared with the Updated 28.7% HBW ICR and FEIR analyses:

- Wheeler Ridge Road: North of Santa Elena Drive
- Street C: Aqueduct Crossing to E Street

One (1) local roadway segment that is significantly impacted in either the Updated 28.7% HBW ICR or FEIR analyses would not be significantly impacted and would operate at acceptable LOS levels in in Scenario 4 under cumulative plus project conditions:

- Street A (Street D to Street I)

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Table E-3: Scenario 4 PM Peak Hour Roadway Capacity Evaluation – Cumulative Plus Project Conditions (2040)

Roadway Segment	Classification	Existing Conditions			Cumulative Plus Scenario 4 Project		
		P.M. Peak Hour Volume	V/C ¹	LOS ²	P.M. Peak Hour Volume	V/C ¹	LOS ²
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	<u>1,575</u>	<u>0.58</u>	<u>E</u>
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			<u>1,740</u>	<u>0.97</u>	<u>E</u>
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			2,875	0.84	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			675	0.38	C
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			130	0.07	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			560	0.31	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			490	0.27	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			1,090	0.61	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			55	0.03	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			315	0.18	C
11. Dennis McCarthy Rd. : North of Laval Rd	2-lane Collector Street	592	0.36	D	940	0.53	D
12. Street A: Street D to Street I	4-lane Arterial Street	Does Not Exist			3,300	0.97	<u>D</u>

Notes: ¹V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.

²Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.

Source: Fehr & Peers, April 2019.

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6.4 SCENARIO 4 IMPACTS TO LOCAL FREEWAY SEGMENTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table F-3 summarizes the Scenario 4 LOS levels on 33 freeway segments in the vicinity of the Project area under cumulative plus project conditions. Scenario 4 would result in new significant impacts at the following local freeway segments:

- I-5 Northbound – Grapevine Slip On-Ramp - AM Peak Hour
- I-5 Northbound – Grapevine Slip On-Ramp to Laval Road East Off-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road On-Ramp to SR9 Off-Ramp - PM Peak Hour
- I-5 Northbound – I-5 Northbound Off-ramp - PM Peak Hour
- I-5 Southbound – Laval Road East Off-Ramp - PM Peak Hour
- I-5 Southbound – Laval Road to Grapevine - PM Peak Hour

The following local freeway segments that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 4 under cumulative plus project conditions:

- Fort Tejon to Base of Grapevine Grade (6% Downgrade) I-5 - PM Peak Hour
- Base of Grapevine Grade to Fort Tejon (6% Upgrade) - AM and PM Peak Hours

Table F-3: Scenario 4 Analysis Peak Hour Freeway Operations – Cumulative Plus Project Conditions (2040)

Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
I-5 Northbound						
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	26	D	29	D
		P.M.	<u>44</u>	<u>E</u>	<u>54</u>	<u>F</u>
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	Does Not Exist		22	C
		P.M.			33	D
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	23	C	19*	B*
		P.M.	31	D	27*	C*
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		27	C
		P.M.			30	D
5. Grapevine Slip On-Ramp	Merge	A.M.	20	B	<u>36</u>	<u>E</u>
		P.M.	26	C	34	D

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
6. Grapevine to Laval Road	Basic	A.M.	18	C	31	D
		P.M.	28	C	<u>36</u>	<u>E</u>
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	27	C	33*	D*
		P.M.	36	E	35*	D*
8. Laval Road West Off-Ramp	Diverge	A.M.	19	B	30	D
		P.M.	27	C	33	D
9. Laval Road On-Ramp	Merge	A.M.	22	C	30	D
		P.M.	31	D	34	D
10. Laval Road to SR-99	Basic	A.M.	17	B	31	D
		P.M.	27	D	<u>38</u>	<u>E</u>
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	17	B	31	D
		P.M.	27	D	<u>38</u>	<u>E</u>
12. North of SR 99 Junction	Basic	A.M.	17	B	22	C
		P.M.	32	D	24	C
SR 99 Northbound						
13. North of I-5 Junction	Basic	A.M.	12	B	23	C
		P.M.	17	B	31	D
SR 99 Southbound						
1. North of I-5 Junction	Basic	A.M.	13	B	20	C
		P.M.	16	B	27	D
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		26	C
		P.M.			32	D
3. Truck Bypass Off-Ramp ³	Basic (Major Diverge)	A.M.	13	B	17	B
		P.M.	16	B	22	C

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
4. SR 99 Auto Lanes to I-5 Southbound ³	Basic (2 Lanes)	A.M.	14	B	23	C
		P.M.	17	B	34	D
I-5 Southbound						
5. North of SR 99 Junction	Basic	A.M.	18	B	22	C
		P.M.	23	C	29	D
6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		11	A
		P.M.			14	B
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		17	B
		P.M.			21	C
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	19	C	21	C
		P.M.	22	C	27	D
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	17	B	17	B
		P.M.	22	C	22	C
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		20	C
		P.M.			27	C
11. SR 99 to Laval Road	Basic	A.M.	19	C	21	C
		P.M.	24	C	29	D
12. Laval Road West Off-Ramp	Diverge	A.M.	24	C	21	C
		P.M.	30	D	29	D
13. Laval Road East Off-Ramp	Diverge	A.M.	20	C	28	D
		P.M.	24	C	36	E
14. Laval Road On-Ramp	Merge	A.M.	23	C	27	C
		P.M.	29	D	31	D
15. Laval Road to Grapevine ⁴	Basic	A.M.	20	C	27	D
		P.M.	25	C	35	E
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	22	C	28*	D*
		P.M.	27	C	34*	D*

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
17. Grapevine Loop On-Ramp	Merge	A.M.	16	B	21	C
		P.M.	21	C	26	C
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		22	C
		P.M.			26	C
19. Relocated Grapevine Interchange to Base of Grapevine Grade ³	Basic	A.M.	Exists as Laval Road to Grapevine		22	C
		P.M.			27	D
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	32	D	<u>36</u>	<u>E</u>
		P.M.	<u>46</u>	<u>F</u>	<u>59</u>	<u>F</u>

Notes: ¹Density is reported in passenger car equivalents per mile per lane (pcpmpl).

²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

³These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.

⁴This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.

⁵Segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.

⁶Segment analysis increases deceleration lane from 170 feet to 500 feet.

*Indicates improved density and LOS.

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.

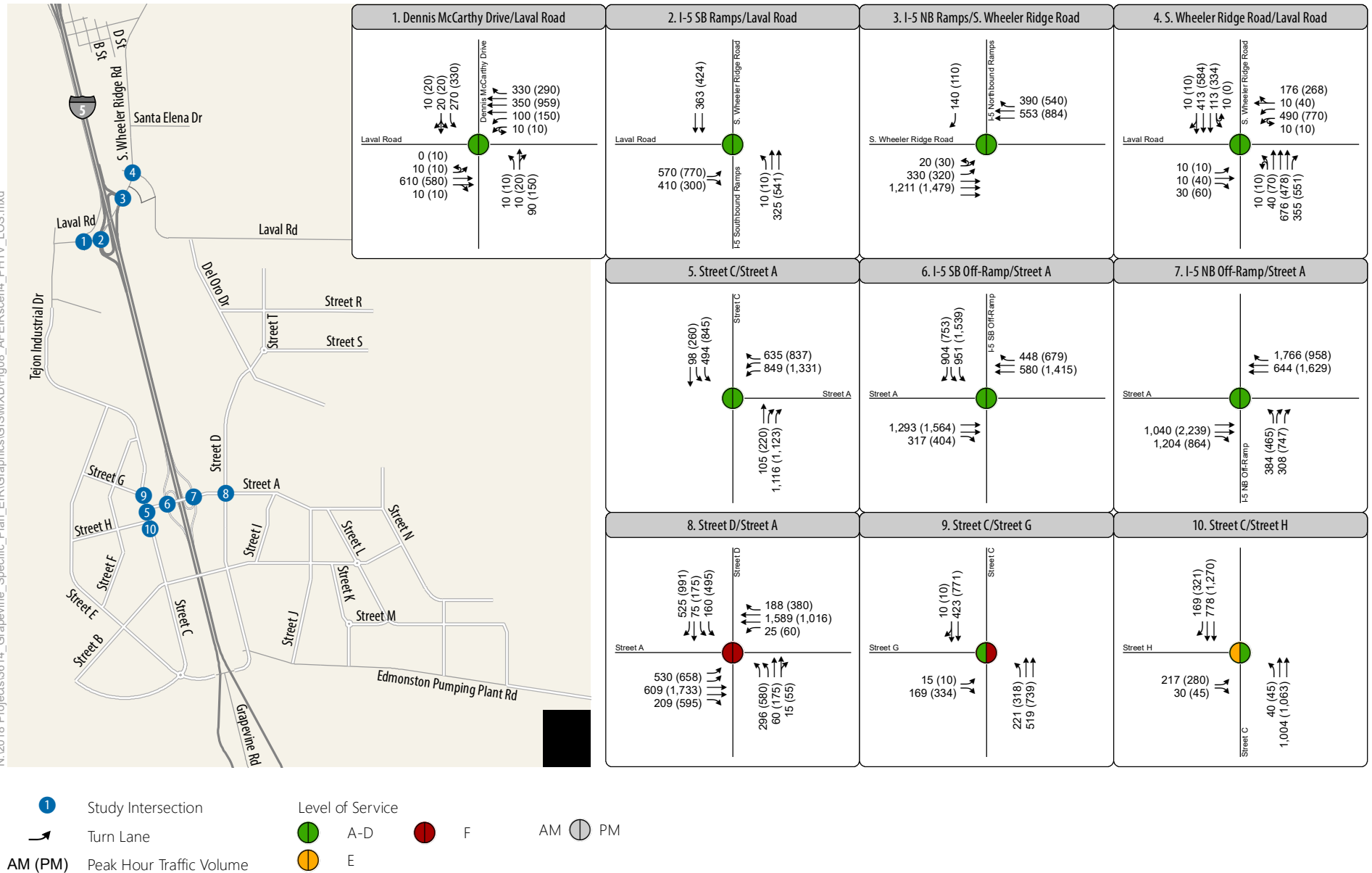


Figure 4-2
Peak Hour Traffic Volumes, Lane Configurations
and Level of Service (LOS) -
Scenario 4

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Table G-3 analyzes the traffic volumes and net new trips generated by Scenario 4 during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Scenario 4 analysis under cumulative plus project conditions. Scenario 1 results in northbound traffic volumes about 2.4 percent lower than in the FEIR analysis (6,692 versus 6,857 trips). Southbound traffic volumes are about 4.4 percent lower than in the FEIR analysis (5,853 versus 6,124 trips). Scenario 4 results in northbound traffic volumes about 2.0 percent lower (6,692 versus 6,829 trips) and southbound traffic volumes about 2.2 percent lower (5,853 versus 5,986 trips) than in the Updated 28.7% HBW ICR analysis.

Table G-3: Scenario 4 Analysis PM Peak Hour Grapevine Grade Traffic Volume by Vehicle Type – Cumulative Plus Project Conditions (2040)

Segment	Vehicle Type	Cumulative No Project (2040)	Net New Trips	Cumulative Plus Project (2040)
<i>I-5 Northbound</i>				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Autos	4,825	466	5,291
	Trucks	1,340	61	1,401
	Total	6,165	527	6,692
<i>I-5 Southbound</i>				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Autos	4,040	365	4,405
	Trucks	1,400	48	1,448
	Total	5,440	413	5,853

Source: Fehr & Peers, April 2019.

Table H-3 analyzes the Scenario 4 traffic density in terms of passenger car equivalents per mile per lane (pcpmpl) during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Updated 28.7% HBW ICR analysis under cumulative plus project conditions. Table H-4 shows that the PM peak hour density in the two inside northbound lanes, which are reserved for passenger vehicles, would be 48 pcpmpl (LOS F). PM peak hour density in the two outside northbound lanes would be 60 pcpmpl (LOS F) under cumulative plus project conditions. These results are lower than in the FEIR and Updated 28.7% HBW ICR analysis.

During the PM peak hour, density in the two inside southbound lanes would be 38 pcpmpl (LOS E); lower than in the FEIR and the Updated 28.7% HBW ICR analysis. Density in the outside two lanes would be 142 pcpmpl (LOS F), lower than in the FEIR and in the Updated 28.7% HBW ICR analysis.

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The total PM peak hour density for the northbound Grapevine Grade under Scenario 4 would be 54 pcpmpl (LOS F), lower than the 58 pcpmpl (LOS F) in the FEIR analysis and lower than the 57 pcpmpl (LOS F) in the Updated 28.7% HBW ICR analysis. The total PM peak hour density in the southbound direction under Scenario 4 would be 59 pcpmpl (LOS F), lower than the 64 pcpmpl (LOS F) in the FEIR analysis and lower than 60 (LOS F) in the Updated 28.7% HBW ICR analysis. These results indicate that Scenario 4 would result in reduced peak PM hour impacts to the Grapevine Grade under cumulative plus project conditions.

Table H-3: Scenario 4 PM Peak Hour Grapevine Grade Freeway Operations – Cumulative Plus Project Conditions with Variant 1 or 2 (2040)

Segment	Lanes	Vehicle Composition	Cumulative No Project (2040)		Cumulative No Project – All Lanes (2040)		Cumulative Plus Project (2040)		Cumulative Plus Project – All Lanes (2040)	
			Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³
I-5 Northbound										
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos Only	39	E	44	E	48	F	54	F
	Outside Two Lanes	Autos & Trucks	51	F			60	F		
I-5 Southbound										
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos Only	29	D	46	F	38	E	59	F
	Outside Two Lanes	Autos & Trucks	86	F			142	F		

Notes: ¹Results for all lanes applies the HCM methodology to the entire segment, as reported in Table 26 Appendix T, page 161.

²Density is reported in passenger car equivalents per mile per lane (pcpmpl).

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria

Source: Fehr & Peers, April 2019.

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6.5 SCENARIO 4 FREEWAY IMPACTS TO STATE HIGHWAY AND FREEWAY SEGMENTS NORTH AND SOUTH OF THE PROJECT AREA UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table I-3 analyzes potential Scenario 4 impacts under cumulative plus project conditions at 15 state freeway and highway segments located to the north of the Project area. Table J-4 analyzes potential Updated 28.7% HBW ICR impacts under cumulative plus project conditions at 66 freeway and highway segments located to the south of the Project area. Significant impacts were determined to occur at any state freeway or highway segment that was determined to: (a) decline from acceptable to unacceptable LOS standards; or (b) the Project's contribution to the vehicle to capacity ratio at the segment operating at unacceptable LOS standard under cumulative without project conditions was greater than .02 under cumulative with project conditions.

Table I- 3 shows that, in the Scenario 4 analysis, all of the freeway and highway segments analyzed to the north of the Project area along SR 99 and I-5 would operate at acceptable levels under cumulative plus project conditions. This is the same result as the FEIR and Updated 28.7% HBW ICR analysis. No new significant impacts would occur.

Table J-3 shows that, in the Scenario 4 analysis, the following freeway and highway segments to the south of the Project area along I-5 and SR-138 would be impacted under cumulative plus project conditions:

The following freeway and highway segments to the south of the Project area that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 4 under cumulative plus project conditions:

I-5 Northbound:

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – AM and PM peak hours

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

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SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

The freeway and highway segments south of the Project impacted in the Scenario 4 analysis under cumulative plus project conditions are the same as in the FEIR and Updated 28.7% HBW ICR analysis. No new significant impacts would occur.

6.6 SCENARIO 4 IMPACTS TO INTERIM I-5 ACCESS FACILITIES

As shown in Table A-3, Scenario 4 results in 13,590 and 14,775 average weekday AM and PM peak hour trips, respectively, lower than the 18,119 and 19,699 average weekday AM and PM peak hour trips in the Updated 28.7% HBW ICR analysis. As shown in Table B-3, the volume of traffic using interim Project access facilities would be higher at comparable Project development levels higher because the ICR for Scenario 4 is 20 percentage points and 31-33 percent lower than in the Updated 28.7% HBW ICR and FEIR analysis. Consequently, applicable Interim B access LOS standards could be exceeded at a lower level of development than identified in the Updated 28.7% HBW ICR and FEIR analysis. The construction of a new and relocated interchange along I-5, including either interchange Variant 1 or Variant 2 (see Figure 2-5 and Figure 2-6) would likely be required earlier under Scenario 4 than in the Updated 28.7% HBW ICR and FEIR analysis.

Table I-3
Cumulative With Scenario 4 Analysis Freeway Level of Service Analysis– North of Project Area

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
1	Btw . Jct Rte 58 W and California		4M							4M							LOS E	
	2014 Count	104,110		2,246	8,985	3,848	0.43	6,276	0.70		2,246	8,985	4,004	0.45	6,694	0.75		
	2040 Without Project	127,150		2,246	8,985	4,824	0.54	7,415	0.83		2,246	8,985	5,372	0.60	7,782	0.87		
	2040 With Project	129,463		2,246	8,985	5,064	0.56	7,484	0.83		2,246	8,985	5,493	0.61	7,815	0.87		
	Grapevine Specific Plan Net New Project Impacts	2,313				240	0.03	69	0.01				121	0.01	33	0.00		
2	Btw. California and Jct Rte 58 E		4M							4M							LOS E	
	2014 Count	89,700		2,246	8,985	3,392	0.38	5,263	0.59		2,246	8,985	3,390	0.38	5,895	0.66		
	2040 Without Project	106,340		2,246	8,985	3,950	0.44	6,231	0.69		2,246	8,985	4,326	0.48	6,761	0.75		
	2040 With Project	109,656		2,246	8,985	4,279	0.48	6,323	0.70		2,246	8,985	4,467	0.50	6,862	0.76		
	Grapevine Specific Plan Net New Project Impacts	3,316				329	0.04	92	0.01				141	0.02	101	0.01		
3	Btw. Jct Rte 58 E & Ming Ave		5M							5M							LOS E	
	2014 Count	88,820		2,246	10,107	3,406	0.34	5,478	0.54		2,246	10,107	3,217	0.32	5,663	0.56		
	2040 Without Project	134,395		2,246	10,107	4,865	0.48	7,754	0.77		2,246	10,107	5,602	0.55	8,658	0.86		
	2040 With Project	141,831		2,246	10,107	5,774	0.57	7,924	0.78		2,246	10,107	5,869	0.58	8,799	0.87		
	Grapevine Specific Plan Net New Project Impacts	7,436				909	0.09	170	0.02				267	0.03	141	0.01		
4	Btw. Ming Ave & White Lane		4M							4M							LOS E	
	2014 Count	69,755		2,246	8,985	2,614	0.29	4,435	0.49		2,296	9,186	2,394	0.26	4,508	0.49		
	2040 Without Project	119,800		2,246	8,985	4,994	0.56	7,099	0.79		2,296	9,186	4,737	0.52	7,130	0.78		
	2040 With Project	129,021		2,246	8,985	6,017	0.67	7,348	0.82		2,296	9,186	5,108	0.56	7,332	0.80		
	Grapevine Specific Plan Net New Project Impacts	9,221				1,023	0.11	249	0.03				371	0.04	202	0.02		
5	Btw. White Lane & Panama Lane		4M							4M							LOS E	
	2014 Count	57,090		2,296	9,186	2,165	0.24	3,616	0.39		2,296	9,186	2,072	0.23	3,565	0.39		
	2040 Without Project	101,775		2,296	9,186	4,191	0.46	6,111	0.67		2,296	9,186	3,793	0.41	6,260	0.68		
	2040 With Project	115,515		2,296	9,186	5,546	0.60	6,442	0.70		2,296	9,186	4,334	0.47	6,781	0.74		
	Grapevine Specific Plan Net New Project Impacts	13,740				1,355	0.15	331	0.04				541	0.06	521	0.06		
6	Btw. Panama Lane & Jct Rte 119 W		4M							4M							LOS E	
	2014 Count	44,450		2,296	9,186	1,622	0.18	2,890	0.31		2,296	9,186	1,797	0.20	2,581	0.28		
	2040 Without Project	84,820		2,296	9,186	3,379	0.37	5,264	0.57		2,296	9,186	3,270	0.36	5,051	0.55		
	2040 With Project	101,686		2,296	9,186	4,881	0.53	5,667	0.62		2,296	9,186	3,890	0.42	5,899	0.64		
	Grapevine Specific Plan Net New Project Impacts	16,866				1,502	0.16	403	0.04				620	0.07	848	0.09		
7	Btw. Jct Rte 119 W & Houghton Rd		3M							3M							LOS D	
	2014 Count	35,470		2,296	6,889	1,229	0.18	2,345	0.34		2,141	6,422	1,533	0.24	1,987	0.31		
	2040 Without Project	62,960		2,296	6,889	2,334	0.34	4,037	0.59		2,141	6,422	2,683	0.42	3,538	0.55		
	2040 With Project	81,866		2,296	6,889	3,962	0.58	4,502	0.65		2,141	6,422	3,389	0.53	4,521	0.70		
	Grapevine Specific Plan Net New Project Impacts	18,906				1,628	0.24	465	0.07				706	0.11	983	0.15		
8	Btw. Houghton Rd & Jct Rte 223 E		3M							3M							LOS D	
	2014 Count	33,360		2,141	6,422	1,158	0.18	2,176	0.34		2,141	6,422	1,473	0.23	1,865	0.29		
	2040 Without Project	60,280		2,141	6,422	2,229	0.35	3,856	0.60		2,141	6,422	2,588	0.40	3,383	0.53		
	2040 With Project	79,672		2,141	6,422	3,900	0.61	4,331	0.67		2,141	6,422	3,318	0.52	4,386	0.68		
	Grapevine Specific Plan Net New Project Impacts	19,392				1,671	0.26	475	0.07				730	0.11	1,003	0.16		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
9	Btw. Jct Rte 223 E & Old U.S. 99		3M							3M							LOS D	
	2014 Count	27,270		2,141	6,422	945	0.15	1,788	0.28		2,133	6,400	1,233	0.19	1,488	0.23		
	2040 Without Project	54,555		2,141	6,422	1,964	0.31	3,513	0.55		2,133	6,400	2,390	0.37	3,044	0.48		
	2040 With Project	74,924		2,141	6,422	3,645	0.57	4,027	0.63		2,133	6,400	3,139	0.49	4,173	0.65		
	Grapevine Specific Plan Net New Project Impacts	20,369				1,681	0.26	514	0.08				749	0.12	1,129	0.18		
10	Btw. Old U.S. 99 & Herring Rd		3M							3M							LOS D	
	2014 Count	28,585		2,133	6,400	987	0.15	1,860	0.29		2,133	6,400	1,284	0.20	1,586	0.25		
	2040 Without Project	57,525		2,133	6,400	2,065	0.32	3,664	0.57		2,133	6,400	2,484	0.39	3,292	0.51		
	2040 With Project	80,517		2,133	6,400	3,842	0.60	4,255	0.66		2,133	6,400	3,327	0.52	4,680	0.73		
	Grapevine Specific Plan Net New Project Impacts	22,992				1,777	0.28	591	0.09				843	0.13	1,388	0.22		
11	Btw. Herring Rd & Sandrini Rd.		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	80,202		2,133	6,400	3,829	0.60	4,233	0.66		2,133	6,400	3,319	0.52	4,659	0.73		
	Grapevine Specific Plan Net New Project Impacts	23,067				1,777	0.28	597	0.09				850	0.13	1,389	0.22		
12	Btw. Sandrini Rd & David Rd		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	80,202		2,133	6,400	3,829	0.60	4,233	0.66		2,133	6,400	3,319	0.52	4,659	0.73		
	Grapevine Specific Plan Net New Project Impacts	23,067				1,777	0.28	597	0.09				850	0.13	1,389	0.22		
13	Btw. David Rd & Valpredo		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,133	6,400	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,133	6,400	2,364	0.37	3,104	0.49		
	2040 With Project	78,872		2,133	6,400	3,781	0.59	4,141	0.65		2,133	6,400	3,293	0.51	4,559	0.71		
	Grapevine Specific Plan Net New Project Impacts	24,357				1,818	0.28	669	0.10				929	0.15	1,455	0.23		
14	Btw. Valpredo & Jct Rte 166 W		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,096	6,288	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,096	6,288	2,364	0.38	3,104	0.49		
	2040 With Project	78,872		2,133	6,400	3,781	0.59	4,141	0.65		2,096	6,288	3,293	0.52	4,559	0.73		
	Grapevine Specific Plan Net New Project Impacts	24,357				1,818	0.28	669	0.10				929	0.15	1,455	0.23		
15	Btw. Jct Rte 166 W & Jct I-5		3M							3M							LOS D	
	2014 Count	26,965		2,096	6,288	934	0.15	1,733	0.28		2,054	6,162	1,219	0.20	1,507	0.24		
	2040 Without Project	54,150		2,096	6,288	1,926	0.31	3,373	0.54		2,054	6,162	2,363	0.38	3,168	0.51		
	2040 With Project	83,910		2,096	6,288	3,819	0.61	4,513	0.72		2,054	6,162	3,548	0.58	4,902	0.80		
	Grapevine Specific Plan Net New Project Impacts	29,760				1,893	0.30	1,140	0.18				1,185	0.19	1,734	0.28		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

Table J-3
Cumulative With Scenario 4 Analysis Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
1	Btw. Fort Tejon Rd & Lebec Rd		4M							4M							LOS D	
	2014 Count	72,000		1,839	7,355	1,390	0.19	2,426	0.33		2,036	8,143	1,346	0.17	2,304	0.28		
	2035 Without Project	119,850		1,839	7,355	2,895	0.39	4,255	0.58		2,036	8,143	3,170	0.39	3,640	0.45		
	2035 With Project	129,470		1,839	7,355	3,363	0.46	4,782	0.65		2,036	8,143	3,686	0.45	4,053	0.50		
	Grapevine Specific Plan Net New Project Impacts	9,620				468	0.06	527	0.07				516	0.06	413	0.05		
2	Btw. Lebec Rd & Frazier Mtn Park		4M							4M							LOS D	
	2014 Count	73,000		1,839	7,355	1,409	0.19	2,460	0.33		2,036	8,143	1,365	0.17	2,336	0.29		
	2035 Without Project	120,850		1,839	7,355	2,915	0.40	4,285	0.58		2,036	8,143	3,190	0.39	3,680	0.45		
	2035 With Project	130,484		1,839	7,355	3,383	0.46	4,814	0.65		2,036	8,143	3,706	0.46	4,094	0.50		
	Grapevine Specific Plan Net New Project Impacts	9,634				468	0.06	529	0.07				516	0.06	414	0.05		
3	Btw. Frazier Mtn Park & Gorman Rd		4M							4M							LOS D	
	2014 Count	70,000		2,036	8,143	1,351	0.17	2,359	0.29		1,401	5,606	1,309	0.23	2,240	0.4		
	2035 Without Project	114,850		2,036	8,143	2,775	0.34	4,015	0.49		1,401	5,606	3,020	0.54	3,380	0.60		
	2035 With Project	124,484		2,036	8,143	3,243	0.40	4,544	0.56		1,401	5,606	3,536	0.63	3,794	0.68		
	Grapevine Specific Plan Net New Project Impacts	9,634				468	0.06	529	0.06				516	0.09	414	0.07		
4	Btw. Gorman Rd & N Jct SR-138		4M							4M							LOS D	
	2014 Count	70,000		1,849	7,398	1,351	0.18	2,359	0.32		2,042	8,169	1,309	0.16	2,240	0.27		
	2035 Without Project	117,850		1,849	7,398	2,745	0.37	4,405	0.60		2,042	8,169	3,280	0.40	3,350	0.41		
	2035 With Project	127,484		1,849	7,398	3,213	0.43	4,934	0.67		2,042	8,169	3,796	0.46	3,764	0.46		
	Grapevine Specific Plan Net New Project Impacts	9,634				468	0.06	529	0.07				516	0.06	414	0.05		
5	Btw. N Jct SR-138 & Quail Lake Rd		4M							4M							LOS D	
	2014 Count	67,000		1,849	7,398	1,293	0.17	2,258	0.31		2,042	8,169	1,253	0.15	2,144	0.26		
	2035 Without Project	89,175		1,849	7,398	1,750	0.24	3,140	0.42		2,042	8,169	2,055	0.25	2,360	0.29		
	2035 With Project	95,143		1,849	7,398	2,035	0.28	3,467	0.47		2,042	8,169	2,380	0.29	2,617	0.32		
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.04	327	0.04				325	0.04	257	0.03		
6	Btw. Quail Lake Rd & S Jct SR-138		4M							4M							LOS D	
	2014 Count	67,000		1,375	5,500	1,293	0.24	2,258	0.41		1,375	5,500	1,253	0.23	2,144	0.39		
	2035 Without Project	90,175		1,375	5,500	1,750	0.32	3,590	0.65		1,375	5,500	2,055	0.37	2,360	0.43		
	2035 With Project	96,143		1,375	5,500	2,035	0.37	3,917	0.71		1,375	5,500	2,380	0.43	2,617	0.48		
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.05	327	0.06				325	0.06	257	0.05		
7	Btw. S Jct SR-138 & Smokey Bear Rd		4M							4M							LOS D	
	2014 Count	69,000		1,375	5,500	1,332	0.24	2,325	0.42		1,375	5,500	1,290	0.23	2,208	0.4		
	2035 Without Project	123,175		1,375	5,500	2,240	0.41	5,170	0.94		1,375	5,500	4,145	0.75	3,240	0.59		Yes
	2035 With Project	129,143		1,375	5,500	2,525	0.46	5,497	1.00		1,375	5,500	4,470	0.81	3,497	0.64		Yes
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.05	327	0.06				325	0.06	257	0.05		
8	Btw. Smokey Bear Rd & Vista Del Lago Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	131,143		1,489	5,957	2,625	0.44	5,587	0.94		1,489	5,957	4,570	0.77	3,637	0.61		Yes
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.05	327	0.06				325	0.05	257	0.04		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
9	Btw. Vista Del Lago Rd & Templin Hwy		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.4		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	131,143		1,489	5,957	2,625	0.44	5,587	0.94		1,489	5,957	4,570	0.77	3,637	0.61		Yes
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.05	327	0.06				325	0.05	257	0.04		
10	Btw. Templin Hwy & Lake Hughes Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	126,175		1,489	5,957	2,380	0.40	5,260	0.88		1,489	5,957	4,205	0.71	3,410	0.57		
	2035 With Project	132,143		1,489	5,957	2,665	0.45	5,587	0.94		1,489	5,957	4,530	0.76	3,667	0.62		Yes
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.05	327	0.06				325	0.05	257	0.04		
11	Btw. Lake Hughes Rd & Parker Rd		4M + 1 AUX							4M + 1 AUX							LOS E	
	2014 Count	73,000		1,856	7,422	1,504	0.2	1,949	0.26		1,856	7,422	1,854	0.25	2,519	0.34		
	2035 Without Project	154,175		1,856	8,422	5,360	0.64	8,080	0.96		1,856	8,422	8,405	1.00	5,050	0.60		
	2035 With Project	160,143		1,856	8,422	5,645	0.67	8,407	1.00		1,856	8,422	8,730	1.04	5,307	0.63		Yes
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.03	327	0.04				325	0.04	257	0.03		
12	Btw. Parker Rd & Hasley Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	108,000		1,856	7,422	2,225	0.30	2,884	0.39		1,856	7,422	2,743	0.37	3,726	0.5		
	2035 Without Project	171,175		1,856	9,022	5,360	0.59	7,030	0.78		1,856	9,022	7,285	0.81	5,120	0.57		
	2035 With Project	177,143		1,856	9,022	5,645	0.63	7,357	0.82		1,856	9,022	7,610	0.84	5,377	0.60		
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.03	327	0.04				325	0.04	257	0.03		
13	Btw. Hasley Cyn Rd & N Jct SR-126 (NB)		4M (+1H +1A)							4M (+1H)							LOS E	
	2014 Count	114,000		1,856	8,422	2,348	0.28	3,044	0.36		1,856	8,422	2,896	0.34	3,933	0.47		
	2035 Without Project	170,175		1,856	10,022	5,180	0.52	6,800	0.68		1,856	9,022	7,085	0.79	5,120	0.57		
	2035 With Project	176,143		1,856	10,022	5,465	0.55	7,127	0.71		1,856	9,022	7,410	0.82	5,377	0.60		
	Grapevine Specific Plan Net New Project Impacts	5,968				285	0.03	327	0.03				325	0.04	257	0.03		
14	Btw. N Jct SR-126 & Rye Cyn Rd		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	130,000		1,867	7,470	2,678	0.36	3,471	0.46		1,867	7,470	3,302	0.44	4,485	0.60		
	2035 Without Project	175,375		1,867	9,070	4,615	0.51	6,450	0.71		1,867	10,070	6,865	0.68	5,565	0.55		
	2035 With Project	181,063		1,867	9,070	4,892	0.54	6,762	0.75		1,867	10,070	7,172	0.71	5,807	0.58		
	Grapevine Specific Plan Net New Project Impacts	5,688				277	0.03	312	0.03				307	0.03	242	0.02		
15	Btw.Rye Cyn Rd & Magic Mountain Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	154,000		1,918	7,670	3,172	0.41	4,112	0.54		1,918	7,670	3,912	0.51	5,313	0.69		
	2035 Without Project	181,375		1,918	9,270	4,615	0.50	6,450	0.70		1,918	10,270	6,875	0.67	5,395	0.53		
	2035 With Project	187,063		1,918	9,270	4,892	0.53	6,762	0.73		1,918	10,270	7,182	0.70	5,637	0.55		
	Grapevine Specific Plan Net New Project Impacts	5,688				277	0.03	312	0.03				307	0.03	242	0.02		
16	Btw. Magic Mountain Pkwy & Valencia Blvd		4M (+1H + 1A)							4M (+1H)							LOS E	
	2014 Count	165,000		1,918	7,670	3,399	0.44	4,406	0.57		1,918	7,670	4,191	0.55	5,693	0.74		
	2035 Without Project	194,375		1,918	10,270	5,615	0.55	6,980	0.68		1,918	9,270	6,815	0.74	5,735	0.62		
	2035 With Project	200,063		1,918	10,270	5,892	0.57	7,292	0.71		1,918	9,270	7,122	0.77	5,977	0.64		
	Grapevine Specific Plan Net New Project Impacts	5,688				277	0.03	312	0.03				307	0.03	242	0.03		
17	Btw. Valencia Blvd & McBean Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	175,000		1,918	7,670	3,605	0.47	4,673	0.61		1,918	7,670	4,445	0.58	6,038	0.79		
	2035 Without Project	218,375		1,918	9,270	6,475	0.70	7,290	0.79		1,918	10,270	8,135	0.79	6,615	0.64		
	2035 With Project	224,063		1,918	9,270	6,752	0.73	7,602	0.82		1,918	10,270	8,442	0.82	6,857	0.67		
	Grapevine Specific Plan Net New Project Impacts	5,688				277	0.03	312	0.03				307	0.03	242	0.02		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
18	Btw. McBeach Pkwy & Lyons Ave/Pico Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	186,000		1,990	7,960	3,832	0.48	4,966	0.62		1,990	7,960	4,724	0.59	6,417	0.81		
	2035 Without Project	222,375		1,990	9,560	6,555	0.69	8,640	0.90		1,990	9,560	9,105	0.95	6,685	0.70		
	2035 With Project	228,063		1,990	9,560	6,832	0.71	8,952	0.94		1,990	9,560	9,412	0.98	6,927	0.72		
	Grapevine Specific Plan Net New Project Impacts	5,688			277	0.03	312	0.03			307	0.03	242	0.03				
19	Btw. Lyons Ave & Calgrove Blvd		4M (+1H + 1A)							4M (+1H + 1T)							LOS E	
	2014 Count	199,000		1,990	7,960	4,099	0.52	5,313	0.67		1,990	9,560	5,055	0.53	6,866	0.72		
	2035 Without Project	252,375		1,990	10,560	6,855	0.65	10,070	0.95		1,990	11,160	9,175	0.82	6,705	0.60		
	2035 With Project	258,063		1,990	10,560	7,132	0.68	10,382	0.98		1,990	11,160	9,482	0.85	6,947	0.62		
	Grapevine Specific Plan Net New Project Impacts	5,688			277	0.03	312	0.03			307	0.03	242	0.02				
20	Btw. Calgrove Blvd & SR-14		4M (+1H + 1T[C])							4M (+1H + 2T[C])							LOS E	
	2014 Count	200,000		1,990	9,160	4,120	0.45	5,340	0.58		1,990	10,360	5,080	0.49	6,900	0.67		
	2035 Without Project	253,375		1,990	10,760	5,725	0.53	9,190	0.85		1,990	11,960	9,805	0.82	6,845	0.57		
	2035 With Project	259,063		1,990	10,760	6,002	0.56	9,502	0.88		1,990	11,960	10,112	0.85	7,087	0.59		
	Grapevine Specific Plan Net New Project Impacts	5,688			277	0.03	312	0.03			307	0.03	242	0.02				
21	Btw. SR-14 & SR-210		3M (+1H+3A[F]+2T)							4M (+1H+2A[F]+2T)							LOS E	
	2014 Count	329,000		1,997	16,791	7,863	0.47	12,930	0.77			1,997	16,788	14,213	0.85	9,409		0.56
	2035 Without Project	383,650		1,997	16,791	9,130	0.54	15,005	0.89			1,997	16,788	16,580	0.99	10,885		0.65
	2035 With Project	387,286		1,997	16,791	9,302	0.55	15,218	0.91			1,997	16,788	16,762	1.00	11,045		0.66
	Grapevine Specific Plan Net New Project Impacts	3,636			172	0.01	213	0.01				182	0.01	160	0.01			
22	Btw. SR-210 & Roxford St		4M (+1H+ 1A[F])							5M (+1H)							LOS E	
	2014 Count	266,000		2,212	12,449	6,357	0.51	10,454	0.84		2,212	12,661	11,491	0.91	7,608	0.6		
	2035 Without Project	304,650		2,212	12,449	7,240	0.58	11,905	0.96		2,212	12,661	13,170	1.04	8,625	0.68		Yes
	2035 With Project	308,286		2,212	12,449	7,412	0.60	12,118	0.97		2,212	12,661	13,352	1.05	8,785	0.69		
	Grapevine Specific Plan Net New Project Impacts	3,636			172	0.01	213	0.02			182	0.01	160	0.01				
23	Btw. Roxford St & I-405		5M (+1H+ 1A[F])							5M (+1H+1A[F])							LOS E	
	2014 Count	283,000		2,212	14,661	6,764	0.46	11,122	0.76		2,212	14,661	12,226	0.83	8,094	0.55		
	2035 Without Project	318,650		2,212	14,661	7,580	0.52	12,465	0.85		2,212	14,661	13,790	0.94	9,035	0.62		
	2035 With Project	322,286		2,212	14,661	7,752	0.53	12,678	0.86		2,212	14,661	13,972	0.95	9,195	0.63		
	Grapevine Specific Plan Net New Project Impacts	3,636			172	0.01	213	0.01			182	0.01	160	0.01				
24	Btw. I-405 & San Fernando Mission Blvd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	141,000		2,190	8,171	3,370	0.41	5,541	0.68		2,190	8,171	6,091	0.75	4,033	0.49		
	2035 Without Project	161,650		2,190	8,171	3,830	0.47	6,295	0.77		2,190	8,171	7,010	0.86	4,545	0.56		
	2035 With Project	165,286		2,190	8,171	4,002	0.49	6,508	0.80		2,190	8,171	7,192	0.88	4,705	0.58		
	Grapevine Specific Plan Net New Project Impacts	3,636			172	0.02	213	0.03			182	0.02	160	0.02				

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
25	Btw Dawn Rd & Rosamond Blvd		2M							2M							LOS D	
	2014 Count	23,000		2,332	4,665	1,083	0.23	849	0.18		2,332	4,665	499	0.11	1,323	0.28		
	2035 Without Project	29,825		2,332	4,665	1,345	0.29	1,095	0.23		2,332	4,665	610	0.13	1,535	0.33		
	2035 With Project	30,089		2,332	4,665	1,353	0.29	1,103	0.24		2,332	4,665	632	0.14	1,550	0.33		
	Grapevine Specific Plan Net New Project Impacts	264				8	0.00	8	0.00				22	0.00	15	0.00		
26	Btw. Rosamond Blvd & Ave A		2M							2M							LOS D	
	2014 Count	30,000		2,339	4,679	1,413	0.3	1,107	0.24		2,339	4,679	651	0.14	1,725	0.37		
	2035 Without Project	34,825		2,339	4,679	1,715	0.37	1,335	0.29		2,339	4,679	720	0.15	1,855	0.40		
	2035 With Project	35,089		2,339	4,679	1,723	0.37	1,343	0.29		2,339	4,679	742	0.16	1,870	0.40		
	Grapevine Specific Plan Net New Project Impacts	264				8	0.00	8	0.00				22	0.00	15	0.00		
27	Ave A & N Jct Rte 138/Ave D		2M							2M							LOS D	
	2014 Count	34,000		2,339	4,679	1,129	0.24	1,261	0.27		2,339	4,679	1,244	0.27	1,567	0.34		
	2035 Without Project	55,825		2,339	4,679	2,115	0.45	2,125	0.45		2,339	4,679	1,950	0.42	2,335	0.50		
	2035 With Project	56,089		2,339	4,679	2,123	0.45	2,133	0.46		2,339	4,679	1,972	0.42	2,350	0.50		
	Grapevine Specific Plan Net New Project Impacts	264				8	0.00	8	0.00				22	0.00	15	0.00		
28	Btw. Jct Rte 138/Ave D & Ave F		2M							2M							LOS D	
	2014 Count	36,000		2,332	4,665	1,195	0.26	1,336	0.29		2,332	4,665	1,318	0.28	1,660	0.36		
	2035 Without Project	87,650		2,332	4,665	3,525	0.76	3,685	0.79		2,332	4,665	3,360	0.72	3,720	0.80		
	2035 With Project	88,913		2,332	4,665	3,580	0.77	3,765	0.81		2,332	4,665	3,427	0.73	3,771	0.81		
	Grapevine Specific Plan Net New Project Impacts	1,263				55	0.01	80	0.02				67	0.01	51	0.01		
29	Btw. Ave F & Ave G		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	102,650		2,332	4,665	4,235	0.91	3,835	0.82		2,332	4,665	3,690	0.79	4,460	0.96		Yes
	2035 With Project	103,913		2,332	4,665	4,290	0.92	3,915	0.84		2,332	4,665	3,757	0.81	4,511	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,263				55	0.01	80	0.02				67	0.01	51	0.01		
30	Btw. Ave G & Ave H		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	107,650		2,332	4,665	4,385	0.94	3,815	0.82		2,332	4,665	3,810	0.82	4,600	0.99		Yes
	2035 With Project	108,913		2,332	4,665	4,440	0.95	3,895	0.83		2,332	4,665	3,877	0.83	4,651	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,263				55	0.01	80	0.02				67	0.01	51	0.01		
31	Btw. Ave H & Ave I		2M							2M							LOS E	
	2014 Count	40,000		2,332	4,665	1,328	0.28	1,484	0.32		2,332	4,665	1,464	0.31	1,844	0.4		
	2035 Without Project	108,650		2,332	4,665	4,345	0.93	4,025	0.86		2,332	4,665	3,880	0.83	4,530	0.97		
	2035 With Project	109,913		2,332	4,665	4,400	0.94	4,105	0.88		2,332	4,665	3,947	0.85	4,581	0.98		
	Grapevine Specific Plan Net New Project Impacts	1,263				55	0.01	80	0.02				67	0.01	51	0.01		
32	Btw. Ave I & Ave J		3M							3M							LOS E	
	2014 Count	47,000		2,332	6,997	1,560	0.22	1,744	0.25		2,332	6,997	1,720	0.25	2,167	0.31		
	2035 Without Project	114,650		2,332	6,997	4,605	0.66	4,365	0.62		2,332	6,997	3,950	0.56	4,890	0.70		
	2035 With Project	117,151		2,332	6,997	4,730	0.68	4,498	0.64		2,332	6,997	4,083	0.58	4,999	0.71		
	Grapevine Specific Plan Net New Project Impacts	2,501				125	0.02	133	0.02				133	0.02	109	0.02		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
33	Btw. Ave J & 20th St W		3M							3M							LOS E	
	2014 Count	42,000		2,339	7,016	1,394	0.2	1,558	0.22		2,339	7,016	1,537	0.22	1,936	0.28		
	2035 Without Project	99,650		2,339	7,016	4,105	0.59	3,905	0.56		2,339	7,016	3,500	0.50	4,370	0.62		
	2035 With Project	102,088		2,339	7,016	4,230	0.60	4,034	0.58		2,339	7,016	3,625	0.52	4,479	0.64		
	Grapevine Specific Plan Net New Project Impacts	2,438				125	0.02	129	0.02				125	0.02	109	0.02		
34	Btw. 20th St W & Ave K		3M							3M							LOS E	
	2014 Count	59,000		2,339	7,016	1,959	0.28	2,189	0.31		2,339	7,016	2,159	0.31	2,720	0.39		
	2035 Without Project	118,650		2,339	7,016	4,715	0.67	4,585	0.65		2,339	7,016	4,160	0.59	5,180	0.74		
	2035 With Project	121,088		2,339	7,016	4,840	0.69	4,714	0.67		2,339	7,016	4,285	0.61	5,289	0.75		
	Grapevine Specific Plan Net New Project Impacts	2,438				125	0.02	129	0.02				125	0.02	109	0.02		
35	Btw. Ave K & Ave L		3M							3M							LOS E	
	2014 Count	74,000		2,339	7,016	2,457	0.35	2,745	0.39		2,339	7,016	2,708	0.39	3,411	0.49		
	2035 Without Project	127,650		2,339	7,016	4,975	0.71	4,835	0.69		2,339	7,016	4,440	0.63	5,650	0.81		
	2035 With Project	130,088		2,339	7,016	5,100	0.73	4,964	0.71		2,339	7,016	4,565	0.65	5,759	0.82		
	Grapevine Specific Plan Net New Project Impacts	2,438				125	0.02	129	0.02				125	0.02	109	0.02		
36	Btw. Ave L & Ave M		3M							3M							LOS E	
	2014 Count	89,000		2,339	7,016	2,955	0.42	3,302	0.47		2,339	7,016	3,257	0.46	4,103	0.58		
	2035 Without Project	100,650		2,339	7,016	3,875	0.55	3,435	0.49		2,339	7,016	3,630	0.52	4,540	0.65		
	2035 With Project	102,746		2,339	7,016	3,984	0.57	3,542	0.50		2,339	7,016	3,737	0.53	4,637	0.66		
	Grapevine Specific Plan Net New Project Impacts	2,096				109	0.02	107	0.02				107	0.02	97	0.01		
37	Btw. Ave M & Ave N		3M							3M							LOS E	
	2014 Count	92,000		2,339	7,016	3,054	0.44	3,413	0.49		2,339	7,016	3,367	0.48	4,241	0.60		
	2035 Without Project	100,650		2,339	7,016	3,895	0.56	3,365	0.48		2,339	7,016	3,550	0.51	4,710	0.67		
	2035 With Project	102,474		2,339	7,016	3,996	0.57	3,449	0.49		2,339	7,016	3,639	0.52	4,801	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,824				101	0.01	84	0.01				89	0.01	91	0.01		
38	Btw. Ave N & 10th St W		3M							3M							LOS E	
	2014 Count	87,000		2,339	7,016	2,888	0.41	3,228	0.46		2,339	7,016	3,184	0.45	4,011	0.57		
	2035 Without Project	98,650		2,339	7,016	4,085	0.58	3,215	0.46		2,339	7,016	3,280	0.47	4,700	0.67		
	2035 With Project	100,405		2,339	7,016	4,186	0.60	3,291	0.47		2,339	7,016	3,369	0.48	4,785	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,755				101	0.01	76	0.01				89	0.01	85	0.01		
39	Btw. 10th St W & Rancho Vista Blvd		3M							3M							LOS E	
	2014 Count	87,000		2,225	6,675	2,888	0.43	3,228	0.48		2,225	6,675	3,184	0.48	4,011	0.60		
	2035 Without Project	93,650		2,225	6,675	3,965	0.59	3,165	0.47		2,225	6,675	3,170	0.47	4,510	0.68		
	2035 With Project	95,172		2,225	6,675	4,059	0.61	3,241	0.49		2,225	6,675	3,232	0.48	4,582	0.69		
	Grapevine Specific Plan Net New Project Impacts	1,522				94	0.01	76	0.01				62	0.01	72	0.01		
40	Btw. Rancho Vista Blvd & S Jct Rte 138		3M							3M							LOS E	
	2014 Count	84,000		2,225	6,675	2,789	0.42	3,116	0.47		2,225	6,675	3,074	0.46	3,872	0.58		
	2035 Without Project	94,650		2,225	6,675	4,015	0.60	3,085	0.46		2,225	6,675	3,140	0.47	4,570	0.68		
	2035 With Project	95,851		2,225	6,675	4,077	0.61	3,161	0.47		2,225	6,675	3,193	0.48	4,618	0.69		
	Grapevine Specific Plan Net New Project Impacts	1,201				62	0.01	76	0.01				53	0.01	48	0.01		
41	Btw. S Jct Rte 138 & Ave S		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	81,000		2,225	6,050	2,689	0.44	3,005	0.5		2,225	8,275	2,965	0.36	3,734	0.45		
	2035 Without Project	91,650		2,225	6,050	3,535	0.58	3,475	0.57		2,225	8,275	3,260	0.39	4,590	0.55		
	2035 With Project	92,745		2,225	6,050	3,590	0.59	3,551	0.59		2,225	8,275	3,309	0.40	4,629	0.56		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.00		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
42	Btw. Ave S & Pearlblossom/Sierra Hwy		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	71,000		2,225	6,050	2,357	0.39	2,634	0.44		2,225	8,275	2,599	0.31	3,273	0.4		
	2035 Without Project	75,650		2,225	6,050	3,015	0.50	2,655	0.44		2,225	8,275	2,660	0.32	3,820	0.46		
	2035 With Project	76,745		2,225	6,050	3,070	0.51	2,731	0.45		2,225	8,275	2,709	0.33	3,859	0.47		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.00		
43	Btw. Pearlblossom/Sierra Hwy & Angeles Forest		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	83,000		2,225	6,050	2,756	0.46	3,079	0.51		2,225	8,275	3,038	0.37	3,826	0.46		
	2035 Without Project	88,650		2,225	6,050	3,225	0.53	3,065	0.51		2,225	8,275	3,100	0.37	4,380	0.53		
	2035 With Project	89,745		2,225	6,050	3,280	0.54	3,141	0.52		2,225	8,275	3,149	0.38	4,419	0.53		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.00		
44	Btw. Angeles Forest Hwy & Soledad		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	144,000		2,225	8,275	3,154	0.38	3,525	0.43		2,225	6,050	3,477	0.57	4,380	0.72		
	2035 Without Project	114,650		2,225	8,275	3,845	0.46	3,875	0.47		2,225	6,050	3,620	0.60	6,000	0.99		
	2035 With Project	115,745		2,225	8,275	3,900	0.47	3,951	0.48		2,225	6,050	3,669	0.61	6,039	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.01		
45	Btw. Soledad & Santiago Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	113,650		2,236	6,071	3,845	0.63	3,905	0.64		2,236	6,071	3,430	0.56	5,640	0.93		
	2035 With Project	114,745		2,236	6,071	3,900	0.64	3,981	0.66		2,236	6,071	3,479	0.57	5,679	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.01		
46	Btw. Santiago Rd & Crown Valley Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	94,000		2,236	6,071	3,121	0.51	3,487	0.57		2,236	6,071	3,440	0.57	4,333	0.71		
	2035 Without Project	108,650		2,236	6,071	3,625	0.60	3,955	0.65		2,236	6,071	3,430	0.56	5,420	0.89		
	2035 With Project	109,745		2,236	6,071	3,680	0.61	4,031	0.66		2,236	6,071	3,479	0.57	5,459	0.90		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.01		
47	Btw. Crown Valley Rd & Ward Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	138,650		2,236	6,071	3,765	0.62	3,875	0.64		2,236	6,071	3,460	0.57	5,670	0.93		
	2035 With Project	139,745		2,236	6,071	3,820	0.63	3,951	0.65		2,236	6,071	3,509	0.58	5,709	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.01		
48	Btw. Ward Rd & Escondido Cyn Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	93,000		2,189	8,167	3,088	0.38	3,450	0.42		2,189	5,978	3,404	0.57	4,287	0.72		
	2035 Without Project	115,650		2,189	8,167	3,745	0.46	4,445	0.54		2,189	5,978	3,650	0.61	5,720	0.96		
	2035 With Project	116,745		2,189	8,167	3,800	0.47	4,521	0.55		2,189	5,978	3,699	0.62	5,759	0.96		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.01		
49	Btw. Escondido Cyn Rd & Agua Dulce Cyn Rd		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	93,000		2,236	8,307	1,776	0.21	4,669	0.56		2,236	6,071	4994	0.82	2,613	0.43		
	2035 Without Project	114,650		2,236	8,307	2,285	0.28	5,555	0.67		2,236	6,071	5,320	0.88	3,950	0.65		
	2035 With Project	115,745		2,236	8,307	2,340	0.28	5,631	0.68		2,236	6,071	5,369	0.88	3,989	0.66		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.01		
50	Btw. Agua Dulce Cyn Rd & Soledad Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	96,000		2,236	8,307	1,834	0.22	4,819	0.58		2,236	6,071	5,155	0.85	2,698	0.44		
	2035 Without Project	116,850		2,236	8,307	2,415	0.29	5,565	0.67		2,236	6,071	5,220	0.86	4,070	0.67		
	2035 With Project	117,945		2,236	8,307	2,470	0.30	5,641	0.68		2,236	6,071	5,269	0.87	4,109	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
51	Btw. Shadow Pines/Soledad Rd & Sand Cyn Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	99,000		2,236	6,071	1,891	0.31	4,970	0.82		2,236	6,071	5,316	0.88	2,782	0.46		
	2035 Without Project	115,650		2,236	6,071	2,395	0.39	5,205	0.86		2,236	6,071	5,380	0.89	3,820	0.63		
	2035 With Project	116,745		2,236	6,071	2,450	0.40	5,281	0.87		2,236	6,071	5,429	0.89	3,859	0.64		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.01		
52	Btw. Sand Cyn Rd & Via Princessa		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	112,000		2,215	8,246	2,139	0.26	5,622	0.68		2,215	8,246	6,014	0.73	3,147	0.38		
	2035 Without Project	135,650		2,215	8,246	2,575	0.31	6,365	0.77		2,215	8,246	6,840	0.83	4,770	0.58		
	2035 With Project	136,745		2,215	8,246	2,630	0.32	6,441	0.78		2,215	8,246	6,889	0.84	4,809	0.58		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.00		
53	Btw. Via Princessa & Golden Valley Rd		3M (+1H+1A)							3M (+1H+1A)							LOS E	
	2014 Count	144,000		2,215	9,246	2,750	0.3	7,229	0.78		2,215	9,246	7,733	0.84	4,046	0.44		
	2035 Without Project	172,650		2,215	9,246	3,255	0.35	7,895	0.85		2,215	9,246	8,590	0.93	5,470	0.59		
	2035 With Project	173,745		2,215	9,246	3,310	0.36	7,971	0.86		2,215	9,246	8,639	0.93	5,509	0.60		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.00		
54	Btw. Golden Valley Rd & Placerita Cyn Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	144,000		2,215	8,246	2,750	0.33	7,229	0.88		2,215	8,246	7,733	0.94	4,046	0.49		
	2035 Without Project	169,650		2,215	8,246	3,105	0.38	7,645	0.93		2,215	8,246	8,520	1.03	5,140	0.62		
	2035 With Project	170,745		2,215	8,246	3,160	0.38	7,721	0.94		2,215	8,246	8,569	1.04	5,179	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.00		
55	Btw. Placerita Cyn Rd & San Fernando Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	151,000		2,215	8,246	2,884	0.35	7,580	0.92		2,215	8,246	8,109	0.98	4,243	0.51		
	2035 Without Project	173,650		2,215	8,246	3,155	0.38	7,995	0.97		2,215	8,246	8,520	1.03	5,110	0.62		
	2035 With Project	174,745		2,215	8,246	3,210	0.39	8,071	0.98		2,215	8,246	8,569	1.04	5,149	0.62		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.01	76	0.01				49	0.01	39	0.00		
56	Btw. San Fernando Rd//Newhall Ave & Jct I-5		5M (+1H)							5M (+1H)							LOS E	
	2014 Count	166,000		2,215	12,676	3,171	0.25	8,333	0.66		2,215	12,676	8,914	0.7	4,665	0.37		
	2035 Without Project	180,650		2,215	12,676	3,145	0.25	8,625	0.68		2,215	12,676	9,310	0.73	5,050	0.40		
	2035 With Project	181,745		2,215	12,676	3,200	0.25	8,701	0.69		2,215	12,676	9,359	0.74	5,089	0.40		
	Grapevine Specific Plan Net New Project Impacts	1,095				55	0.00	76	0.01				49	0.00	39	0.00		
SR-138																		
57	Between Jct I-5 and Gorman Post Rd		2M							2M							LOS D	
	2014 Count	4,500		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	71,675		1,904	3,808	2,525	0.66	3,830	1.01		1,904	3,808	3,855	1.01	2,725	0.72		
	2035 With Project	75,349		1,904	3,808	2,693	0.71	4,028	1.06		1,904	3,808	4,064	1.07	2,885	0.76		
	Grapevine Specific Plan Net New Project Impacts	3,674				168	0.04	198	0.05				209	0.06	160	0.04		
58	Between Gorman Post Rd and Old Ridge Route Rd		1M							1M							LOS D	
	2014 Count	4,900		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	83,675		1,904	1,904	2,785	1.46	4,680	2.46		1,904	1,904	4,525	2.38	3,055	1.60		
	2035 With Project	87,349		1,904	1,904	2,953	1.55	4,878	2.56		1,904	1,904	4,734	2.49	3,215	1.69		
	Grapevine Specific Plan Net New Project Impacts	3,674				168	0.09	198	0.10				209	0.11	160	0.09		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-138																		
59	Between Old Ridge Route Rd and 300th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	87,225		1,904	1,904	2,855	1.50	4,805	2.52		1,904	1,904	4,645	2.44	3,130	1.64		Yes
	2035 With Project	89,999		1,904	1,904	2,980	1.57	4,950	2.60		1,904	1,904	4,810	2.53	3,251	1.71		Yes
	Grapevine Specific Plan Net New Project Impacts	2,774				125	0.07	145	0.08				165	0.09	121	0.07		
60	Between 300th St West and 245TH St		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	152	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	72,225		1,904	1,904	3,495	1.84	2,885	1.52		1,904	1,904	2,915	1.53	3,830	2.01		Yes
	2035 With Project	74,999		1,904	1,904	3,620	1.90	3,030	1.59		1,904	1,904	3,080	1.62	3,951	2.07		Yes
	Grapevine Specific Plan Net New Project Impacts	2,774				125	0.06	145	0.07				165	0.09	121	0.06		
61	Between 245th St West and 190th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	89	0.05	147	0.09			1,700	113	0.07	87	0.05		
	2035 Without Project	62,225		1,904	1,904	2,595	1.36	2,325	1.22		1,904	1,904	2,465	1.29	3,050	1.60		Yes
	2035 With Project	64,999		1,904	1,904	2,720	1.43	2,470	1.30		1,904	1,904	2,630	1.38	3,171	1.67		Yes
	Grapevine Specific Plan Net New Project Impacts	2,774				125	0.07	145	0.08				165	0.09	121	0.07		
62	Between 190th St West and 110th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	52,999		1,962	1,962	2,120	1.08	1,900	0.97		1,962	1,962	2,180	1.11	2,541	1.29		Yes
	Grapevine Specific Plan Net New Project Impacts	2,774				125	0.06	145	0.08				165	0.08	121	0.06		
63	Between 110th St West and 60th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	52,377		1,962	1,962	2,089	1.06	1,869	0.95		1,962	1,962	2,144	1.09	2,514	1.28		Yes
	Grapevine Specific Plan Net New Project Impacts	2,152				94	0.04	114	0.06				129	0.06	94	0.05		
64	Between 60th St West and Jct Rte 14 North		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	141	0.08	177	0.1			1,700	123	0.07	148	0.09		
	2035 Without Project	55,225		1,962	1,962	2,355	1.20	1,895	0.97		1,962	1,962	1,985	1.01	2,700	1.38		Yes
	2035 With Project	56,752		1,962	1,962	2,417	1.23	1,983	1.01		1,962	1,962	2,074	1.06	2,766	1.41		Yes
	Grapevine Specific Plan Net New Project Impacts	1,527				62	0.03	88	0.04				89	0.05	66	0.03		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-126																		
65	Btw. N Jct SR-126 & Henry Mayo Dr		3M							3M							LOS D	
	2014 Count	29,025			6,288	1,264	0.20	1,618	0.26			6,288	1,406	0.22	1,517	0.24		
	2035 Without Project	31,145			6,288	1,369	0.22	1,802	0.29			6,288	1,518	0.24	1,540	0.24		
	2035 With Project	31,425			6,288	1,377	0.22	1,817	0.29			6,288	1,536	0.24	1,555	0.25		
	Project Impact	280			6,288	8	0.00	15	0.00			6,288	18	0.00	15	0.00		
66	Btw. Henry Mayo Dr & Commerce Center Dr		2M							2M							LOS D	
	2014 Count	29,025			4,665	1,264	0.27	1,618	0.35			4,665	1,406	0.30	1,517	0.33		
	2035 Without Project	31,145			4,665	1,369	0.29	1,802	0.39			4,665	1,518	0.33	1,540	0.33		
	2035 With Project	31,425			4,665	1,377	0.30	1,817	0.39			4,665	1,536	0.33	1,555	0.33		
	Grapevine Specific Plan Net New Project Impacts	280			4,665	8	0.00	15	0.00			4,665	18	0.00	15	0.00		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

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7 SCENARIO 9 ANALYSIS

This section analyzes the potential transportation and traffic impacts that could occur in Scenario 9. The impact assessment was conducted for cumulative plus project conditions and evaluates the same local intersections, local roadways, local freeway segments, state highway and freeway segments to the north and south of the Project site and interim access impacts considered in the Updated 28.7% HBW ICR analysis summarized in Section 2.3 of this report. Scenario 9 includes 14,000 dwelling units with legally required schools and parks and no complementary commercial/light industrial amenities or onsite employment-generating land uses.

7.1 SCENARIO 9 ANALYSIS METHODOLOGY AND ICR ASSUMPTIONS

Table A-4 summarizes the Scenario 9 daily and AM and PM peak hour number of trips generated by proposed Project land uses. The Scenario 9 ADT is 145,616 trips compared with 197,685 trips in the Updated 28.7% HBW ICR analysis and 201,542 trips in the FEIR analysis. Based on the 2016 ITE Manual trip generation rates and the 2014 Kern COG model, the average weekday VMT in Scenario 9 is 4,336,327 miles compared with 3,114,939 miles in the Updated 28.7% HBW ICR analysis and 3,175,626 miles in the FEIR analysis.

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Table A-4: ITE Trip Generation Estimate – Scenario 9 Analysis

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	In	Out	Total	In	Out	
Residential									
Residential	9,800 DUs	210	7,252	1,813	5,439	9,702	6,112	3,590	92,512
Village Center Residential	4,200 DUs	220	1,932	444	1,488	2,352	1,482	870	30,744
Non-Residential									
Village Center Commercial - Retail ¹	0	820 ¹	0	0	0	0	0	0	0
Village Center Commercial - Office ¹	0	710 ¹	0	0	0	0	0	0	0
Freeway Commercial	0	820	0	0	0	0	0	0	0
Office/Research & Development	0	710	0	0	0	0	0	0	0
Light Industrial/Warehouse ²	0	130/150 ²	0	0	0	0	0	0	0
Schools & Parks									
Elementary Schools ⁴	5,798 students	520	3,885	2,098	1,787	986	473	513	10,958
Middle Schools ⁴	1,960 students	522	1,137	614	523	333	163	170	4,176
High Schools ⁴	3,500 students	530	1,820	1,219	601	490	235	255	7,106
Parks ³	154 acres	411							120
Total			16,025	6,188	9,837	13,863	8,466	5,397	145,616

Notes: DUs = dwelling units; ksf = thousand square feet

Trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 10th Edition*

¹Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)

²Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)

³City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information.

⁴Student enrollment based on number of students anticipated per residential dwelling unit based on discussions with school district

Source: *Trip Generation Manual, 10th Edition* (Institute of Transportation Engineers, 2016).

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Table B-4 summarizes the ICRs used in Scenario 9. The Scenario 9 ICR for all trips combined is 21.3 percent in the AM peak hour and 6.5 percent in the PM peak hour, which are 38.5 percentage points lower during the AM peak hour and 57.7 percentage points lower during the PM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. As shown in Table B-9, due to the absence of any onsite employment-generating land uses, the ICR for Home-Based Work trips in Scenario 9 assumes that 100 percent of all Home-Based Work trips will be external during both the AM and PM peak hours. The AM peak hour ICR is higher than in the PM peak hour because trips to onsite schools are assumed to occur during the AM peak hour. Trips from onsite schools would occur outside (generally prior to) the PM peak hour.

Table B-4: Scenario 9 Estimated Project Trip Internalization by Peak Hour

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips ¹	% Internal ²	Total Internalization % ³	% of Trips ¹	% Internal ²	Total Internalization % ³
Home-Based Work	47.8%	0.0%	0.0%	28.1%	0.0%	0.0%
Home-Based Other/ Non-Home-Based	52.2%	40.8%	21.3%	71.9%	9.0%	6.5%
Total			21.3%			6.5%

Notes: ¹Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17 of Appendix T, page 117.

²Internalization percentage by trip purpose. Home-Based work trip internalization shown in Table 18 of Appendix T, page 118. Home-Based other/non-home-based trip internalization shown in Table 22 of Appendix T, page 139.

³Overall internalization estimate calculation.

Source: Fehr & Peers, April 2019.

Table C-4 summarizes the percentage of trips traveling to the north and south of the Project during the AM and PM peak hours in Scenario 9. About 62.6 percent and 77.3 percent of peak AM and PM Project trips (respectively) would travel to and from the north (i.e. Bakersfield, Arvin-Lamont and Eastern Kern County) and 16.1 percent and 16.2 percent of peak AM and PM Project trips (respectively) would travel to and from the south (i.e. southern Kern County, Antelope Valley, Santa Clarita valley and metropolitan Los Angeles).

The percentage of all Scenario 9 trips to the north is 34.3 percentage points or 121 percent greater during the AM peak hour and 53 percentage points or 218 percent greater during the PM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. The share of all Scenario 9 trips to the south is 4.2 percentage points or 35.3 percent greater during the AM peak hour and 4.7 percentage points or 40.9 percent greater during the PM peak hours than in the Updated 28.7% HBW ICR and FEIR analysis (see Table A-FEIR and Table A-AFA).

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**Table C-4: Scenario 9 Build-out Trip Distribution Estimate -
Cumulative Plus Project Conditions (2040)**

Origin/Destination	Trip Distribution Estimate	
	<i>A.M. Peak Hour</i>	<i>P.M. Peak Hour</i>
Project Area	21.3%	6.5%
North of Grapevine	62.6%	77.3%
West Bakersfield via I-5	6.6%	8.3%
North of Bakersfield via I-5	3.3%	4.1%
Bakersfield Metropolitan Area via SR 99	36.1%	44.6%
North of Bakersfield via SR 99	3.3%	4.1%
Arvin-Lamont Area	10.0%	12.1%
Eastern Kern County via SR 58	3.3%	4.1%
South of Grapevine	16.1%	16.2%
Southern Kern County (Frazier Park/Tejon Mountain Village)	2.0%	1.8%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	6.0%	5.4%
Santa Clarita Valley Area ¹	4.1%	3.7%
Los Angeles Basin/Orange County/Inland Empire	4.0%	5.3%

Source: Fehr & Peers, May 2019

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7.2 SCENARIO 9 ANALYSIS OF IMPACTS TO LOCAL INTERSECTIONS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

As shown in Table D-4, Scenario 9 would result in new significant impacts to the following two (2) local intersections compared with the Updated 28.7% HBW ICR and FEIR analyses:

- S. Wheeler Ridge Road / Laval Road – PM Peak Hour
- Street C / Street H – AM Peak Hour

Three (3) local intersections that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 9 under cumulative plus project conditions:

- Street D / Street A – AM and PM Peak Hour
- Street C / Street G – PM Peak Hour
- Street I / Street A – PM Peak Hour

Two (2) local intersections that are significantly impacted in either the Updated 28.7% HBW ICR or FEIR analyses would not be significantly impacted and would operate at acceptable LOS levels in Scenario 9 under cumulative plus project conditions:

- Street C / Street A – PM Peak Hour
- Street C / Street H – PM Peak Hour

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Table D-4: Scenario 9 Analysis Peak Hour Intersection Operations Cumulative Plus Project Conditions (2040)

Intersection	Traffic Control	Peak Hour	Cumulative No Project		Cumulative + Scenario 9 Project	
			Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	16	B	18	B
		P.M.	16	B	19	B
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	14	B	15	B
		P.M.	20	C	40	D
3. S. Wheeler Ridge Road / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A
		P.M.	4	A	4	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	20	C	18	B
		P.M.	45	D	<u>104</u>	<u>F</u>
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		36	D
		P.M.			51	D
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		41	D
		P.M.			44	D
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		17	B
		P.M.			30	C
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		<u>273</u>	<u>F</u>
		P.M.			<u>126</u>	<u>F</u>
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		12	B
		P.M.			<u>113</u>	<u>F</u>
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		<u>173</u>	<u>F</u>
		P.M.			12	B
11. Street I / Street A ⁴	Side-Street Stop	A.M.	Does Not Exist		0 (15)	A (C)
		P.M.			<u>4 (316)</u>	<u>A (F)</u>

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.

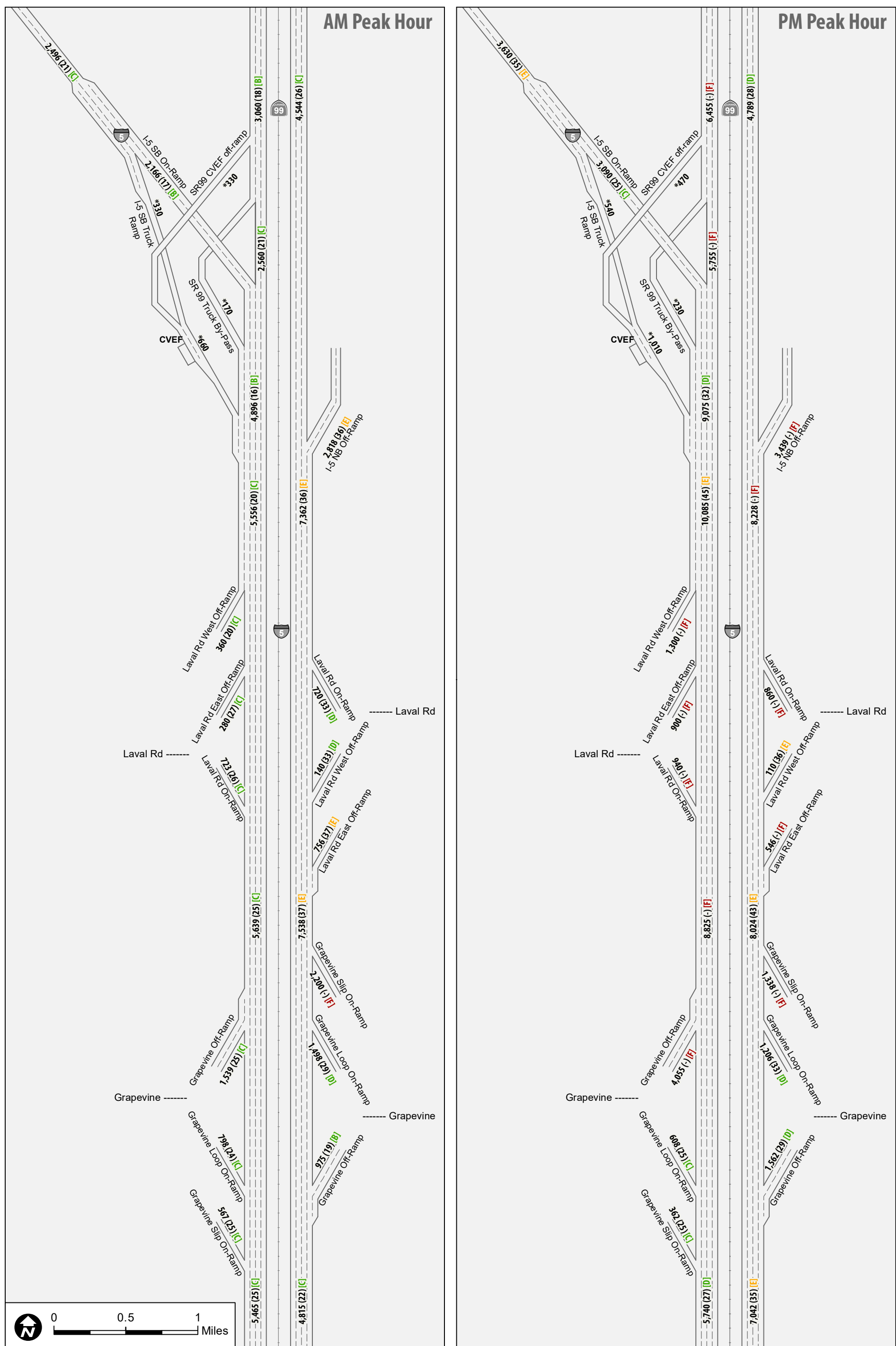
³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).

⁴ The shared movement with the greatest

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.



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7.3 SCENARIO 9 LOCAL ROADWAY IMPACTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS, PM PEAK HOUR

Table E-4 shows the Scenario 9 impacts to local roadway segments under cumulative plus project conditions during the PM peak hour, the period of heaviest roadway use and when the combination of vehicle trip purposes is at the highest level. As shown in Table E-4, Scenario 9 would result in a new significant impact to the following local roadway compared with the Updated 28.7% HBW ICR and FEIR analyses:

- Wheeler Ridge Road: North of Santa Elena Drive
- Street C: Aqueduct Crossing to E Street

One local roadway that is significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 9 under cumulative plus project conditions:

- Future Street A between Street D and Street I

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**Table E-4: Scenario 9 P.M. Peak Hour Roadway Capacity Evaluation –
Cumulative Plus Project Conditions (2040)**

Roadway Segment	Classification	Existing Conditions			Cumulative Plus Scenario 9 Project		
		P.M. Peak Hour Volume	V/C ¹	LOS ²	P.M. Peak Hour Volume	V/C ¹	LOS ²
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	<u>2,062</u>	<u>0.76</u>	<u>E</u>
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			<u>2,240</u>	<u>1.25</u>	<u>F</u>
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			2,850	0.84	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			700	0.39	C
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			130	0.07	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			575	0.32	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			505	0.28	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			1,120	0.63	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			55	0.03	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			315	.018	C
11. Dennis McCarthy Rd.: North of Laval Rd	2-lane Collector Street	592	0.36	D	940	0.53	D
12. Street A: Street D to Street I	4-lane Arterial Street	Does Not Exist			<u>3,570</u>	<u>1.05</u>	<u>F</u>

Notes: ¹V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.

²Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.
Source: Fehr & Peers, April 2019.

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7.4 SCENARIO 9 IMPACTS TO LOCAL FREEWAY SEGMENTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table F-4 summarizes the Scenario 9 LOS levels on 33 freeway segments in the vicinity of the Project area under cumulative plus project conditions. Scenario 9 would result in the following new significant impacts to local freeway segments compared with the FEIR and Updated 28.7% HBW ICR analysis:

- I-5 Northbound – Grapevine Slip On-Ramp - AM and PM Peak Hours
- I-5 Northbound – Grapevine Slip On-Ramp to Laval Road East Off-Ramp - AM and PM Peak Hours
- I-5 Northbound – Laval Road East Off-Ramp - AM and PM Peak Hours
- I-5 Northbound – Laval Road West Off-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road On-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road On-Ramp to SR 99 Off-Ramp - AM and PM Peak Hours
- I-5 Northbound – I-5 Northbound Off-ramp - AM and PM Peak Hours
- SR 99 Southbound – North of I-5 Junction - PM Peak Hour
- SR 99 Southbound – CVEF Off-Ramp - PM Peak Hour
- SR 99 Southbound – Truck Bypass Off-Ramp - PM Peak Hour
- SR 99 Southbound – SR 99 Auto Lanes to I-5 Southbound - PM Peak Hour
- I-5 Southbound – North of SR 99 Junction - PM Peak Hour
- I-5 Southbound – I-5 Southbound Auto / Truck Bypass - PM Peak Hour
- I-5 Southbound – SR 99 to Laval Road - PM Peak Hour
- I-5 Southbound – Laval Road West Off-Ramp - PM Peak Hour
- I-5 Southbound – Laval Road East Off-Ramp - PM Peak Hour
- I-5 Southbound – Laval Road On-Ramp - PM Peak Hour
- I-5 Southbound – Laval Road to Grapevine - PM Peak Hour
- I-5 Southbound – Grapevine Off-Ramp - PM Peak Hour

The following local freeway segments that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 9 under cumulative plus project conditions:

- Fort Tejon to Base of Grapevine Grade (6% Downgrade) I-5 - PM Peak Hour
- Base of Grapevine Grade to Fort Tejon (6% Upgrade) - AM and PM Peak Hours

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**Table F-4: Scenario 9 Analysis Peak Hour Freeway Operations –
Cumulative Plus Project Conditions (2040)**

Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
I-5 Northbound						
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	26	D	30	D
		P.M.	<u>44</u>	<u>E</u>	-	<u>F</u>
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	Does Not Exist		22	C
		P.M.			35	D
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	23	C	19*	B*
		P.M.	31	D	29*	D*
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		29	D
		P.M.			33	D
5. Grapevine Slip On-Ramp	Merge	A.M.	20	B	-	<u>F</u>
		P.M.	26	C	-	<u>F</u>
6. Grapevine to Laval Road	Basic	A.M.	18	C	<u>37</u>	<u>E</u>
		P.M.	28	C	<u>43</u>	<u>E</u>
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	27	C	<u>37*</u>	<u>E*</u>
		P.M.	36	E	-	<u>F*</u>
8. Laval Road West Off-Ramp	Diverge	A.M.	19	B	33	D
		P.M.	27	C	<u>36</u>	<u>E</u>
9. Laval Road On-Ramp	Merge	A.M.	22	C	33	D
		P.M.	31	D	-	<u>F</u>
10. Laval Road to SR-99	Basic	A.M.	17	B	<u>36</u>	<u>E</u>
		P.M.	27	D	-	<u>F</u>
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	17	B	<u>36</u>	<u>E</u>
		P.M.	27	D	-	<u>F</u>

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
12. North of SR 99 Junction	Basic	A.M.	17	B	26	C
		P.M.	32	D	28	D
SR 99 Northbound						
13. North of I-5 Junction	Basic	A.M.	12	B	25	C
		P.M.	17	B	33	D
SR 99 Southbound						
1. North of I-5 Junction	Basic	A.M.	13	B	18	B
		P.M.	16	B	-	<u>F</u>
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		24	C
		P.M.			-	<u>F</u>
3. Truck Bypass Off-Ramp ³	Basic (Major Diverge)	A.M.	13	B	15	B
		P.M.	16	B	-	<u>F</u>
4. SR 99 Auto Lanes to I-5 Southbound ³	Basic (2 Lanes)	A.M.	14	B	21	C
		P.M.	17	B	-	<u>F</u>
I-5 Southbound						
5. North of SR 99 Junction	Basic	A.M.	18	B	21	C
		P.M.	23	C	<u>35</u>	<u>E</u>
6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		10	A
		P.M.			15	B
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		17	B
		P.M.			25	C
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	19	C	19	C
		P.M.	22	C	-	<u>F</u>
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	17	B	16	B
		P.M.	22	C	32	D
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		19	B
		P.M.			32	D

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
11. SR 99 to Laval Road	Basic	A.M.	19	C	20	C
		P.M.	24	C	<u>45</u>	<u>E</u>
12. Laval Road West Off-Ramp	Diverge	A.M.	24	C	20	C
		P.M.	30	D	-	<u>F</u>
13. Laval Road East Off-Ramp	Diverge	A.M.	20	C	27	C
		P.M.	24	C	-	<u>F</u>
14. Laval Road On-Ramp	Merge	A.M.	23	C	26	C
		P.M.	29	D	-	<u>F</u>
15. Laval Road to Grapevine ⁴	Basic	A.M.	20	C	25	C
		P.M.	25	C	-	<u>F</u>
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	22	C	25*	C*
		P.M.	27	C	-	<u>F*</u>
17. Grapevine Loop On-Ramp	Merge	A.M.	16	B	24	C
		P.M.	21	C	25	C
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		25	C
		P.M.			25	C
19. Relocated Grapevine Interchange to Base of Grapevine Grade ³	Basic	A.M.	Exists as Laval Road to Grapevine		25	C
		P.M.			27	D
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	32	D	<u>42</u>	<u>E</u>
		P.M.	<u>46</u>	<u>F</u>	-	<u>F</u>

Notes: ¹Density is reported in passenger car equivalents per mile per lane (pcpmpl).

²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

³These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.

⁴This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.

⁵Segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.

⁶Segment analysis increases deceleration lane from 170 feet to 500 feet.

*Indicates improved density and LOS.

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.

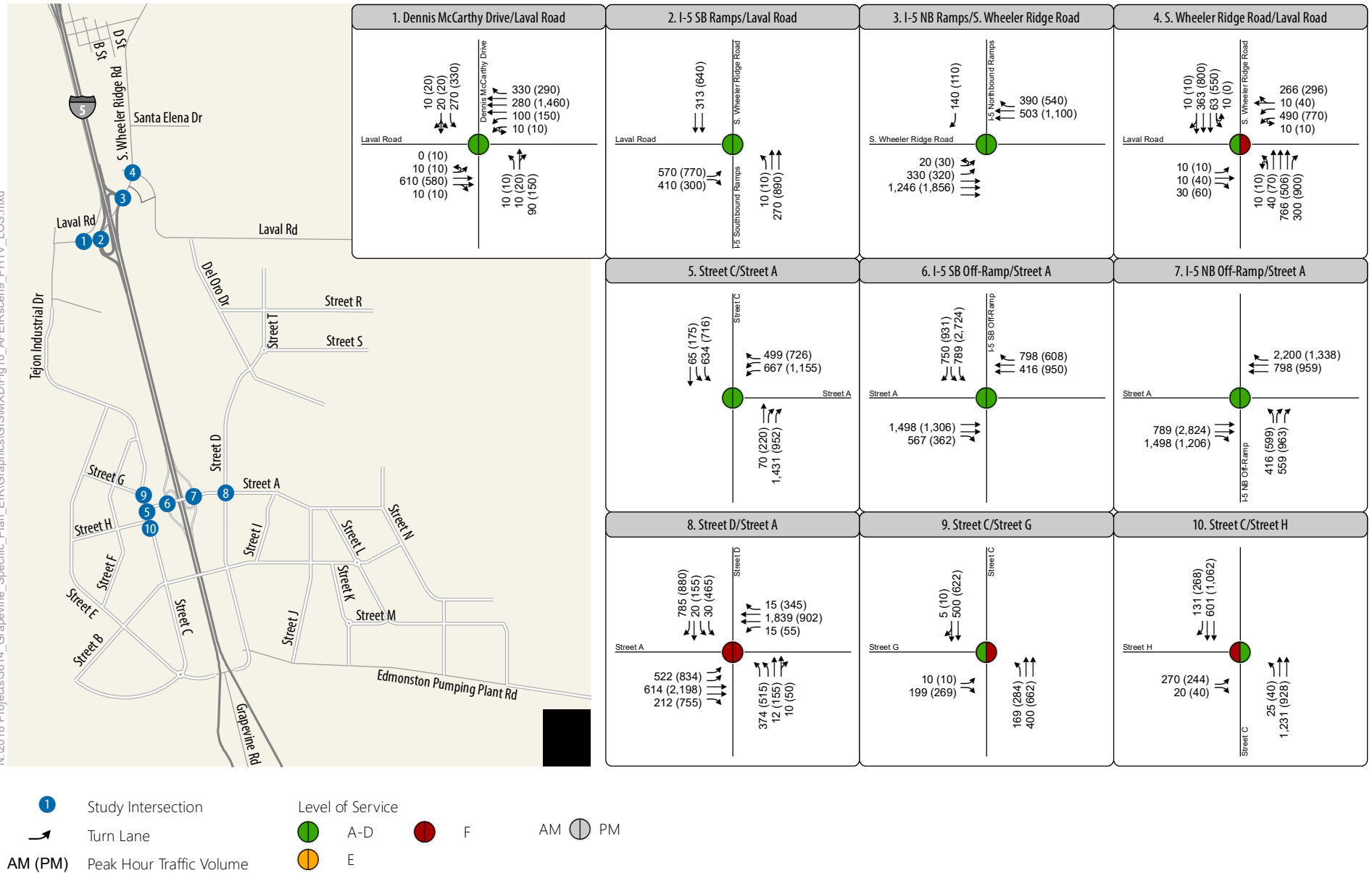


Figure 9-2
 Peak Hour Traffic Volumes, Lane Configurations
 and Level of Service (LOS) -
 Scenario 9

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Table G-4 analyzes the traffic volumes and net new trips generated by Scenario 9 during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Scenario 9 analysis under cumulative plus project conditions. Scenario 9 results in northbound traffic volumes about 2.6 percent higher than in the FEIR analysis (7,042 versus 6,857 trips). Southbound traffic volumes are about 6.3 percent lower than in the FEIR analysis (5,740 versus 6,124 trips). Scenario 9 results in northbound traffic volumes about 3.1 percent higher (7,042 versus 6,829 trips) and southbound traffic volumes about 4.1 percent lower (5,740 versus 5,986 trips) than in the Updated 28.7% HBW ICR analysis.

Table G-4: Scenario 9 Analysis PM Peak Hour Grapevine Grade Traffic Volume by Vehicle Type – Cumulative Plus Project Conditions (2040)

Segment	Vehicle Type	Cumulative No Project (2040)	Net New Trips	Cumulative Plus Project (2040)
<i>I-5 Northbound</i>				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Autos	4,825	877	5,702
	Trucks	1,340	0	1,340
	Total	6,165	877	7,042
<i>I-5 Southbound</i>				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Autos	4,040	300	4,340
	Trucks	1,400	0	1,400
	Total	5,440	300	5,740

Source: Fehr & Peers, April 2019.

Table H-4 analyzes the Scenario 9 traffic density in terms of passenger car equivalents per mile per lane (pcpmpl) during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Updated 28.7% HBW ICR analysis under cumulative plus project conditions. Table H-4 shows that the PM peak hour density in the two inside northbound lanes, which are reserved for passenger vehicles, would be 59 pcpmpl (LOS F). PM peak hour density in the two outside northbound lanes would be 57 pcpmpl (LOS F) under cumulative plus project conditions. These results are higher than the FEIR and Updated 28.7% HBW ICR analysis for the two inside northbound lanes and lower than the FEIR and Updated 28.7% HBW ICR analysis for the two outside northbound lanes.

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Table H-4: Scenario 9 PM Peak Hour Grapevine Grade Freeway Operations – Cumulative Plus Project Conditions with Variant 1 or 2 (2040)

Segment	Lanes	Vehicle Composition	Cumulative No Project (2040)		Cumulative No Project – All Lanes (2040)		Cumulative Plus Project (2040)		Cumulative Plus Project – All Lanes (2040)	
			Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³
I-5 Northbound										
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos Only	39	E	44	E	59	F	57	F
	Outside Two Lanes	Autos & Trucks	51	F			57	F		
I-5 Southbound										
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos Only	29	D	46	F	37	E	53	F
	Outside Two Lanes	Autos & Trucks	86	F			106	F		

Notes: ¹Results for all lanes applies the HCM methodology to the entire segment, as reported in Table 26 Appendix T, page 161.

²Density is reported in passenger car equivalents per mile per lane (pcpmpl).

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria

Source: Fehr & Peers, April 2019.

During the PM peak hour, density in the two inside southbound lanes would be 37 pcpmpl (LOS E), lower than the FEIR and Updated 28.7% HBW ICR analysis. Density in the outside two lanes would be 106 pcpmpl (LOS F), lower than in the FEIR and Updated 28.7% HBW ICR analysis.

The total PM peak hour density for the northbound Grapevine Grade under Scenario 9 would be 57 pcpmpl (LOS F), lower than the 58 pcpmpl (LOS F) in the FEIR analysis and the same as the 57 pcpmpl (LOS F) in the Updated 28.7% HBW ICR analysis. The total PM peak hour density in the southbound direction under Scenario 9 would be 53 pcpmpl (LOS F), lower than the 64 pcpmpl (LOS F) in the FEIR analysis and lower than 60 (LOS F) in the Updated 28.7% HBW ICR analysis. These results indicate that Scenario 9 would result in lower PM peak hour impacts to the Grapevine Grade under cumulative plus project conditions that would occur in the FEIR and Updated 28.7% HBW ICR analysis.

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7.5 SCENARIO 9 FREEWAY IMPACTS TO STATE HIGHWAY AND FREEWAY SEGMENTS NORTH AND SOUTH OF THE PROJECT AREA UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table I-4 analyzes potential Scenario 9 impacts under cumulative plus project conditions at 15 state freeway and highway segments located to the north of the Project area. Table J-9 analyzes potential Updated 28.7% HBW ICR impacts under cumulative plus project conditions at 66 freeway and highway segments located to the south of the Project area. Significant impacts were determined to occur at any state freeway or highway segment that was determined to: (a) decline from acceptable to unacceptable LOS standards; or (b) the Project's contribution to the vehicle to capacity ratio at the segment operating at unacceptable LOS standard under cumulative without project conditions was greater than .02 under cumulative with project conditions.

Table I-4 shows that Scenario 9 would result in two (2) new significant impacts to state highway and freeway segments to the north of the Project area:

SR 99 Southbound:

- Old US 99 to Herring Road– PM peak hour
- Junction Route 166 West to Junction I-5 – PM peak hour

Table J-4 shows Scenario 9 analysis would result in three (3) new significant impacts to state freeway and highway segments located south of the Project Area:

I-5 Southbound:

- McBean Parkway to Lyons Avenue / Pico Canyon Road – AM peak hour
- SR 14 to SR 120 – AM Peak Hour
- SR 120 to Roxford Street – AM peak hour

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The following freeway and highway segments to the south of the Project area that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 9 under cumulative plus project conditions:

I-5 Northbound:

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – AM and PM peak hours

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

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7.6 SCENARIO 9 IMPACTS TO INTERIM I-5 ACCESS FACILITIES

As shown in Table A-4, Scenario 9 results in 16,025 and 13,863 average weekday AM and PM peak hour trips, respectively, lower than the 18,119 and 19,699 average weekday AM and PM peak hour trips in the Updated 28.7% HBW ICR analysis. As shown in Table B-4, the volume of traffic using interim Project access facilities would be higher at comparable Project development levels higher because the ICR for Scenario 9 is 38.5 percentage points and 64.4 percent lower in the AM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. During the PM peak hour, the Scenario 9 ICR is 57.7 percentage points and 89.9 percent lower than in the Updated 28.7% HBW ICR and FEIR analysis. Consequently, applicable Interim B access LOS standards could be exceeded at a lower level of development than identified in the Updated 28.7% HBW ICR and FEIR analysis. The construction of a new and relocated interchange along I-5, including either interchange Variant 1 or Variant 2 (see Figure 2-5 and Figure 2-6) would likely be required earlier in under Scenario 9 than in the Updated 28.7% HBW ICR and FEIR analysis.

Table I-4
Cumulative With Scenario 9 Analysis Freeway Level of Service Analysis– North of Project Area

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
1	Btw . Jct Rte 58 W and California		4M							4M							LOS E	
	2014 Count	104,110		2,246	8,985	3,848	0.43	6,276	0.70		2,246	8,985	4,004	0.45	6,694	0.75		
	2040 Without Project	127,150		2,246	8,985	4,824	0.54	7,415	0.83		2,246	8,985	5,372	0.60	7,782	0.87		
	2040 With Project	129,985		2,246	8,985	5,128	0.57	7,519	0.84		2,246	8,985	5,461	0.61	7,852	0.87		
	Grapevine Specific Plan Net New Project Impacts	2,835				304	0.03	104	0.01				89	0.01	70	0.01		
2	Btw. California and Jct Rte 58 E		4M							4M							LOS E	
	2014 Count	89,700		2,246	8,985	3,392	0.38	5,263	0.59		2,246	8,985	3,390	0.38	5,895	0.66		
	2040 Without Project	106,340		2,246	8,985	3,950	0.44	6,231	0.69		2,246	8,985	4,326	0.48	6,761	0.75		
	2040 With Project	110,709		2,246	8,985	4,368	0.49	6,370	0.71		2,246	8,985	4,430	0.49	6,975	0.78		
	Grapevine Specific Plan Net New Project Impacts	4,369				418	0.05	139	0.02				104	0.01	214	0.02		
3	Btw. Jct Rte 58 E & Ming Ave		5M							5M							LOS E	
	2014 Count	88,820		2,246	10,107	3,406	0.34	5,478	0.54		2,246	10,107	3,217	0.32	5,663	0.56		
	2040 Without Project	134,395		2,246	10,107	4,865	0.48	7,754	0.77		2,246	10,107	5,602	0.55	8,658	0.86		
	2040 With Project	143,915		2,246	10,107	6,018	0.60	8,010	0.79		2,246	10,107	5,799	0.57	8,956	0.89		
	Grapevine Specific Plan Net New Project Impacts	9,520				1,153	0.11	256	0.03				197	0.02	298	0.03		
4	Btw. Ming Ave & White Lane		4M							4M							LOS E	
	2014 Count	69,755		2,246	8,985	2,614	0.29	4,435	0.49		2,296	9,186	2,394	0.26	4,508	0.49		
	2040 Without Project	119,800		2,246	8,985	4,994	0.56	7,099	0.79		2,296	9,186	4,737	0.52	7,130	0.78		
	2040 With Project	131,658		2,246	8,985	6,291	0.70	7,472	0.83		2,296	9,186	5,010	0.55	7,558	0.82		
	Grapevine Specific Plan Net New Project Impacts	11,858				1,297	0.14	373	0.04				273	0.03	428	0.05		
5	Btw. White Lane & Panama Lane		4M							4M							LOS E	
	2014 Count	57,090		2,296	9,186	2,165	0.24	3,616	0.39		2,296	9,186	2,072	0.23	3,565	0.39		
	2040 Without Project	101,775		2,296	9,186	4,191	0.46	6,111	0.67		2,296	9,186	3,793	0.41	6,260	0.68		
	2040 With Project	120,371		2,296	9,186	5,909	0.64	6,608	0.72		2,296	9,186	4,192	0.46	7,365	0.80		
	Grapevine Specific Plan Net New Project Impacts	18,596				1,718	0.19	497	0.05				399	0.04	1,105	0.12		
6	Btw. Panama Lane & Jct Rte 119 W		4M							4M							LOS E	
	2014 Count	44,450		2,296	9,186	1,622	0.18	2,890	0.31		2,296	9,186	1,797	0.20	2,581	0.28		
	2040 Without Project	84,820		2,296	9,186	3,379	0.37	5,264	0.57		2,296	9,186	3,270	0.36	5,051	0.55		
	2040 With Project	108,646		2,296	9,186	5,284	0.58	5,870	0.64		2,296	9,186	3,727	0.41	6,848	0.75		
	Grapevine Specific Plan Net New Project Impacts	23,826				1,905	0.21	606	0.07				457	0.05	1,797	0.20		
7	Btw. Jct Rte 119 W & Houghton Rd		3M							3M							LOS D	
	2014 Count	35,470		2,296	6,889	1,229	0.18	2,345	0.34		2,141	6,422	1,533	0.24	1,987	0.31		
	2040 Without Project	62,960		2,296	6,889	2,334	0.34	4,037	0.59		2,141	6,422	2,683	0.42	3,538	0.55		
	2040 With Project	89,794		2,296	6,889	4,399	0.64	4,735	0.69		2,141	6,422	3,203	0.50	5,622	0.88		
	Grapevine Specific Plan Net New Project Impacts	26,834				2,065	0.30	698	0.10				520	0.08	2,084	0.32		
8	Btw. Houghton Rd & Jct Rte 223 E		3M							3M							LOS D	
	2014 Count	33,360		2,141	6,422	1,158	0.18	2,176	0.34		2,141	6,422	1,473	0.23	1,865	0.29		
	2040 Without Project	60,280		2,141	6,422	2,229	0.35	3,856	0.60		2,141	6,422	2,588	0.40	3,383	0.53		
	2040 With Project	87,763		2,141	6,422	4,348	0.68	4,570	0.71		2,141	6,422	3,125	0.49	5,509	0.86		
	Grapevine Specific Plan Net New Project Impacts	27,483				2,119	0.33	714	0.11				537	0.08	2,126	0.33		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
9	Btw. Jct Rte 223 E & Old U.S. 99		3M							3M							LOS D	
	2014 Count	27,270		2,141	6,422	945	0.15	1,788	0.28		2,133	6,400	1,233	0.19	1,488	0.23		
	2040 Without Project	54,555		2,141	6,422	1,964	0.31	3,513	0.55		2,133	6,400	2,390	0.37	3,044	0.48		
	2040 With Project	83,808		2,141	6,422	4,097	0.64	4,285	0.67		2,133	6,400	2,942	0.46	5,437	0.85		
	Grapevine Specific Plan Net New Project Impacts	29,253				2,133	0.33	772	0.12				552	0.09	2,393	0.37		
10	Btw. Old U.S. 99 & Herring Rd		3M							3M							LOS D	
	2014 Count	28,585		2,133	6,400	987	0.15	1,860	0.29		2,133	6,400	1,284	0.20	1,586	0.25		
	2040 Without Project	57,525		2,133	6,400	2,065	0.32	3,664	0.57		2,133	6,400	2,484	0.39	3,292	0.51		
	2040 With Project	91,047		2,133	6,400	4,318	0.67	4,552	0.71		2,133	6,400	3,105	0.49	6,234	0.97		Yes
	Grapevine Specific Plan Net New Project Impacts	33,522				2,253	0.35	888	0.14				621	0.10	2,942	0.46		
11	Btw. Herring Rd & Sandrini Rd.		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	90,746		2,133	6,400	4,305	0.67	4,534	0.71		2,133	6,400	3,096	0.48	6,215	0.97		
	Grapevine Specific Plan Net New Project Impacts	33,611				2,253	0.35	898	0.14				627	0.10	2,945	0.46		
12	Btw. Sandrini Rd & David Rd		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	90,746		2,133	6,400	4,305	0.67	4,534	0.71		2,133	6,400	3,096	0.48	6,215	0.97		
	Grapevine Specific Plan Net New Project Impacts	33,611				2,253	0.35	898	0.14				627	0.10	2,945	0.46		
13	Btw. David Rd & Valpredo		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,133	6,400	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,133	6,400	2,364	0.37	3,104	0.49		
	2040 With Project	89,920		2,133	6,400	4,269	0.67	4,477	0.70		2,133	6,400	3,049	0.48	6,189	0.97		
	Grapevine Specific Plan Net New Project Impacts	35,405				2,306	0.36	1,005	0.16				685	0.11	3,085	0.48		
14	Btw. Valpredo & Jct Rte 166 W		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,096	6,288	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,096	6,288	2,364	0.38	3,104	0.49		
	2040 With Project	89,920		2,133	6,400	4,269	0.67	4,477	0.70		2,096	6,288	3,049	0.48	6,189	0.98		
	Grapevine Specific Plan Net New Project Impacts	35,405				2,306	0.36	1,005	0.16				685	0.11	3,085	0.49		
15	Btw. Jct Rte 166 W & Jct I-5		3M							3M							LOS D	
	2014 Count	26,965		2,096	6,288	934	0.15	1,733	0.28		2,054	6,162	1,219	0.20	1,507	0.24		
	2040 Without Project	54,150		2,096	6,288	1,926	0.31	3,373	0.54		2,054	6,162	2,363	0.38	3,168	0.51		
	2040 With Project	97,465		2,096	6,288	4,327	0.69	5,086	0.81		2,054	6,162	3,236	0.53	6,844	1.11		Yes
	Grapevine Specific Plan Net New Project Impacts	43,315				2,401	0.38	1,713	0.27				873	0.14	3,676	0.60		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.90
E	0.91	-	1.00
F	>		1.00

Table J-4
Cumulative With Scenario 9 Analysis Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
1	Btw. Fort Tejon Rd & Lebec Rd		4M							4M							LOS D	
	2014 Count	72,000		1,839	7,355	1,390	0.19	2,426	0.33		2,036	8,143	1,346	0.17	2,304	0.28		
	2035 Without Project	119,850		1,839	7,355	2,895	0.39	4,255	0.58		2,036	8,143	3,170	0.39	3,640	0.45		
	2035 With Project	134,030		1,839	7,355	3,438	0.47	5,132	0.70		2,036	8,143	4,286	0.53	3,940	0.48		
	Grapevine Specific Plan Net New Project Impacts	14,180				543	0.07	877	0.12				1116	0.14	300	0.04		
2	Btw. Lebec Rd & Frazier Mtn Park		4M							4M							LOS D	
	2014 Count	73,000		1,839	7,355	1,409	0.19	2,460	0.33		2,036	8,143	1,365	0.17	2,336	0.29		
	2035 Without Project	120,850		1,839	7,355	2,915	0.40	4,285	0.58		2,036	8,143	3,190	0.39	3,680	0.45		
	2035 With Project	135,051		1,839	7,355	3,458	0.47	5,166	0.70		2,036	8,143	4,306	0.53	3,980	0.49		
	Grapevine Specific Plan Net New Project Impacts	14,201				543	0.07	881	0.12				1116	0.14	300	0.04		
3	Btw. Frazier Mtn Park & Gorman Rd		4M							4M							LOS D	
	2014 Count	70,000		2,036	8,143	1,351	0.17	2,359	0.29		1,401	5,606	1,309	0.23	2,240	0.4		
	2035 Without Project	114,850		2,036	8,143	2,775	0.34	4,015	0.49		1,401	5,606	3,020	0.54	3,380	0.60		
	2035 With Project	129,051		2,036	8,143	3,318	0.41	4,896	0.60		1,401	5,606	4,136	0.74	3,680	0.66		
	Grapevine Specific Plan Net New Project Impacts	14,201				543	0.07	881	0.11				1116	0.20	300	0.05		
4	Btw. Gorman Rd & N Jct SR-138		4M							4M							LOS D	
	2014 Count	70,000		1,849	7,398	1,351	0.18	2,359	0.32		2,042	8,169	1,309	0.16	2,240	0.27		
	2035 Without Project	117,850		1,849	7,398	2,745	0.37	4,405	0.60		2,042	8,169	3,280	0.40	3,350	0.41		
	2035 With Project	132,051		1,849	7,398	3,288	0.44	5,286	0.71		2,042	8,169	4,396	0.54	3,650	0.45		
	Grapevine Specific Plan Net New Project Impacts	14,201				543	0.07	881	0.12				1116	0.14	300	0.04		
5	Btw. N Jct SR-138 & Quail Lake Rd		4M							4M							LOS D	
	2014 Count	67,000		1,849	7,398	1,293	0.17	2,258	0.31		2,042	8,169	1,253	0.15	2,144	0.26		
	2035 Without Project	89,175		1,849	7,398	1,750	0.24	3,140	0.42		2,042	8,169	2,055	0.25	2,360	0.29		
	2035 With Project	97,995		1,849	7,398	2,080	0.28	3,685	0.50		2,042	8,169	2,757	0.34	2,546	0.31		
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.04	545	0.07				702	0.09	186	0.02		
6	Btw. Quail Lake Rd & S Jct SR-138		4M							4M							LOS D	
	2014 Count	67,000		1,375	5,500	1,293	0.24	2,258	0.41		1,375	5,500	1,253	0.23	2,144	0.39		
	2035 Without Project	90,175		1,375	5,500	1,750	0.32	3,590	0.65		1,375	5,500	2,055	0.37	2,360	0.43		
	2035 With Project	98,995		1,375	5,500	2,080	0.38	4,135	0.75		1,375	5,500	2,757	0.50	2,546	0.46		
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.06	545	0.10				702	0.13	186	0.03		
7	Btw. S Jct SR-138 & Smokey Bear Rd		4M							4M							LOS D	
	2014 Count	69,000		1,375	5,500	1,332	0.24	2,325	0.42		1,375	5,500	1,290	0.23	2,208	0.4		
	2035 Without Project	123,175		1,375	5,500	2,240	0.41	5,170	0.94		1,375	5,500	4,145	0.75	3,240	0.59		Yes
	2035 With Project	131,995		1,375	5,500	2,570	0.47	5,715	1.04		1,375	5,500	4,847	0.88	3,426	0.62		Yes
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.06	545	0.10				702	0.13	186	0.03		
8	Btw. Smokey Bear Rd & Vista Del Lago Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	133,995		1,489	5,957	2,670	0.45	5,805	0.97		1,489	5,957	4,947	0.83	3,566	0.60		Yes
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.06	545	0.09				702	0.12	186	0.03		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
9	Btw. Vista Del Lago Rd & Templin Hwy		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.4		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	133,995		1,489	5,957	2,670	0.45	5,805	0.97		1,489	5,957	4,947	0.83	3,566	0.60		Yes
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.06	545	0.09				702	0.12	186	0.03		
10	Btw. Templin Hwy & Lake Hughes Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	126,175		1,489	5,957	2,380	0.40	5,260	0.88		1,489	5,957	4,205	0.71	3,410	0.57		
	2035 With Project	134,995		1,489	5,957	2,710	0.45	5,805	0.97		1,489	5,957	4,907	0.82	3,596	0.60		Yes
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.06	545	0.09				702	0.12	186	0.03		
11	Btw. Lake Hughes Rd & Parker Rd		4M + 1 AUX							4M + 1 AUX							LOS E	
	2014 Count	73,000		1,856	7,422	1,504	0.2	1,949	0.26		1,856	7,422	1,854	0.25	2,519	0.34		
	2035 Without Project	154,175		1,856	8,422	5,360	0.64	8,080	0.96		1,856	8,422	8,405	1.00	5,050	0.60		
	2035 With Project	162,995		1,856	8,422	5,690	0.68	8,625	1.02		1,856	8,422	9,107	1.08	5,236	0.62		Yes
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.04	545	0.06				702	0.08	186	0.02		
12	Btw. Parker Rd & Hasley Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	108,000		1,856	7,422	2,225	0.30	2,884	0.39		1,856	7,422	2,743	0.37	3,726	0.5		
	2035 Without Project	171,175		1,856	9,022	5,360	0.59	7,030	0.78		1,856	9,022	7,285	0.81	5,120	0.57		
	2035 With Project	179,995		1,856	9,022	5,690	0.63	7,575	0.84		1,856	9,022	7,987	0.89	5,306	0.59		
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.04	545	0.06				702	0.08	186	0.02		
13	Btw. Hasley Cyn Rd & N Jct SR-126 (NB)		4M (+1H +1A)							4M (+1H)							LOS E	
	2014 Count	114,000		1,856	8,422	2,348	0.28	3,044	0.36		1,856	8,422	2,896	0.34	3,933	0.47		
	2035 Without Project	170,175		1,856	10,022	5,180	0.52	6,800	0.68		1,856	9,022	7,085	0.79	5,120	0.57		
	2035 With Project	178,995		1,856	10,022	5,510	0.55	7,345	0.73		1,856	9,022	7,787	0.86	5,306	0.59		
	Grapevine Specific Plan Net New Project Impacts	8,820				330	0.03	545	0.05				702	0.08	186	0.02		
14	Btw. N Jct SR-126 & Rye Cyn Rd		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	130,000		1,867	7,470	2,678	0.36	3,471	0.46		1,867	7,470	3,302	0.44	4,485	0.60		
	2035 Without Project	175,375		1,867	9,070	4,615	0.51	6,450	0.71		1,867	10,070	6,865	0.68	5,565	0.55		
	2035 With Project	183,776		1,867	9,070	4,936	0.54	6,970	0.77		1,867	10,070	7,529	0.75	5,740	0.57		
	Grapevine Specific Plan Net New Project Impacts	8,401				321	0.04	520	0.06				664	0.07	175	0.02		
15	Btw.Rye Cyn Rd & Magic Mountain Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	154,000		1,918	7,670	3,172	0.41	4,112	0.54		1,918	7,670	3,912	0.51	5,313	0.69		
	2035 Without Project	181,375		1,918	9,270	4,615	0.50	6,450	0.70		1,918	10,270	6,875	0.67	5,395	0.53		
	2035 With Project	189,776		1,918	9,270	4,936	0.53	6,970	0.75		1,918	10,270	7,539	0.73	5,570	0.54		
	Grapevine Specific Plan Net New Project Impacts	8,401				321	0.03	520	0.06				664	0.06	175	0.02		
16	Btw. Magic Mountain Pkwy & Valencia Blvd		4M (+1H + 1A)							4M (+1H)							LOS E	
	2014 Count	165,000		1,918	7,670	3,399	0.44	4,406	0.57		1,918	7,670	4,191	0.55	5,693	0.74		
	2035 Without Project	194,375		1,918	10,270	5,615	0.55	6,980	0.68		1,918	9,270	6,815	0.74	5,735	0.62		
	2035 With Project	202,776		1,918	10,270	5,936	0.58	7,500	0.73		1,918	9,270	7,479	0.81	5,910	0.64		
	Grapevine Specific Plan Net New Project Impacts	8,401				321	0.03	520	0.05				664	0.07	175	0.02		
17	Btw. Valencia Blvd & McBean Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	175,000		1,918	7,670	3,605	0.47	4,673	0.61		1,918	7,670	4,445	0.58	6,038	0.79		
	2035 Without Project	218,375		1,918	9,270	6,475	0.70	7,290	0.79		1,918	10,270	8,135	0.79	6,615	0.64		
	2035 With Project	226,776		1,918	9,270	6,796	0.73	7,810	0.84		1,918	10,270	8,799	0.86	6,790	0.66		
	Grapevine Specific Plan Net New Project Impacts	8,401				321	0.03	520	0.06				664	0.06	175	0.02		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
18	Btw. McBeach Pkwy & Lyons Ave/Pico Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	186,000		1,990	7,960	3,832	0.48	4,966	0.62		1,990	7,960	4,724	0.59	6,417	0.81		
	2035 Without Project	222,375		1,990	9,560	6,555	0.69	8,640	0.90		1,990	9,560	9,105	0.95	6,685	0.70		
	2035 With Project	230,776		1,990	9,560	6,876	0.72	9,160	0.96		1,990	9,560	9,769	1.02	6,860	0.72		
	Grapevine Specific Plan Net New Project Impacts	8,401			321	0.03	520	0.05				664	0.07	175	0.02			
19	Btw. Lyons Ave & Calgrove Blvd		4M (+1H + 1A)							4M (+1H + 1T)							LOS E	
	2014 Count	199,000		1,990	7,960	4,099	0.52	5,313	0.67		1,990	9,560	5,055	0.53	6,866	0.72		
	2035 Without Project	252,375		1,990	10,560	6,855	0.65	10,070	0.95		1,990	11,160	9,175	0.82	6,705	0.60		
	2035 With Project	260,776		1,990	10,560	7,176	0.68	10,590	0.99		1,990	11,160	9,839	0.88	6,880	0.62		
	Grapevine Specific Plan Net New Project Impacts	8,401			321	0.03	520	0.04				664	0.06	175	0.02			
20	Btw. Calgrove Blvd & SR-14		4M (+1H + 1T[C])							4M (+1H + 2T[C])							LOS E	
	2014 Count	200,000		1,990	9,160	4,120	0.45	5,340	0.58		1,990	10,360	5,080	0.49	6,900	0.67		
	2035 Without Project	253,375		1,990	10,760	5,725	0.53	9,190	0.85		1,990	11,960	9,805	0.82	6,845	0.57		
	2035 With Project	261,776		1,990	10,760	6,046	0.56	9,710	0.90		1,990	11,960	10,469	0.88	7,020	0.59		
	Grapevine Specific Plan Net New Project Impacts	8,401			321	0.03	520	0.05				664	0.06	175	0.01			
21	Btw. SR-14 & SR-210		3M (+1H+3A[F]+2T)							4M (+1H+2A[F]+2T)							LOS E	
	2014 Count	329,000		1,997	16,791	7,863	0.47	12,930	0.77			1,997	16,788	14,213	0.85	9,409		0.56
	2035 Without Project	383,650		1,997	16,791	9,130	0.54	15,005	0.89			1,997	16,788	16,580	0.99	10,885		0.65
	2035 With Project	388,973		1,997	16,791	9,329	0.56	15,360	0.91			1,997	16,788	16,974	1.01	11,001		0.66
	Grapevine Specific Plan Net New Project Impacts	5,323			199	0.01	355	0.02					394	0.02	116	0.01		
22	Btw. SR-210 & Roxford St		4M (+1H+ 1A[F])							5M (+1H)							LOS E	
	2014 Count	266,000		2,212	12,449	6,357	0.51	10,454	0.84		2,212	12,661	11,491	0.91	7,608	0.6		
	2035 Without Project	304,650		2,212	12,449	7,240	0.58	11,905	0.96		2,212	12,661	13,170	1.04	8,625	0.68		
	2035 With Project	309,973		2,212	12,449	7,439	0.60	12,260	0.98		2,212	12,661	13,564	1.07	8,741	0.69		
	Grapevine Specific Plan Net New Project Impacts	5,323			199	0.02	355	0.03				394	0.03	116	0.01			
23	Btw. RoxfoRd St & I-405		5M (+1H+ 1A[F])							5M (+1H+1A[F])							LOS E	
	2014 Count	283,000		2,212	14,661	6,764	0.46	11,122	0.76		2,212	14,661	12,226	0.83	8,094	0.55		
	2035 Without Project	318,650		2,212	14,661	7,580	0.52	12,465	0.85		2,212	14,661	13,790	0.94	9,035	0.62		
	2035 With Project	323,973		2,212	14,661	7,779	0.53	12,820	0.87		2,212	14,661	14,184	0.97	9,151	0.62		
	Grapevine Specific Plan Net New Project Impacts	5,323			199	0.01	355	0.02				394	0.03	116	0.01			
24	Btw. I-405 & San Fernando Mission Blvd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	141,000		2,190	8,171	3,370	0.41	5,541	0.68		2,190	8,171	6,091	0.75	4,033	0.49		
	2035 Without Project	161,650		2,190	8,171	3,830	0.47	6,295	0.77		2,190	8,171	7,010	0.86	4,545	0.56		
	2035 With Project	166,973		2,190	8,171	4,029	0.49	6,650	0.81		2,190	8,171	7,404	0.91	4,661	0.57		
	Grapevine Specific Plan Net New Project Impacts	5,323			199	0.02	355	0.04				394	0.05	116	0.01			

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
25	Btw Dawn Rd & Rosamond Blvd		2M							2M							LOS D	
	2014 Count	23,000		2,332	4,665	1,083	0.23	849	0.18		2,332	4,665	499	0.11	1,323	0.28		
	2035 Without Project	29,825		2,332	4,665	1,345	0.29	1,095	0.23		2,332	4,665	610	0.13	1,535	0.33		
	2035 With Project	30,229		2,332	4,665	1,354	0.29	1,108	0.24		2,332	4,665	658	0.14	1,546	0.33		
	Grapevine Specific Plan Net New Project Impacts	404				9	0.00	13	0.00				48	0.01	11	0.00		
26	Btw. Rosamond Blvd & Ave A		2M							2M							LOS D	
	2014 Count	30,000		2,339	4,679	1,413	0.3	1,107	0.24		2,339	4,679	651	0.14	1,725	0.37		
	2035 Without Project	34,825		2,339	4,679	1,715	0.37	1,335	0.29		2,339	4,679	720	0.15	1,855	0.40		
	2035 With Project	35,229		2,339	4,679	1,724	0.37	1,348	0.29		2,339	4,679	768	0.16	1,866	0.40		
	Grapevine Specific Plan Net New Project Impacts	404				9	0.00	13	0.00				48	0.01	11	0.00		
27	Ave A & N Jct Rte 138/Ave D		2M							2M							LOS D	
	2014 Count	34,000		2,339	4,679	1,129	0.24	1,261	0.27		2,339	4,679	1,244	0.27	1,567	0.34		
	2035 Without Project	55,825		2,339	4,679	2,115	0.45	2,125	0.45		2,339	4,679	1,950	0.42	2,335	0.50		
	2035 With Project	56,229		2,339	4,679	2,124	0.45	2,138	0.46		2,339	4,679	1,998	0.43	2,346	0.50		
	Grapevine Specific Plan Net New Project Impacts	404				9	0.00	13	0.00				48	0.01	11	0.00		
28	Btw. Jct Rte 138/Ave D & Ave F		2M							2M							LOS D	
	2014 Count	36,000		2,332	4,665	1,195	0.26	1,336	0.29		2,332	4,665	1,318	0.28	1,660	0.36		
	2035 Without Project	87,650		2,332	4,665	3,525	0.76	3,685	0.79		2,332	4,665	3,360	0.72	3,720	0.80		
	2035 With Project	89,540		2,332	4,665	3,588	0.77	3,818	0.82		2,332	4,665	3,504	0.75	3,757	0.81		
	Grapevine Specific Plan Net New Project Impacts	1,890				63	0.01	133	0.03				144	0.03	37	0.01		
29	Btw. Ave F & Ave G		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	102,650		2,332	4,665	4,235	0.91	3,835	0.82		2,332	4,665	3,690	0.79	4,460	0.96		Yes
	2035 With Project	104,540		2,332	4,665	4,298	0.92	3,968	0.85		2,332	4,665	3,834	0.82	4,497	0.96		
	Grapevine Specific Plan Net New Project Impacts	1,890				63	0.01	133	0.03				144	0.03	37	0.00		
30	Btw. Ave G & Ave H		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	107,650		2,332	4,665	4,385	0.94	3,815	0.82		2,332	4,665	3,810	0.82	4,600	0.99		Yes
	2035 With Project	109,540		2,332	4,665	4,448	0.95	3,948	0.85		2,332	4,665	3,954	0.85	4,637	0.99		
	Grapevine Specific Plan Net New Project Impacts	1,890				63	0.01	133	0.03				144	0.03	37	0.00		
31	Btw. Ave H & Ave I		2M							2M							LOS E	
	2014 Count	40,000		2,332	4,665	1,328	0.28	1,484	0.32		2,332	4,665	1,464	0.31	1,844	0.4		
	2035 Without Project	108,650		2,332	4,665	4,345	0.93	4,025	0.86		2,332	4,665	3,880	0.83	4,530	0.97		
	2035 With Project	110,540		2,332	4,665	4,408	0.94	4,158	0.89		2,332	4,665	4,024	0.86	4,567	0.98		
	Grapevine Specific Plan Net New Project Impacts	1,890				63	0.01	133	0.03				144	0.03	37	0.01		
32	Btw. Ave I & Ave J		3M							3M							LOS E	
	2014 Count	47,000		2,332	6,997	1,560	0.22	1,744	0.25		2,332	6,997	1,720	0.25	2,167	0.31		
	2035 Without Project	114,650		2,332	6,997	4,605	0.66	4,365	0.62		2,332	6,997	3,950	0.56	4,890	0.70		
	2035 With Project	118,321		2,332	6,997	4,750	0.68	4,587	0.66		2,332	6,997	4,239	0.61	4,969	0.71		
	Grapevine Specific Plan Net New Project Impacts	3,671				145	0.02	222	0.03				289	0.04	79	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
33	Btw. Ave J & 20th St W		3M							3M							LOS E	
	2014 Count	42,000		2,339	7,016	1,394	0.2	1,558	0.22		2,339	7,016	1,537	0.22	1,936	0.28		
	2035 Without Project	99,650		2,339	7,016	4,105	0.59	3,905	0.56		2,339	7,016	3,500	0.50	4,370	0.62		
	2035 With Project	103,193		2,339	7,016	4,250	0.61	4,120	0.59		2,339	7,016	3,769	0.54	4,449	0.63		
	Grapevine Specific Plan Net New Project Impacts	3,543				145	0.02	215	0.03				269	0.04	79	0.01		
34	Btw. 20th St W & Ave K		3M							3M							LOS E	
	2014 Count	59,000		2,339	7,016	1,959	0.28	2,189	0.31		2,339	7,016	2,159	0.31	2,720	0.39		
	2035 Without Project	118,650		2,339	7,016	4,715	0.67	4,585	0.65		2,339	7,016	4,160	0.59	5,180	0.74		
	2035 With Project	122,193		2,339	7,016	4,860	0.69	4,800	0.68		2,339	7,016	4,429	0.63	5,259	0.75		
	Grapevine Specific Plan Net New Project Impacts	3,543				145	0.02	215	0.03				269	0.04	79	0.01		
35	Btw. Ave K & Ave L		3M							3M							LOS E	
	2014 Count	74,000		2,339	7,016	2,457	0.35	2,745	0.39		2,339	7,016	2,708	0.39	3,411	0.49		
	2035 Without Project	127,650		2,339	7,016	4,975	0.71	4,835	0.69		2,339	7,016	4,440	0.63	5,650	0.81		
	2035 With Project	131,193		2,339	7,016	5,120	0.73	5,050	0.72		2,339	7,016	4,709	0.67	5,729	0.82		
	Grapevine Specific Plan Net New Project Impacts	3,543				145	0.02	215	0.03				269	0.04	79	0.01		
36	Btw. Ave L & Ave M		3M							3M							LOS E	
	2014 Count	89,000		2,339	7,016	2,955	0.42	3,302	0.47		2,339	7,016	3,257	0.46	4,103	0.58		
	2035 Without Project	100,650		2,339	7,016	3,875	0.55	3,435	0.49		2,339	7,016	3,630	0.52	4,540	0.65		
	2035 With Project	103,676		2,339	7,016	4,002	0.57	3,612	0.51		2,339	7,016	3,861	0.55	4,610	0.66		
	Grapevine Specific Plan Net New Project Impacts	3,026				127	0.02	177	0.03				231	0.03	70	0.01		
37	Btw. Ave M & Ave N		3M							3M							LOS E	
	2014 Count	92,000		2,339	7,016	3,054	0.44	3,413	0.49		2,339	7,016	3,367	0.48	4,241	0.60		
	2035 Without Project	100,650		2,339	7,016	3,895	0.56	3,365	0.48		2,339	7,016	3,550	0.51	4,710	0.67		
	2035 With Project	103,226		2,339	7,016	4,013	0.57	3,504	0.50		2,339	7,016	3,742	0.53	4,776	0.68		
	Grapevine Specific Plan Net New Project Impacts	2,576				118	0.02	139	0.02				192	0.03	66	0.01		
38	Btw. Ave N & 10th St W		3M							3M							LOS E	
	2014 Count	87,000		2,339	7,016	2,888	0.41	3,228	0.46		2,339	7,016	3,184	0.45	4,011	0.57		
	2035 Without Project	98,650		2,339	7,016	4,085	0.58	3,215	0.46		2,339	7,016	3,280	0.47	4,700	0.67		
	2035 With Project	101,141		2,339	7,016	4,203	0.60	3,342	0.48		2,339	7,016	3,472	0.49	4,761	0.68		
	Grapevine Specific Plan Net New Project Impacts	2,491				118	0.02	127	0.02				192	0.03	61	0.01		
39	Btw. 10th St W & Rancho Vista Blvd		3M							3M							LOS E	
	2014 Count	87,000		2,225	6,675	2,888	0.43	3,228	0.48		2,225	6,675	3,184	0.48	4,011	0.60		
	2035 Without Project	93,650		2,225	6,675	3,965	0.59	3,165	0.47		2,225	6,675	3,170	0.47	4,510	0.68		
	2035 With Project	95,763		2,225	6,675	4,074	0.61	3,292	0.49		2,225	6,675	3,305	0.50	4,563	0.68		
	Grapevine Specific Plan Net New Project Impacts	2,113				109	0.02	127	0.02				135	0.02	53	0.01		
40	Btw. Rancho Vista Blvd & S Jct Rte 138		3M							3M							LOS E	
	2014 Count	84,000		2,225	6,675	2,789	0.42	3,116	0.47		2,225	6,675	3,074	0.46	3,872	0.58		
	2035 Without Project	94,650		2,225	6,675	4,015	0.60	3,085	0.46		2,225	6,675	3,140	0.47	4,570	0.68		
	2035 With Project	96,398		2,225	6,675	4,087	0.61	3,212	0.48		2,225	6,675	3,255	0.49	4,605	0.69		
	Grapevine Specific Plan Net New Project Impacts	1,748				72	0.01	127	0.02				115	0.02	35	0.01		
41	Btw. S Jct Rte 138 & Ave S		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	81,000		2,225	6,050	2,689	0.44	3,005	0.5		2,225	8,275	2,965	0.36	3,734	0.45		
	2035 Without Project	91,650		2,225	6,050	3,535	0.58	3,475	0.57		2,225	8,275	3,260	0.39	4,590	0.55		
	2035 With Project	93,272		2,225	6,050	3,598	0.59	3,602	0.60		2,225	8,275	3,366	0.41	4,619	0.56		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.01	29	0.00		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
42	Btw. Ave S & Pearlblossom/Sierra Hwy		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	71,000		2,225	6,050	2,357	0.39	2,634	0.44		2,225	8,275	2,599	0.31	3,273	0.4		
	2035 Without Project	75,650		2,225	6,050	3,015	0.50	2,655	0.44		2,225	8,275	2,660	0.32	3,820	0.46		
	2035 With Project	77,272		2,225	6,050	3,078	0.51	2,782	0.46		2,225	8,275	2,766	0.33	3,849	0.47		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.01	29	0.00		
43	Btw. Pearlblossom/Sierra Hwy & Angeles Forest		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	83,000		2,225	6,050	2,756	0.46	3,079	0.51		2,225	8,275	3,038	0.37	3,826	0.46		
	2035 Without Project	88,650		2,225	6,050	3,225	0.53	3,065	0.51		2,225	8,275	3,100	0.37	4,380	0.53		
	2035 With Project	90,272		2,225	6,050	3,288	0.54	3,192	0.53		2,225	8,275	3,206	0.39	4,409	0.53		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.01	29	0.00		
44	Btw. Angeles Forest Hwy & Soledad		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	144,000		2,225	8,275	3,154	0.38	3,525	0.43		2,225	6,050	3,477	0.57	4,380	0.72		
	2035 Without Project	114,650		2,225	8,275	3,845	0.46	3,875	0.47		2,225	6,050	3,620	0.60	6,000	0.99		
	2035 With Project	116,272		2,225	8,275	3,908	0.47	4,002	0.48		2,225	6,050	3,726	0.62	6,029	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.02	29	0.00		
45	Btw. Soledad & Santiago Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	113,650		2,236	6,071	3,845	0.63	3,905	0.64		2,236	6,071	3,430	0.56	5,640	0.93		
	2035 With Project	115,272		2,236	6,071	3,908	0.64	4,032	0.66		2,236	6,071	3,536	0.58	5,669	0.93		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.02	29	0.00		
46	Btw. Santiago Rd & Crown Valley Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	94,000		2,236	6,071	3,121	0.51	3,487	0.57		2,236	6,071	3,440	0.57	4,333	0.71		
	2035 Without Project	108,650		2,236	6,071	3,625	0.60	3,955	0.65		2,236	6,071	3,430	0.56	5,420	0.89		
	2035 With Project	110,272		2,236	6,071	3,688	0.61	4,082	0.67		2,236	6,071	3,536	0.58	5,449	0.90		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.02	29	0.00		
47	Btw. Crown Valley Rd & Ward Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	138,650		2,236	6,071	3,765	0.62	3,875	0.64		2,236	6,071	3,460	0.57	5,670	0.93		
	2035 With Project	140,272		2,236	6,071	3,828	0.63	4,002	0.66		2,236	6,071	3,566	0.59	5,699	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.02	29	0.00		
48	Btw. Ward Rd & Escondido Cyn Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	93,000		2,189	8,167	3,088	0.38	3,450	0.42		2,189	5,978	3,404	0.57	4,287	0.72		
	2035 Without Project	115,650		2,189	8,167	3,745	0.46	4,445	0.54		2,189	5,978	3,650	0.61	5,720	0.96		
	2035 With Project	117,272		2,189	8,167	3,808	0.47	4,572	0.56		2,189	5,978	3,756	0.63	5,749	0.96		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.02	29	0.00		
49	Btw. Escondido Cyn Rd & Agua Dulce Cyn Rd		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	93,000		2,236	8,307	1,776	0.21	4,669	0.56		2,236	6,071	4994	0.82	2,613	0.43		
	2035 Without Project	114,650		2,236	8,307	2,285	0.28	5,555	0.67		2,236	6,071	5,320	0.88	3,950	0.65		
	2035 With Project	116,272		2,236	8,307	2,348	0.28	5,682	0.68		2,236	6,071	5,426	0.89	3,979	0.66		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.02	29	0.00		
50	Btw. Agua Dulce Cyn Rd & Soledad Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	96,000		2,236	8,307	1,834	0.22	4,819	0.58		2,236	6,071	5,155	0.85	2,698	0.44		
	2035 Without Project	116,850		2,236	8,307	2,415	0.29	5,565	0.67		2,236	6,071	5,220	0.86	4,070	0.67		
	2035 With Project	118,472		2,236	8,307	2,478	0.30	5,692	0.69		2,236	6,071	5,326	0.88	4,099	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.02	29	0.00		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
51	Btw. Shadow Pines/Soledad Rd & Sand Cyn Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	99,000		2,236	6,071	1,891	0.31	4,970	0.82		2,236	6,071	5,316	0.88	2,782	0.46		
	2035 Without Project	115,650		2,236	6,071	2,395	0.39	5,205	0.86		2,236	6,071	5,380	0.89	3,820	0.63		
	2035 With Project	117,272		2,236	6,071	2,458	0.40	5,332	0.88		2,236	6,071	5,486	0.90	3,849	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.02	29	0.00		
52	Btw. Sand Cyn Rd & Via Princessa		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	112,000		2,215	8,246	2,139	0.26	5,622	0.68		2,215	8,246	6,014	0.73	3,147	0.38		
	2035 Without Project	135,650		2,215	8,246	2,575	0.31	6,365	0.77		2,215	8,246	6,840	0.83	4,770	0.58		
	2035 With Project	137,272		2,215	8,246	2,638	0.32	6,492	0.79		2,215	8,246	6,946	0.84	4,799	0.58		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.01	29	0.00		
53	Btw. Via Princessa & Golden Valley Rd		3M (+1H+1A)							3M (+1H+1A)							LOS E	
	2014 Count	144,000		2,215	9,246	2,750	0.3	7,229	0.78		2,215	9,246	7,733	0.84	4,046	0.44		
	2035 Without Project	172,650		2,215	9,246	3,255	0.35	7,895	0.85		2,215	9,246	8,590	0.93	5,470	0.59		
	2035 With Project	174,272		2,215	9,246	3,318	0.36	8,022	0.87		2,215	9,246	8,696	0.94	5,499	0.59		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.01				106	0.01	29	0.00		
54	Btw. Golden Valley Rd & Placerita Cyn Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	144,000		2,215	8,246	2,750	0.33	7,229	0.88		2,215	8,246	7,733	0.94	4,046	0.49		
	2035 Without Project	169,650		2,215	8,246	3,105	0.38	7,645	0.93		2,215	8,246	8,520	1.03	5,140	0.62		
	2035 With Project	171,272		2,215	8,246	3,168	0.38	7,772	0.94		2,215	8,246	8,626	1.04	5,169	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.00	29	0.00		
55	Btw. Placerita Cyn Rd & San Fernando Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	151,000		2,215	8,246	2,884	0.35	7,580	0.92		2,215	8,246	8,109	0.98	4,243	0.51		
	2035 Without Project	173,650		2,215	8,246	3,155	0.38	7,995	0.97		2,215	8,246	8,520	1.03	5,110	0.62		
	2035 With Project	175,272		2,215	8,246	3,218	0.39	8,122	0.98		2,215	8,246	8,626	1.04	5,139	0.62		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.01	127	0.02				106	0.00	29	0.00		
56	Btw. San Fernando Rd//Newhall Ave & Jct I-5		5M (+1H)							5M (+1H)							LOS E	
	2014 Count	166,000		2,215	12,676	3,171	0.25	8,333	0.66		2,215	12,676	8,914	0.7	4,665	0.37		
	2035 Without Project	180,650		2,215	12,676	3,145	0.25	8,625	0.68		2,215	12,676	9,310	0.73	5,050	0.40		
	2035 With Project	182,272		2,215	12,676	3,208	0.25	8,752	0.69		2,215	12,676	9,416	0.74	5,079	0.40		
	Grapevine Specific Plan Net New Project Impacts	1,622				63	0.00	127	0.01				106	0.01	29	0.00		
SR-138																		
57	Between Jct I-5 and Gorman Post Rd		2M							2M							LOS D	
	2014 Count	4,500		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	71,675		1,904	3,808	2,525	0.66	3,830	1.01		1,904	3,808	3,855	1.01	2,725	0.72		
	2035 With Project	77,137		1,904	3,808	2,720	0.71	4,160	1.09		1,904	3,808	4,307	1.13	2,841	0.75		
	Grapevine Specific Plan Net New Project Impacts	5,462				195	0.05	330	0.08				452	0.12	116	0.03		
58	Between Gorman Post Rd and Old Ridge Route Rd		1M							1M							LOS D	
	2014 Count	4,900		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	83,675		1,904	1,904	2,785	1.46	4,680	2.46		1,904	1,904	4,525	2.38	3,055	1.60		
	2035 With Project	89,137		1,904	1,904	2,980	1.56	5,010	2.63		1,904	1,904	4,977	2.61	3,171	1.67		
	Grapevine Specific Plan Net New Project Impacts	5,462				195	0.10	330	0.17				452	0.23	116	0.07		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-138																		
59	Between Old Ridge Route Rd and 300th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	87,225		1,904	1,904	2,855	1.50	4,805	2.52		1,904	1,904	4,645	2.44	3,130	1.64		Yes
	2035 With Project	91,371		1,904	1,904	3,000	1.58	5,046	2.65		1,904	1,904	5,001	2.63	3,218	1.69		Yes
	Grapevine Specific Plan Net New Project Impacts	4,146				145	0.08	241	0.13				356	0.19	88	0.05		
60	Between 300th St West and 245TH St		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	152	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	72,225		1,904	1,904	3,495	1.84	2,885	1.52		1,904	1,904	2,915	1.53	3,830	2.01		Yes
	2035 With Project	76,371		1,904	1,904	3,640	1.91	3,126	1.64		1,904	1,904	3,271	1.72	3,918	2.06		Yes
	Grapevine Specific Plan Net New Project Impacts	4,146				145	0.07	241	0.12				356	0.19	88	0.05		
61	Between 245th St West and 190th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	89	0.05	147	0.09			1,700	113	0.07	87	0.05		
	2035 Without Project	62,225		1,904	1,904	2,595	1.36	2,325	1.22		1,904	1,904	2,465	1.29	3,050	1.60		Yes
	2035 With Project	66,371		1,904	1,904	2,740	1.44	2,566	1.35		1,904	1,904	2,821	1.48	3,138	1.65		Yes
	Grapevine Specific Plan Net New Project Impacts	4,146				145	0.08	241	0.13				356	0.19	88	0.05		
62	Between 190th St West and 110th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	54,371		1,962	1,962	2,140	1.09	1,996	1.02		1,962	1,962	2,371	1.21	2,508	1.28		Yes
	Grapevine Specific Plan Net New Project Impacts	4,146				145	0.07	241	0.13				356	0.18	88	0.05		
63	Between 110th St West and 60th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	53,453		1,962	1,962	2,104	1.07	1,945	0.99		1,962	1,962	2,294	1.17	2,488	1.27		Yes
	Grapevine Specific Plan Net New Project Impacts	3,228				109	0.05	190	0.10				279	0.14	68	0.04		
64	Between 60th St West and Jct Rte 14 North		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	141	0.08	177	0.1			1,700	123	0.07	148	0.09		
	2035 Without Project	55,225		1,962	1,962	2,355	1.20	1,895	0.97		1,962	1,962	1,985	1.01	2,700	1.38		Yes
	2035 With Project	57,519		1,962	1,962	2,427	1.24	2,041	1.04		1,962	1,962	2,177	1.11	2,748	1.40		Yes
	Grapevine Specific Plan Net New Project Impacts	2,294				72	0.04	146	0.07				192	0.10	48	0.02		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-126																		
65	Btw. N Jct SR-126 & Henry Mayo Dr		3M							3M							LOS D	
	2014 Count	29,025			6,288	1,264	0.20	1,618	0.26			6,288	1,406	0.22	1,517	0.24		
	2035 Without Project	31,145			6,288	1,369	0.22	1,802	0.29			6,288	1,518	0.24	1,540	0.24		
	2035 With Project	31,564			6,288	1,378	0.22	1,827	0.29			6,288	1,556	0.25	1,551	0.25		
	Project Impact	419			6,288	9	0.00	25	0.00			6,288	38	0.01	11	0.00		
66	Btw. Henry Mayo Dr & Commerce Center Dr		2M							2M							LOS D	
	2014 Count	29,025			4,665	1,264	0.27	1,618	0.35			4,665	1,406	0.30	1,517	0.33		
	2035 Without Project	31,145			4,665	1,369	0.29	1,802	0.39			4,665	1,518	0.33	1,540	0.33		
	2035 With Project	31,564			4,665	1,378	0.30	1,827	0.39			4,665	1,556	0.33	1,551	0.33		
	Grapevine Specific Plan Net New Project Impacts	419			4,665	9	0.00	25	0.01			4,665	38	0.01	11	0.00		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.90
E	0.91	-	1.00
F	>		1.00

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8 SCENARIO 10 ANALYSIS

This section analyzes the potential transportation and traffic impacts that could occur in Scenario 10. The impact assessment was conducted for cumulative plus project conditions and evaluates the same local intersections, local roadways, local freeway segments, state highway and freeway segments to the north and south of the Project site and interim access impacts considered in the Updated 28.7% HBW ICR analysis summarized in Section 2.3 of this report. Scenario 10 includes 12,000 dwelling units with legally-required schools and parks and no complementary commercial/light industrial amenities or onsite employment-generating land uses.

8.1 SCENARIO 10 ANALYSIS METHODOLOGY AND ICR ASSUMPTIONS

Table A-5 summarizes the Scenario 10 daily and AM and PM peak hour number of trips generated by proposed Project land uses. The Scenario 10 ADT is 124,819 trips compared with 197,685 trips in the Updated 28.7% HBW ICR analysis and 201,542 trips in the FEIR analysis. Based on the 2016 ITE Manual trip generation rates and the 2014 Kern COG model, the average weekday VMT in Scenario 9 is 3,716,852 miles compared with 3,114,939 miles in the Updated 28.7% HBW ICR analysis and 3,175,626 miles in the FEIR analysis.

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Table A-5: ITE Trip Generation Estimate - Scenario 10 Analysis

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	In	Out	Total	In	Out	
Residential									
Residential	8,400 DUs	210	6,216	1,554	4,662	8,316	5,239	3,077	79,296
Village Center Residential	3,600 DUs	220	1,656	381	1,275	2,016	1,270	746	26,352
Non-Residential									
Village Center Commercial - Retail ¹	0	820 ¹	0	0	0	0	0	0	0
Village Center Commercial - Office ¹	0	710 ¹	0	0	0	0	0	0	0
Freeway Commercial	0	820	0	0	0	0	0	0	0
Office/Research & Development	0	710	0	0	0	0	0	0	0
Light Industrial/Warehouse ²	0	130/ 150 ²	0	0	0	0	0	0	0
Schools & Parks ¹⁰									
Elementary Schools ⁴	4,970 students	520	3,330	1,798	1,532	845	406	439	9,394
Middle Schools ⁴	1,680 students	522	974	526	448	286	140	146	3,578
High Schools ⁴	3,000 students	530	1,560	1,045	515	420	202	218	6,090
Parks ³	132 acres	411							104
Total			13,736	5,304	8,432	11,882	7,256	4,626	124,814

Notes: DUs = dwelling units; ksf = thousand square feet

Trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 10th Edition*

¹Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)

²Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)

³City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information.

⁴.Student enrollment based on number of students anticipated per residential dwelling unit based on discussions with school district

Source: *Trip Generation Manual, 10th Edition* (Institute of Transportation Engineers, 2016).

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Table B-5 summarizes the ICRs used in Scenario 10. The Scenario 10 ICR for all trips combined is 21.3 percent in the AM peak hour and 6.5 percent in the PM peak hour, which are 38.5 percentage points lower during the AM peak hour and 57.7 percentage points lower during the PM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. As shown in Table B-10, due to the absence of any onsite employment-generating land uses, the ICR for Home-Based Work trips in Scenario 10 assumes that 100 percent of all Home-Based Work trips will be external during both the AM and PM peak hours. The AM peak hour ICR is higher than in the PM peak hour because trips to onsite schools are assumed to occur during the AM peak hour. Trips from onsite schools would occur outside (generally prior to) the PM peak hour.

Table B-5: Scenario 10 Estimated Project Trip Internalization by Peak Hour

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips ¹	% Internal ²	Total Internalization % ³	% of Trips ¹	% Internal ²	Total Internalization % ³
Home-Based Work	47.8%	0.0%	0.0%	28.1%	0.0%	0.0%
Home-Based Other/ Non-Home-Based	52.2%	40.8%	21.3%	71.9%	9.0%	6.5%
Total			21.3%			6.5%

Notes: ¹Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17 of Appendix T, page 117.

²Internalization percentage by trip purpose. Home-Based work trip internalization shown in Table 18 of Appendix T, page 118. Home-Based other/non-home-based trip internalization shown in Table 22 of Appendix T, page 139.

³Overall internalization estimate calculation.

Source: Fehr & Peers, April 2019.

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Table C-5 summarizes the percentage of trips traveling to the north and south of the Project during the AM and PM peak hours in Scenario 10. About 62.6 percent and 77.3 percent of peak AM and PM Project trips (respectively) would travel to and from the north (i.e. Bakersfield, Arvin-Lamont and Eastern Kern County) and 16.1 percent and 16.2 percent of peak AM and PM Project trips (respectively) would travel to and from the south (i.e. southern Kern County, Antelope Valley, Santa Clarita valley and metropolitan Los Angeles).

The percentage of all Scenario 10 trips to the north is 34.3 percentage points or 121% percent greater during the AM peak hour and 53 percentage points or 218 percent greater during the PM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. The share of all Scenario 10 trips to the south is 4.2 percentage points or 35.3 percent greater during the AM peak hour and 4.7 percentage points or 40.9 percent greater during the PM peak hours than in the Updated 28.7% HBW ICR and FEIR analysis (see Table A-FEIR and Table A-AFA).

**Table C-5: Scenario 10 Build-out Trip Distribution Estimate -
Cumulative Plus Project Conditions (2040)**

Origin/Destination	Trip Distribution Estimate	
	<i>A.M. Peak Hour</i>	<i>P.M. Peak Hour</i>
Project Area	21.3%	6.5%
North of Grapevine	62.6%	77.3%
West Bakersfield via I-5	6.6%	8.3%
North of Bakersfield via I-5	3.3%	4.1%
Bakersfield Metropolitan Area via SR 99	36.1%	44.6%
North of Bakersfield via SR 99	3.3%	4.1%
Arvin-Lamont Area	10.0%	12.1%
Eastern Kern County via SR 58	3.3%	4.1%
South of Grapevine	16.1%	16.2%
Southern Kern County (Frazier Park/Tejon Mountain Village)	2.0%	1.8%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	6.0%	5.4%
Santa Clarita Valley Area ¹	4.1%	3.7%
Los Angeles Basin/Orange County/Inland Empire	4.0%	5.3%

Source: Fehr & Peers, August 2016

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8.2 SCENARIO 10 ANALYSIS OF IMPACTS TO LOCAL INTERSECTIONS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

As shown in Table D-5, Scenario 10 would result in the following new significant impacts to local intersections compared with the Updated 28.7% HBW ICR and FEIR analyses:

- S. Wheeler Ridge Road / Laval Road – PM Peak Hour
- Street C / Street H – AM Peak Hour

Two (2) intersections that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 10 under cumulative plus project conditions:

- Street D / Street A – AM and PM Peak Hours
- Street I / Street A – PM Peak Hour

Three (3) local intersections that are significantly impacted in either the Updated 28.7% HBW ICR or FEIR analyses would not be significantly impacted and would operate at acceptable LOS levels in in Scenario 10 under cumulative plus project conditions:

- Street C / Street A – PM Peak Hour
- Street C / Street G – PM Peak Hour
- Street C / Street H – PM Peak Hour

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Table D-5: Scenario 10 Analysis Peak Hour Intersection Operations Cumulative Plus Project Conditions (2040)

Intersection	Traffic Control	Peak Hour	Cumulative No Project		Cumulative + Scenario 10 Project	
			Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	16	B	18	B
		P.M.	16	B	18	B
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	14	B	14	B
		P.M.	20	C	34	C
3. S. Wheeler Ridge Road / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A
		P.M.	4	A	4	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	20	C	17	B
		P.M.	45	D	<u>67</u>	<u>E</u>
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		39	D
		P.M.			25	C
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		40	D
		P.M.			30	C
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		15	B
		P.M.			19	B
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		229	F
		P.M.			<u>81</u>	<u>F</u>
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		14	B
		P.M.			15	B
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		<u>141</u>	<u>F</u>
		P.M.			8	A
11. Street I / Street A ⁴	Side-Street Stop	A.M.	Does Not Exist		0 (17)	A (C)
		P.M.			<u>1 (87)</u>	<u>A (F)</u>

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.

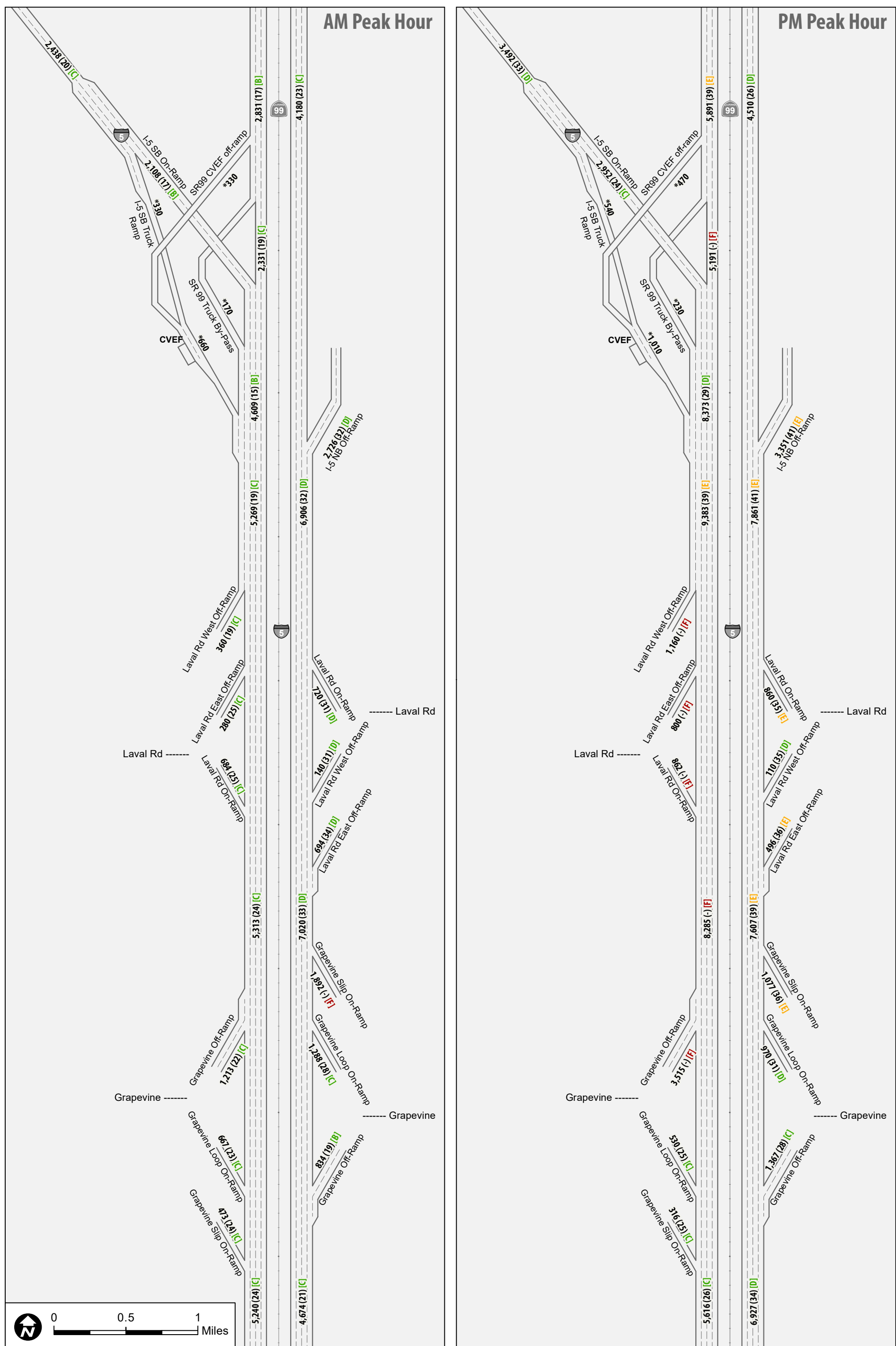
³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).

⁴ The shared movement with the greatest

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.



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8.3 SCENARIO 10 LOCAL ROADWAY IMPACTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS, PM PEAK HOUR

Table E-5 shows the Scenario 10 impacts to local roadway segments under cumulative plus project conditions during the PM peak hour, the period of heaviest roadway use and when the combination of vehicle trip purposes is at the highest level. Scenario 10 would result in new significant impacts to the following local roadways in the PM peak hour:

- Wheeler Ridge Road: North of Santa Elena Drive
- Street C: Aqueduct Crossing to E Street

One local roadway that is significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 10 under cumulative plus project conditions:

- Future Street A between Street D and Street I

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Table E-5: Scenario 10 PM Peak Hour Roadway Capacity Evaluation – Cumulative Plus Project Conditions (2040)

Roadway Segment	Classification	Existing Conditions			Cumulative Plus Scenario 10 Project		
		P.M. Peak Hour Volume	V/C ¹	LOS ²	P.M. Peak Hour Volume	V/C ¹	LOS ²
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	<u>1,800</u>	<u>0.66</u>	<u>E</u>
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			<u>2,100</u>	<u>1.17</u>	<u>F</u>
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			2,800	0.82	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			610	0.34	C
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			120	0.07	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			500	0.28	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			440	0.25	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			965	0.54	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			50	0.03	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			270	0.15	C
11. Dennis McCarthy Rd. : North of Laval Rd	2-lane Collector Street	592	0.36	D	940	0.53	D
12. Street A: Street D to Street I	4-lane Arterial Street	Does Not Exist			<u>3,485</u>	<u>1.02</u>	<u>F</u>

Notes: ¹V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.

²Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.

Source: Fehr & Peers, April 2019.

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8.4 SCENARIO 10 IMPACTS TO LOCAL FREEWAY SEGMENTS UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table F-5 summarizes the Scenario 10 LOS levels on 33 freeway segments in the vicinity of the Project area under cumulative plus project conditions. Scenario 10 would result in new significant impacts to the following local freeway segments compared with the Updated 28.7% HBW ICR and FEIR analysis:

- I-5 Northbound – Grapevine Slip On-Ramp – AM and PM Peak Hours
- I-5 Northbound – Grapevine Slip On-Ramp to Laval Road East Off-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road East Off-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road On-Ramp - PM Peak Hour
- I-5 Northbound – Laval Road On-Ramp to SR 99 Off-Ramp - PM Peak Hour
- I-5 Northbound – I-5 Northbound Off-ramp - PM Peak Hour
- SR 99 Southbound – North of I-5 Junction - PM Peak Hour
- SR 99 Southbound – CVEF Off-Ramp - PM Peak Hour
- SR 99 Southbound – Truck Bypass Off-Ramp - PM Peak Hour
- SR 99 Southbound – SR 99 Auto Lanes to I-5 Southbound - PM Peak Hour
- I-5 Southbound – I-5 Southbound Auto / Truck Bypass - PM Peak Hour
- I-5 Southbound – SR 99 to Laval Road - PM Peak Hour
- I-5 Southbound – Laval Road West Off-Ramp - PM Peak Hour
- I-5 Southbound – Laval Road East Off-Ramp - PM Peak Hour
- I-5 Southbound – Laval Road On-Ramp - PM Peak Hour
- I-5 Southbound – Laval Road to Grapevine - PM Peak Hour
- I-5 Southbound – Grapevine Off-Ramp - PM Peak Hour

The following local freeway segments that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 1 under cumulative plus project conditions:

- Fort Tejon to Base of Grapevine Grade (6% Downgrade) I-5 - PM Peak Hour
- Base of Grapevine Grade to Fort Tejon (6% Upgrade) - AM and PM Peak Hours

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Table F-5: Scenario 10 Analysis Peak Hour Freeway Operations – Cumulative Plus Project Conditions (2040)

Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
I-5 Northbound						
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	26	D	29	D
		P.M.	44	E	-	F
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	Does Not Exist		21	C
		P.M.			34	D
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	23	C	19*	B*
		P.M.	31	D	28*	C*
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		28	C
		P.M.			31	D
5. Grapevine Slip On-Ramp	Merge	A.M.	20	B	-	F
		P.M.	26	C	36	E
6. Grapevine to Laval Road	Basic	A.M.	18	C	33	D
		P.M.	28	C	39	E
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	27	C	34*	D*
		P.M.	36	E	36*	E*
8. Laval Road West Off-Ramp	Diverge	A.M.	19	B	31	D
		P.M.	27	C	35	D
9. Laval Road On-Ramp	Merge	A.M.	22	C	31	D
		P.M.	31	D	35	E
10. Laval Road to SR-99	Basic	A.M.	17	B	32	D
		P.M.	27	D	41	E
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	17	B	32	D
		P.M.	27	D	41	E
12. North of SR 99 Junction	Basic	A.M.	17	B	23	C

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
		P.M.	32	D	26	D
SR 99 Northbound						
13. North of I-5 Junction	Basic	A.M.	12	B	24	C
		P.M.	17	B	32	D
SR 99 Southbound						
1. North of I-5 Junction	Basic	A.M.	13	B	17	B
		P.M.	16	B	<u>39</u>	<u>E</u>
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		23	C
		P.M.			38	E
3. Truck Bypass Off-Ramp ³	Basic (Major Diverge)	A.M.	13	B	14	B
		P.M.	16	B	-	<u>F</u>
4. SR 99 Auto Lanes to I-5 Southbound ³	Basic (2 Lanes)	A.M.	14	B	19	C
		P.M.	17	B	-	<u>F</u>
I-5 Southbound						
5. North of SR 99 Junction	Basic	A.M.	18	B	20	C
		P.M.	23	C	33	D
6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		10	A
		P.M.			15	B
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		17	B
		P.M.			24	C
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	19	C	18	B
		P.M.	22	C	-	<u>F</u>
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	17	B	15	B
		P.M.	22	C	29	D
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		19	B
		P.M.			30	D
11. SR 99 to Laval Road	Basic	A.M.	19	C	19	C

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Segment	Segment Type	Peak Hour	Cumulative No Project (2040)		Cumulative Plus Project (2040)	
			LOS ²	Density ¹	Density ¹	LOS ²
		P.M.	24	C	<u>39</u>	<u>E</u>
12. Laval Road West Off-Ramp	Diverge	A.M.	24	C	19	C
		P.M.	30	D	-	<u>F</u>
13. Laval Road East Off-Ramp	Diverge	A.M.	20	C	25	C
		P.M.	24	C	-	<u>F</u>
14. Laval Road On-Ramp	Merge	A.M.	23	C	25	C
		P.M.	29	D	-	<u>F</u>
15. Laval Road to Grapevine ⁴	Basic	A.M.	20	C	24	C
		P.M.	25	C	-	<u>F</u>
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	22	C	22*	C*
		P.M.	27	C	-	<u>F*</u>
17. Grapevine Loop On-Ramp	Merge	A.M.	16	B	23	C
		P.M.	21	C	25	C
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		24	C
		P.M.			25	C
19. Relocated Grapevine Interchange to Base of Grapevine Grade ³	Basic	A.M.	Exists as Laval Road to Grapevine		24	C
		P.M.			26	C
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	32	D	<u>39</u>	<u>E</u>
		P.M.	<u>46</u>	<u>F</u>	-	<u>F</u>

Notes: ¹Density is reported in passenger car equivalents per mile per lane (pcpmpl).

²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

³These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.

⁴This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.

⁵Segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.

⁶Segment analysis increases deceleration lane from 170 feet to 500 feet.

*Indicates improved density and LOS.

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, April 2019.

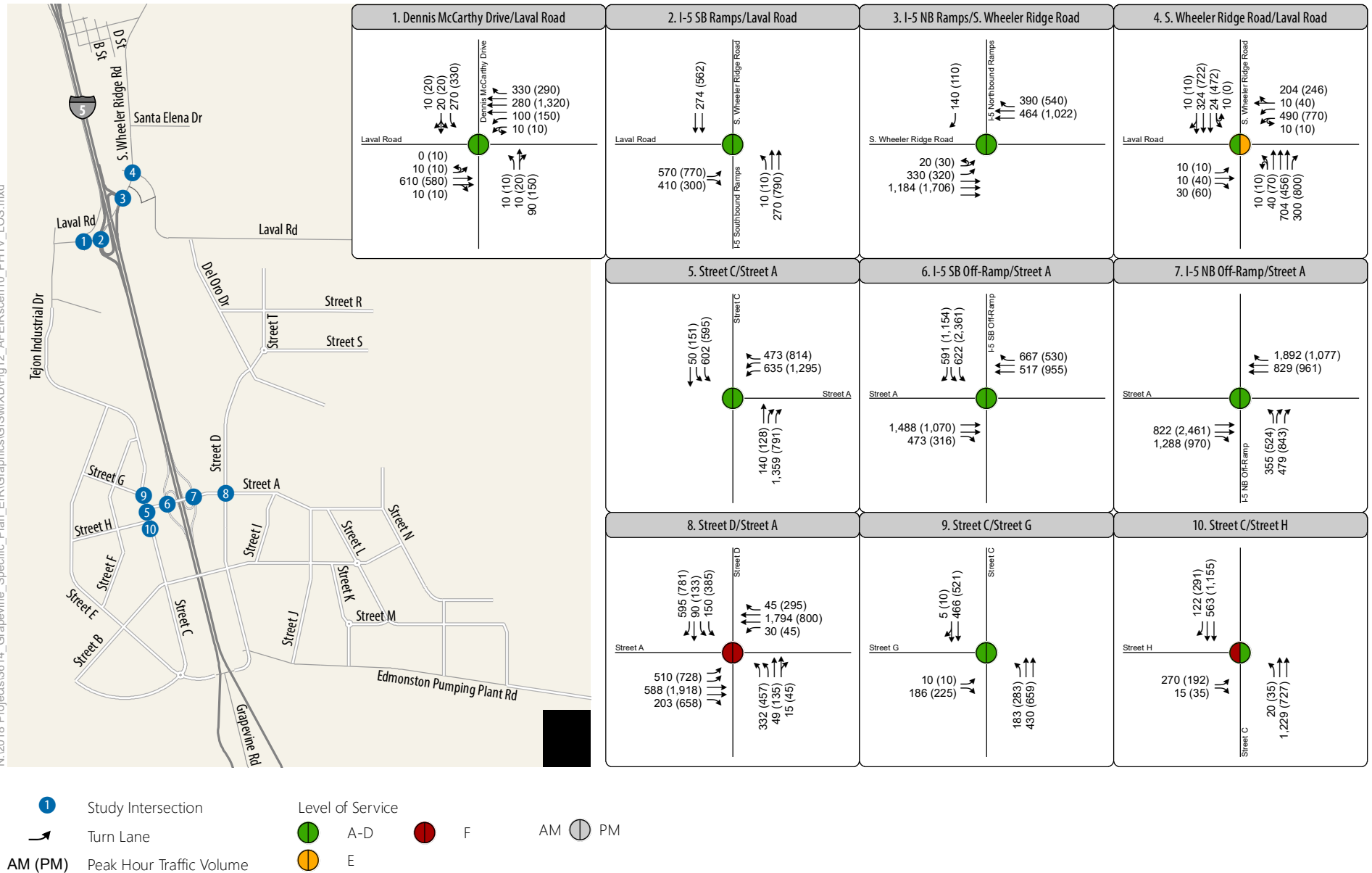


Figure 10-2

Peak Hour Traffic Volumes, Lane Configurations
and Level of Service (LOS) -
Scenario 10

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Table G-5 analyzes the traffic volumes and net new trips generated by Scenario 10 during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Scenario 10 analysis under cumulative plus project conditions. Scenario 10 results in northbound traffic volumes about 0.001 percent lower than in the FEIR analysis (6,847 versus 6,857 trips). Southbound traffic volumes are about 8.3 percent lower than in the FEIR analysis (5,616 versus 6,124 trips). Scenario 10 results in northbound traffic volumes about 0.2 percent higher (6,847 versus 6,829 trips) and southbound traffic volumes about 6.2 percent lower (5,616 versus 5,986 trips) than in the Updated 28.7% HBW ICR analysis.

**Table G-5: Scenario 10 Analysis PM Peak Hour Grapevine Grade Traffic Volume by
Vehicle Type – Cumulative Plus Project Conditions (2040)**

Segment	Vehicle Type	Cumulative No Project (2040)	Net New Trips	Cumulative Plus Project (2040)
I-5 Northbound				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Autos	4,825	682	5,507
	Trucks	1,340	0	1,340
	Total	6,165	682	6,847
I-5 Southbound				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Autos	4,040	176	4,216
	Trucks	1,400	0	1,400
	Total	5,440	176	5,616

Source: Fehr & Peers, April 2019.

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Table H-5 analyzes the Scenario 10 traffic density in terms of passenger car equivalents per mile per lane (pcpmpl) during the PM peak hour on the on the northbound (downgrade) and southbound (upgrade) portions of the Grapevine Grade in the Updated 28.7% HBW ICR analysis under cumulative plus project conditions. Table H-10 shows that the PM peak hour density in the two inside northbound lanes, which are reserved for passenger vehicles, would be 53 pcpmpl (LOS F). PM peak hour density in the two outside northbound lanes would be 56 pcpmpl (LOS F) under cumulative plus project conditions. These results are higher than the FEIR and Updated 28.7% HBW ICR analysis for the two inside northbound lanes and lower than the FEIR and Updated 28.7% HBW ICR analysis for the two outside northbound lanes.

Table H-5: Scenario 10 PM Peak Hour Grapevine Grade Freeway Operations – Cumulative Plus Project Conditions with Variant 1 or 2 (2040)

Segment	Lanes	Vehicle Composition	Cumulative No Project (2040)		Cumulative No Project – All Lanes (2040)		Cumulative Plus Project (2040)		Cumulative Plus Project – All Lanes (2040)	
			Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³
I-5 Northbound										
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos Only	39	E	44	E	53	F	55	F
	Outside Two Lanes	Autos & Trucks	51	F			56	F		
I-5 Southbound										
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos Only	29	D	46	F	36	E	52	F
	Outside Two Lanes	Autos & Trucks	86	F			105	F		

Notes: ¹Results for all lanes applies the HCM methodology to the entire segment, as reported in Table 26 Appendix T, page 161.

²Density is reported in passenger car equivalents per mile per lane (pcpmpl).

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria

Source: Fehr & Peers, April 2019.

During the PM peak hour, density in the two inside southbound lanes would be 36 pcpmpl (LOS E), lower than in the FEIR and Updated 28.7% HBW ICR analysis. Density in the outside two lanes would be 105 pcpmpl (LOS F), lower than in the FEIR and Updated 28.7% HBW ICR analysis.

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The total PM peak hour density for the northbound Grapevine Grade under Scenario 10 would be 55 pcpmpl (LOS F), lower than the 58 pcpmpl (LOS F) in the FEIR analysis and lower than the 57 pcpmpl (LOS F) in the Updated 28.7% HBW ICR analysis. The total PM peak hour density in the southbound direction under Scenario 10 would be 52 pcpmpl (LOS F), lower than the 64 pcpmpl (LOS F) in the FEIR analysis and lower than the 60 pcpmpl (LOS F) in the Updated 28.7% HBW ICR analysis. These results indicate that Scenario 10 would result in lower PM peak hour impacts to the Grapevine Grade under cumulative plus project conditions that would occur in the FEIR and Updated 28.7% HBW ICR analysis.

8.5 SCENARIO 10 FREEWAY IMPACTS TO STATE HIGHWAY AND FREEWAY SEGMENTS NORTH AND SOUTH OF THE PROJECT AREA UNDER CUMULATIVE PLUS PROJECT CONDITIONS

Table I-5 analyzes potential Scenario 10 impacts under cumulative plus project conditions at 15 state freeway and highway segments located to the north of the Project area. Table J-10 analyzes potential Updated 28.7% HBW ICR impacts under cumulative plus project conditions at 66 freeway and highway segments located to the south of the Project area. Significant impacts were determined to occur at any state freeway or highway segment that was determined to: (a) decline from acceptable to unacceptable LOS standards; or (b) the Project's contribution to the vehicle to capacity ratio at the segment operating at unacceptable LOS standard under cumulative without project conditions was greater than .02 under cumulative with project conditions.

Table I-5 shows that, Scenario 10 would result in one (1) new significant impact to a state highway or freeway segment to the north of the Project area compared with the FEIR and Updated 28.7% HBW ICR analysis:

SR 99 Southbound:

- Junction Route 166 West to Junction I-5 – PM peak hour

Table J-5 shows that Scenario 10 would result in two (2) new significant impacts to state highway or freeway segments to the south of the Project area compared with the FEIR and Updated 28.7% HBW ICR analysis:

The following freeway and highway segments to the south of the Project area along I-5 and SR-138 would be impacted under cumulative plus project conditions in Scenario 10:

I-5 Southbound:

- McBean Parkway to Lyons Avenue / Pico Canyon Road – AM peak hour
- SR 120 to Roxford Street – AM peak hour

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The following freeway and highway segments to the south of the Project area that are significantly impacted in the Updated 28.7% HBW ICR and FEIR analyses would also be significantly impacted in Scenario 109 under cumulative plus project conditions:

I-5 Northbound:

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – AM and PM peak hours

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

Table I-5
Cumulative With Scenario 10 Analysis Freeway Level of Service Analysis– North of Project Area

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
1	Btw . Jct Rte 58 W and California		4M							4M							LOS E	
	2014 Count	104,110		2,246	8,985	3,848	0.43	6,276	0.70		2,246	8,985	4,004	0.45	6,694	0.75		
	2040 Without Project	127,150		2,246	8,985	4,824	0.54	7,415	0.83		2,246	8,985	5,372	0.60	7,782	0.87		
	2040 With Project	129,475		2,246	8,985	5,082	0.57	7,497	0.83		2,246	8,985	5,438	0.61	7,842	0.87		
	Grapevine Specific Plan Net New Project Impacts	2,325				258	0.03	82	0.01				66	0.01	60	0.01		
2	Btw. California and Jct Rte 58 E		4M							4M							LOS E	
	2014 Count	89,700		2,246	8,985	3,392	0.38	5,263	0.59		2,246	8,985	3,390	0.38	5,895	0.66		
	2040 Without Project	106,340		2,246	8,985	3,950	0.44	6,231	0.69		2,246	8,985	4,326	0.48	6,761	0.75		
	2040 With Project	109,947		2,246	8,985	4,304	0.48	6,341	0.71		2,246	8,985	4,402	0.49	6,942	0.77		
	Grapevine Specific Plan Net New Project Impacts	3,607				354	0.04	110	0.01				76	0.01	181	0.02		
3	Btw. Jct Rte 58 E & Ming Ave		5M							5M							LOS E	
	2014 Count	88,820		2,246	10,107	3,406	0.34	5,478	0.54		2,246	10,107	3,217	0.32	5,663	0.56		
	2040 Without Project	134,395		2,246	10,107	4,865	0.48	7,754	0.77		2,246	10,107	5,602	0.55	8,658	0.86		
	2040 With Project	142,286		2,246	10,107	5,843	0.58	7,956	0.79		2,246	10,107	5,747	0.57	8,910	0.88		
	Grapevine Specific Plan Net New Project Impacts	7,891				978	0.10	202	0.02				145	0.01	252	0.02		
4	Btw. Ming Ave & White Lane		4M							4M							LOS E	
	2014 Count	69,755		2,246	8,985	2,614	0.29	4,435	0.49		2,296	9,186	2,394	0.26	4,508	0.49		
	2040 Without Project	119,800		2,246	8,985	4,994	0.56	7,099	0.79		2,296	9,186	4,737	0.52	7,130	0.78		
	2040 With Project	129,597		2,246	8,985	6,095	0.68	7,394	0.82		2,296	9,186	4,939	0.54	7,492	0.82		
	Grapevine Specific Plan Net New Project Impacts	9,797				1,101	0.12	295	0.03				202	0.02	362	0.04		
5	Btw. White Lane & Panama Lane		4M							4M							LOS E	
	2014 Count	57,090		2,296	9,186	2,165	0.24	3,616	0.39		2,296	9,186	2,072	0.23	3,565	0.39		
	2040 Without Project	101,775		2,296	9,186	4,191	0.46	6,111	0.67		2,296	9,186	3,793	0.41	6,260	0.68		
	2040 With Project	117,177		2,296	9,186	5,649	0.61	6,504	0.71		2,296	9,186	4,087	0.44	7,196	0.78		
	Grapevine Specific Plan Net New Project Impacts	15,402				1,458	0.16	393	0.04				294	0.03	936	0.10		
6	Btw. Panama Lane & Jct Rte 119 W		4M							4M							LOS E	
	2014 Count	44,450		2,296	9,186	1,622	0.18	2,890	0.31		2,296	9,186	1,797	0.20	2,581	0.28		
	2040 Without Project	84,820		2,296	9,186	3,379	0.37	5,264	0.57		2,296	9,186	3,270	0.36	5,051	0.55		
	2040 With Project	104,589		2,296	9,186	4,995	0.54	5,743	0.63		2,296	9,186	3,607	0.39	6,572	0.72		
	Grapevine Specific Plan Net New Project Impacts	19,769				1,616	0.18	479	0.05				337	0.04	1,521	0.17		
7	Btw. Jct Rte 119 W & Houghton Rd		3M							3M							LOS D	
	2014 Count	35,470		2,296	6,889	1,229	0.18	2,345	0.34		2,141	6,422	1,533	0.24	1,987	0.31		
	2040 Without Project	62,960		2,296	6,889	2,334	0.34	4,037	0.59		2,141	6,422	2,683	0.42	3,538	0.55		
	2040 With Project	85,217		2,296	6,889	4,086	0.59	4,589	0.67		2,141	6,422	3,066	0.48	5,302	0.83		
	Grapevine Specific Plan Net New Project Impacts	22,257				1,752	0.25	552	0.08				383	0.06	1,764	0.27		
8	Btw. Houghton Rd & Jct Rte 223 E		3M							3M							LOS D	
	2014 Count	33,360		2,141	6,422	1,158	0.18	2,176	0.34		2,141	6,422	1,473	0.23	1,865	0.29		
	2040 Without Project	60,280		2,141	6,422	2,229	0.35	3,856	0.60		2,141	6,422	2,588	0.40	3,383	0.53		
	2040 With Project	83,073		2,141	6,422	4,027	0.63	4,420	0.69		2,141	6,422	2,984	0.46	5,183	0.81		
	Grapevine Specific Plan Net New Project Impacts	22,793				1,798	0.28	564	0.09				396	0.06	1,800	0.28		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-99																		
9	Btw. Jct Rte 223 E & Old U.S. 99		3M							3M							LOS D	
	2014 Count	27,270		2,141	6,422	945	0.15	1,788	0.28		2,133	6,400	1,233	0.19	1,488	0.23		
	2040 Without Project	54,555		2,141	6,422	1,964	0.31	3,513	0.55		2,133	6,400	2,390	0.37	3,044	0.48		
	2040 With Project	78,822		2,141	6,422	3,773	0.59	4,124	0.64		2,133	6,400	2,797	0.44	5,070	0.79		
	Grapevine Specific Plan Net New Project Impacts	24,267				1,809	0.28	611	0.10				407	0.06	2,026	0.32		
10	Btw. Old U.S. 99 & Herring Rd		3M							3M							LOS D	
	2014 Count	28,585		2,133	6,400	987	0.15	1,860	0.29		2,133	6,400	1,284	0.20	1,586	0.25		
	2040 Without Project	57,525		2,133	6,400	2,065	0.32	3,664	0.57		2,133	6,400	2,484	0.39	3,292	0.51		
	2040 With Project	85,337		2,133	6,400	3,977	0.62	4,366	0.68		2,133	6,400	2,942	0.46	5,783	0.90		
	Grapevine Specific Plan Net New Project Impacts	27,812				1,912	0.30	702	0.11				458	0.07	2,491	0.38		
11	Btw. Herring Rd & Sandrini Rd.		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	85,016		2,133	6,400	3,964	0.62	4,345	0.68		2,133	6,400	2,931	0.46	5,763	0.90		
	Grapevine Specific Plan Net New Project Impacts	27,881				1,912	0.30	709	0.11				462	0.07	2,493	0.39		
12	Btw. Sandrini Rd & David Rd		3M							3M							LOS D	
	2014 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
	2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
	2040 With Project	85,016		2,133	6,400	3,964	0.62	4,345	0.68		2,133	6,400	2,931	0.46	5,763	0.90		
	Grapevine Specific Plan Net New Project Impacts	27,881				1,912	0.30	709	0.11				462	0.07	2,493	0.39		
13	Btw. David Rd & Valpredo		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,133	6,400	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,133	6,400	2,364	0.37	3,104	0.49		
	2040 With Project	83,854		2,133	6,400	3,919	0.61	4,266	0.67		2,133	6,400	2,869	0.45	5,716	0.89		
	Grapevine Specific Plan Net New Project Impacts	29,339				1,956	0.31	794	0.12				505	0.08	2,612	0.41		
14	Btw. Valpredo & Jct Rte 166 W		3M							3M							LOS D	
	2014 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,096	6,288	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,096	6,288	2,364	0.38	3,104	0.49		
	2040 With Project	83,854		2,133	6,400	3,919	0.61	4,266	0.67		2,096	6,288	2,869	0.46	5,716	0.91		
	Grapevine Specific Plan Net New Project Impacts	29,339				1,956	0.31	794	0.12				505	0.08	2,612	0.42		
15	Btw. Jct Rte 166 W & Jct I-5		3M							3M							LOS D	
	2014 Count	26,965		2,096	6,288	934	0.15	1,733	0.28		2,054	6,162	1,219	0.20	1,507	0.24		
	2040 Without Project	54,150		2,096	6,288	1,926	0.31	3,373	0.54		2,054	6,162	2,363	0.38	3,168	0.51		
	2040 With Project	89,885		2,096	6,288	3,963	0.63	4,727	0.75		2,054	6,162	3,007	0.49	6,280	1.02		Yes
	Grapevine Specific Plan Net New Project Impacts	35,735				2,037	0.32	1,354	0.22				644	0.10	3,112	0.51		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

Table J-5
Cumulative With Scenario 10 Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
1	Btw. Fort Tejon Rd & Lebec Rd		4M							4M							LOS D	
	2014 Count	72,000		1,839	7,355	1,390	0.19	2,426	0.33		2,036	8,143	1,346	0.17	2,304	0.28		
	2035 Without Project	119,850		1,839	7,355	2,895	0.39	4,255	0.58		2,036	8,143	3,170	0.39	3,640	0.45		
	2035 With Project	130,605		1,839	7,355	3,297	0.45	4,937	0.67		2,036	8,143	4,061	0.50	3,816	0.47		
	Grapevine Specific Plan Net New Project Impacts	10,755				402	0.05	682	0.09				891	0.11	176	0.02		
2	Btw. Lebec Rd & Frazier Mtn Park		4M							4M							LOS D	
	2014 Count	73,000		1,839	7,355	1,409	0.19	2,460	0.33		2,036	8,143	1,365	0.17	2,336	0.29		
	2035 Without Project	120,850		1,839	7,355	2,915	0.40	4,285	0.58		2,036	8,143	3,190	0.39	3,680	0.45		
	2035 With Project	131,621		1,839	7,355	3,317	0.45	4,970	0.68		2,036	8,143	4,081	0.50	3,856	0.47		
	Grapevine Specific Plan Net New Project Impacts	10,771				402	0.05	685	0.09				891	0.11	176	0.02		
3	Btw. Frazier Mtn Park & Gorman Rd		4M							4M							LOS D	
	2014 Count	70,000		2,036	8,143	1,351	0.17	2,359	0.29		1,401	5,606	1,309	0.23	2,240	0.4		
	2035 Without Project	114,850		2,036	8,143	2,775	0.34	4,015	0.49		1,401	5,606	3,020	0.54	3,380	0.60		
	2035 With Project	125,621		2,036	8,143	3,177	0.39	4,700	0.58		1,401	5,606	3,911	0.70	3,556	0.63		
	Grapevine Specific Plan Net New Project Impacts	10,771				402	0.05	685	0.08				891	0.16	176	0.03		
4	Btw. Gorman Rd & N Jct SR-138		4M							4M							LOS D	
	2014 Count	70,000		1,849	7,398	1,351	0.18	2,359	0.32		2,042	8,169	1,309	0.16	2,240	0.27		
	2035 Without Project	117,850		1,849	7,398	2,745	0.37	4,405	0.60		2,042	8,169	3,280	0.40	3,350	0.41		
	2035 With Project	128,621		1,849	7,398	3,147	0.43	5,090	0.69		2,042	8,169	4,171	0.51	3,526	0.43		
	Grapevine Specific Plan Net New Project Impacts	10,771				402	0.05	685	0.09				891	0.11	176	0.02		
5	Btw. N Jct SR-138 & Quail Lake Rd		4M							4M							LOS D	
	2014 Count	67,000		1,849	7,398	1,293	0.17	2,258	0.31		2,042	8,169	1,253	0.15	2,144	0.26		
	2035 Without Project	89,175		1,849	7,398	1,750	0.24	3,140	0.42		2,042	8,169	2,055	0.25	2,360	0.29		
	2035 With Project	95,867		1,849	7,398	1,995	0.27	3,564	0.48		2,042	8,169	2,616	0.32	2,469	0.30		
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.03	424	0.06				561	0.07	109	0.01		
6	Btw. Quail Lake Rd & S Jct SR-138		4M							4M							LOS D	
	2014 Count	67,000		1,375	5,500	1,293	0.24	2,258	0.41		1,375	5,500	1,253	0.23	2,144	0.39		
	2035 Without Project	90,175		1,375	5,500	1,750	0.32	3,590	0.65		1,375	5,500	2,055	0.37	2,360	0.43		
	2035 With Project	96,867		1,375	5,500	1,995	0.36	4,014	0.73		1,375	5,500	2,616	0.48	2,469	0.45		
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.04	424	0.08				561	0.10	109	0.02		
7	Btw. S Jct SR-138 & Smokey Bear Rd		4M							4M							LOS D	
	2014 Count	69,000		1,375	5,500	1,332	0.24	2,325	0.42		1,375	5,500	1,290	0.23	2,208	0.4		
	2035 Without Project	123,175		1,375	5,500	2,240	0.41	5,170	0.94		1,375	5,500	4,145	0.75	3,240	0.59		Yes
	2035 With Project	129,867		1,375	5,500	2,485	0.45	5,594	1.02		1,375	5,500	4,706	0.86	3,349	0.61		Yes
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.04	424	0.08				561	0.10	109	0.02		
8	Btw. Smokey Bear Rd & Vista Del Lago Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	131,867		1,489	5,957	2,585	0.43	5,684	0.95		1,489	5,957	4,806	0.81	3,489	0.59		Yes
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.04	424	0.07				561	0.09	109	0.02		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
I-5																		
9	Btw. Vista Del Lago Rd & Templin Hwy		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.4		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57		
	2035 With Project	131,867		1,489	5,957	2,585	0.43	5,684	0.95		1,489	5,957	4,806	0.81	3,489	0.59		Yes
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.04	424	0.07				561	0.09	109	0.02		
10	Btw. Templin Hwy & Lake Hughes Rd		4M							4M							LOS D	
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	126,175		1,489	5,957	2,380	0.40	5,260	0.88		1,489	5,957	4,205	0.71	3,410	0.57		
	2035 With Project	132,867		1,489	5,957	2,625	0.44	5,684	0.95		1,489	5,957	4,766	0.80	3,519	0.59		Yes
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.04	424	0.07				561	0.09	109	0.02		
11	Btw. Lake Hughes Rd & Parker Rd		4M + 1 AUX							4M + 1 AUX							LOS E	
	2014 Count	73,000		1,856	7,422	1,504	0.2	1,949	0.26		1,856	7,422	1,854	0.25	2,519	0.34		
	2035 Without Project	154,175		1,856	8,422	5,360	0.64	8,080	0.96		1,856	8,422	8,405	1.00	5,050	0.60		
	2035 With Project	160,867		1,856	8,422	5,605	0.67	8,504	1.01		1,856	8,422	8,966	1.06	5,159	0.61		Yes
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.03	424	0.05				561	0.07	109	0.01		
12	Btw. Parker Rd & Hasley Cyn Rd		4M (+1H)							4M (+1H)							LOS E	
	2014 Count	108,000		1,856	7,422	2,225	0.30	2,884	0.39		1,856	7,422	2,743	0.37	3,726	0.5		
	2035 Without Project	171,175		1,856	9,022	5,360	0.59	7,030	0.78		1,856	9,022	7,285	0.81	5,120	0.57		
	2035 With Project	177,867		1,856	9,022	5,605	0.62	7,454	0.83		1,856	9,022	7,846	0.87	5,229	0.58		
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.03	424	0.05				561	0.06	109	0.01		
13	Btw. Hasley Cyn Rd & N Jct SR-126 (NB)		4M (+1H +1A)							4M (+1H)							LOS E	
	2014 Count	114,000		1,856	8,422	2,348	0.28	3,044	0.36		1,856	8,422	2,896	0.34	3,933	0.47		
	2035 Without Project	170,175		1,856	10,022	5,180	0.52	6,800	0.68		1,856	9,022	7,085	0.79	5,120	0.57		
	2035 With Project	176,867		1,856	10,022	5,425	0.54	7,224	0.72		1,856	9,022	7,646	0.85	5,229	0.58		
	Grapevine Specific Plan Net New Project Impacts	6,692				245	0.02	424	0.04				561	0.06	109	0.01		
14	Btw. N Jct SR-126 & Rye Cyn Rd		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	130,000		1,867	7,470	2,678	0.36	3,471	0.46		1,867	7,470	3,302	0.44	4,485	0.60		
	2035 Without Project	175,375		1,867	9,070	4,615	0.51	6,450	0.71		1,867	10,070	6,865	0.68	5,565	0.55		
	2035 With Project	181,749		1,867	9,070	4,853	0.54	6,854	0.76		1,867	10,070	7,395	0.73	5,668	0.56		
	Grapevine Specific Plan Net New Project Impacts	6,374				238	0.03	404	0.04				530	0.05	103	0.01		
15	Btw.Rye Cyn Rd & Magic Mountain Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	154,000		1,918	7,670	3,172	0.41	4,112	0.54		1,918	7,670	3,912	0.51	5,313	0.69		
	2035 Without Project	181,375		1,918	9,270	4,615	0.50	6,450	0.70		1,918	10,270	6,875	0.67	5,395	0.53		
	2035 With Project	187,749		1,918	9,270	4,853	0.52	6,854	0.74		1,918	10,270	7,405	0.72	5,498	0.54		
	Grapevine Specific Plan Net New Project Impacts	6,374				238	0.03	404	0.04				530	0.05	103	0.01		
16	Btw. Magic Mountain Pkwy & Valencia Blvd		4M (+1H + 1A)							4M (+1H)							LOS E	
	2014 Count	165,000		1,918	7,670	3,399	0.44	4,406	0.57		1,918	7,670	4,191	0.55	5,693	0.74		
	2035 Without Project	194,375		1,918	10,270	5,615	0.55	6,980	0.68		1,918	9,270	6,815	0.74	5,735	0.62		
	2035 With Project	200,749		1,918	10,270	5,853	0.57	7,384	0.72		1,918	9,270	7,345	0.79	5,838	0.63		
	Grapevine Specific Plan Net New Project Impacts	6,374				238	0.02	404	0.04				530	0.06	103	0.01		
17	Btw. Valencia Blvd & McBean Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E	
	2014 Count	175,000		1,918	7,670	3,605	0.47	4,673	0.61		1,918	7,670	4,445	0.58	6,038	0.79		
	2035 Without Project	218,375		1,918	9,270	6,475	0.70	7,290	0.79		1,918	10,270	8,135	0.79	6,615	0.64		
	2035 With Project	224,749		1,918	9,270	6,713	0.72	7,694	0.83		1,918	10,270	8,665	0.84	6,718	0.65		
	Grapevine Specific Plan Net New Project Impacts	6,374				238	0.03	404	0.04				530	0.05	103	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold	
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C			
I-5																			
18	Btw. McBeach Pkwy & Lyons Ave/Pico Cyn Rd		4M (+1H)							4M (+1H)							LOS E		
	2014 Count	186,000		1,990	7,960	3,832	0.48	4,966	0.62		1,990	7,960	4,724	0.59	6,417	0.81			
	2035 Without Project	222,375		1,990	9,560	6,555	0.69	8,640	0.90		1,990	9,560	9,105	0.95	6,685	0.70			
	2035 With Project	228,749		1,990	9,560	6,793	0.71	9,044	0.95		1,990	9,560	9,635	1.01	6,788	0.71		Yes	
	Grapevine Specific Plan Net New Project Impacts	6,374			238	0.02	404	0.04			530	0.06	103	0.01					
19	Btw. Lyons Ave & Calgrove Blvd		4M (+1H + 1A)							4M (+1H + 1T)							LOS E		
	2014 Count	199,000		1,990	7,960	4,099	0.52	5,313	0.67		1,990	9,560	5,055	0.53	6,866	0.72			
	2035 Without Project	252,375		1,990	10,560	6,855	0.65	10,070	0.95		1,990	11,160	9,175	0.82	6,705	0.60			
	2035 With Project	258,749		1,990	10,560	7,093	0.67	10,474	0.99		1,990	11,160	9,705	0.87	6,808	0.61			
	Grapevine Specific Plan Net New Project Impacts	6,374			238	0.02	404	0.04			530	0.05	103	0.01					
20	Btw. Calgrove Blvd & SR-14		4M (+1H + 1T[C])							4M (+1H + 2T[C])							LOS E		
	2014 Count	200,000		1,990	9,160	4,120	0.45	5,340	0.58		1,990	10,360	5,080	0.49	6,900	0.67			
	2035 Without Project	253,375		1,990	10,760	5,725	0.53	9,190	0.85		1,990	11,960	9,805	0.82	6,845	0.57			
	2035 With Project	259,749		1,990	10,760	5,963	0.55	9,594	0.89		1,990	11,960	10,335	0.86	6,948	0.58			
	Grapevine Specific Plan Net New Project Impacts	6,374			238	0.02	404	0.04			530	0.04	103	0.01					
21	Btw. SR-14 & SR-210		3M (+1H+3A[F]+2T)							4M (+1H+2A[F]+2T)							LOS E		
	2014 Count	329,000		1,997	16,791	7,863	0.47	12,930	0.77			1,997	16,788	14,213	0.85	9,409		0.56	
	2035 Without Project	383,650		1,997	16,791	9,130	0.54	15,005	0.89			1,997	16,788	16,580	0.99	10,885		0.65	
	2035 With Project	387,682		1,997	16,791	9,277	0.55	15,281	0.91			1,997	16,788	16,895	1.01	10,953		0.65	
	Grapevine Specific Plan Net New Project Impacts	4,032			147	0.01	276	0.02				315	0.02	68	0.00				
22	Btw. SR-210 & Roxford St		4M (+1H+ 1A[F])							5M (+1H)							LOS E		
	2014 Count	266,000		2,212	12,449	6,357	0.51	10,454	0.84		2,212	12,661	11,491	0.91	7,608	0.6			
	2035 Without Project	304,650		2,212	12,449	7,240	0.58	11,905	0.96		2,212	12,661	13,170	1.04	8,625	0.68		Yes	
	2035 With Project	308,682		2,212	12,449	7,387	0.59	12,181	0.98		2,212	12,661	13,485	1.07	8,693	0.69		Yes	
	Grapevine Specific Plan Net New Project Impacts	4,032			147	0.01	276	0.02			315	0.03	68	0.01					
23	Btw. Roxford St & I-405		5M (+1H+ 1A[F])							5M (+1H+1A[F])							LOS E		
	2014 Count	283,000		2,212	14,661	6,764	0.46	11,122	0.76		2,212	14,661	12,226	0.83	8,094	0.55			
	2035 Without Project	318,650		2,212	14,661	7,580	0.52	12,465	0.85		2,212	14,661	13,790	0.94	9,035	0.62			
	2035 With Project	322,682		2,212	14,661	7,727	0.53	12,741	0.87		2,212	14,661	14,105	0.96	9,103	0.62			
	Grapevine Specific Plan Net New Project Impacts	4,032			147	0.01	276	0.02			315	0.02	68	0.00					
24	Btw. I-405 & San Fernando Mission Blvd		3M (+1H)							3M (+1H)							LOS E		
	2014 Count	141,000		2,190	8,171	3,370	0.41	5,541	0.68		2,190	8,171	6,091	0.75	4,033	0.49			
	2035 Without Project	161,650		2,190	8,171	3,830	0.47	6,295	0.77		2,190	8,171	7,010	0.86	4,545	0.56			
	2035 With Project	165,682		2,190	8,171	3,977	0.49	6,571	0.80		2,190	8,171	7,325	0.90	4,613	0.56			
	Grapevine Specific Plan Net New Project Impacts	4,032			147	0.02	276	0.03			315	0.04	68	0.01					

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
25	Btw Dawn Rd & Rosamond Blvd		2M							2M							LOS D	
	2014 Count	23,000		2,332	4,665	1,083	0.23	849	0.18		2,332	4,665	499	0.11	1,323	0.28		
	2035 Without Project	29,825		2,332	4,665	1,345	0.29	1,095	0.23		2,332	4,665	610	0.13	1,535	0.33		
	2035 With Project	30,132		2,332	4,665	1,352	0.29	1,105	0.24		2,332	4,665	648	0.14	1,541	0.33		
	Grapevine Specific Plan Net New Project Impacts	307				7	0.00	10	0.00				38	0.01	6	0.00		
26	Btw. Rosamond Blvd & Ave A		2M							2M							LOS D	
	2014 Count	30,000		2,339	4,679	1,413	0.3	1,107	0.24		2,339	4,679	651	0.14	1,725	0.37		
	2035 Without Project	34,825		2,339	4,679	1,715	0.37	1,335	0.29		2,339	4,679	720	0.15	1,855	0.40		
	2035 With Project	35,132		2,339	4,679	1,722	0.37	1,345	0.29		2,339	4,679	758	0.16	1,861	0.40		
	Grapevine Specific Plan Net New Project Impacts	307				7	0.00	10	0.00				38	0.01	6	0.00		
27	Ave A & N Jct Rte 138/Ave D		2M							2M							LOS D	
	2014 Count	34,000		2,339	4,679	1,129	0.24	1,261	0.27		2,339	4,679	1,244	0.27	1,567	0.34		
	2035 Without Project	55,825		2,339	4,679	2,115	0.45	2,125	0.45		2,339	4,679	1,950	0.42	2,335	0.50		
	2035 With Project	56,132		2,339	4,679	2,122	0.45	2,135	0.46		2,339	4,679	1,988	0.42	2,341	0.50		
	Grapevine Specific Plan Net New Project Impacts	307				7	0.00	10	0.00				38	0.01	6	0.00		
28	Btw. Jct Rte 138/Ave D & Ave F		2M							2M							LOS D	
	2014 Count	36,000		2,332	4,665	1,195	0.26	1,336	0.29		2,332	4,665	1,318	0.28	1,660	0.36		
	2035 Without Project	87,650		2,332	4,665	3,525	0.76	3,685	0.79		2,332	4,665	3,360	0.72	3,720	0.80		
	2035 With Project	89,087		2,332	4,665	3,572	0.77	3,788	0.81		2,332	4,665	3,475	0.74	3,742	0.80		
	Grapevine Specific Plan Net New Project Impacts	1,437				47	0.01	103	0.02				115	0.02	22	0.00		
29	Btw. Ave F & Ave G		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	102,650		2,332	4,665	4,235	0.91	3,835	0.82		2,332	4,665	3,690	0.79	4,460	0.96		Yes
	2035 With Project	104,087		2,332	4,665	4,282	0.92	3,938	0.84		2,332	4,665	3,805	0.82	4,482	0.96		
	Grapevine Specific Plan Net New Project Impacts	1,437				47	0.01	103	0.02				115	0.02	22	0.00		
30	Btw. Ave G & Ave H		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	107,650		2,332	4,665	4,385	0.94	3,815	0.82		2,332	4,665	3,810	0.82	4,600	0.99		Yes
	2035 With Project	109,087		2,332	4,665	4,432	0.94	3,918	0.84		2,332	4,665	3,925	0.84	4,622	0.99		
	Grapevine Specific Plan Net New Project Impacts	1,437				47	0.00	103	0.02				115	0.02	22	0.00		
31	Btw. Ave H & Ave I		2M							2M							LOS E	
	2014 Count	40,000		2,332	4,665	1,328	0.28	1,484	0.32		2,332	4,665	1,464	0.31	1,844	0.4		
	2035 Without Project	108,650		2,332	4,665	4,345	0.93	4,025	0.86		2,332	4,665	3,880	0.83	4,530	0.97		
	2035 With Project	110,087		2,332	4,665	4,392	0.94	4,128	0.88		2,332	4,665	3,995	0.86	4,552	0.98		
	Grapevine Specific Plan Net New Project Impacts	1,437				47	0.01	103	0.02				115	0.02	22	0.00		
32	Btw. Ave I & Ave J		3M							3M							LOS E	
	2014 Count	47,000		2,332	6,997	1,560	0.22	1,744	0.25		2,332	6,997	1,720	0.25	2,167	0.31		
	2035 Without Project	114,650		2,332	6,997	4,605	0.66	4,365	0.62		2,332	6,997	3,950	0.56	4,890	0.70		
	2035 With Project	117,432		2,332	6,997	4,712	0.67	4,537	0.65		2,332	6,997	4,180	0.60	4,936	0.71		
	Grapevine Specific Plan Net New Project Impacts	2,782				107	0.02	172	0.02				230	0.03	46	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
33	Btw. Ave J & 20th St W		3M							3M							LOS E	
	2014 Count	42,000		2,339	7,016	1,394	0.2	1,558	0.22		2,339	7,016	1,537	0.22	1,936	0.28		
	2035 Without Project	99,650		2,339	7,016	4,105	0.59	3,905	0.56		2,339	7,016	3,500	0.50	4,370	0.62		
	2035 With Project	102,331		2,339	7,016	4,212	0.60	4,073	0.58		2,339	7,016	3,715	0.53	4,416	0.63		
	Grapevine Specific Plan Net New Project Impacts	2,681				107	0.02	168	0.02				215	0.03	46	0.01		
34	Btw. 20th St W & Ave K		3M							3M							LOS E	
	2014 Count	59,000		2,339	7,016	1,959	0.28	2,189	0.31		2,339	7,016	2,159	0.31	2,720	0.39		
	2035 Without Project	118,650		2,339	7,016	4,715	0.67	4,585	0.65		2,339	7,016	4,160	0.59	5,180	0.74		
	2035 With Project	121,331		2,339	7,016	4,822	0.69	4,753	0.68		2,339	7,016	4,375	0.62	5,226	0.74		
	Grapevine Specific Plan Net New Project Impacts	2,681				107	0.02	168	0.02				215	0.03	46	0.01		
35	Btw. Ave K & Ave L		3M							3M							LOS E	
	2014 Count	74,000		2,339	7,016	2,457	0.35	2,745	0.39		2,339	7,016	2,708	0.39	3,411	0.49		
	2035 Without Project	127,650		2,339	7,016	4,975	0.71	4,835	0.69		2,339	7,016	4,440	0.63	5,650	0.81		
	2035 With Project	130,331		2,339	7,016	5,082	0.72	5,003	0.71		2,339	7,016	4,655	0.66	5,696	0.81		
	Grapevine Specific Plan Net New Project Impacts	2,681				107	0.02	168	0.02				215	0.03	46	0.01		
36	Btw. Ave L & Ave M		3M							3M							LOS E	
	2014 Count	89,000		2,339	7,016	2,955	0.42	3,302	0.47		2,339	7,016	3,257	0.46	4,103	0.58		
	2035 Without Project	100,650		2,339	7,016	3,875	0.55	3,435	0.49		2,339	7,016	3,630	0.52	4,540	0.65		
	2035 With Project	102,936		2,339	7,016	3,969	0.57	3,573	0.51		2,339	7,016	3,814	0.54	4,581	0.65		
	Grapevine Specific Plan Net New Project Impacts	2,286				94	0.01	138	0.02				184	0.03	41	0.01		
37	Btw. Ave M & Ave N		3M							3M							LOS E	
	2014 Count	92,000		2,339	7,016	3,054	0.44	3,413	0.49		2,339	7,016	3,367	0.48	4,241	0.60		
	2035 Without Project	100,650		2,339	7,016	3,895	0.56	3,365	0.48		2,339	7,016	3,550	0.51	4,710	0.67		
	2035 With Project	102,589		2,339	7,016	3,982	0.57	3,473	0.50		2,339	7,016	3,704	0.53	4,749	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,939				87	0.01	108	0.02				154	0.02	39	0.01		
38	Btw. Ave N & 10th St W		3M							3M							LOS E	
	2014 Count	87,000		2,339	7,016	2,888	0.41	3,228	0.46		2,339	7,016	3,184	0.45	4,011	0.57		
	2035 Without Project	98,650		2,339	7,016	4,085	0.58	3,215	0.46		2,339	7,016	3,280	0.47	4,700	0.67		
	2035 With Project	100,526		2,339	7,016	4,172	0.59	3,314	0.47		2,339	7,016	3,434	0.49	4,736	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,876				87	0.01	99	0.01				154	0.02	36	0.01		
39	Btw. 10th St W & Rancho Vista Blvd		3M							3M							LOS E	
	2014 Count	87,000		2,225	6,675	2,888	0.43	3,228	0.48		2,225	6,675	3,184	0.48	4,011	0.60		
	2035 Without Project	93,650		2,225	6,675	3,965	0.59	3,165	0.47		2,225	6,675	3,170	0.47	4,510	0.68		
	2035 With Project	95,237		2,225	6,675	4,045	0.61	3,264	0.49		2,225	6,675	3,278	0.49	4,541	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,587				80	0.01	99	0.01				108	0.02	31	0.00		
40	Btw. Rancho Vista Blvd & S Jct Rte 138		3M							3M							LOS E	
	2014 Count	84,000		2,225	6,675	2,789	0.42	3,116	0.47		2,225	6,675	3,074	0.46	3,872	0.58		
	2035 Without Project	94,650		2,225	6,675	4,015	0.60	3,085	0.46		2,225	6,675	3,140	0.47	4,570	0.68		
	2035 With Project	95,975		2,225	6,675	4,069	0.61	3,184	0.48		2,225	6,675	3,232	0.48	4,591	0.69		
	Grapevine Specific Plan Net New Project Impacts	1,325				54	0.01	99	0.01				92	0.01	21	0.00		
41	Btw. S Jct Rte 138 & Ave S		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	81,000		2,225	6,050	2,689	0.44	3,005	0.5		2,225	8,275	2,965	0.36	3,734	0.45		
	2035 Without Project	91,650		2,225	6,050	3,535	0.58	3,475	0.57		2,225	8,275	3,260	0.39	4,590	0.55		
	2035 With Project	92,883		2,225	6,050	3,582	0.59	3,574	0.59		2,225	8,275	3,344	0.40	4,607	0.56		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.02				84	0.01	17	0.00		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
42	Btw. Ave S & Pearlblossom/Sierra Hwy		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	71,000		2,225	6,050	2,357	0.39	2,634	0.44		2,225	8,275	2,599	0.31	3,273	0.4		
	2035 Without Project	75,650		2,225	6,050	3,015	0.50	2,655	0.44		2,225	8,275	2,660	0.32	3,820	0.46		
	2035 With Project	76,883		2,225	6,050	3,062	0.51	2,754	0.46		2,225	8,275	2,744	0.33	3,837	0.46		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.02				84	0.01	17	0.00		
43	Btw. Pearlblossom/Sierra Hwy & Angeles Forest		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	83,000		2,225	6,050	2,756	0.46	3,079	0.51		2,225	8,275	3,038	0.37	3,826	0.46		
	2035 Without Project	88,650		2,225	6,050	3,225	0.53	3,065	0.51		2,225	8,275	3,100	0.37	4,380	0.53		
	2035 With Project	89,883		2,225	6,050	3,272	0.54	3,164	0.52		2,225	8,275	3,184	0.38	4,397	0.53		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.02				84	0.01	17	0.00		
44	Btw. Angeles Forest Hwy & Soledad		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	144,000		2,225	8,275	3,154	0.38	3,525	0.43		2,225	6,050	3,477	0.57	4,380	0.72		
	2035 Without Project	114,650		2,225	8,275	3,845	0.46	3,875	0.47		2,225	6,050	3,620	0.60	6,000	0.99		
	2035 With Project	115,883		2,225	8,275	3,892	0.47	3,974	0.48		2,225	6,050	3,704	0.61	6,017	0.99		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.01				84	0.01	17	0.00		
45	Btw. Soledad & Santiago Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	113,650		2,236	6,071	3,845	0.63	3,905	0.64		2,236	6,071	3,430	0.56	5,640	0.93		
	2035 With Project	114,883		2,236	6,071	3,892	0.64	4,004	0.66		2,236	6,071	3,514	0.58	5,657	0.93		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.02				84	0.01	17	0.00		
46	Btw. Santiago Rd & Crown Valley Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	94,000		2,236	6,071	3,121	0.51	3,487	0.57		2,236	6,071	3,440	0.57	4,333	0.71		
	2035 Without Project	108,650		2,236	6,071	3,625	0.60	3,955	0.65		2,236	6,071	3,430	0.56	5,420	0.89		
	2035 With Project	109,883		2,236	6,071	3,672	0.60	4,054	0.67		2,236	6,071	3,514	0.58	5,437	0.90		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.02				84	0.01	17	0.00		
47	Btw. Crown Valley Rd & Ward Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	138,650		2,236	6,071	3,765	0.62	3,875	0.64		2,236	6,071	3,460	0.57	5,670	0.93		
	2035 With Project	139,883		2,236	6,071	3,812	0.63	3,974	0.65		2,236	6,071	3,544	0.58	5,687	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.02				84	0.01	17	0.00		
48	Btw. Ward Rd & Escondido Cyn Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	93,000		2,189	8,167	3,088	0.38	3,450	0.42		2,189	5,978	3,404	0.57	4,287	0.72		
	2035 Without Project	115,650		2,189	8,167	3,745	0.46	4,445	0.54		2,189	5,978	3,650	0.61	5,720	0.96		
	2035 With Project	116,883		2,189	8,167	3,792	0.46	4,544	0.56		2,189	5,978	3,734	0.62	5,737	0.96		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.01				84	0.01	17	0.00		
49	Btw. Escondido Cyn Rd & Agua Dulce Cyn Rd		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	93,000		2,236	8,307	1,776	0.21	4,669	0.56		2,236	6,071	4994	0.82	2,613	0.43		
	2035 Without Project	114,650		2,236	8,307	2,285	0.28	5,555	0.67		2,236	6,071	5,320	0.88	3,950	0.65		
	2035 With Project	115,883		2,236	8,307	2,332	0.28	5,654	0.68		2,236	6,071	5,404	0.89	3,967	0.65		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.01				84	0.01	17	0.00		
50	Btw. Agua Dulce Cyn Rd & Soledad Rd		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	96,000		2,236	8,307	1,834	0.22	4,819	0.58		2,236	6,071	5,155	0.85	2,698	0.44		
	2035 Without Project	116,850		2,236	8,307	2,415	0.29	5,565	0.67		2,236	6,071	5,220	0.86	4,070	0.67		
	2035 With Project	118,083		2,236	8,307	2,462	0.30	5,664	0.68		2,236	6,071	5,304	0.87	4,087	0.67		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.01				84	0.01	17	0.00		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-14																		
51	Btw. Shadow Pines/Soledad Rd & Sand Cyn Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	99,000		2,236	6,071	1,891	0.31	4,970	0.82		2,236	6,071	5,316	0.88	2,782	0.46		
	2035 Without Project	115,650		2,236	6,071	2,395	0.39	5,205	0.86		2,236	6,071	5,380	0.89	3,820	0.63		
	2035 With Project	116,883		2,236	6,071	2,442	0.40	5,304	0.87		2,236	6,071	5,464	0.90	3,837	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.02				84	0.01	17	0.00		
52	Btw. Sand Cyn Rd & Via Princessa		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	112,000		2,215	8,246	2,139	0.26	5,622	0.68		2,215	8,246	6,014	0.73	3,147	0.38		
	2035 Without Project	135,650		2,215	8,246	2,575	0.31	6,365	0.77		2,215	8,246	6,840	0.83	4,770	0.58		
	2035 With Project	136,883		2,215	8,246	2,622	0.32	6,464	0.78		2,215	8,246	6,924	0.84	4,787	0.58		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.01				84	0.01	17	0.00		
53	Btw. Via Princessa & Golden Valley Rd		3M (+1H+1A)							3M (+1H+1A)							LOS E	
	2014 Count	144,000		2,215	9,246	2,750	0.3	7,229	0.78		2,215	9,246	7,733	0.84	4,046	0.44		
	2035 Without Project	172,650		2,215	9,246	3,255	0.35	7,895	0.85		2,215	9,246	8,590	0.93	5,470	0.59		
	2035 With Project	173,883		2,215	9,246	3,302	0.36	7,994	0.86		2,215	9,246	8,674	0.94	5,487	0.59		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.01				84	0.01	17	0.00		
54	Btw. Golden Valley Rd & Placerita Cyn Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	144,000		2,215	8,246	2,750	0.33	7,229	0.88		2,215	8,246	7,733	0.94	4,046	0.49		
	2035 Without Project	169,650		2,215	8,246	3,105	0.38	7,645	0.93		2,215	8,246	8,520	1.03	5,140	0.62		Yes
	2035 With Project	170,883		2,215	8,246	3,152	0.38	7,744	0.94		2,215	8,246	8,604	1.04	5,157	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.01				84	0.01	17	0.00		
55	Btw. Placerita Cyn Rd & San Fernando Rd		3M (+1H)							3M (+1H)							LOS E	
	2014 Count	151,000		2,215	8,246	2,884	0.35	7,580	0.92		2,215	8,246	8,109	0.98	4,243	0.51		
	2035 Without Project	173,650		2,215	8,246	3,155	0.38	7,995	0.97		2,215	8,246	8,520	1.03	5,110	0.62		Yes
	2035 With Project	174,883		2,215	8,246	3,202	0.39	8,094	0.98		2,215	8,246	8,604	1.04	5,127	0.62		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.01	99	0.01				84	0.01	17	0.00		
56	Btw. San Fernando Rd//Newhall Ave & Jct I-5		5M (+1H)							5M (+1H)							LOS E	
	2014 Count	166,000		2,215	12,676	3,171	0.25	8,333	0.66		2,215	12,676	8,914	0.7	4,665	0.37		
	2035 Without Project	180,650		2,215	12,676	3,145	0.25	8,625	0.68		2,215	12,676	9,310	0.73	5,050	0.40		
	2035 With Project	181,883		2,215	12,676	3,192	0.25	8,724	0.69		2,215	12,676	9,394	0.74	5,067	0.40		
	Grapevine Specific Plan Net New Project Impacts	1,233				47	0.00	99	0.01				84	0.01	17	0.00		
SR-138																		
57	Between Jct I-5 and Gorman Post Rd		2M							2M							LOS D	
	2014 Count	4,500		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	71,675		1,904	3,808	2,525	0.66	3,830	1.01		1,904	3,808	3,855	1.01	2,725	0.72		Yes
	2035 With Project	75,822		1,904	3,808	2,669	0.70	4,086	1.07		1,904	3,808	4,216	1.11	2,793	0.73		Yes
	Grapevine Specific Plan Net New Project Impacts	4,147				144	0.04	256	0.06				361	0.10	68	0.02		
58	Between Gorman Post Rd and Old Ridge Route Rd		1M							1M							LOS D	
	2014 Count	4,900		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	83,675		1,904	1,904	2,785	1.46	4,680	2.46		1,904	1,904	4,525	2.38	3,055	1.60		Yes
	2035 With Project	87,822		1,904	1,904	2,929	1.54	4,936	2.59		1,904	1,904	4,886	2.57	3,123	1.64		Yes
	Grapevine Specific Plan Net New Project Impacts	4,147				144	0.08	256	0.13				361	0.19	68	0.04		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-138																		
59	Between Old Ridge Route Rd and 300th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	87,225		1,904	1,904	2,855	1.50	4,805	2.52		1,904	1,904	4,645	2.44	3,130	1.64		Yes
	2035 With Project	90,376		1,904	1,904	2,962	1.56	4,992	2.62		1,904	1,904	4,929	2.59	3,181	1.67		Yes
	Grapevine Specific Plan Net New Project Impacts	3,151				107	0.06	187	0.10				284	0.15	51	0.03		
60	Between 300th St West and 245TH St		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	73	0.04	152	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	72,225		1,904	1,904	3,495	1.84	2,885	1.52		1,904	1,904	2,915	1.53	3,830	2.01		Yes
	2035 With Project	75,376		1,904	1,904	3,602	1.89	3,072	1.61		1,904	1,904	3,199	1.68	3,881	2.04		Yes
	Grapevine Specific Plan Net New Project Impacts	3,151				107	0.05	187	0.09				284	0.15	51	0.03		
61	Between 245th St West and 190th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	89	0.05	147	0.09			1,700	113	0.07	87	0.05		
	2035 Without Project	62,225		1,904	1,904	2,595	1.36	2,325	1.22		1,904	1,904	2,465	1.29	3,050	1.60		Yes
	2035 With Project	65,376		1,904	1,904	2,702	1.42	2,512	1.32		1,904	1,904	2,749	1.44	3,101	1.63		Yes
	Grapevine Specific Plan Net New Project Impacts	3,151				107	0.06	187	0.10				284	0.15	51	0.03		
62	Between 190th St West and 110th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	53,376		1,962	1,962	2,102	1.07	1,942	0.99		1,962	1,962	2,299	1.17	2,471	1.26		Yes
	Grapevine Specific Plan Net New Project Impacts	3,151				107	0.05	187	0.10				284	0.14	51	0.03		
63	Between 110th St West and 60th St West		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23		Yes
	2035 With Project	52,679		1,962	1,962	2,075	1.06	1,903	0.97		1,962	1,962	2,238	1.14	2,460	1.25		Yes
	Grapevine Specific Plan Net New Project Impacts	2,454				80	0.04	148	0.08				223	0.11	40	0.02		
64	Between 60th St West and Jct Rte 14 North		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	141	0.08	177	0.1			1,700	123	0.07	148	0.09		
	2035 Without Project	55,225		1,962	1,962	2,355	1.20	1,895	0.97		1,962	1,962	1,985	1.01	2,700	1.38		Yes
	2035 With Project	56,969		1,962	1,962	2,409	1.23	2,008	1.02		1,962	1,962	2,139	1.09	2,728	1.39		Yes
	Grapevine Specific Plan Net New Project Impacts	1,744				54	0.03	113	0.05				154	0.08	28	0.01		

Location No.	Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	xceeds Threshold
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
SR-126																		
65	Btw. N Jct SR-126 & Henry Mayo Dr		3M							3M							LOS D	
	2014 Count	29,025			6,288	1,264	0.20	1,618	0.26			6,288	1,406	0.22	1,517	0.24		
	2035 Without Project	31,145			6,288	1,369	0.22	1,802	0.29			6,288	1,518	0.24	1,540	0.24		
	2035 With Project	31,463			6,288	1,376	0.22	1,822	0.29			6,288	1,549	0.25	1,546	0.25		
	Project Impact	318			6,288	7	0.00	20	0.00			6,288	31	0.00	6	0.00		
66	Btw. Henry Mayo Dr & Commerce Center Dr		2M							2M							LOS D	
	2014 Count	29,025			4,665	1,264	0.27	1,618	0.35			4,665	1,406	0.30	1,517	0.33		
	2035 Without Project	31,145			4,665	1,369	0.29	1,802	0.39			4,665	1,518	0.33	1,540	0.33		
	2035 With Project	31,463			4,665	1,376	0.29	1,822	0.39			4,665	1,549	0.33	1,546	0.33		
	Grapevine Specific Plan Net New Project Impacts	318			4,665	7	0.00	20	0.00			4,665	31	0.01	6	0.00		

Notes:
Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume
V/C – Volume/Capacity

M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F	>		1

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8.6 SCENARIO 10 IMPACTS TO INTERIM I-5 ACCESS FACILITIES

As shown in Table A-5, Scenario 9 Scenario 9 results in 13,376 and 11,882 average weekday AM and PM peak hour trips, respectively, lower than the 18,119 and 19,699 average weekday AM and PM peak hour trips in the Updated 28.7% HBW ICR analysis. As shown in Table B-5, the volume of traffic using interim Project access facilities would be higher at comparable Project development levels higher because the ICR for Scenario 10 is 38.5 percentage points and 64.4 percent lower in the AM peak hour than in the Updated 28.7% HBW ICR and FEIR analysis. During the PM peak hour, the Scenario 10 ICR is 57.7 percentage points and 89.9 percent lower than in the Updated 28.7% HBW ICR and FEIR analysis. Consequently, applicable Interim B access LOS standards could be exceeded at a lower level of development than identified in the Updated 28.7% HBW ICR and FEIR analysis. The construction of a new and relocated interchange along I-5, including either interchange Variant 1 or Variant 2 (see Figure 2-5 and Figure 2-6) would likely be required earlier in under Scenario 10 than in the Updated 28.7% HBW ICR and FEIR analysis.

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9 REDUCED ICR SCENARIO MITIGATION MEASURES AND SIGNIFICANCE DETERMINATIONS

This section summarizes the potential significant impacts that could occur from one or more of the reduced ICR scenarios analyzed in Sections 4-8 of this report. Feasible improvements are identified that could be implemented within the Project footprint analyzed in the FEIR are identified that would reduce significant impacts to local intersections, local roadways, and all local freeway segments except on the Grapevine Grade. The reduced ICR scenario analyses are highly conservative. Nevertheless, the FEIR mitigation measures have been expanded as described below to require earlier and more frequent monitoring of project traffic conditions, and to allow for improvements that reduce impacts to less than significant levels in lieu of monitoring, in order to address the possibility that additional potentially significant impacts could occur, or occur more early in the development process, from lower than anticipated ICR rates. With these expanded mitigation measures, potential Project impacts to transportation and traffic would be reduced to less than significant levels. Cumulative impacts to state highway and freeway facilities, including the Grapevine Grade, would remain significant and unavoidable.

9.1 REDUCED ICR SIGNIFICANT IMPACT SUMMARY

As discussed in Section 4-8 of this report, the reduced ICR scenarios could result in new significant impacts compared with the FEIR and Updated 28.7% HBW ICR analysis. Table 9-1 summarizes the significant impacts to local intersections that could occur under cumulative plus project conditions in the FEIR, Updated 28.7% HBW ICR and in one or more of the reduced ICR scenario analyses. Two (2) new significant impacts could occur to local intersections in one or more of the reduced ICR scenarios compared with the FEIR and Updated 28.7% HBW ICR analysis. One (1) significant impact in the FEIR analysis would be avoided in the reduced ICR scenarios.

Table 9-1: Significant Local Intersection Impact Summary FEIR, Updated 28.7% HBW ICR and Reduced ICR Scenario Analyses - Cumulative plus Project Conditions

Intersection	FEIR	Updated 28.7% HBW ICR	Reduced ICR Scenarios
S. Wheeler Ridge Road / Laval Road PM Peak Hour			✓
Street C / Street A PM Peak Hour	✓		
Street D / Street A AM and PM Peak Hours	✓	✓	✓
Street C / Street G PM Peak Hour	✓	✓	✓
Street C / Street H AM Peak Hour			✓
Street C / Street H PM Peak Hour	✓		✓
Street I / Street A	✓	✓	✓

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Table 9-2 identifies feasible improvements that could be implemented within the Project footprint analyzed in the FEIR to reduce each of the impacts to local intersections identified in Table 9-1 to less than significant levels.

Table 9-2: Project Improvements that Would Reduce Potential Local Intersection Impacts to Less than Significant Levels - Cumulative plus Project Conditions

Intersection	FEIR	Updated 28.7% HBW ICR	Reduced ICR Scenarios
Street C / Street H, AM and PM Peak Hours - A third northbound through lane	✓		✓ (All)
Street D / Street A, AM and PM Peak Hour - A shared westbound through / right –turn lane and shared eastbound through / right-turn lane	✓	✓	✓ (All)
Street C / Street G, PM – Signal timing coordination with Street C / Street A	✓	✓	✓ (2,4,9)
Street I / Street A, PM Peak Hour – New traffic signal	✓	✓	✓ (All)
S. Wheeler Ridge Road / Laval Road, PM Peak Hour - Stripe the second southbound left-turn lane;			✓ (2, 9,10)
Street A/Street C, PM Peak Hour- A second westbound right-turn lane from the I-5 southbound off-ramp to C Street	✓		

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Table 9-3 summarizes the significant impacts to local roadways in the PM peak hour that could occur under cumulative plus project conditions in the FEIR, Updated 28.7% HBW ICR and in one or more of the reduced ICR scenario analyses. As discussed above, the analysis considered cumulative plus project conditions during the PM peak hour, the period of heaviest roadway use and when the combination of vehicle trip purposes is at the highest level. Two (2) new significant impacts could occur to local roadways in one or more of the reduced ICR scenarios compared with the FEIR and Updated 28.7% HBW ICR analysis.

**Table 9-3: Significant Local Roadway PM Peak Hour Impact Summary
FEIR, Updated 28.7% HBW ICR and Reduced ICR Scenario Analyses - Cumulative plus
Project Conditions**

Roadway	FEIR	Updated 28.7% HBW ICR	Reduced ICR Scenarios
Wheeler Ridge Rd: North of Santa Elena Dr.			✓
Street C: Aqueduct Crossing to Street E			✓
Street A: Street D to Street I	✓	✓	✓

Table 9-4 identifies feasible improvements that could be implemented within the Project footprint analyzed in the FEIR to reduce each of the PM peak hour local roadway impacts identified in Table 9-3 to less than significant levels.

**Table 9-4: Project Improvements that Would Reduce Potential PM Peak Hour Local
Roadway Impacts to Less than Significant Levels - Cumulative plus Project Conditions**

Roadway	FEIR	Updated 28.7% HBW ICR	Reduced ICR Scenarios
Street A between Street D and Street I – Construct 6-lane arterial from Street D to Street I, and construct 4-lane arterial between Street I and Street N.	✓	✓	✓ (1,2,9,10)
Wheeler Ridge Road north of Santa Elena Drive – Extend two northbound travel lanes to 1,500 feet north of Santa Elena Drive			✓ (All)
Street C from Aqueduct crossing to Street E – Widen from a 2-lane to a 4-lane roadway			✓ (2,4,9,10)

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Table 9-5 summarizes the significant impacts to local freeway segments that could occur under cumulative plus project conditions in the FEIR, Updated 28.7% HBW ICR and in one or more of the reduced ICR scenario analyses. Twenty (20) new significant impacts to local freeway segments could occur in one or more of the reduced ICR scenarios compared with the FEIR and Updated 28.7% HBW ICR analysis.

Table 9-5: Significant Local Freeway Segment Impact Summary FEIR, Updated 28.7% HBW ICR and Reduced ICR Scenario Analyses - Cumulative plus Project Conditions

Freeway Segment	FEIR	Updated 28.7% HBW ICR	Reduced ICR Scenarios
I-5 Northbound, Base of Grapevine Grade to Relocated Grapevine Interchange PM Peak Hour			✓
I-5 Northbound, Grapevine Slip On-Ramp AM and PM Peak Hours			✓
I-5 Northbound, Grapevine Slip On-Ramp to Laval Road East Off-Ramp AM and PM Peak Hours			✓
I-5 Northbound, I-5 Northbound Off-ramp AM and PM Peak Hours			✓
I-5 Northbound, Laval Road East Off-Ramp AM and PM Peak Hours			✓
I-5 Northbound, Laval Road On-Ramp PM Peak Hour			✓
I-5 Northbound, Laval Road On-Ramp to SR 99 Off-Ramp AM and PM Peak Hours			✓
I-5 Northbound, Laval Road West Off-Ramp PM Peak Hour			✓
I-5 Southbound, North of SR 99 Junction PM Peak Hour			✓
I-5 Southbound, Grapevine Off-Ramp PM Peak Hour			✓
I-5 Southbound, I-5 Southbound Auto / Truck Bypass PM Peak Hour			✓
I-5 Southbound, Laval Road East Off-Ramp PM Peak Hour			✓
I-5 Southbound, Laval Road On-Ramp PM Peak Hour			✓
I-5 Southbound, Laval Road to Grapevine PM Peak Hour			✓
I-5 Southbound, Laval Road West Off-Ramp PM Peak Hour			✓
I-5 Southbound, SR 99 to Laval Road PM Peak Hour			✓
SR 99 Southbound, CVEF Off-Ramp PM Peak Hour			✓
SR 99 Southbound, North of I-5 Junction PM Peak Hour			✓
SR 99 Southbound, SR 99 Auto Lanes to I-5 Southbound PM Peak Hour			✓
SR 99 Southbound, Truck Bypass Off-Ramp PM Peak Hour			✓
Fort Tejon to Base of Grapevine Grade (6% Downgrade) PM Peak Hour	✓	✓	✓
Base of Grapevine Grade to Fort Tejon (6% Upgrade) AM and PM Peak Hours	✓	✓	✓

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Table 9-6 identifies feasible improvements that could be implemented within the Project footprint analyzed in the FEIR to reduce each of the local freeway segment impacts identified in Table 9-5, except to segments in the Grapevine Grade, to less than significant levels. The Grapevine Grade segments are subject to the fair share funding agreements between the Project and Caltrans as discussed in more detail below.

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Table 9-6: Project Improvements that Would Reduce Potential Local Freeway Segment Impacts to Less than Significant Levels - Cumulative plus Project Conditions

Freeway Segment	FEIR	Updated 28.7% HBW ICR	Reduced ICR Scenarios
I-5 Northbound, Base of Grapevine Grade to Relocated Grapevine Interchange PM Peak Hour – Extend NB I-5 Grapevine Off-Ramp Deceleration Lane			✓ (2)
I-5 Northbound, Grapevine Slip On-Ramp AM and PM Peak Hours - Two lane on-ramp with peak hour ramp metering			✓(All)
I-5 Northbound, Grapevine Slip On-Ramp to Laval Road East Off-Ramp AM and PM Peak Hours - Auxiliary lane between Grapevine Slip On-Ramp to Laval Road East Off-Ramp			✓(All)
I-5 Northbound, Laval Road East Off-Ramp AM and PM Peak Hours - Auxiliary lane from the Grapevine on-ramp to the Laval Road East off-ramp			✓(1,2,9,10)
I-5 Northbound, Laval Road On-Ramp PM Peak Hour - Extend Laval Road On-Ramp acceleration lane			✓(2,9,10)
I-5 Northbound, Laval Road On-Ramp to SR 99 Off-Ramp AM and PM Peak Hours – Extension of on-ramp acceleration lane			✓(All)
I-5 Northbound, Laval Road West Off-Ramp PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane			✓(All)
I-5 Northbound, I-5 Northbound Off-ramp AM and PM Peak Hours - Provide dedicated two-lane off-ramp (eliminate shared off-ramp / through lane)			✓(All)
I-5 Southbound, North of SR 99 Junction PM Peak Hour - Extend third Southbound SR 99 through lane			✓(9)
I-5 Southbound, Grapevine Off-Ramp PM Peak Hour – Extend Grapevine Off-Ramp deceleration lane			✓(2,9,10)
I-5 Southbound, I-5 Southbound Auto / Truck Bypass PM Peak Hour - Extend third Southbound SR 99 through lane			✓(9,10)
I-5 Southbound, Laval Road East Off-Ramp PM Peak Hour - Extend Laval Road East Off-Ramp deceleration lane			✓(All)
I-5 Southbound, Laval Road On-Ramp PM Peak Hour - Two lane on-ramp with peak hour ramp metering			✓(9,10)
I-5 Southbound, Laval Road to Grapevine PM Peak Hour - Two lane on-ramp with peak hour ramp metering			✓ (2,4,9,10)
I-5 Southbound, Laval Road West Off-Ramp PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane			✓(9,10)
I-5 Southbound, SR 99 to Laval Road PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane			✓(9,10)
SR 99 Southbound, CVEF Off-Ramp PM Peak Hour - Extend third Southbound SR 99 through lane			✓ (9,10)
SR 99 Southbound, North of I-5 Junction PM Peak Hour - Extend third Southbound SR 99 through lane			✓ (9,10)
SR 99 Southbound, SR 99 Auto Lanes to I-5 Southbound PM Peak Hour - Extend third Southbound SR 99 through lane			✓(2,9,10)
SR 99 Southbound, Truck Bypass Off-Ramp PM Peak Hour - Extend third Southbound SR 99 through lane			✓(9,10)

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Table 9-7 summarizes the significant impacts to state highway and freeway segments that could occur to the north and south of the Project area under cumulative plus project conditions in the FEIR, Updated 28.7% HBW ICR and in one or more of the reduced ICR scenario analyses. New significant impacts to local freeway segments could occur in one or more of the reduced ICR scenarios to two (2) segments to the north and four (4) segments to the south of the Project area compared with the FEIR and Updated 28.7% HBW ICR analysis.

Table 9-7: Significant State Highway and Freeway Segment Impact Summary North and South of the Project Area FEIR, Updated 28.7% HBW ICR and Reduced ICR Scenario Analyses - Cumulative plus Project Conditions

Freeway Segment North or South	FEIR	Updated 28.7% HBW ICR	Reduced ICR Scenarios
South of Project, 21 Segments per FEIR Analysis	✓	✓	✓
South of Project, Fort Tejon to Base of Grapevine Grade (6% Downgrade) PM Peak Hour	✓	✓	✓
South of Project, Base of Grapevine Grade to Fort Tejon (6% Upgrade) AM and PM Peak Hours	✓	✓	✓
South of Project, Lyons Avenue to Calgrove Boulevard PM Peak Hour			✓
South of Project, McBean Parkway to Lyons Avenue / Pico Canyon Road AM Peak Hour			✓
South of Project, SR 120 to Roxford Street AM Peak Hour			✓
South of Project, SR 14 to SR 120, AM Peak Hour			✓
North of Project, Old US 99 to Herring Road PM peak hour			✓
North of Project, Junction Route 166 West to Junction I-5, PM Peak Hour			✓

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Although impacts to the Grapevine Grade were analyzed in the FEIR and this report in the context of local freeway segment impacts, the Project's contribution to significant impacts at these locations, as well as all other significantly impacted state highway and freeway segments identified in the FEIR and in the Updated 28.7% HBW ICR analysis are covered by the terms of the fair share funding agreements between the project and Caltrans. As discussed in Section 1 of this report, in 2017, the Project executed traffic mitigation agreements with Caltrans District 6 and Caltrans District 7 to mitigate Project-related impacts to state highway facilities located in Kern and Los Angeles counties. In June 2017 Caltrans issued a Project Study Report-Project Development Support (PSR/PDS) for the proposed new interchange to be located along Interstate-5 (I-5) that would be required to serve the Project and other regional transportation demands prior to Project buildout. As discussed in Section 9-2 of this report, MM 4.16-9 has been expanded to require that Project ICR levels be evaluated and reported to Caltrans earlier in the development process and that the project proponent implement transportation demand management strategies, provide fair share funding for impacts not covered by the 2017 fair share funding agreements, or a combination of these strategies to address potential impacts to state highway facilities.

Finally, as discussed in Section 4-8 of this report, the larger volume of external trips associated with the reduced ICR scenarios would cause applicable Interim B access LOS standards could be exceeded at a lower level of development than identified in the Updated 28.7% HBW ICR and FEIR analysis. As a result, if one or more reduced ICR scenarios should occur, construction of a new and relocated interchange along I-5, including either interchange Variant 1 or Variant 2 (see Figure 2-5 and Figure 2-6) would likely be required earlier in the Project development process than in the Updated 28.7% HBW ICR and FEIR analysis.

9.2 EXPANDED MITIGATION MEASURES

The analysis of the reduced ICR scenarios is conservative for several reasons in likely over-estimating AM and PM peak hour external trips, and accordingly identifying potentially significant new onsite traffic impacts.

First, the 2016 ITE Manual assumes a very high percentage of commute trips take place during AM or PM peak hours which does not reflect real world conditions in which many workers are required to commute outside of the peak periods to arrive at work at or leave from work to arrive at their destination in a timely manner. The Kern COG model, in contrast, allows for deviations in peak hour commuting volumes that differentiate between longer and shorter commute trips, which effectively shifts certain trips to non-peak periods. To match the peak AM and PM period trip volumes generated by the 2016 ITE Manual, the large number of additional external commute trips that would not occur based on real-world distances and employment start times were nevertheless added to the Kern COG distribution model results for each scenario (see Table 1-2). For example, this methodology assumed that a commuter from north Bakersfield, a commuter from Arvin, and a commuter from Los Angeles county, all began and ended their trip in the peak periods defined in the ITE Manual which artificially concentrates commuter trip volumes within the ITE Manual's AM and PM peak hours. As shown in Table 1-3 of this report, a significant number of external trips that the Kern COG model projected would occur outside of

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the peak AM and PM periods was reassigned to these time frames to provide a conservative analysis of the reduced ICR scenarios.

Second, neither the FEIR, Updated 28.7% HBW ICR, nor the reduced ICR scenarios, calculated any reduction in average daily or peak hour trips from implementation of required mitigation measures. Mitigation Measure 4.16-2, for example, mandates the formation and funding of a Transportation Management Association (TMA) to implement several measures to encourage alternative transportation modes such as walking and biking, and to create incentives for carpooling and other measures to reduce single-occupant automobile commute trips. This report does not quantify average daily or peak hour trip reductions from implementation of this Mitigation Measure, and is accordingly conservative in likely over-estimating actual trip counts. This report also recommends that Mitigation Measure 4.16-2 be expanded to require TMA-implementation of employer surveys and other measures to accurately inform more frequently-required traffic reports on ICRs and other traffic operational conditions, and to further reduce automobile trips.

Third, by reducing the FEIR ICRs by 10 and 20 percentage points, the analysis considers ICRs that are actually about 16-17 percent and 31-33 percent lower than considered in the FEIR and Updated 28.7% HBW ICR analysis. To analyze an ICR reduction of 10 percent, 10 percentage points were subtracted from the total Project ICRs used in the FEIR, which result in an AM peak hour ICR of 49.8 percent, and a PM peak hour ICR of 54.2 percent. Subtracting 10 percentage points from the total Project ICRs used in the FEIR corresponds with reduced capture rate about 17 percent lower than the AM peak period ICR used in the FEIR (10 divided by 59.8 equals a 17 percent reduction) and 16 percent in the PM peak hour (10 divided by 64.2 equals a 17 percent reduction). To analyze an ICR reduction of 20 percent, 20 percentage points were subtracted from the Project ICRs used in the FEIR, which result in an AM peak hour ICR of 39.8 percent, and a PM peak hour ICR of 44.2 percent. Subtracting 20 percentage points from the ICRs used in the FEIR corresponds with reduced capture rate about 33 percent lower than the AM peak period ICR used in the FEIR (20 divided by 59.8 equals a 33 percent reduction) and 31 percent in the PM peak hour (20 divided by 64.2 equals a 31 percent reduction).

Finally, development of housing without any complementary onsite uses such as retail, restaurants, medical and other services, and local businesses beyond than legally required schools and parks is inconsistent with the proposed Project purpose and design. The proposed Project has been designed to incorporate complementary residential and non-residential land uses that would reduce the volume of external trips below the levels evaluated in the residential-only development scenarios. The development of additional employment-generating uses immediately adjacent to TRCC, an existing job center, without residential units on the Project site is also unlikely to occur.

Notwithstanding these considerations, the mitigation measures included in the FEIR have been expanded to address the possibility, however unlikely, that the Project ICR variations may cause impacts similar to one or more of the reduced ICR scenarios. The expanded mitigation measures require earlier and more extensive traffic monitoring to detect and respond to the potential emergency of lower than anticipated ICR rates earlier in the Project's development process. In addition, the mitigation measures have been expanded to specifically reference and allow for the implementation of one or more of the onsite improvements identified in Table 9-2,

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Table 9-4 and Table 9-6 to reduce potentially significant impacts to local intersections, local roadways and local freeway segments to less than significant levels. These improvements include all of the potentially new significant impacts to local intersections, local roadways and local freeway segments identified in the FEIR, the Updated 28.7% HBW ICR analysis, and one or more of the reduced ICR scenarios (except for impacts to the Grapevine Grade that are covered by the fair share funding agreements with Caltrans). As discussed above, the expanded mitigation measures also require that the project proponent implement transportation demand management strategies, provide fair share funding for impacts not covered by the 2017 fair share funding agreements, or a combination of these strategies to address potential impacts to state highway facilities.

The expanded mitigation measures proposed for the Project (with deleted text shown as strikethrough and expanded requirements underlined), and other applicable mitigation measures recommended in this report that were included in the FEIR, are as follows:

- MM 4.16-1** All project circulation elements, including on-site public roadways and driveways, will be designed and constructed in compliance with the goals, policies and design criteria described in the Grapevine Specific and Community Plan and the Grapevine Special Plan.
- MM 4.16-2** Prior to the issuance of the first occupancy permit, a Transportation Management Association shall be formed and funded to implement transportation demand management measures that reduce vehicle trips and encourage multi-modal movement in a phased manner as development occurs within the project area. The Transportation Management Association shall fund a transportation coordinator for the project area and shall be responsible for implementing a commute trip evaluation and reduction program that includes the following strategies:
- 1) Coordinating transit schedules to align with employer work schedules;
 - 2) Providing discounted transit passes;
 - 3) Organizing ridesharing, bike-share or car-share programs;
 - 4) Sponsored shuttle/vanpool services, in collaboration with employers, to serve major employment centers;
 - 5) Preferential carpool and vanpool parking;
 - 6) End of trip facilities for bicyclists;
 - 7) Conducting marketing campaigns to encourage non-automotive modes for commuting and other movement requirements such as the encouragement of flexible work schedules and telecommuting, and the benefits of parking fees and parking cash-out programs.
 - 8) Coordinating with project employers to establish a ride home service for employees needing to respond to an emergency condition (e.g., playground injury of a child) that have used project transit to commute to work, such as on-demand transportation provided by taxis and ride services such as Uber and Lyft;
 - 9) Coordinating with local schools to establish and maintain a Safe Routes to School program to facilitate students walking and biking to schools;

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- 10) Coordinating with project employers to update internal capture rate (ICR) information within the project for future required traffic studies to determine the estimated percentage of employees who live within the project site; and
- 11) Maintaining a TMA website accessible to project residents, employers and employees that includes educational information about air quality and greenhouse gas benefits of implementing a compressed work week schedule and home-based telecommunication program.
- 12) Implementing other feasible trip reduction measures to avoid causing a significant adverse traffic impact within the project's roadway segments and intersections.

Upon commencement of project construction activities, the ~~Transportation Management Association~~ TMA or its designee shall prepare an annual report that outlines program reduction measures implemented during the past year. ~~A copy of the report~~ At the earlier of five year intervals after commencement of projection construction activities, and for each of the traffic reports submitted for an application for a tentative tract map as required by MM 4.16-3 below, the TMA or its designee shall prepare a report describing the effectiveness of program reduction measures (and any other relevant change in transportation legal mandates, or transportation services or technologies) to reduce single-occupancy automobile use in Home-Based Work trips, and may include reductions in other automobile trips. This TMA trip reduction data shall be used in subsequent project traffic reports to calibrate actual trips in relation to the estimated average daily, and AM/PM peak trips, included in the EIR certified for the Project. A copy of all TMA reports shall be submitted to the Kern County Planning and Natural Resource Department and the Kern County Public Works Department by April 15th of each calendar year.

MM 4.16-3 Concurrent with the submittal of any application for tentative tract map, parcel map (with the exception of financing maps), or commercial/industrial site plan development, the project proponent shall conduct an appropriate traffic study, which shall include an analysis to determine if project traffic volumes are consistent with the trip distribution assumptions and internal capture (ICR) rate projections identified in the EIR and whether the trip distribution and/or internal capture rate information in the traffic study identifies a potentially significant adverse impact to roadway segments or intersection operations. The study shall also specifically evaluate queuing level and ~~Level of Service (LOS)~~ traffic conditions at both the I-5/Wheeler Ridge Road/Laval Road Interchange and the I-5/Grapevine Road Interchange. ~~Any~~

- 1) A 10% deviation in trip distribution or internal capture rates shall be considered potentially significant, and the traffic study shall identify the extent to which this or a greater deviation reflects a temporary snapshot of the partial buildout of the project or is likely to continue under then-reasonably foreseeable circumstances through future project buildout. For any reasonably foreseeable persistent significant deviations from the trip distribution and/or internal capture rates identified for the project in the EIR, the traffic study shall further identify whether this change to the trip distribution and/or

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internal capture rate would result in a significant adverse traffic impact to roadway segments or intersection operations. If such a significant traffic impact is identified in the traffic study, the applicant shall be required to consult with the County to review whether intersection and roadway performance is consistent with applicable County and Grapevine Specific and Community Plan criteria, or if any additional measures are required to avoid a significant adverse impact to roadway segments or intersection operations. If such measures are required, the applicant shall:

- (a) identify additional trip reduction measures through the Transportation Management Association pursuant to the TMA procedures set forth in MM 4.16-2 to avoid causing any significant new impact to a local intersection, peak hour road, or local freeway segment;
- (b) identify roadway and signalization design modifications within the development area of the project site that are sufficient to avoid a new significant impact or avoid substantially worsening a previously-identified significant impact, consistent with the applicable conceptual improvements identified in the table below, which includes all improvements identified in all of the reduced ICR scenarios evaluated in the 2019 TIA.;

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<u>I-5 Northbound, Base of Grapevine Grade to Relocated Grapevine Interchange PM Peak Hour – Extend NB I-5 Grapevine Off-Ramp Deceleration Lane</u>
<u>I-5 Northbound, Grapevine Slip On-Ramp AM and PM Peak Hours - Two lane on-ramp with peak hour ramp metering</u>
<u>I-5 Northbound, Grapevine Slip On-Ramp to Laval Road East Off-Ramp AM and PM Peak Hours - Auxiliary lane between Grapevine Slip On-Ramp to Laval Road East Off-Ramp</u>
<u>I-5 Northbound, I-5 Northbound Off-ramp AM and PM Peak Hours - Provide dedicated two-lane off-ramp (eliminate shared off-ramp / through lane)</u>
<u>I-5 Northbound, Laval Road East Off-Ramp AM and PM Peak Hours - Auxiliary lane from the Grapevine on-ramp to the Laval Road East off-ramp</u>
<u>I-5 Northbound, Laval Road On-Ramp PM Peak Hour - Extend Laval Road On-Ramp acceleration lane</u>
<u>I-5 Northbound, Laval Road On-Ramp to SR 99 Off-Ramp AM and PM Peak Hours – Extension of on-ramp acceleration lane</u>
<u>I-5 Northbound, Laval Road West Off-Ramp PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane</u>
<u>I-5 Southbound, North of SR 99 Junction PM Peak Hour - Extend third Southbound SR 99 through lane</u>
<u>I-5 Southbound, Grapevine Off-Ramp PM Peak Hour – Extend Grapevine Off-Ramp deceleration lane</u>
<u>I-5 Southbound, I-5 Southbound Auto / Truck Bypass PM Peak Hour - Extend third Southbound SR 99 through lane</u>
<u>I-5 Southbound, Laval Road East Off-Ramp PM Peak Hour - Extend Laval Road East Off-Ramp deceleration lane</u>
<u>I-5 Southbound, Laval Road On-Ramp PM Peak Hour - Two lane on-ramp with peak hour ramp metering</u>
<u>I-5 Southbound, Laval Road to Grapevine PM Peak Hour - Two lane on-ramp with peak hour ramp metering</u>
<u>I-5 Southbound, Laval Road West Off-Ramp PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane</u>
<u>I-5 Southbound, SR 99 to Laval Road PM Peak Hour - Extend Laval Road West Off-Ramp deceleration lane</u>
<u>SR 99 Southbound, CVEF Off-Ramp PM Peak Hour - Extend third Southbound SR 99 through lane</u>
<u>SR 99 Southbound, North of I-5 Junction PM Peak Hour - Extend third Southbound SR 99 through lane</u>
<u>SR 99 Southbound, SR 99 Auto Lanes to I-5 Southbound PM Peak Hour - Extend third Southbound SR 99 through lane</u>
<u>SR 99 Southbound, Truck Bypass Off-Ramp PM Peak Hour - Extend third Southbound SR 99 through lane</u>
<u>Street C / Street H, AM and PM Peak Hours - A third northbound through lane</u>
<u>Street D / Street A, AM and PM Peak Hour - A shared westbound through / right –turn lane and shared eastbound through / right-turn lane</u>
<u>Street C / Street G, PM – Signal timing coordination with Street C / Street A</u>
<u>Street I / Street A, PM Peak Hour – New traffic signal</u>
<u>S. Wheeler Ridge Road / Laval Road, PM Peak Hour - Stripe the second southbound left-turn lane;</u>
<u>Street A/Street C, PM Peak Hour- A second westbound right-turn lane from the I-5 southbound off-ramp to C Street</u>
<u>Street A between Street D and Street I – Construct 6-lane arterial from Street D to Street I, and construct 4-lane arterial between Street I and Street N.</u>
<u>Wheeler Ridge Road north of Santa Elena Drive – Extend two northbound travel lanes to 1,500 feet north of Santa Elena Drive</u>
<u>Street C from Aqueduct crossing to Street E – Widen from a 2-lane to a 4-lane roadway</u>

Or

(c) identify a combination of (a) and (b) above.

- 2) In its tentative tract map submittal, the applicant shall reserve the right of way required for potential implementation of such roadway improvements that will avoid significant adverse impacts to local intersections, local roadways, and local freeway segments. These improvements may include but are not limited to those identified in the table above, which includes all improvements identified in all of the reduced ICR scenarios evaluated in the 2019 TIA. The applicant may apply to the County for the release of any such road right of way reservation in an amended tentative tract map, parcel map, or final map, or as part of a commercial site plan review, at such time as the applicant can demonstrate that it is no longer reasonably foreseeable that such expanded

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roadway improvements are needed to avoid the significant impact identified. Any such application shall include a traffic report documenting the absence of a current or reasonably foreseeable significant adverse impact to such local intersection, local roadways, and local freeway segments. In the interim, the reserved right of way may be developed with uses that support multi-modal transportation, including but not limited to walking, biking, or NEV trails, until such a time as the right of way is needed to construct the required roadway improvements or such right of way is released per above procedure.

- 3) Any identified roadway or signalization improvements, or reservations of right of way to accommodate potential future improvements, required by the County and State to be implemented under MM 4-16-3(1)(b) and (2) above shall be included as conditions of approval of any final subdivision maps or commercial/industrial site plans and be implemented prior to issuance of any building or grading permits.

MM 4.16-4 Prior to the issuance of the first building permit within each Plan Area as identified in the Grapevine Specific and Community Plan and the Grapevine Special Plan, the project proponent shall be required to provide a one-time road maintenance endowment to off-set ongoing costs of roadway maintenance. Payments(s) shall be provided in eight (8) installments as identified below.

- Plan Area 1: Total Due \$280,000
- Plan Area 2: Total Due \$481,800
- Plan Area 3: Total Due \$363,400
- Plan Area 4: Total Due \$391,600
- Plan Area 5a: Total Due \$382,000
- Plan Area 5b: Total Due \$76,400
- Plan Area 6a: Total Due \$246,400
- Plan Area 6b-6e: Total Due \$68,800

MM 4.16-5 The project proponent is responsible for ensuring construction activities associated with development of the Grapevine Project are not detrimental to any County maintained road(s) within the Grapevine Specific and Community Plan.

Prior to issuance of any grading or building permit, the project proponent shall adhere to the following provisions:

- 1) Obtain an Encroachment Permit from Kern County Public Works Department and enter into a secured agreement for unanticipated construction related road repairs. The purpose of this secured agreement is to ensure that any County maintained road within the Grapevine Specific and Community Plan boundary that is demonstrably damaged by the construction related activities are promptly repaired and, if necessary paved, slurry sealed or reconstructed as per requirements of the state and/or Kern County. The project proponent shall identify and provide the Kern County Public Works Department with a videotape of the pre- and post-construction condition of all County maintained

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public roadways within the Grapevine Specific and Community Plan boundary that will be utilized by the project proponent to access the proposed construction site.

- 2) Upon conclusion of the construction activities, the project proponent shall make any necessary construction related repairs to County roadways within the Grapevine Specific and Community Plan boundary in consultation with Public Works Staff.

Any grading or building permit for a single-family residential dwelling unit located within an approved tentative tract map or parcel map that has already complied with this measure is specifically exempt from any further maintenance requirements. Any roadways that have been specifically over engineered and constructed by the project proponent to withstand large scale construction traffic and use, as determined by the Kern County Public Works Department shall also be exempt from future maintenance requirements.

MM 4.16-6 The project proponent shall implement the following measures to ensure ~~adequate performance standards at internal intersections within the Grapevine Specific~~ the absence of any significant adverse impacts on project and ~~Community Plan boundary~~ local roadways.

- 1) As part of any traffic study submitted with an application for a tentative tract map, parcel map (with the exception of financing maps), or commercial/industrial site plan development, the project proponent shall be required to identify any project or local roadway or intersection that could potentially fall below Level of Service (LOS) D under cumulative plus project conditions and reserve sufficient right of way within these intersections to implement future improvements if determined necessary in consultation with the County. This traffic study shall also identify residential and commercial uses for previously-approved tentative and/or final tract maps, occupancy permits issued for residential and commercial uses, and an updated analysis of the internal capture rate for Home-Based Work trips from the employer survey information collected by the Transportation Management Association pursuant to MM 4.16-2 above.
- 2) Prior to issuance of the 65,000th, 7,500th, and 10,000th residential unit occupancy permits, the project proponent shall prepare ~~an intersection evaluation report~~ a traffic report to identify the Level of Service (LOS) at on all constructed project and local roadways and intersections. This traffic report may be included as part of the traffic study required for each tentative tract maps if the tentative tract map (TTM) aligns with these residential buildout milestones but need not be included if the TTM does not align with these milestones. If the ~~study~~ traffic report determines that any such project or local roadway or intersection is operating within LOS E or LOS F, the project proponent, in consultation with the County shall review whether ~~intersection~~ this performance is consistent with County and Grapevine Specific and Community Plan criteria and determine if any additional improvements or implementation of additional transportation demand measures are required to ensure ongoing functioning of the intersection. Any such improvements shall be constructed by the project proponent or implemented

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through another agreement in consultation with the Kern County Public Works Department.

- MM 4.16-7** Prior to the issuance of any building permit that would facilitate development within the project site that could be accessed utilizing the existing I-5/Grapevine Road interchange, the project proponent shall be required to consult with Caltrans and complete appropriate interchange enhancements such as implementing gore points, auxiliary lanes, acceleration lanes, lighting, signage, or reconstruction of exit and entrance ramps as shown in Figure 2-3 (Project Roadway Network – Interim B) or moving the existing Northbound and Southbound I-5 on-ramp and off-ramps one-half (1/2) mile to the north as shown in Figure 2-4 (Project Roadway Network – Interim B Option).
- MM 4.16-8** Subsequent to the commencement of construction activities on the project site, the project proponent shall be required to conduct a biennial traffic monitoring report at the existing I-5/Wheeler Ridge Road/Laval Road interchange and, following the completion of operational enhancements, at the existing I-5/Grapevine Road interchange. The purpose of this program is to monitor Level of Service and queuing conditions at project utilized interchanges. The required report shall be submitted to Kern County and to Caltrans by April 15th every other year.

If at any time, the results of this biennial traffic monitoring report indicate that the project is within 10 percent of falling below Level of Service (LOS) D at either interchange, the project proponent shall implement the following actions:

- 1) Provide Kern County and Caltrans a detailed breakdown of how many additional permits (Interim Permits) can be issued while still maintaining a Level of Service (LOS) D at either interchange. Once the Interim Permits have been issued, the County of Kern will not issue any additional building permits until such time as appropriate expanded and/or relocated improvements have been constructed.
- 2) Initiate with Caltrans all necessary actions to expand and/or relocate the existing I-5/Grapevine Interchange. Improvements can include, but are not limited to the following options:
 - a.) Variant 1 – Relocate the I-5/Grapevine interchange approximately one (1) mile north of the existing interchange, with construction phased to capacity requirements. This proposal would further connect with planned streets, construct a 2-lane overpass ½ mile north of the existing interchange, close freeway access while maintaining the underpass at the existing Grapevine interchange and require the replacement of the existing California Vehicle Enforcement Facility (CVEF) on Tejon RanchCorp land west of the junction of I-5 and State Route (SR) 99 with a new access and bypass ramps connecting the CVEF to the freeway and a southbound auxiliary lane to the existing I-5/Laval Road interchange
 - b.) Variant 2 – Would include similar improvements to Variant 1, except the location of the relocated I-5/Grapevine Interchange and the 2-lane overpass would be reversed. Further, this option would not require relocation of the

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existing California Vehicle Enforcement Facility (CVEF) but will require braided ramp improvements.

Through consultation with Caltrans, required improvements as identified above can be construed in phases as development occurs. The project proponent shall provide any phased improvement provisions that have been approved by Caltrans to the County of Kern, and any such phased improvement provisions shall be included as conditions of approval for any applicable future tentative tract map, parcel map or commercial/industrial site plan development.

MM 4.16-9 Requires assessments of community ICR at future buildout checkpoints, utilizing residential milestones on the basis that with existing commercial uses adjacent to Grapevine, development of residential uses is most directly related to the future communities ICR. Recognizing that the ICR evolves as different uses are constructed and occupied, the MM provides for milestone checkpoints at intervals of buildout that will allow for the community to be established but ensure analysis is performed before projected significant impacts occur. Additionally, the checkpoints include a percentage range with the buildout ICR that the project is assessed for at each checkpoint, and these percentage ranges gradually tighten towards the buildout projected ICRs as more development occurs. In combination with other MMs, this percentage range allows for the project to build out a mix of residential, commercial, and institutional uses, which will each develop at different paces, while ensuring that the projected ICR is being analyzed before construction (MM 4.16-3), monitored for (MM 4.16-8) and identified impacts are mitigated (MM 4.16-8 Action 1 or 2).

A. After issuance of the 64,000th residential unit building permit and prior to issuance of the 75,000th building permit, the project proponent shall prepare and submit to the County of Kern and to Caltrans an Internalization Rate Report for all AM and PM project related trips. If the required internalization rate report indicates that internalization rates are more than 35 percent below projected buildout levels of 59.8 percent for the AM peak hour and 64.2 percent for the PM, the project proponent shall consult with Caltrans and the project proponent shall elect to either (1) implement additional transportation demand management strategies as necessary to ensure that Caltrans facilities serving the project operate within applicable level of service standards, (2) provide fair share funding for impacts to state highway and freeway facilities not covered by the 2017 fair share funding agreements between the Project proponent and Caltrans, or (3) implement a combination of (1) and (2) herein.

B. After issuance of the 6,500th residential unit building permit and prior to issuance of the 7,500th building permit, the project proponent shall prepare and submit to the County of Kern and to Caltrans an Internalization Rate Report for all AM and PM project related trips. If the required internalization rate report indicates that internalization rates are more than 20 percent below projected buildout levels of 59.8 percent for the AM peak hour and 64.2 percent for the PM, the project proponent shall consult with Caltrans and the project proponent shall elect to either (1) implement additional transportation demand management strategies as necessary to ensure that Caltrans facilities serving the project

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operate within applicable level of service standards-, (2) provide fair share funding for impacts to state highway and freeway facilities not covered by the 2017 fair share funding agreements between the Project proponent and Caltrans, or (3) implement a combination of (1) and (2) herein.

C. After issuance of the 9,000th building permit and prior to issuance of the 10,000th building permit, the project proponent shall prepare and submit to the County of Kern and to Caltrans an Internalization Rate Report for all AM and PM project related trips. If the required internalization rate report indicates that internalization rates are more than 10 percent below projected levels, the project proponent shall consult with Caltrans and the project proponent shall elect to either (1) implement additional transportation demand management strategies as necessary to ensure that Caltrans facilities serving the project operate-with within applicable level of service standards-, (2) provide fair share funding for impacts to state highway and freeway facilities not covered by the 2017 fair share funding agreements between the Project proponent and Caltrans, or (3) implement a combination of (1) and (2) herein.

MM 4.16-10 The following statement shall be included as a note on the final map for all subdivisions, commercial site plans and included in the project Covenants, Conditions and Restrictions (CC&Rs): "This property is presently located under military training routes and a supersonic corridor subject to use by the Department of Defense. For that reason, the property may be subject to some of the annoyances or inconveniences associated with proximity to the routes and corridor (for example: noise, vibration, low-level over flight or sonic booms). Tejon Ranch currently operates a helistop and you may be exposed to noise impacts from helicopter overflights. Individual sensitivities to those annoyances can vary from person to person. You may wish to consider what annoyances, if any, are associated with the property before you complete your purchase and determine whether they are acceptable to you."

MM 4.16-11 A Construction Traffic Management Plan shall be submitted with each application for a project tract or parcel map to ensure that safe operating conditions are maintained on local roadways, freeway facilities and for all pedestrian, cycling, trail and transit facilities. The Construction Traffic Management Plan shall be subject to the review and approval of the Kern County Public Works Department in consultation with Caltrans, as applicable. A copy of the plan shall be submitted to local emergency response agencies and transit providers as directed by Kern County, and to Caltrans. These agencies shall be notified at least 30 days before the commencement of construction that would partially or fully obstruct public roadways.

MM 4.16-12 Prior to the issuance of any building permit, the project proponent shall provide evidence that the following off-site impact mitigation requirements have been completed: Execute traffic impact mitigation agreements with Caltrans that identify project funding that will be paid to Caltrans to mitigate the project's incremental contribution to I-5 cumulative impacts to the Grapevine Grade in Kern County and

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Los Angeles County and cumulative impacts to State Route (SR) 138 in Los Angeles County.

9.3 REDUCED ICR SCENARIO SIGNIFICANCE DETERMINATION

As discussed in Section 4-8 and summarized in Section 9.1 of this report, one or more of the reduce ICR scenarios would result in new significant impacts to local intersections, local roadways, local freeway segments and state highway and freeway facilities to the south and north of the Project area compared with the FEIR and Updated 28.7% HBW ICR analysis. Each of the reduced ICR scenarios would generate a greater volume of peak AM and PM hour trips and higher levels of average weekday VMT than in the FEIR and Updated 28.7% HBW ICR analysis. These increases would result in greater use of Project interim access facilities and adjacent intersections, and a greater volume of trips and VMT on external highways and freeways. A new interchange would likely be required to avoid exceeding applicable LOS levels on interim access facilities earlier in the development process than considered in the FEIR and Updated 28.7% HBW ICR analysis. Consequently, if one or more of the reduced ICR scenarios should occur, impacts would be greater than considered under Threshold 1 in the Updated 28.7% HBW ICR and FEIR analysis.

Feasible onsite improvements within the Project footprint analyzed in the FEIR have been identified that would reduce all of the new significant impacts to local intersections, local roadways and local freeway segments that could potentially be caused by one or more of the reduced ICR scenarios. Feasible onsite improvements within the Project footprint analyzed in the FEIR have also been identified to address significant impacts to local intersections, local roadways and local freeway segments identified in the FEIR and Updated 28.7% HBW ICR analysis. Potential Project impacts to the Grapevine Grade and to state highway and freeway segments to the north and south of the Project Area in the FEIR and Updated 28.7% HBW ICR analysis, and that could occur under one or more of the reduced ICR scenarios, are subject to the fair share funding agreements between the Project and Caltrans that have been implemented in accordance with MM 4.16-12.

Expanded Mitigation Measures 4.16-2, 4.16-3, 4.16-6 and 4.16-9 have been proposed to require earlier and more comprehensive ICR and related traffic system monitoring than required in the FEIR. The expanded Mitigation Measures also incorporate the potential implementation of the onsite improvements identified in Tables 9.2, 9.4 and 9.6 of this report that would, if required, reduce potential significant impacts to local intersections, local roadways, and local freeway segments (except in the Grapevine Grade) identified in the FEIR, the Updated 28.7% HBW ICR and in one or more of the reduced ICR scenarios to less than significant levels.

MM 4.16-9 requires assessments of Project ICR at specified milestones of future buildout. Because the majority of trips are related to residential units, requiring updated ICR evaluations based on residential unit buildout milestones provides the most accurate ongoing basis for calculating ICR. Recognizing that the ICR evolves as different uses are constructed and occupied, the MM provides for milestone checkpoints at residential buildout milestones to be evaluated in advance of the next increment of planned buildout, to identify and mitigate potential ICR-related impacts before these impacts occur. Additionally, the milestones include a percentage range estimating buildout ICR, and these percentage ranges gradually tighten as more development occurs and the projected buildout ICR becomes more certain. In combination with

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other MMs and future phase County review and approval requirements (e.g., the traffic studies and traffic-related infrastructure designs required for tentative tract maps), this ICR percentage range allows for the project to include the planned mix of residential, commercial, and institutional uses, which will each develop at different paces, while ensuring that the projected ICR is being analyzed before construction (MM 4.16-3), monitored over time (MM 4.16-8), and identified impacts are mitigated (MM 4.16-8 Action 1 or 2).

With the implementation of MM 4.16-1 to 4.16-9, including expanded Mitigation Measures 4.16-2, 4.16-3, 4.16-6 and 4.16-9, and the fair share agreements with Caltrans pursuant to MM 4.16-12, potential impacts under Threshold 1 would be less than significant.

Impacts related to congestion management plans could be greater than the impacts considered under Threshold 2 in the Updated 28.7% HBW ICR and FEIR analysis because there would be more use of Project access facilities and adjacent intersections, and a greater volume of trips and VMT on external highways and freeways, in one or more of the reduced ICR scenarios. As discussed under Threshold 1, expanded Mitigation Measures have been proposed that require earlier and more comprehensive ICR and related traffic system monitoring than required in the FEIR. The expanded Mitigation Measures also incorporate the potential implementation of the onsite improvements identified in Tables 9.2, 9.4 and 9.6 of this report that would, if required, reduce potential significant impacts to local intersections, local roadways, and local freeway segments (except in the Grapevine Grade) identified in the FEIR, the Updated 28.7% HBW ICR and in one or more of the reduced ICR scenarios to less than significant levels. The Project has implemented the fair share funding agreements with Caltrans required by MM 4.16-12. With the implementation of expanded MM 4.16-2, MM 4.16-3, MM 4.16-6 and MM 4.16-9, and MM 4.16-7 to 4.16-8, these impacts would be less than significant.

Impacts related to changed airport traffic patterns would be the same as the impacts considered under Threshold 3 in the Updated 28.7% HBW ICR and FEIR analysis. With the implementation of MM 4.16-10, these impacts would be less than significant.

Impacts related to design features or incompatible use hazards would be the same as considered under Threshold 4 in the Updated 28.7% HBW ICR and FEIR analysis. With the implementation of MM 4.16-1 through MM 4.16-7, including expanded MM 4.16-2, MM 4.16-3, and MM 4.16-6 and expanded MM 4.16-9, these impacts would be less than significant.

Impacts related to emergency access would be the same as considered under Threshold 5 in the Updated 28.7% HBW ICR and FEIR analysis. With the implementation of MM 4.16-1 and MM 4.16-11, including expanded MM 4.16-2, MM 4.16-3, MM 4.16-6 and MM 4.16-9, these impacts would be less than significant.

Impacts related to conflicts with adopted policies, plans, or programs supporting alternative transportation would be the same as the impacts considered under Threshold 6 in the Updated 28.7% HBW ICR and FEIR analysis. With the implementation of expanded MM 4.16-2, MM 4.16-6, and MM 4.16-9, these impacts would be less than significant.

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Cumulative impacts would be larger than the impacts considered under Threshold 7 in the Updated 28.7% HBW ICR and FEIR analysis because there would be more use of Project access facilities and adjacent intersections, and a greater volume of trips and VMT on external highways and freeways, in one or more of the reduced ICR scenarios. As discussed under Threshold 1, feasible onsite improvements within the Project footprint analyzed in the FEIR have been identified that would reduce all of the new significant impacts to local intersections, local roadways and local freeway segments that could potentially be caused by one or more of the reduced ICR scenarios and identified in the FEIR and the Updated 28.7% HBW ICR analysis. Potential Project impacts to the Grapevine Grade and to state highway and freeway segments to the north and south of the Project Area in the FEIR and Updated 28.7% HBW ICR analysis, and that could occur under one or more of the reduced ICR scenarios, are subject to the fair share funding agreements between the Project and Caltrans that have been implemented in accordance with MM 4.16-12.

The implementation of MM 4.16-1 to 4.16-9, including expanded Mitigation Measures 4.16-2, 4.16-3, 4.16-6 and 4.16-9, and the fair share agreements with Caltrans pursuant to MM 4.16-12 would reduce but not avoid significant impacts to the Grapevine Grade, along I-5 and in Los Angeles County. Although MM 4.16-12 requires that the Project provide fair-share funding to mitigate for potential cumulative impacts to state highway facilities, and the Project has executed such agreements with Caltrans, the County lacks jurisdiction to require the implementation of the required improvements by Caltrans. Cumulative impacts to state highway facilities would remain significant and unavoidable.

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Transportation Impact Study Technical Report**

**SUPPLEMENTAL RECIRCULATED
TRANSPORTATION IMPACT STUDY
TECHNICAL APPENDICES**

**for the
Grapevine Specific and
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Appendix C – Updated 28.7% HBW ICR – PM Peak Hour Synchro / SimTraffic Results
Appendix D – Updated 28.7% HBW ICR – AM Peak Hour HCS Freeway Mainline Analysis
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Appendix U – Scenario 9 – PM Peak Hour HCS Freeway Mainline Analysis
Appendix V – Scenario 10 – AM Peak Hour Synchro / SimTraffic Results
Appendix W – Scenario 10 – PM Peak Hour Synchro / SimTraffic Results
Appendix X – Scenario 10 – AM Peak Hour HCS Freeway Mainline Analysis
Appendix Y – Scenario 10 – PM Peak Hour HCS Freeway Mainline Analysis
Appendix Z – August 2018 AM and PM Peak Hour Traffic Counts

Appendix A
Appendix JJ from FEIR

Exhibit 1

Project Roadway Network – Interim A

Roadway Segments-Number of Lanes

2 4

Traffic Control



Traffic Signal



Traffic Signal or Roundabout



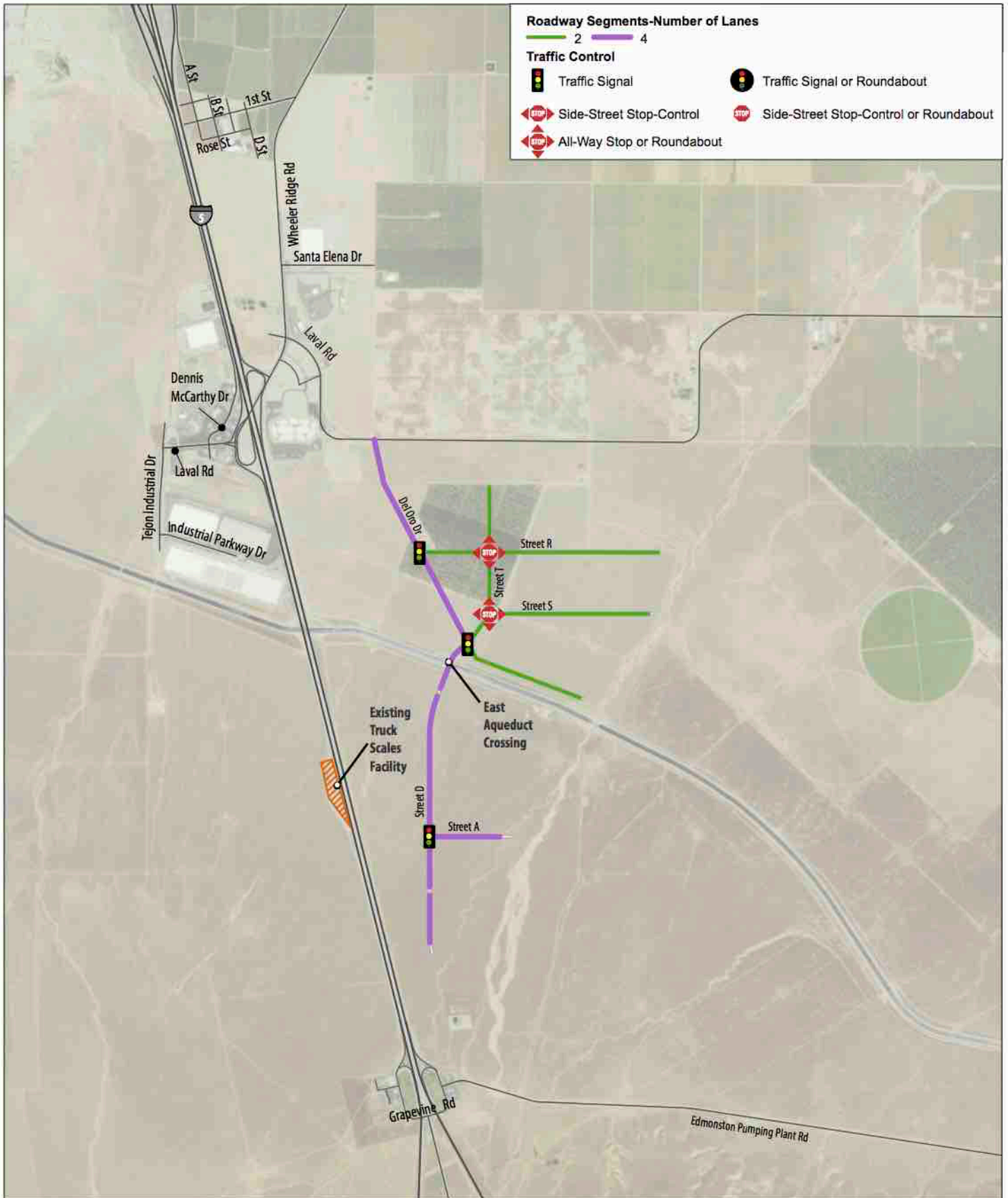
Side-Street Stop-Control



Side-Street Stop-Control or Roundabout



All-Way Stop or Roundabout



0 0.5 1 Miles

SOURCES: USGS, ESRI

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Exhibit 1

Project Roadway Network - Interim A

Exhibit 2

Project Roadway Network – Interim B

Roadway Segments-Number of Lanes

2 4 I-5/Grapevine Existing Interchange Improvements

Traffic Control

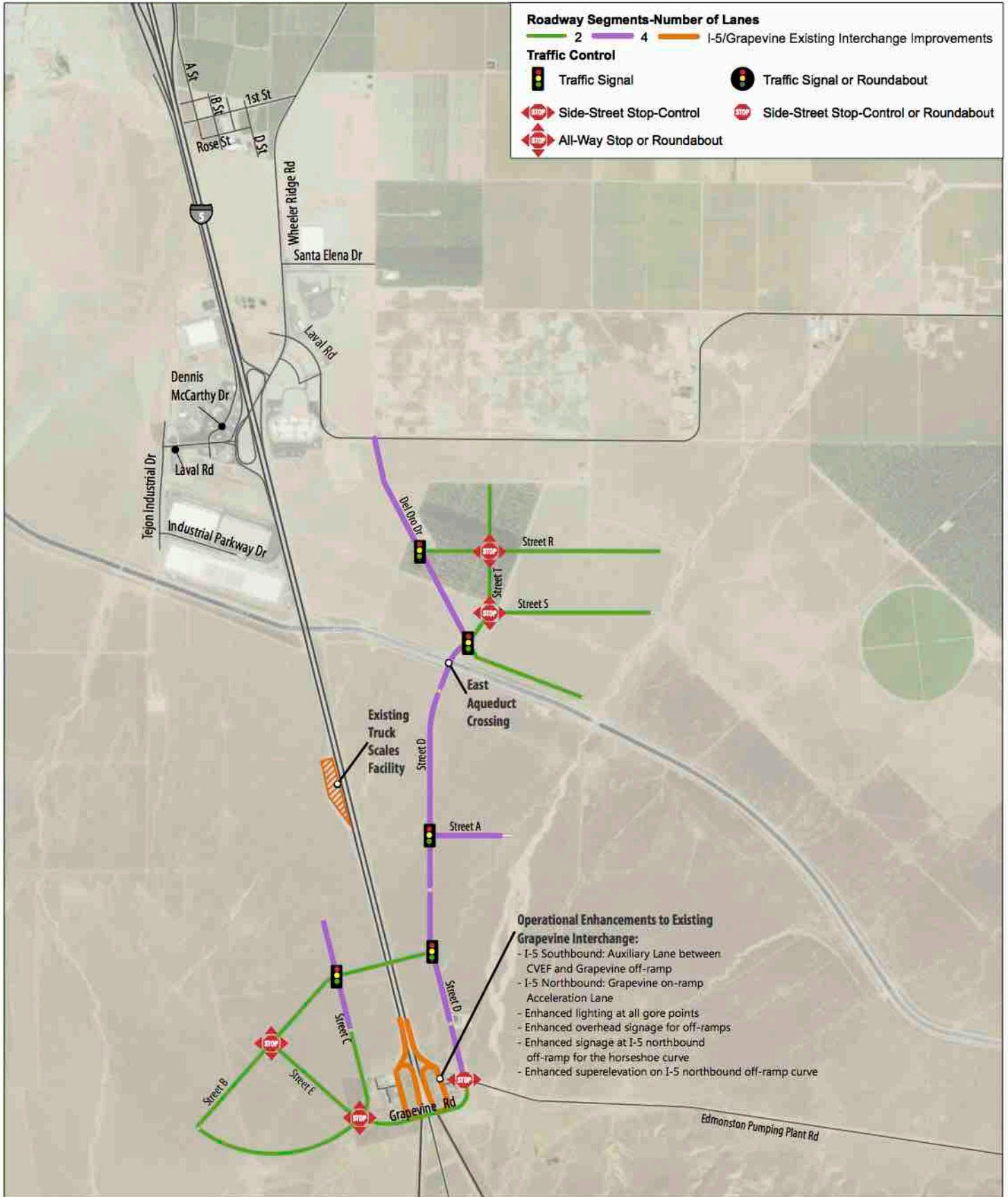
Traffic Signal

Traffic Signal or Roundabout

Side-Street Stop-Control

Side-Street Stop-Control or Roundabout

All-Way Stop or Roundabout



0 0.5 1 Miles

SOURCES: USGS, ESRI

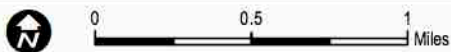
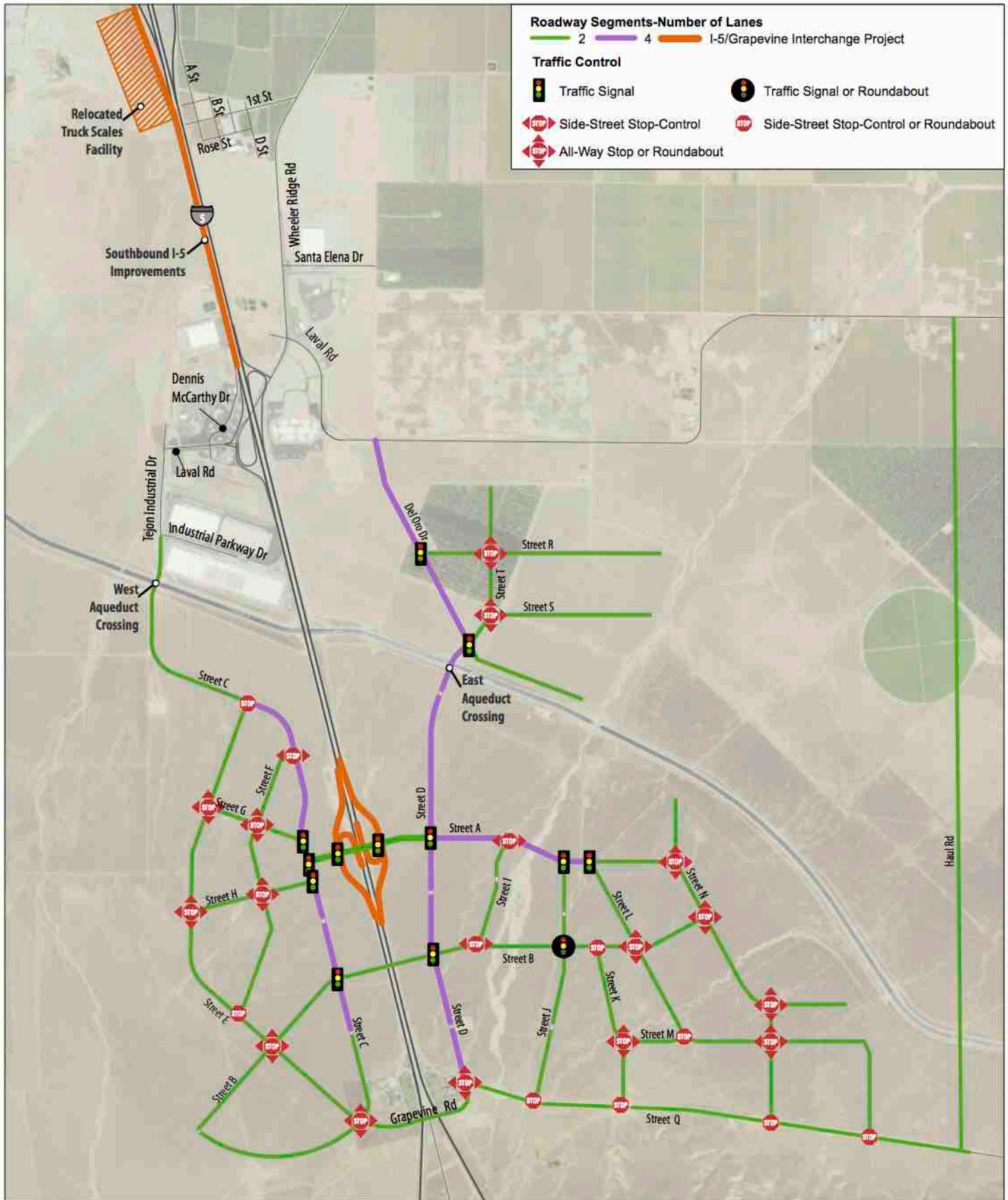
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Exhibit 2

Project Roadway Network - Interim B

Exhibit 3

Project Roadway Network – Variant 1



SOURCES: USGS, ESRI

GRAPEVINE PROJECT

Exhibit 3
Project Roadway Network - Variant 1

Exhibit 4

Project Roadway Network – Variant 2

Roadway Segments-Number of Lanes

2 4 I-5/Grapevine Interchange Project

Traffic Control

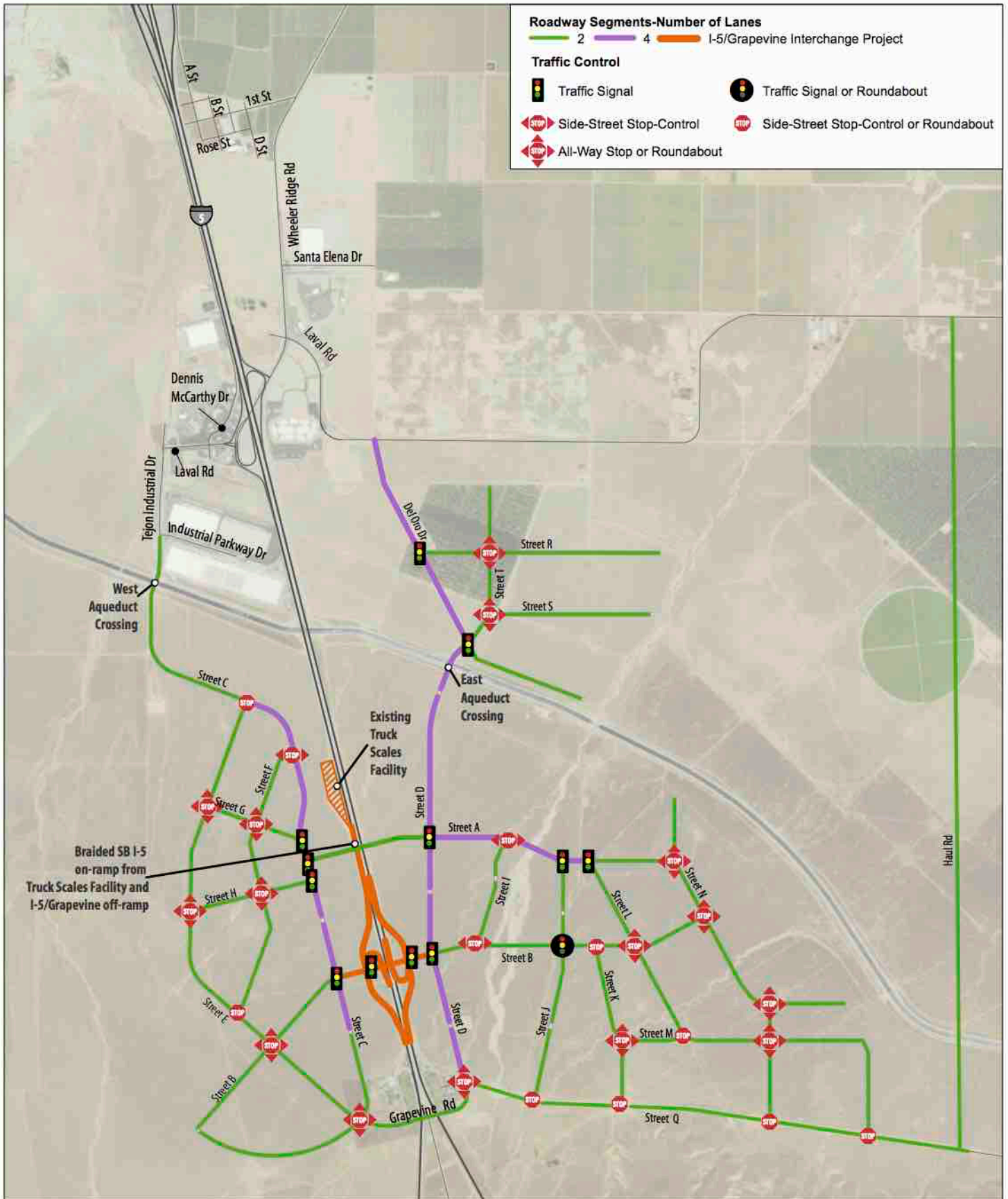
Traffic Signal

Traffic Signal or Roundabout

Side-Street Stop-Control

Side-Street Stop-Control or Roundabout

All-Way Stop or Roundabout



0 0.5 1 Miles

SOURCES: USGS, ESRI

GRAPEVINE PROJECT

Exhibit 4

Project Roadway Network - Variant 2

**Grapevine Transportation Impact Study – Trip
Internalization Sensitivity Analysis**

EXHIBIT 5

Grapevine Transportation Impact Study – Trip Internalization Sensitivity Analysis

This memorandum summarizes the results of the analysis of lower internal trip capture rates for the project completed by Fehr & Peers in response to comments received from Caltrans at an in-person meeting on Wednesday, January 27, 2016 and a follow-up phone call on Wednesday, February 3, 2016. As discussed in the Global Response, consistent with DEIR mitigation measure (MM) 4.16-12, the project proponent is negotiating a mitigation agreement with the California Department of Transportation (Caltrans) District 6 in Kern County and Caltrans District 7 in Los Angeles County. The project proponent has also initiated a Project Study Report - Project Development Support (PSR/PDS) process for the proposed expanded and relocated interchange in accordance with Caltrans requirements.

As discussed in the DEIR and DEIR Appendix T, the project Traffic Impact Study (TIS), estimated internal trip capture rates by using the Kern Council of Governments (Kern COG) traffic model developed for the approved Kern County Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The Kern COG model results indicated that 72.2% of all AM peak hour trip and 71.4% of all PM peak hour trips would be internal to the project. This result is consistent with the fact that the project and adjacent employment and retail centers will provide full-service amenities in close proximity with local housing that will be much more convenient to access than amenities in Bakersfield or in the Los Angeles metropolitan region.

The Kern COG model results were further validated by using multiple independent methodologies to estimate the total number and internal trips for three project trips categories:

- (1) Home Based Work (trips to and from home to employment);
- (2) Home-Based Other (trips to and from home for shopping, schools, entertainment, etc.); and
- (3) Non-Home Based work trips (trips to and from work or other non-home locations to a restaurant or shopping).

As discussed in the Global Response, Internal trip capture rates are typically different for Home-Based Work trips when compared to Home-Based Other or Non-Home-Based trips because employees are often willing to accept longer commutes for employment. As a result, the internalization rate for project Home-Based Work trips has a larger effect on potential project impacts to state and external roadways.

Caltrans, which operates state transportation facilities, requested that the Home-Based Work trip capture rate be analyzed at rate that is 50% lower than developed during the validation of the KernCOG model results, or 28.7% rather than 57.4%. This reduction results in total AM peak hour capture rates of 59.8% and PM capture rates of 64.2%, which are 12.4 % and 7.2 % lower than the AM and PM peak hour rates (respectively) derived from the KernCOG traffic model. As shown in the July 14, 2016 project mitigation agreement meeting minutes prepared by Caltrans (Attachment 1), Caltrans has agreed to use the lower internal capture rates to determine the project's fair share mitigation obligations for impacts to state highways facilities.

The following sections summarize the analysis of project internal capture rates using the lower Home-Based Work trip capture rate that was requested by and provided to Caltrans.

Home-Based Work Trips

To validate the KernCOG model results, the internalization rate for project home-based work trips was estimated by using U.S. Census Journey to Work data for California communities that have similar characteristics to the Grapevine Specific and Community Plan Project. This includes similar size, in terms of dwelling units and population, employment opportunities, and separation from other developed areas. The validation analysis (see DEIR Appendix T) included the following six communities:

- Eureka, CA
- Paso Robles, CA
- Porterville, CA
- San Luis Obispo, CA
- Santa Maria, CA
- Watsonville, CA

Internal trip capture rates are typically different for home-based work trips than home-based other or non-home-based trips because employees are often willing to accept longer commutes for employment. The internalization study used the Journey to Work data from the U.S. Census Bureau's American Community Survey (ACS) for these communities to estimate how many Grapevine residents would work within Grapevine and the immediate area (i.e., TRCC). Specifically, the study uses the percentage of the population who worked in their place of residence from the Journey to Work data, as presented in Table 1 below.

Based on this U.S. Census data, the Kern COG validation analysis projected that a percentage of Grapevine residents would live and work within the Grapevine/TRCC area. The results of the analysis determined that approximately **57.4%** of home-based work trips would remain internal within the Grapevine/TRCC area.

TABLE 1
JOURNEY TO WORK DATA FOR SIMILAR COMMUNITIES

City	Percent of Population that Work in Place of Residence
Eureka, CA	63.8%
Paso Robles, CA	48.5%
Porterville, CA	58.0%
San Luis Obispo, CA	62.7%
Santa Maria, CA	62.0%
Watsonville, CA	49.4%
Average	57.4%

Source: 2008-2012 ACS – Report S0801, U.S. Census Bureau, 2012.

As discussed above Caltrans requested that a sensitivity analysis be performed in which the home-based work internalization rate was reduced by 50% from the KernCOG validation analysis estimate, or from **57.4% to 28.7%**. Table 2 below presents the resulting total project trip internalization using the lower home-based work internalization rate.

TABLE 2
LOWER INTERNALIZATION SENSITIVITY ANALYSIS
ESTIMATED PROJECT TRIP INTERNALIZATION BY PEAK HOUR

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips ¹	% Internal ²	Total Internalization % ³	% of Trips ¹	% Internal ²	Total Internalization % ³
Home-Based Work	47.8%	28.7%	13.7%	28.1%	28.7%	8.1%
Home-Based Other/ Non-Home-Based	52.2%	88.3%	46.1%	71.9%	78.0%	56.1%
Total			59.8%			64.2%

Notes: ¹Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17 of Appendix T, page 117.

²Internalization percentage by trip purpose. Home-based work trip internalization shown in Table 18 of Appendix T, page 118. Home-based other/non-home-based trip internalization shown in Table 22 of Appendix T, page 139.

³Overall internalization estimate calculation.

Source: Fehr & Peers, August 2016.

Table 3 compares the internal and external trips AM and PM peak hour trip results of the KernCOG validation analysis and the analysis using the lower internalization rate the resulting changes from under this reduced internalization scenario.

TABLE 3
LOWER INTERNALIZATION SENSITIVITY ANALYSIS-
INTERNAL AND EXTERNAL TRIP GENERATION BY PEAK HOUR

Scenario	A.M. Peak Hour				P.M. Peak Hour			
	<i>Percent Internal</i>	<i>Total Trips</i>	<i>Internal Trips</i>	<i>External Trips</i>	<i>Total Trips</i>	<i>Percent Internal</i>	<i>Internal Trips</i>	<i>External Trips</i>
Kern COG Validation analysis	72.2%	17,512	12,644	4,868	20,713	71.4%	14,789	5,924
Lower Internalization Analysis with 50% reduction in Home Based Work Trips	59.8%	17,512	10,472	7,040	20,713	64.2%	13,298	7,415

Source: Fehr & Peers, August 2016.

Both trip internalization analyses indicate that the project would generate 17,512 vehicle trips during the morning peak hour (7:30 to 8:30 AM) and 20,713 vehicle trips during the evening peak hour (4:30 PM to 5:30 PM).

During the morning peak hour (7:30 to 8:30 AM), the reduction in the home-based work internalization rate would reduce the total number of internal trips from **72.2%** to **59.8%**; thereby increasing the number of external trips from 4,868 to 7,040 vehicle trips.

During the evening peak hour (4:30 PM to 5:30 PM), the reduction in the home-based work internalization rate would reduce the total number of internal trips from **71.4%** to **64.2%**; thereby increasing the number of external trips from 5,924 to 7,415 vehicle trips.

The 2040 Kern COG TDF model distributes trips using a "gravity model" which assumes that trips are more likely to occur based on complementary uses, such as nearby residences and a supermarket. The TDF model accounts for the distance between trip origins and destinations in travel time, the type of land use, and the amount of land use (size) in distributing trips. Table 4 summarizes the proposed project trip distribution at project build-out under 2040 cumulative plus project conditions.

As discussed above, during both morning and evening peak hours 59.8%- 64.2% of all project trips at build-out would be internalized (respectively) and remain within the project area (the Grapevine project and TRCC). Approximately 28.3% and 24.3% of the total project trips would travel north to and from the Bakersfield metropolitan area during the AM and PM peak hours (respectively). The remaining 11.9% to 11.5% of the total project trips would travel south to and from Los Angeles County during the AM and PM peak hours (respectively).

Table 4
Project Build-out Trip Distribution Estimate –
Cumulative Plus Project Conditions (2040)

Origin/Destination	Trip Distribution Estimate	
	<i>A.M. Peak Hour</i>	<i>P.M. Peak Hour</i>
Project Area	59.8%	64.2%
North of Grapevine	28.3%	24.3%
West Bakersfield via I-5	3.0%	2.6%
North of Bakersfield via I-5	1.5%	1.3%
Bakersfield Metropolitan Area via SR 99	16.4%	14.1%
North of Bakersfield via SR 99	1.5%	1.3%
Arvin-Lamont Area	4.5%	3.8%
Eastern Kern County via SR 58	1.5%	1.3%
South of Grapevine	11.9%	11.5%
Southern Kern County (Frazier Park/Tejon Mountain Village)	1.5%	1.3%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	4.5%	3.8%
Santa Clarita Valley Area	3.0%	2.6%
Los Angeles Basin/Orange County/Inland Empire	3.0%	3.8%

Source: Fehr & Peers, August 2016.

Exhibit 8 of the Global Response provides an analysis of potential project impacts to local intersections and roads, state facilities, and the Grapevine Grade under existing plus project conditions. Exhibit 9 of this Global Response provides an analysis of potential project impacts to local intersections and roads, state facilities, and the Grapevine Grade under cumulative plus project conditions.

Attachment 1

Grapevine Mitigation Agreement Meeting Minutes 7/14/16

General Discussion

- From TIS: MM X-3 is the measure requiring fair share contribution.
- MM 4-16-10 is in DEIR traffic section but not the DEIR executive summary. Tejon Ranch will coordinate with County to include it in the executive summary.

Grapevine Mitigation Agreement Split

- All parties agreed to have a separate Traffic Mitigation Agreement for Districts 6 and 7. Simpler to coordinate and will expedite process.

ROW Dedication

- Caltrans requested an irrevocable offer of ROW from TRC. TRC would not be credited for the ROW. Caltrans indicated that the ROW will be along the frontage of the Grapevine project area only.

Exhibit B – Fair Share Calculations

- The draft exhibit is based upon the 70%/72% internal trip capture rate used in the traffic study. Caltrans requested the exhibit be revised using previously agreed 60%/64% internal trip capture rate.
- Caltrans believes the growth rate should be between 2-2.5% instead of ~4.4%. Fehr & Peers will follow up with Caltrans to discuss and review this information.
- 5.13 mile vs 10.04 miles; Analysis in the traffic study only identified a significant impact in the area of existing Grapevine Road Interchange to Fort Tejon Road Interchange which is a distance of 5.13 miles. Caltrans will review the analysis in the traffic study and follow up with Fehr & Peers.
- Fehr & Peers will work with Caltrans to review the fair share calculation spreadsheet.

3-Party Agreement

- Caltrans will send information to Kern County Department of Public Works and Kern County Department of Planning outlining why Caltrans wants Kern County to be a signatory to the Grapevine Mitigation Agreement.
- Caltrans will follow up with Brandon Walker regarding 3-party agreement feasibility.

Point 8 Verbiage

- It was clarified that the intent of this item was to identify specific measures to mitigate cumulative I-5 project impacts if Caltrans does not implement the 5th lane-widening project. Prior to implementing any measure, there would need to be mutual agreement.
- It was agreed to revise the language to more clearly state this intent. Caltrans requests that any measure used to mitigate cumulative I-5 project impacts be measurable.

Exhibit 6

Project Roadway Network – Interim B Option

Roadway Segments-Number of Lanes

2 4 I-5/Grapevine Interchange Improvements

Traffic Control

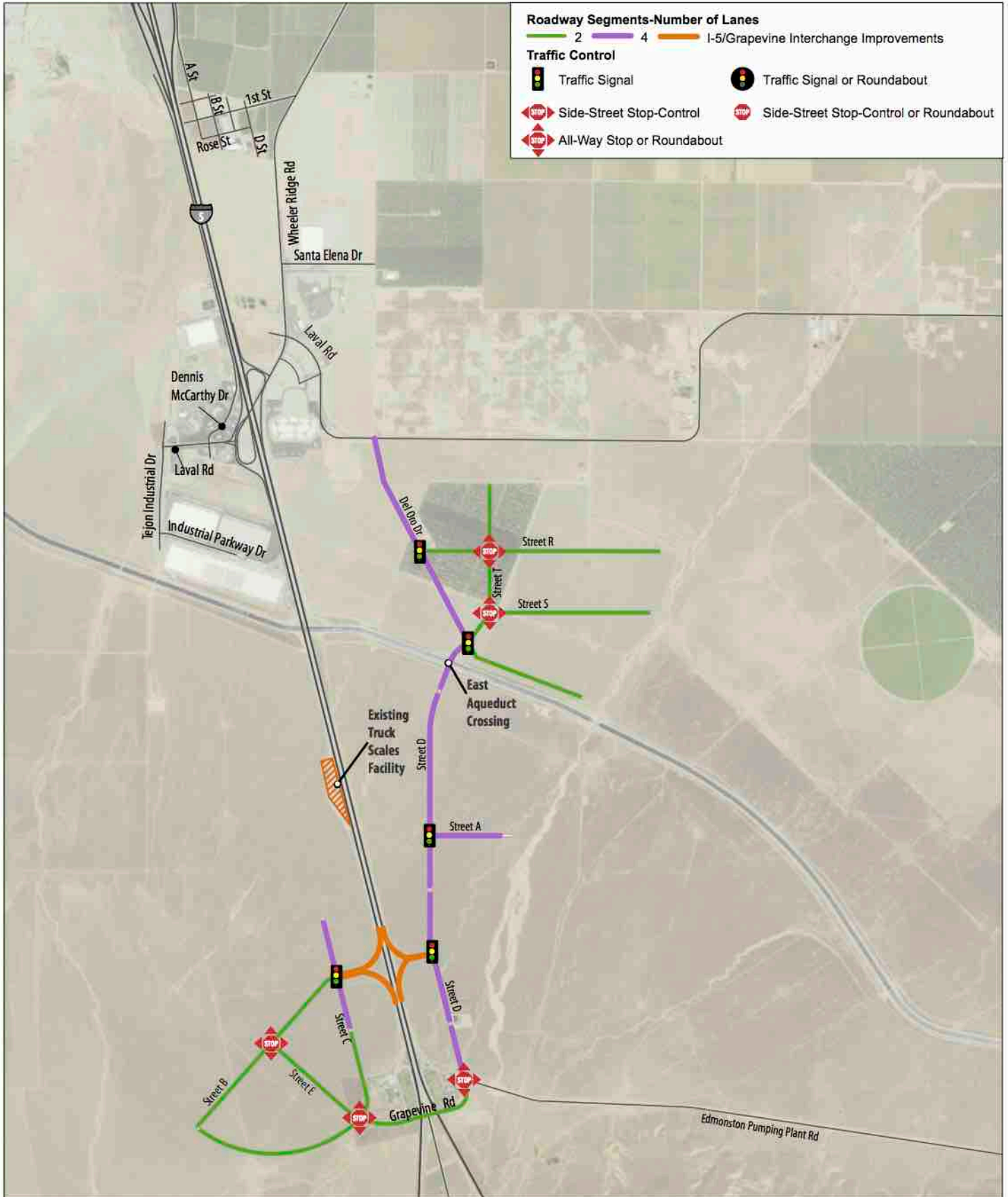
Traffic Signal

Traffic Signal or Roundabout

Side-Street Stop-Control

Side-Street Stop-Control or Roundabout

All-Way Stop or Roundabout



0 0.5 1 Miles

SOURCES: USGS, ESRI

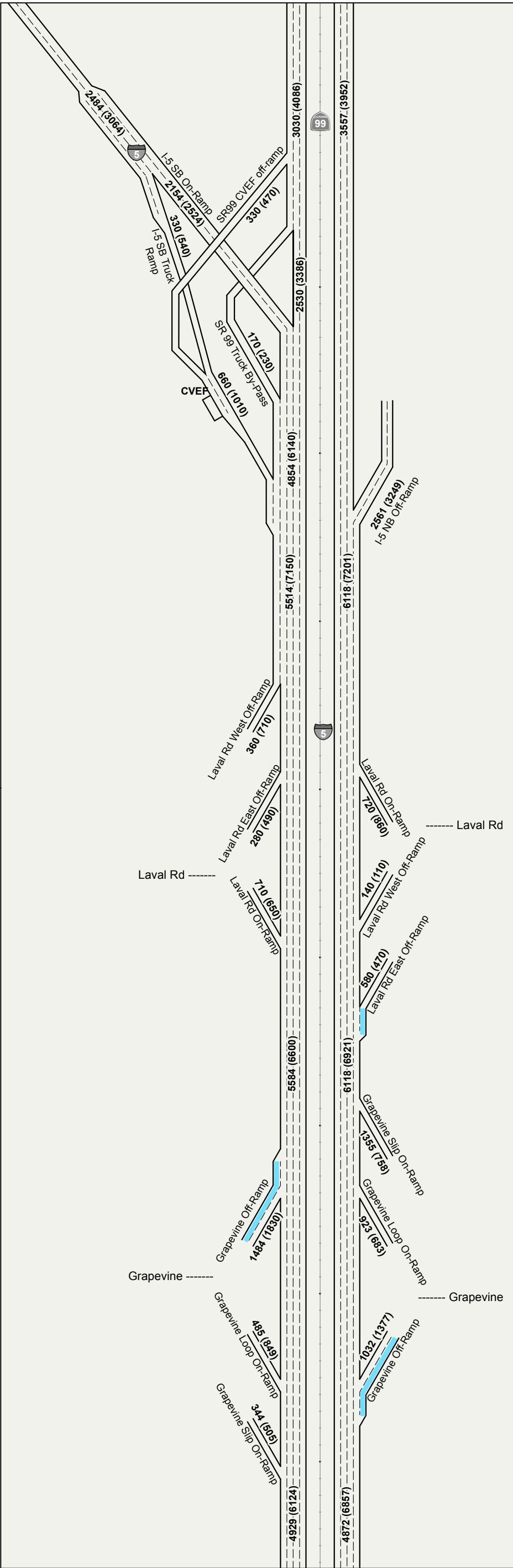
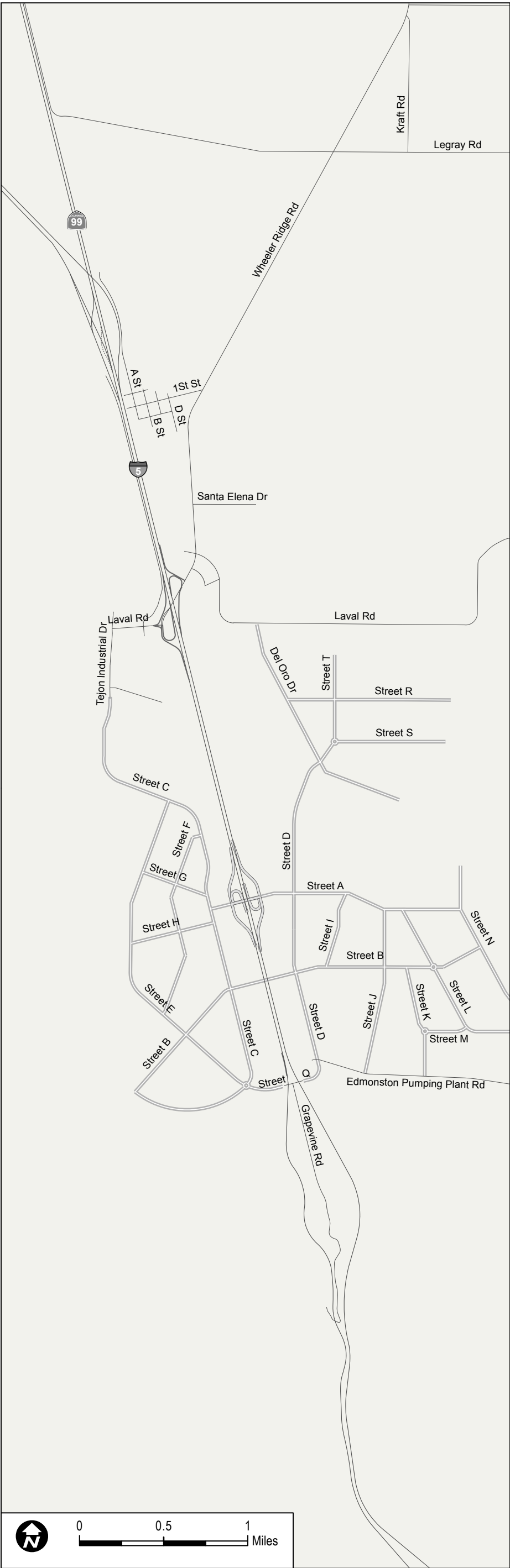
GRAPEVINE PROJECT

Exhibit 6

Project Roadway Network - Interim B Option

Exhibit 7

**Peak Hour Traffic Volumes – Freeway and Ramp
Configurations Cumulative Plus Project Conditions
(2040)**



AM (PM) AM and PM Traffic Volume

Second Lane Design within the Project Development Footprint

Exhibit 7

Peak Hour Traffic Volumes

Freeway and Ramp Configurations Cumulative Plus Project Conditions (2040)

GRAPEVINE PROJECT

SOURCES: USGS, ESRI

Exhibit 8

Existing + Project With Lower Internalization Transportation Impact Analysis

EXHIBIT 8

Existing + Project With Lower Internalization Transportation Impact Analysis

This Exhibit describes the transportation conditions that would occur under Existing Plus Project conditions using the lower internal trip capture rate described in Exhibit 5 of this Global Response. The analysis was conducted by adding the trips generated by the proposed project at buildout to the existing roadway and freeway facility volumes.

Intersection Operations Under Existing Plus Project Conditions

Table 1 presents the anticipated a.m. and p.m. peak hour delay and LOS at the study intersections under existing plus project conditions. As shown in Table 1, all existing intersections would operate acceptably at LOS C or better under existing plus project conditions. The Northbound and Southbound I-5 ramp terminal intersections at the I-5 / Wheeler Ridge Road / Laval Road interchange would operate at LOS B or better during both AM and PM peak hour conditions. The Northbound and Southbound ramp terminal intersections at the relocated I-5 / Grapevine interchange would operate acceptably at LOS D or better during both AM and PM peak hour conditions.

All of the new intersections that would be constructed within the Grapevine project area would operate at acceptable performance levels except the following locations during either AM or PM Peak Hour Conditions:

- Street A / Street D (Traffic Signal);
- Street C / Street A (Traffic Signal);
- Street C / Street G (Traffic Signal); and
- Street A / Street I (Side Street Stop Controlled).

As discussed in DEIR Section 4.16, Impact 4.16-1, the project is designed as a multimodal development subject to performance criteria other than LOS standards in accordance with the smart growth provisions of the Kern County General Plan (KCGP). As discussed in Section 4.16.3, Regulatory Setting, to encourage the incorporation of innovative or “smart growth” land use planning techniques as design features in new development, Section 1.10.8 of the KCGP allows for the assessment of traffic and safety impacts through means other than LOS when development utilizes Smart Growth policies that encourage efficient multi-modal movements as part of a community plan or specific plan. Certain intersections within the project may operate at lower LOS levels to encourage non-automotive movements, including walking, biking and transit use, without generating significant impacts in accordance Section 1.10.8 of the KCGP.

Table 1
Peak Hour Intersection Operations– Existing Plus Project Conditions(2015)

Intersection	Traffic Control	Peak Hour	Existing		Existing + Project	
			Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	13	B	16	B
		P.M.	17	B	18	B
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	9	A	11	B
		P.M.	12	B	15	B
3. S. Wheeler Ridge Road / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A
		P.M.	3	A	3	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	13	B	18	B
		P.M.	10	B	26	C
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		28	C
		P.M.			<u>55</u>	<u>E</u>
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		41	D
		P.M.			34	C
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		16	B
		P.M.			26	C
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		<u>92</u>	<u>E</u>
		P.M.			<u>98</u>	<u>E</u>
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		13	B
		P.M.			<u>55</u>	<u>E</u>
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		41	D
		P.M.			<u>55</u>	<u>E</u>
11. Street I / Street A ⁴	Side-Street Stop	A.M.	Does Not Exist		25 (1)	C (A)
		P.M.			<u>165</u> (1)	<u>E</u> (A)

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized and all-way stop intersections.

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).

⁴The shared movement with the greatest delay is reported in seconds per vehicle at side-street stop controlled intersections. The overall intersection delay and LOS are provided for informational purposes only.

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, August 2016.

DEIR mitigation measure (MM) 4.16-6 states that, "The project proponent shall implement the following measures to ensure adequate performance standards at internal intersections within the Grapevine Specific and Community Plan boundary.

1) As part of any traffic study submitted with an application for a tentative tract map, parcel map (with the exception of financing maps), or commercial/industrial site plan development, the project proponent shall be required to identify any intersection that could potentially fall below Level of Service (LOS) D under cumulative plus project conditions and reserve sufficient right-of-way within these intersections to implement future improvements if determined necessary in consultation with the County.

2) Prior to issuance of the 6,000th and 10,000th occupancy permits, the project proponent shall prepare an intersection evaluation report to identify the Level of Service (LOS) at all constructed intersections. If the study determines that any such intersection is operating within LOS E or LOS F, the project proponent, in consultation with the County shall review whether intersection performance is consistent with County and Grapevine Specific and Community Plan criteria and determine if any additional intersection improvements or implementation of additional transportation demand measures are required to ensure ongoing functioning of the intersection. Any such improvements shall be constructed by the project proponent or implemented through another agreement in consultation with the Kern County Public Works Department."

Per the traffic analysis completed for this study, the following capacity enhancements within the applicable rights of way at each location would improve traffic operations to acceptable LOS D or better under existing plus project AM and PM peak hour conditions if implemented in accordance with MM 4.16-6:

Street A / Street D

- A third westbound through lane from Street D to the I-5 northbound on-ramp
- A channelized southbound Street D right-turn lane to westbound Street A
- Provide a third westbound through lane from east of Street D

Street C / Street A

- A third westbound right-turn lane from the I-5 southbound off-ramp to C Street
- A third eastbound right-turn lane from the C Street to the I-5 southbound on-ramp
- These improvements would improve LOS operations at Street C / Street G (traffic signal) and Street C / Street H (traffic signal)

Street A / Street I

- Option A: Provide a receiving lane in the median for northbound left-turn movements, allowing “two-stage” gap acceptance for left-turning vehicles.
- Option B: Restrict the outbound movements on Street I to right-turn only movements. This would force the left-turn movements to either re-route to another roadway, or travel east and make a U-turn at the next available opportunity.

Roadway Segment Capacity Evaluation Under Existing Plus Project Conditions

Table 2 summarizes the p.m. peak hour volumes on project area roadway segments under existing plus project conditions. Table 2 shows that all roadway segments would have sufficient capacity to meet demand and would operate at acceptable LOS levels under existing plus project conditions.

Table 2
P.M. Peak Hour Roadway Capacity Evaluation – Existing Plus Project Conditions (2015)

Roadway Segment	Classification	Existing Conditions			Existing Plus Project		
		P.M. Peak Hour Volume	V/C ¹	LOS ²	P.M. Peak Hour Volume	V/C ¹	LOS ²
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	1,140	0.42	D
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			1,450	0.81	D
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			3,250	0.95	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			900	0.50	C
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			165	0.09	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			600	0.34	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			600	0.34	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			1,650	0.92	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			50	0.03	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			205	0.11	C
11. Dennis McCarthy Rd. : North of Laval Rd	2-lane Collector Street	592	.36	D	900	0.50	D

Notes: ¹V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.

²Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.

Source: Fehr & Peers, August 2016.

Freeway Operations Under Existing Plus Project Conditions

Table 3 summarizes the a.m. and p.m. peak hour LOS levels on the freeway segments in the vicinity of the project area under existing plus project conditions using the lower trip internalization level described in Exhibit 5 of the Global Response. Table 3 shows that 33 of the 33 (100.0%) freeway mainline, on-ramp merge, and off-ramp diverge segments would continue to operate at acceptable LOS C conditions or better during AM and PM Peak Hour Conditions.

Table 3
Peak Hour Freeway Operations –
Existing Plus Project Conditions (2015)

Segment	Segment Type	Peak Hour	Existing Conditions		Existing Plus Project	
			Density ¹	LOS ²	Density ¹	LOS ²
I-5 Northbound						
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	9	A	15	B
		P.M.	13	B	20	C
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	Exists as Grapevine to Laval Road (see below)		12	B
		P.M.			16	B
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	10	B	15	B
		P.M.	13	B	19	B
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		16	B
		P.M.			17	B
5. Grapevine Slip On-Ramp	Merge	A.M.	9	A	23	C
		P.M.	11	B	22	C
6. Grapevine to Laval Road	Basic	A.M.	7	A	16	B
		P.M.	9	A	16	B
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	11	B	18	B
		P.M.	14	B	18	B
8. Laval Road West Off-Ramp	Diverge	A.M.	9	A	18	B
		P.M.	12	B	18	B
9. Laval Road On-Ramp	Merge	A.M.	9	A	20	B
		P.M.	13	B	23	C
10. Laval Road to SR-99	Basic	A.M.	7	A	17	B
		P.M.	9	A	18	B

Table 3
Peak Hour Freeway Operations –
Existing Plus Project Conditions (2015)

Segment	Segment Type	Peak Hour	Existing Conditions		Existing Plus Project	
			Density ¹	LOS ²	Density ¹	LOS ²
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	7	A	17	B
		P.M.	9	A	18	B
12. North of SR 99 Junction	Basic	A.M.	5	A	12	B
		P.M.	8	A	13	B
SR 99 Northbound						
13. North of I-5 Junction	Basic	A.M.	6	A	15	B
		P.M.	7	A	15	B
SR 99 Southbound						
1. North of I-5 Junction	Basic	A.M.	6	A	12	B
		P.M.	7	A	17	B
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		18	B
		P.M.			23	C
3. Truck Bypass Off-Ramp	Basic (Major Diverge)	A.M.	6	A	11	A
		P.M.	7	A	15	B
4. SR 99 Auto Lanes to I-5 Southbound	Basic (2 Lanes)	A.M.	7	A	15	B
		P.M.	7	A	21	C
I-5 Southbound						
5. North of SR 99 Junction	Basic	A.M.	5	A	8	A
		P.M.	9	A	13	B
6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		4	A
		P.M.			7	A
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		6	A
		P.M.			11	A
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	6	A	11	A
		P.M.	9	A	16	B
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	6	A	9	A
		P.M.	8	A	13	B

Table 3
Peak Hour Freeway Operations –
Existing Plus Project Conditions (2015)

Segment	Segment Type	Peak Hour	Existing Conditions		Existing Plus Project	
			Density ¹	LOS ²	Density ¹	LOS ²
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		10	B
		P.M.			14	B
11. SR 99 to Laval Road	Basic	A.M.	7	A	11	B
		P.M.	9	A	16	B
12. Laval Road West Off-Ramp	Diverge	A.M.	12	B	11	B
		P.M.	14	B	16	B
13. Laval Road East Off-Ramp	Diverge	A.M.	10	A	17	B
		P.M.	10	B	22	C
14. Laval Road On-Ramp	Merge	A.M.	9	A	15	B
		P.M.	10	B	18	B
15. Laval Road to Grapevine ⁴	Basic	A.M.	7	A	14	B
		P.M.	8	A	17	B
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	10	A	19	B
		P.M.	11	B	24	C
17. Grapevine Loop On-Ramp	Merge	A.M.	9	A	13	B
		P.M.	7	A	16	B
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		13	B
		P.M.			17	B
19. Relocated Grapevine Interchange to Base of Grapevine Grade	Basic	A.M.	Exists as Laval Road to Grapevine (See Above)		11	A
		P.M.			14	B
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	12	B	19	C
		P.M.	14	B	22	C

Notes: ¹Density is reported in passenger car equivalents per mile per lane (pcmppl).

²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

³These segments are re-configured under existing plus project conditions to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.

⁴This table reports the “existing conditions” results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.

⁵Segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.

⁶Segment analysis increases deceleration lane from 170 feet to 500 feet.

Source: Fehr & Peers, August 2016.

Freeway Off-Ramp Queuing Under Existing Plus Project Conditions

Table 4 presents the results of the a.m. and p.m. peak hour queuing analysis at each off-ramp study intersections. Based on these results, the proposed project would not cause the 95th percentile queues to extend back onto the freeway and create safety issues at any off-ramp.

Table 4
Peak Hour Off-Ramp Queuing –
Existing Plus Project Conditions (2015)

Freeway Ramp	Traffic Control at Ramp Terminal	Available Storage ¹	Peak Hour	95 th Percentile Queue ²	
				Existing Conditions	Existing Plus Project
I-5 Northbound					
Grapevine off-ramp ³	Traffic Signal	2,300 ft.	A.M.	N/A	400 ft.
			P.M.	N/A	600 ft.
Laval Road east off-ramp	Free	2,800 ft.	A.M.	75 ft.	150 ft.
			P.M.	100 ft.	125 ft.
Laval Road west off-ramp	Free	2,100 ft.	A.M.	75 ft.	125 ft.
			P.M.	125 ft.	225 ft.
I-5 Southbound					
Laval Road west off-ramp	Free	3,400 ft.	A.M.	75 ft.	125 ft.
			P.M.	125 ft.	225 ft.
Laval Road east off-ramp	Traffic Signal	1,700 ft.	A.M.	75 ft.	125 ft.
			P.M.	75 ft.	225 ft.
Grapevine off-ramp ³	Traffic Signal	2,300 ft.	A.M.	N/A	275 ft.
			P.M.	N/A	425 ft.

Notes: ¹Available storage based on total available queue space shown in Table 22. Based on a combination of off-ramp length and distance to nearest downstream controlled intersection for free-flow off-ramps.

²95th percentile vehicle queue results are based on output from the Synchro traffic operations model; taken from controlling intersection (i.e., ramp terminal intersection with signal; or nearest downstream controlled intersection when ramp terminal operates free).

³N/A = not applicable. The traffic using the existing Grapevine off-ramps never reach a controlled intersection. Therefore, no queues exist at the existing Grapevine off-ramps.

Source: Fehr & Peers, August 2016.

Cumulative + Project With Lower Internalization Transportation Impact Analysis

EXHIBIT 9

Cumulative + Project With Lower Internalization Transportation Impact Analysis

This Exhibit describes the transportation conditions that would occur under cumulative without project and cumulative plus project conditions using the lower internal trip capture rate described in Exhibit 5 of this Global Response with full build out of the project and the development of reasonably foreseeable projects. As discussed in DEIR Section 4.16, the cumulative traffic analysis uses the Kern Council of Governments (COG) Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) travel demand forecasting model to forecast the cumulative traffic volumes for Kern County locations north of the existing I-5/Fort Tejon interchange. The Kern COG RTP/SCS travel model is consistent with the adopted RTP/SCS for the Kern COG region, and takes into account the Kern County General Plan. The Southern California Association of Governments (SCAG) RTP/SCS projections were used to analyze cumulative conditions for locations south of the existing I- 5/Fort Tejon interchange in Los Angeles County. The project buildout transportation facilities used in the analysis, including the preferred location for the expanded and relocated I-5 interchange and relocated CVEF, the additional off-ramp lane at the new and expanded interchange, and the extension of the Laval road East off-ramp deceleration land, are shown in Exhibit 7 of the Global response.

Consistent with DEIR Section 4.16, the analysis also considered interim cumulative traffic conditions that are projected to occur in 2025 without the Interim B project, and interim cumulative conditions with the Interim B project. Project impacts from interim access conditions were evaluated under Interim B conditions which would generate the largest amount of project related Phase 1 traffic. Under Interim A conditions, Phase 1 traffic volumes would be lower and impacts would be reduced compared with Interim B. As discussed in the Global Response, the level of development that could be achieved under Interim B with the lower capture rate described in Exhibit 5 while maintaining acceptable interchange LOS standards is lower than projected in the DEIR and includes up to 5,000 homes and 1.7 million square feet of non-residential land uses. The lower capture rate scenario analysis assumes this level of development will occur under Interim B, including the potential Interim B option requested by Caltrans (see Global Response Exhibit 6) and that additional development would require the construction of the new and relocated interchange.

Intersection Operations Under Cumulative Plus Project Conditions

Table 1 presents the anticipated AM and PM peak hour delay and LOS at the study intersections under cumulative plus project conditions. As shown in Table 1, all existing intersections would operate acceptably at LOS C or better under cumulative plus project conditions with lower internalization. The

Northbound and Southbound I-5 ramp terminal intersections at the I-5 / Wheeler Ridge Road / Laval Road interchange would operate at LOS C or better during both AM and PM peak hour conditions. The Northbound and Southbound ramp terminal intersections at the relocated I-5 / Grapevine interchange would operate acceptably at LOS D or better during both AM and PM peak hour conditions.

All of the new intersections that would be constructed within the Grapevine project area would operate at acceptable performance levels except the following locations during either AM or PM Peak Hour Conditions:

- Street A / Street D (Traffic Signal);
- Street C / Street A (Traffic Signal);
- Street C / Street G (Traffic Signal);
- Street C / Street H (Traffic Signal); and
- Street A / Street I (Side Street Stop Controlled).

As discussed in DEIR Section 4.16, Impact 4.16-1, the project is designed as a multimodal development subject to performance criteria other than LOS standards in accordance with the smart growth provisions of the Kern County General Plan (KCGP). As discussed in Section 4.16.3, Regulatory Setting, to encourage the incorporation of innovative or “smart growth” land use planning techniques as design features in new development, Section 1.10.8 of the KCGP allows for the assessment of traffic and safety impacts through means other than LOS when development utilizes Smart Growth policies that encourage efficient multimodal movements as part of a community plan or specific plan. Certain intersections within the project may operate at lower LOS levels to encourage non-automotive movements, including walking, biking and transit use, without generating significant impacts in accordance Section 1.10.8 of the KCGP.

DEIR mitigation measure (MM) 4.16-6 states that, “The project proponent shall implement the following measures to ensure adequate performance standards at internal intersections within the Grapevine Specific and Community Plan boundary.

- 1) As part of any traffic study submitted with an application for a tentative tract map, parcel map (with the exception of financing maps), or commercial/industrial site plan development, the project proponent shall be required to identify any intersection that could potentially fall below Level of Service (LOS) D under cumulative plus project conditions and reserve sufficient right-of-way within these intersections to implement future improvements if determined necessary in consultation with the County.

Table 1
Peak Hour Intersection Operations –
Cumulative Plus Project Conditions (2040)

Intersection	Traffic Control	Peak Hour	Existing		Cumulative No Project		Cumulative + Project		Cumulative + Project Lower Internalization	
			Delay ²	LOS ³	Delay ²	LOS ³	Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	13	B	16	B	17	B	17	B
		P.M.	17	B	16	B	18	B	18	B
2. I-5 Southbound Ramps / S. Wheeler Ridge / Laval Road	Traffic Signal	A.M.	9	A	14	B	16	B	16	B
		P.M.	12	B	20	C	26	C	26	C
3. S. Wheeler Ridge / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A	3	A	3	A
		P.M.	3	A	4	A	4	A	4	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	13	B	20	C	18	B	18	B
		P.M.	10	B	45	D	33	C	33	C
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		Does Not Exist		14	B	28	C
		P.M.					32	C	<u>57</u>	<u>E</u>
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		Does Not Exist		14	B	45	D
		P.M.					27	C	38	D
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		Does Not Exist		12	B	18	B
		P.M.					20	B	35	D
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		Does Not Exist		48	D	<u>128</u>	<u>F</u>
		P.M.					<u>109</u>	<u>F</u>	<u>155</u>	<u>F</u>
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		Does Not Exist		14	B	13	B
		P.M.					17	B	<u>72</u>	<u>E</u>
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		Does Not Exist		10	B	33	C
		P.M.					11	B	<u>56</u>	<u>E</u>
11. Street I / Street A ⁴	Side-Street Stop	A.M.	Does Not Exist		Does Not Exist		24 (1)	C (A)	25 (1)	C (A)
		P.M.					<u>154</u> (1)	<u>E</u> (A)	<u>165</u> (1)	<u>F</u> (A)

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized intersections.

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).

⁴The shared movement with the greatest delay is reported in seconds per vehicle at side-street stop controlled intersections.

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, August 2016.

2) Prior to issuance of the 6,000th and 10,000th occupancy permits, the project proponent shall prepare an intersection evaluation report to identify the Level of Service (LOS) at all constructed intersections. If the study determines that any such intersection is operating within LOS E or LOS F, the project proponent, in consultation with the County shall review whether intersection performance is consistent with County and Grapevine Specific and Community Plan criteria and determine if any additional intersection improvements or implementation of additional transportation demand measures are required to ensure ongoing functioning of the intersection. Any such improvements shall be constructed by the project proponent or implemented through another agreement in consultation with the Kern County Public Works Department."

Per the traffic analysis completed for this study, the following capacity enhancements within the applicable rights of way at each location would improve traffic operations to acceptable LOS D or better under cumulative plus project AM and PM peak hour conditions if implemented in accordance with MM 4.16-6:

Street A / Street D

- A third westbound through lane from Street D to the I-5 northbound on-ramp
- A channelized southbound Street D right-turn lane to westbound Street A
- Provide a third westbound through lane from east of Street D

Street C / Street A

- A third westbound right-turn lane from the I-5 southbound off-ramp to C Street
- A third eastbound right-turn lane from the C Street to the I-5 southbound on-ramp
- These improvements would improve LOS operations at Street C / Street G (traffic signal) and Street C / Street H (traffic signal)

Street A / Street I

- Option A: Provide a receiving lane in the median for northbound left-turn movements, allowing "two-stage" gap acceptance for left-turning vehicles.
- Option B: Restrict the outbound movements on Street I to right-turn only movements. This would force the left-turn movements to either re-route to another roadway, or travel east and make a U-turn at the next available opportunity.

Roadway Segment Capacity Evaluation Under Cumulative Plus Project Conditions

Table 2 summarizes the PM peak hour volumes on project area roadway segments under cumulative plus project conditions. The PM peak hour represents the period of heaviest roadway use when the combination of vehicle trip purposes is the highest. Table 2 shows that 11 of the 12 roadway segments would have sufficient capacity to meet demand and would operate at acceptable LOS levels under cumulative plus project conditions.

Table 2
P.M. Peak Hour Roadway Capacity Evaluation –
Cumulative Plus Project Conditions (2040)

Roadway Segment	Classification	Existing Conditions			Cumulative Plus Project With Lower Internalization		
		P.M. Peak Hour Volume	V/C ¹	LOS ²	P.M. Peak Hour Volume	V/C ¹	LOS ²
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	1,320	0.48	D
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			1,650	0.92	D
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			3,250	0.95	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			1,000	0.55	D
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			185	0.10	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			820	0.46	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			720	0.40	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			1,600	0.89	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			75	0.04	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			450	0.25	C
11. Dennis McCarthy Rd. : North of Laval Rd	2-lane Collector Street	592	0.36	D	950	0.53	D
12. Street A: Street D to Street I	4-lane Arterial Street	Does Not Exist			<u>3,550</u>	<u>1.04</u>	<u>F</u>

Notes: ¹V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.

²Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.

Source: Fehr & Peers, August 2016.

The roadway segment of Street A between Street D and Street I is projected to operate at LOS F conditions under cumulative plus project conditions. As discussed in DEIR Section 4.16, Impact 4.16-7, the project is designed as a multi-modal development, which would be subject to performance criteria other than LOS standards in accordance with the smart growth provisions of the KCGP. Certain intersections within the project may operate at lower LOS levels to encourage non-automotive movements, including walking, biking and transit use. The following capacity enhancements within the applicable rights of way would improve traffic operations to acceptable LOS D or better under cumulative plus project conditions if implemented in accordance with MM 4.16-6: adding a third westbound through lane from Street D to the I-5 northbound on-ramp; adding a channelized southbound Street D right-turn lane to westbound Street A; and providing a third westbound through lane from east of Street D.

Freeway Operations Under Cumulative Plus Project Conditions

Table 3 summarizes the AM and PM peak hour LOS levels on the freeway segments in the vicinity of the project area under cumulative plus project conditions using the lower trip internalization level described in Exhibit 5 of the Global Response. Table 3 shows that 31 of the 33 freeway mainline, on-ramp merge, and off-ramp diverge segments would continue to operate at acceptable LOS D conditions or better during AM and PM peak hour Conditions.

DEIR Table 4.16-22 shows that, under the higher internal trip capture rates generated by the KernCOG traffic model, the northbound portion of the Grapevine Grade (Segment 1 in Table 3) would operate at LOS D in the AM peak hour and would operate at LOS F in the PM peak hour. Table 3 shows that, under the lower internal capture rates described in Exhibit 5, the northbound portion of the Grapevine Grade would operate at a lower level of LOS D in the AM peak hour and at a lower level of LOS F in the PM peak period. DEIR Table 4.16-22 shows that, under the higher internal trip capture rates generated by the KernCOG traffic model, the southbound portion of the Grapevine Grade (Segment 20 in Table 3) would operate at the lowest level of LOS D (34 passenger car equivalents per mile per lane (pcpmpl) versus the LOS E threshold of 35 pcpmpl) in the AM peak hour and would operate at LOS F in the PM peak hour. Table 3 shows that, under the lower internal capture rates described in Exhibit 5, the projected density within the southbound portion of the Grapevine Grade during AM peak periods would increase to 36 pcpmpl (just above the LOS E threshold) and at a lower level of LOS F in the PM peak period. The Grapevine Grade analysis results under the lower capture rates are discussed in more detail in the following section.

Table 3
Peak Hour Freeway Operations –
Cumulative Plus Project Conditions (2040)

Segment	Segment Type	Peak Hour	Existing (2015)		Existing + Project (2015)		Cumulative No Project (2040)		Cumulative Plus Project (2040) With Lower Internalization	
			Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
I-5 Northbound										
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	9	A	15	B	26	D	30	D
		P.M.	13	B	20	C	<u>44</u>	<u>E</u>	<u>58</u>	<u>F</u>
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	N/A		12	B	N/A		22	C
		P.M.			16	B			34	D
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	10	B	15*	B*	23	C	20*	B*
		P.M.	13	B	19*	B*	31	D	28*	C*
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		16	B	Does Not Exist		25	C
		P.M.			17	B			29	D
5. Grapevine Slip On-Ramp	Merge	A.M.	9	A	23	C	20	B	32	D
		P.M.	11	B	22	C	26	C	32	D
6. Grapevine to Laval Road	Basic	A.M.	7	A	16	B	18	C	27	D
		P.M.	9	A	16	B	28	C	33	D
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	11	B	18*	B*	27	C	30*	D*
		P.M.	14	B	18*	B*	36	E	33*	D*
8. Laval Road West Off-Ramp	Diverge	A.M.	9	A	18	B	19	B	27	C
		P.M.	12	B	18	B	27	C	32	D
9. Laval Road On-Ramp	Merge	A.M.	9	A	20	B	22	C	28	D
		P.M.	13	B	23	C	31	D	33	D
10. Laval Road to SR-99	Basic	A.M.	7	A	17	B	17	B	27	D
		P.M.	9	A	18	B	27	D	35	D

Table 3
Peak Hour Freeway Operations –
Cumulative Plus Project Conditions (2040)

Segment	Segment Type	Peak Hour	Existing (2015)		Existing + Project (2015)		Cumulative No Project (2040)		Cumulative Plus Project (2040) With Lower Internalization	
			Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	7	A	17	B	17	B	27	D
		P.M.	9	A	18	B	27	D	35	D
12. North of SR 99 Junction	Basic	A.M.	5	A	12	B	17	B	22	C
		P.M.	8	A	13	B	32	D	30	D
SR 99 Northbound										
13. North of I-5 Junction	Basic	A.M.	6	A	15	B	12	B	19	C
		P.M.	7	A	15	B	17	B	22	C
SR 99 Southbound										
1. North of I-5 Junction	Basic	A.M.	6	A	12	B	13	B	18	B
		P.M.	7	A	17	B	16	B	24	C
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		18	B	Does Not Exist		24	C
		P.M.			23	C			30	D
3. Truck Bypass Off-Ramp ³	Basic (Major Diverge)	A.M.	6	A	11	A	13	B	15	B
		P.M.	7	A	15	B	16	B	20	C
4. SR 99 Auto Lanes to I-5 Southbound ³	Basic (2 Lanes)	A.M.	7	A	15	B	14	B	21	C
		P.M.	7	A	21	C	17	B	28	D
I-5 Southbound										
5. North of SR 99 Junction	Basic	A.M.	5	A	8	A	18	B	21	C
		P.M.	9	A	13	B	23	C	28	D
6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		4	A	Does Not Exist		10	A
		P.M.			7	A			13	B
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		6	A	Does Not Exist		17	B
		P.M.			11	A			20	C

Table 3
Peak Hour Freeway Operations –
Cumulative Plus Project Conditions (2040)

Segment	Segment Type	Peak Hour	Existing (2015)		Existing + Project (2015)		Cumulative No Project (2040)		Cumulative Plus Project (2040) With Lower Internalization	
			Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	6	A	11	A	19	C	19	C
		P.M.	9	A	16	B	22	C	24	C
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	6	A	9	A	17	B	16	B
		P.M.	8	A	13	B	22	C	20	C
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		10	B	Does Not Exist		19	B
		P.M.			14	B			26	C
11. SR 99 to Laval Road	Basic	A.M.	7	A	11	B	19	C	20	C
		P.M.	9	A	16	B	24	C	26	C
12. Laval Road West Off-Ramp	Diverge	A.M.	12	B	11	B	24	C	20	C
		P.M.	14	B	16	B	30	D	26	C
13. Laval Road East Off-Ramp	Diverge	A.M.	10	A	17	B	20	C	27	C
		P.M.	10	B	22	C	24	C	34	D
14. Laval Road On-Ramp	Merge	A.M.	9	A	15	B	23	C	26	C
		P.M.	10	B	18	B	29	D	29	D
15. Laval Road to Grapevine ⁴	Basic	A.M.	7	A	14	B	20	C	25	C
		P.M.	8	A	17	B	25	C	32	D
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	10	A	19*	B*	22	C	25*	C*
		P.M.	11	B	24*	C*	27	C	30*	D*
17. Grapevine Loop On-Ramp	Merge	A.M.	9	A	13	B	16	B	21	C
		P.M.	7	A	16	B	21	C	28	C
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		13	B	Does Not Exist		22	C
		P.M.			17	B			27	C

Table 3
Peak Hour Freeway Operations –
Cumulative Plus Project Conditions (2040)

Segment	Segment Type	Peak Hour	Existing (2015)		Existing + Project (2015)		Cumulative No Project (2040)		Cumulative Plus Project (2040) With Lower Internalization	
			Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
19. Relocated Grapevine Interchange to Base of Grapevine Grade ³	Basic	A.M.	Exists as Laval Road to Grapevine		11	A	Exists as Laval Road to Grapevine		22	C
		P.M.			14	B			29	D
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	12	B	19	C	32	D	<u>36</u>	<u>E</u>
		P.M.	14	B	22	C	<u>46</u>	<u>F</u>	<u>64</u>	<u>F</u>

Notes: ¹Density is reported in passenger car equivalents per mile per lane (pcpmpl).

²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

³These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.

⁴This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.

⁵Segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.

⁶Segment analysis increases deceleration lane from 170 feet to 500 feet.

*Indicates improved density and LOS.

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, August 2016.

Grapevine Grade Under Cumulative Plus Project Conditions

The Grapevine Grade extends for approximately five miles and consists of four travel lanes in both the northbound and southbound directions with an approximate 6% upgrade from north to south. The outside travel lane is a dedicated truck lane to separate slower moving trucks as they climb and descend the grade. Trucks also frequently use the lane adjacent to the dedicated truck lane to pass slower moving trucks in both directions.

Cumulative conditions on the Grapevine Grade reflect the fact that trucks are heavily concentrated in these outside two lanes and travel at significantly lower speed than passenger vehicle traffic in both directions. Cumulative conditions without and with the project were analyzed in more detail to identify the project's share of future traffic within this segment.

Table 4 summarizes PM peak hour traffic volumes on the Grapevine Grade for heavy vehicles and passenger cars under cumulative conditions with the lower internal capture rate described in Exhibit 5.

Table 4
PM Peak Hour Grapevine Grade Traffic Volume by Vehicle Type –
Cumulative Plus Project Conditions (2040)

Segment	Vehicle Type	Cumulative No Project (2040)	Net New Trips	Cumulative Plus Project (2040)
<i>I-5 Northbound</i>				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Autos	4,825	612	5,437
	Trucks	1,340	80	1,420
	Total	6,165	692	6,857
<i>I-5 Southbound</i>				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Autos	4,040	604	4,644
	Trucks	1,400	80	1,480
	Total	5,440	684	6,124

Source: Fehr & Peers, August 2016.

Table 5 summarizes the p.m. peak hour density (pcpmpl) and LOS levels under cumulative conditions with lower internalization for the inside and outside lanes in both directions of travel in the Grapevine Grade. DEIR Tables 4.16-23 and 4.16-24 provides a comparable summary using the higher capture rates generated by the Kern COG model.

Tables 4 shows that Grapevine Grade auto traffic under cumulative with project conditions will be higher under the lower capture rate scenario than shown in DEIR Tables 4.16-23 under the higher capture rates generated by the KernCOG model. Table 6 shows that PM peak hour density in the two inside northbound lanes would increase from 44 pcpmpl (LOS E) in DEIR Table 29 to 52 pcpmpl (LOS F) in the lower capture rate scenario. The PM peak hour density in the two inside southbound lanes would increase from 32 pcpmpl (LOS D) in DEIR Table 29 to 41 pcpmpl (LOS E) in the lower capture rate scenario. The outside two lanes would operate at a lower level of LOS F in both directions. Overall, and as also shown in Table 3, Table 6 shows that peak PM hour density in the Grapevine Grade northbound would increase from 51 pcpmpl (LOS F) to 58 pcpmpl (LOS F) and from 51 pcpmpl (LOS F) to 64 pcpmpl (LOS F) in the southbound direction.

Table 5
PM Peak Hour Grapevine Grade Freeway Operations –
Cumulative Plus Project Conditions with Variant 1 or 2 (2040)

Segment	Lanes	Vehicle Composition	Cumulative No Project (2040)		Cumulative No Project – All Lanes (2040)		Cumulative Plus Project (2040)		Cumulative Plus Project – All Lanes (2040) ¹	
			Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³	Density ²	LOS ³
I-5 Northbound										
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos Only	39	E	44	E	<u>52</u>	<u>F</u>	<u>58</u>	<u>F</u>
	Outside Two Lanes	Autos & Trucks	51	F			<u>64</u>	<u>F</u>		
I-5 Southbound										
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos Only	29	D	46	F	<u>41</u>	<u>E</u>	<u>64</u>	<u>F</u>
	Outside Two Lanes	Autos & Trucks	86	F			<u>177</u>	<u>F</u>		

Notes: ¹Results for all lanes applies the HCM methodology to the entire segment, as reported in Table 26 Appendix T, page 161.

²Density is reported in passenger car equivalents per mile per lane (pcpmpl).

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, August 2016.

Freeway Off-Ramp Queuing Under Cumulative Plus Project Conditions

Table 6 presents the results of the a.m. and p.m. peak hour queuing analysis at each off-ramp study intersections under cumulative plus project conditions. Based on these results, the proposed project would not cause the 95th percentile queues to extend back onto the freeway and create safety issues at any off-ramp.

Table 6
Peak Hour Off-Ramp Queuing –
Cumulative Plus Project Conditions with Variant 1 or 2 (2040)

Freeway Ramp	Traffic Control at Ramp Terminal	Available Storage ¹	Peak Hour	95 th Percentile Queue ²		
				Existing Conditions (2015)	Existing Plus Project (2015)	Cumulative Conditions (2040)
I-5 Northbound						
Grapevine off-ramp ³	Traffic Signal	2,300 ft.	A.M.	N/A	400 ft.	325 ft.
			P.M.	N/A	600 ft.	600 ft.
Laval Road east off-ramp	Free	2,800 ft.	A.M.	75 ft.	150 ft.	175 ft.
			P.M.	100 ft.	125 ft.	175 ft.
Laval Road west off-ramp	Free	2,100 ft.	A.M.	75 ft.	125 ft.	75 ft.
			P.M.	125 ft.	225 ft.	225 ft.
I-5 Southbound						
Laval Road west off-ramp	Free	3,400 ft.	A.M.	75 ft.	125 ft.	75 ft.
			P.M.	125 ft.	225 ft.	225 ft.
Laval Road east off-ramp	Traffic Signal	1,700 ft.	A.M.	75 ft.	125 ft.	75 ft.
			P.M.	75 ft.	225 ft.	250 ft.
Grapevine off-ramp ³	Traffic Signal	2,300 ft.	A.M.	N/A	275 ft.	700 ft.
			P.M.	N/A	425 ft.	375 ft.

Notes: ¹Available storage based on total available queue space shown in Table 22 Appendix T, page 139. Based on a combination of off-ramp length and distance to nearest downstream controlled intersection for free-flow off-ramps.

²95th percentile vehicle queue results are based on output from the Synchro traffic operations model; taken from controlling intersection (i.e., ramp terminal intersection with signal; or nearest downstream controlled intersection when ramp terminal operates free).

³N/A = not applicable. The traffic using the existing Grapevine off-ramps never reach a controlled intersection. Therefore, no queues exist at the existing Grapevine off-ramps.

Source: Fehr & Peers, August 2016.

Freeway Operations North of the Project Area under Cumulative Conditions

Table 7 summarizes the volume to capacity analysis of freeway segments and ramps located north of the project area from the SR-99/I-5 junction to Bakersfield under cumulative without and cumulative with project conditions with lower internalization rates. The analysis is based on the most recently available 2040 Kern COG RTP/SCS projections and the reasonably foreseeable or funded projects identified in the DEIR (see Appendix H of DEIR Appendix T). The results show that, although project-related traffic would increase, all of the freeway segments and ramps would operate at applicable LOS levels under cumulative with project conditions under the lower internal rate scenario.

Table 7
Cumulative Freeway Level of Service Analysis – North of Project Area

Location		ADT Volume	NORTHBOUND/EASTBOUND						SOUTHBOUND/WESTBOUND						LOS Threshold	Exceeds Threshold?		
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C			PM Vol	PM V/C
SR-99																		
1	Btw. Jct Rte 58 W and California		4M						4M							LOS D		
	2015 Count	104,110		2,246	8,985	3,848	0.43	6,276		0.70	2,246	8,985	4,004	0.45	6,694		0.75	
	2040 Without Project	127,150		2,246	8,985	4,824	0.54	7,415		0.83	2,246	8,985	5,372	0.60	7,782		0.87	
	2040 With Project	128,865		2,246	8,985	5,003	0.56	7,468		0.83	2,246	8,985	5,458	0.61	7,807		0.87	
	Grapevine Specific Plan Project Impact	1,715			179	0.02	53	0.01			86	0.01	25	0.00				
2	Btw. California and Jct Rte 58 E		4M						4M							LOS D		
	2015 Count	89,700		2,246	8,985	3,392	0.38	5,263		0.59	2,246	8,985	3,390	0.38	5,895		0.66	
	2040 Without Project	106,340		2,246	8,985	3,950	0.44	6,231		0.69	2,246	8,985	4,326	0.48	6,761		0.75	
	2040 With Project	108,805		2,246	8,985	4,196	0.47	6,302		0.70	2,246	8,985	4,426	0.49	6,837		0.76	
	Grapevine Specific Plan Project Impact	2,465			246	0.03	71	0.01			100	0.01	76	0.01				
3	Btw. Jct Rte 58 E & Ming Ave		5M						5M							LOS D		
	2015 Count	88,820		2,246	10,107	3,406	0.34	5,478		0.54	2,246	10,107	3,217	0.32	5,663		0.56	
	2040 Without Project	134,395		2,246	10,107	4,865	0.48	7,754		0.77	2,246	10,107	5,602	0.55	8,658		0.86	
	2040 With Project	139,925		2,246	10,107	5,544	0.55	7,885		0.78	2,246	10,107	5,792	0.57	8,764		0.87	
	Grapevine Specific Plan Project Impact	5,530			679	0.07	131	0.01			190	0.02	106	0.01				
4	Btw. Ming Ave & White Lane		4M						4M							LOS D		
	2015 Count	69,755		2,246	8,985	2,614	0.29	4,435		0.49	2,296	9,186	2,394	0.26	4,508		0.49	
	2040 Without Project	119,800		2,246	8,985	4,994	0.56	7,099		0.79	2,296	9,186	4,737	0.52	7,130		0.78	
	2040 With Project	126,655		2,246	8,985	5,758	0.64	7,290		0.81	2,296	9,186	5,001	0.54	7,282		0.79	
	Grapevine Specific Plan Project Impact	6,855			764	0.09	191	0.02			264	0.03	152	0.02				
5	Btw. White Lane & Panama Lane		4M						4M							LOS D		
	2015 Count	57,090		2,296	9,186	2,165	0.24	3,616		0.39	2,296	9,186	2,072	0.23	3,565		0.39	
	2040 Without Project	101,775		2,296	9,186	4,191	0.46	6,111		0.67	2,296	9,186	3,793	0.41	6,260		0.68	
	2040 With Project	111,995		2,296	9,186	5,203	0.57	6,365		0.69	2,296	9,186	4,178	0.45	6,653		0.72	
	Grapevine Specific Plan Project Impact	10,220			1,012	0.11	254	0.03			385	0.04	393	0.04				
6	Btw. Panama Lane & Jct Rte 119 W		4M						4M							LOS D		
	2015 Count	44,450		2,296	9,186	1,622	0.18	2,890		0.31	2,296	9,186	1,797	0.20	2,581		0.28	
	2040 Without Project	84,820		2,296	9,186	3,379	0.37	5,264		0.57	2,296	9,186	3,270	0.36	5,051		0.55	
	2040 With Project	97,380		2,296	9,186	4,501	0.49	5,574		0.61	2,296	9,186	3,711	0.40	5,690		0.62	
	Grapevine Specific Plan Project Impact	12,560			1,122	0.12	310	0.03			441	0.05	639	0.07				

Table 7
Cumulative Freeway Level of Service Analysis – North of Project Area

Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold?
		Lanes	Cap/Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
7 Btw. Jct Rte 119 W & Houghton Rd		3M							3M							LOS D	
2015 Count	35,470		2,296	6,889	1,229	0.18	2,345	0.34		2,141	6,422	1,533	0.24	1,987	0.31		
2040 Without Project	62,960		2,296	6,889	2,334	0.34	4,037	0.59		2,141	6,422	2,683	0.42	3,538	0.55		
2040 With Project	77,040		2,296	6,889	3,550	0.52	4,394	0.64		2,141	6,422	3,185	0.50	4,279	0.67		
Grapevine Specific Plan Project Impact	14,080				1,216	0.18	357	0.05				502	0.08	741	0.12		
8 Btw. Houghton Rd & Jct Rte 223 E		3M							3M							LOS D	
2015 Count	33,360		2,141	6,422	1,158	0.18	2,176	0.34		2,141	6,422	1,473	0.23	1,865	0.29		
2040 Without Project	60,280		2,141	6,422	2,229	0.35	3,856	0.60		2,141	6,422	2,588	0.40	3,383	0.53		
2040 With Project	74,720		2,141	6,422	3,477	0.54	4,221	0.66		2,141	6,422	3,107	0.48	4,139	0.64		
Grapevine Specific Plan Project Impact	14,440				1,248	0.19	365	0.06				519	0.08	756	0.12		
9 Btw. Jct Rte 223 E & Old U.S. 99		3M							3M							LOS D	
2015 Count	27,270		2,141	6,422	945	0.15	1,788	0.28		2,133	6,400	1,233	0.19	1,488	0.23		
2040 Without Project	54,555		2,141	6,422	1,964	0.31	3,513	0.55		2,133	6,400	2,390	0.37	3,044	0.48		
2040 With Project	69,730		2,141	6,422	3,220	0.50	3,908	0.61		2,133	6,400	2,923	0.46	3,895	0.61		
Grapevine Specific Plan Project Impact	15,175				1,256	0.20	395	0.06				533	0.08	851	0.13		
10 Btw. Old U.S. 99 & Herring Rd		3M							3M							LOS D	
2015 Count	28,585		2,133	6,400	987	0.15	1,860	0.29		2,133	6,400	1,284	0.20	1,586	0.25		
2040 Without Project	57,525		2,133	6,400	2,065	0.32	3,664	0.57		2,133	6,400	2,484	0.39	3,292	0.51		
2040 With Project	74,660		2,133	6,400	3,392	0.53	4,118	0.64		2,133	6,400	3,084	0.48	4,338	0.68		
Grapevine Specific Plan Project Impact	17,135				1,327	0.21	454	0.07				600	0.09	1,046	0.16		
11 Btw. Herring Rd & Sandrini Rd.		3M							3M							LOS D	
2015 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
2040 With Project	74,325		2,133	6,400	3,379	0.53	4,095	0.64		2,133	6,400	3,074	0.48	4,317	0.67		
Grapevine Specific Plan Project Impact	17,190				1,327	0.21	459	0.07				605	0.09	1,047	0.16		
12 Btw. Sandrini Rd & David Rd		3M							3M							LOS D	
2015 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51		
2040 With Project	74,325		2,133	6,400	3,379	0.53	4,095	0.64		2,133	6,400	3,074	0.48	4,317	0.67		
Grapevine Specific Plan Project Impact	17,190				1,327	0.21	459	0.07				605	0.09	1,047	0.16		

Table 7
Cumulative Freeway Level of Service Analysis – North of Project Area

Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold?
		Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
13 Btw. David Rd & Valpredo		3M							3M							LOS D	
2015 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,133	6,400	1,251	0.20	1,535	0.24		
2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,133	6,400	2,364	0.37	3,104	0.49		
2040 With Project	72,665		2,133	6,400	3,321	0.52	3,986	0.62		2,133	6,400	3,025	0.47	4,201	0.66		
Grapevine Specific Plan Project Impact	18,150				1,358	0.21	514	0.08				661	0.10	1,097	0.17		
14 Btw. Valpredo & Jct Rte 166 W		3M							3M							LOS D	
2015 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,096	6,288	1,251	0.20	1,535	0.24		
2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,096	6,288	2,364	0.38	3,104	0.49		
2040 With Project	72,665		2,133	6,400	3,321	0.52	3,986	0.62		2,096	6,288	3,025	0.48	4,201	0.67		
Grapevine Specific Plan Project Impact	18,150				1,358	0.21	514	0.08				661	0.11	1,097	0.17		
15 Btw. Jct Rte 166 W & Jct I-5		3M							3M							LOS D	
2015 Count	26,965		2,096	6,288	934	0.15	1,733	0.28		2,054	6,162	1,219	0.20	1,507	0.24		
2040 Without Project	54,150		2,096	6,288	1,926	0.31	3,373	0.54		2,054	6,162	2,363	0.38	3,168	0.51		
2040 With Project	76,350		2,096	6,288	3,340	0.53	4,249	0.68		2,054	6,162	3,206	0.52	4,475	0.73		
Grapevine Specific Plan Project Impact	22,200				1,414	0.22	876	0.14				843	0.14	1,307	0.21		

Notes:

Bold – denotes LOS exceeds the threshold

ADT – annual average daily traffic

L – Lanes

Cap/Ln – Capacity per lane

Vol – Volume

V/C – Volume/Capacity

M = Multi-flow lane

HOV = High Occupancy Vehicle Lane

T = Truck Lane

NC = No Change

LOS	Freeway Segment V/C Ranges	
A	0	- 0.3
B	0.31	- 0.56
C	0.57	- 0.76
D	0.77	- 0.9
E	0.91	- 1
F	>	1

Freeway Operations South of the Project Area under Cumulative Conditions

Table 8 summarizes the volume to capacity analysis of freeway segments located south of the project area in Los Angeles County under cumulative without and cumulative with project conditions with lower internalization rates. The results show that, although project-related traffic would increase, the same locations identified in DEIR Section 4.16, Impact 4.16-7 (see DEIR Appendix T, Table 33) would be impacted by project-generated traffic:

I-5 Northbound:

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – AM and PM peak hours

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

Table 8

		ADT Volume	NORTHBOUND/EASTBOUND						SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold?
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol		
Location																	
I-5																	
1	Btw. Fort Tejon Rd & Lebec Rd																
	2014 Count	72,000	4M	1,839	7,355	1,390	0.19	2,426	0.33	4M	2,036	8,143	1,346	0.17	2,304	0.28	LOS D
	2035 Without Project	119,850		1,839	7,355	2,895	0.39	4,255	0.58		2,036	8,143	3,170	0.39	3,640	0.45	
	2035 With Project	132,375		1,839	7,355	3,495	0.48	4,950	0.67		2,036	8,143	3,750	0.46	4,325	0.53	
	Grapevine Specific Plan Net New Project Impacts	12,525				600	0.08	695	0.09				580	0.07	685	0.08	
2	Btw. Lebec Rd & Frazier Mtn Park																
	2014 Count	73,000	4M	1,839	7,355	1,409	0.19	2,460	0.33	4M	2,036	8,143	1,365	0.17	2,336	0.29	LOS D
	2035 Without Project	120,850		1,839	7,355	2,915	0.40	4,285	0.58		2,036	8,143	3,190	0.39	3,680	0.45	
	2035 With Project	133,375		1,839	7,355	3,515	0.48	4,980	0.68		2,036	8,143	3,770	0.46	4,365	0.54	
	Grapevine Specific Plan Net New Project Impacts	12,525				600	0.08	695	0.09				580	0.07	685	0.08	
3	Btw. Frazier Mtn Park & Gorman Rd																
	2014 Count	70,000	4M	2,036	8,143	1,351	0.17	2,359	0.29	4M	1,401	5,606	1,309	0.23	2,240	0.40	LOS D
	2035 Without Project	114,850		2,036	8,143	2,775	0.34	4,015	0.49		1,401	5,606	3,020	0.54	3,380	0.60	
	2035 With Project	127,375		2,036	8,143	3,375	0.41	4,710	0.58		1,401	5,606	3,600	0.64	4,065	0.73	
	Grapevine Specific Plan Net New Project Impacts	12,525				600	0.07	695	0.09				580	0.10	685	0.12	
4	Btw. Gorman Rd & N Jct SR-138																
	2014 Count	70,000	4M	1,849	7,398	1,351	0.18	2,359	0.32	4M	2,042	8,169	1,309	0.16	2,240	0.27	LOS D
	2035 Without Project	117,850		1,849	7,398	2,745	0.37	4,405	0.60		2,042	8,169	3,280	0.40	3,350	0.41	
	2035 With Project	130,375		1,849	7,398	3,345	0.45	5,100	0.69		2,042	8,169	3,860	0.47	4,035	0.49	
	Grapevine Specific Plan Net New Project Impacts	12,525				600	0.08	695	0.09				580	0.07	685	0.08	
5	Btw. N Jct SR-138 & Quail Lake Rd																
	2014 Count	67,000	4M	1,849	7,398	1,293	0.17	2,258	0.31	4M	2,042	8,169	1,253	0.15	2,144	0.26	LOS D
	2035 Without Project	89,175		1,849	7,398	1,750	0.24	3,140	0.42		2,042	8,169	2,055	0.25	2,360	0.29	
	2035 With Project	96,850		1,849	7,398	2,115	0.29	3,570	0.48		2,042	8,169	2,420	0.30	2,785	0.34	
	Grapevine Specific Plan Net New Project Impacts	7,675				365	0.05	430	0.06				365	0.04	425	0.05	
6	Btw. Quail Lake Rd & S Jct SR-138																
	2014 Count	67,000	4M	1,375	5,500	1,293	0.24	2,258	0.41	4M	1,375	5,500	1,253	0.23	2,144	0.39	LOS D
	2035 Without Project	90,175		1,375	5,500	1,750	0.32	3,590	0.65		1,375	5,500	2,055	0.37	2,360	0.43	
	2035 With Project	97,850		1,375	5,500	2,115	0.38	4,020	0.73		1,375	5,500	2,420	0.44	2,785	0.51	
	Grapevine Specific Plan Net New Project Impacts	7,675				365	0.07	430	0.08				365	0.07	425	0.08	
7	Btw. S Jct SR-138 & Smokey Bear Rd																
	2014 Count	69,000	4M	1,375	5,500	1,332	0.24	2,325	0.42	4M	1,375	5,500	1,290	0.23	2,208	0.40	LOS D
	2035 Without Project	123,175		1,375	5,500	2,240	0.41	5,170	0.94		1,375	5,500	4,145	0.75	3,240	0.59	
	2035 With Project	130,850		1,375	5,500	2,605	0.47	5,600	1.02		1,375	5,500	4,510	0.82	3,665	0.67	
	Grapevine Specific Plan Net New Project Impacts	7,675				365	0.07	430	0.08				365	0.07	425	0.08	
8	Btw. Smokey Bear Rd & Vista Del Lago Rd																
	2014 Count	70,000	4M	1,489	5,957	1,351	0.23	2,359	0.4	4M	1,489	5,957	1,309	0.22	2,240	0.38	LOS D
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57	
	2035 With Project	132,850		1,489	5,957	2,705	0.45	5,690	0.96		1,489	5,957	4,610	0.77	3,805	0.64	
	Grapevine Specific Plan Net New Project Impacts	7,675				365	0.06	430	0.07				365	0.06	425	0.07	
9	Btw. Vista Del Lago Rd & Templin Hwy																
	2014 Count	70,000	4M	1,489	5,957	1,351	0.23	2,359	0.40	4M	1,489	5,957	1,309	0.22	2,240	0.38	LOS D
	2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57	
	2035 With Project	132,850		1,489	5,957	2,705	0.45	5,690	0.96		1,489	5,957	4,610	0.77	3,805	0.64	
	Grapevine Specific Plan Net New Project Impacts	7,675				365	0.06	430	0.07				365	0.06	425	0.07	
																Yes	

Table 8
Cumulative Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

		ADT Volume	NORTHBOUND/EASTBOUND						SOUTHBOUND/WESTBOUND						LOS Threshold	Exceeds Threshold?	
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C			PM Vol
10	Btw. Templin Hwy & Lake Hughes Rd		4M							4M							LOS D
	2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38	
	2035 Without Project	126,175		1,489	5,957	2,380	0.40	5,260	0.88		1,489	5,957	4,205	0.71	3,410	0.57	
	2035 With Project	133,850		1,489	5,957	2,745	0.46	5,690	0.96		1,489	5,957	4,570	0.77	3,835	0.64	
	Grapevine Specific Plan Net New Project Impacts	7,675			365	0.06	430	0.07				365	0.06	425	0.07		
11	Btw. Lake Hughes Rd & Parker Rd		4M + 1 AUX							4M + 1 AUX							LOS E
	2014 Count	73,000		1,856	7,422	1,504	0.20	1,949	0.26		1,856	7,422	1,854	0.25	2,519	0.34	
	2035 Without Project	154,175		1,856	8,422	5,360	0.64	8,080	0.96		1,856	8,422	8,405	1.00	5,050	0.60	
	2035 With Project	161,850		1,856	8,422	5,725	0.68	8,510	1.01		1,856	8,422	8,770	1.04	5,475	0.65	
	Grapevine Specific Plan Net New Project Impacts	7,675			365	0.04	430	0.05				365	0.04	425	0.05		
12	Btw. Parker Rd & Hasley Cyn Rd		4M (+1H)							4M (+1H)							LOS E
	2014 Count	108,000		1,856	7,422	2,225	0.30	2,884	0.39		1,856	7,422	2,743	0.37	3,726	0.5	
	2035 Without Project	171,175		1,856	9,022	5,360	0.59	7,030	0.78		1,856	9,022	7,285	0.81	5,120	0.57	
	2035 With Project	178,850		1,856	9,022	5,725	0.63	7,460	0.83		1,856	9,022	7,650	0.85	5,545	0.61	
	Grapevine Specific Plan Net New Project Impacts	7,675			365	0.04	430	0.05				365	0.04	425	0.05		
13	Btw. Hasley Cyn Rd & N Jct SR-126 (NB)		4M (+1H +1A)							4M (+1H)							LOS E
	2014 Count	114,000		1,856	8,422	2,348	0.28	3,044	0.36		1,856	8,422	2,896	0.34	3,933	0.47	
	2035 Without Project	170,175		1,856	10,022	5,180	0.52	6,800	0.68		1,856	9,022	7,085	0.79	5,120	0.57	
	2035 With Project	177,850		1,856	10,022	5,545	0.55	7,230	0.72		1,856	9,022	7,450	0.83	5,545	0.61	
	Grapevine Specific Plan Net New Project Impacts	7,675			365	0.04	430	0.04				365	0.04	425	0.05		
14	Btw. N Jct SR-126 & Rye Cyn Rd		4M (+1H)							4M (+1H + 1A)							LOS E
	2014 Count	130,000		1,867	7,470	2,678	0.36	3,471	0.46		1,867	7,470	3,302	0.44	4,485	0.60	
	2035 Without Project	175,375		1,867	9,070	4,615	0.51	6,450	0.71		1,867	10,070	6,865	0.68	5,565	0.55	
	2035 With Project	182,800		1,867	9,070	4,970	0.55	6,860	0.76		1,867	10,070	7,210	0.72	5,965	0.59	
	Grapevine Specific Plan Net New Project Impacts	7,425			355	0.04	410	0.05				345	0.03	400	0.04		
15	Btw. Rye Cyn Rd & Magic Mountain Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E
	2014 Count	154,000		1,918	7,670	3,172	0.41	4,112	0.54		1,918	7,670	3,912	0.51	5,313	0.69	
	2035 Without Project	181,375		1,918	9,270	4,615	0.50	6,450	0.70		1,918	10,270	6,875	0.67	5,395	0.53	
	2035 With Project	188,800		1,918	9,270	4,970	0.54	6,860	0.74		1,918	10,270	7,220	0.70	5,795	0.56	
	Grapevine Specific Plan Net New Project Impacts	7,425			355	0.04	410	0.04				345	0.03	400	0.04		
16	Btw. Magic Mountain Pkwy & Valencia Blvd		4M (+1H + 1A)							4M (+1H)							LOS E
	2014 Count	165,000		1,918	7,670	3,399	0.44	4,406	0.57		1,918	7,670	4,191	0.55	5,693	0.74	
	2035 Without Project	194,375		1,918	10,270	5,615	0.55	6,980	0.68		1,918	9,270	6,815	0.74	5,735	0.62	
	2035 With Project	201,800		1,918	10,270	5,970	0.58	7,390	0.72		1,918	9,270	7,160	0.77	6,135	0.66	
	Grapevine Specific Plan Net New Project Impacts	7,425			355	0.03	410	0.04				345	0.04	400	0.04		
17	Btw. Valencia Blvd & McBean Pkwy		4M (+1H)							4M (+1H + 1A)							LOS E
	2014 Count	175,000		1,918	7,670	3,605	0.47	4,673	0.61		1,918	7,670	4,445	0.58	6,038	0.79	
	2035 Without Project	218,375		1,918	9,270	6,475	0.70	7,290	0.79		1,918	10,270	8,135	0.79	6,615	0.64	
	2035 With Project	225,800		1,918	9,270	6,830	0.74	7,700	0.83		1,918	10,270	8,480	0.83	7,015	0.68	
	Grapevine Specific Plan Net New Project Impacts	7,425			355	0.04	410	0.04				345	0.03	400	0.04		
18	Btw. McBean Pkwy & Lyons Ave/Pico Cyn Rd		4M (+1H)							4M (+1H)							LOS E
	2014 Count	186,000		1,990	7,960	3,832	0.48	4,966	0.62		1,990	7,960	4,724	0.59	6,417	0.81	
	2035 Without Project	222,375		1,990	9,560	6,555	0.69	8,640	0.90		1,990	9,560	9,105	0.95	6,685	0.70	
	2035 With Project	229,800		1,990	9,560	6,910	0.72	9,050	0.95		1,990	9,560	9,450	0.99	7,085	0.74	
	Grapevine Specific Plan Net New Project Impacts	7,425			355	0.04	410	0.04				345	0.04	400	0.04		

Table 8
Cumulative Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

		ADT Volume	NORTHBOUND/EASTBOUND						SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold?	
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol			PM V/C
19	Btw. Lyons Ave & Calgrove Blvd		4M (+1H + 1A)						4M (+1H + 1T)							LOS E		
	2015 Count	199,000		1,990	7,960	4,099	0.52	5,313	0.67		1,990	9,560	5,055	0.53	6,866		0.72	
	2040 Without Project	252,375		1,990	10,560	6,855	0.65	10,070	0.95		1,990	11,160	9,175	0.82	6,705		0.60	
	2040 With Project	259,800		1,990	10,560	7,210	0.68	10,480	0.99		1,990	11,160	9,520	0.85	7,105		0.64	
	Grapevine Specific Plan Net New Project Impacts	7,425				355	0.03	410	0.04				345	0.03	400		0.04	
20	Btw. Calgrove Blvd & SR-14		4M (+1H + 1T[C])						4M (+1H + 2T[C])							LOS E		
	2014 Count	200,000		1,990	9,160	4,120	0.45	5,340	0.58		1,990	10,360	5,080	0.49	6,900		0.67	
	2035 Without Project	253,375		1,990	10,760	5,725	0.53	9,190	0.85		1,990	11,960	9,805	0.82	6,845		0.57	
	2035 With Project	260,800		1,990	10,760	6,080	0.57	9,600	0.89		1,990	11,960	10,150	0.85	7,245		0.61	
	Grapevine Specific Plan Net New Project Impacts	7,425				355	0.03	410	0.04				345	0.03	400		0.03	
21	Btw. SR-14 & SR-210		3M (+1H+3A[F]+2T)						4M (+1H+2A[F]+2T)							LOS E		
	2014 Count	329,000		1,997	16,791	7,863	0.47	12,930	0.77		1,997	16,788	14,213	0.85	9,409		0.56	
	2035 Without Project	383,650		1,997	16,791	9,130	0.54	15,005	0.89		1,997	16,788	16,580	0.99	10,885		0.65	
	2035 With Project	388,475		1,997	16,791	9,350	0.56	15,285	0.91		1,997	16,788	16,785	1.00	11,150		0.66	
	Grapevine Specific Plan Net New Project Impacts	4,825				220	0.01	280	0.02				205	0.01	265		0.02	
22	Btw. SR-210 & Roxford St		4M (+1H+1A[F])						5M (+1H)							LOS E		
	2014 Count	266,000		2,212	12,449	6,357	0.51	10,454	0.84		2,212	12,661	11,491	0.91	7,608		0.6	
	2035 Without Project	302,175		2,212	12,449	7,240	0.58	11,905	0.96		2,212	12,661	13,170	1.04	8,625		0.68	Yes
	2035 With Project	307,000		2,212	12,449	7,460	0.60	12,185	0.98		2,212	12,661	13,375	1.06	8,890		0.70	
	Grapevine Specific Plan Net New Project Impacts	4,825				220	0.02	280	0.02				205	0.016	265		0.02	
23	Btw. Roxford Rd St & I-405		5M (+1H+1A[F])						5M (+1H+1A[F])							LOS E		
	2014 Count	283,000		2,212	14,661	6,764	0.46	11,122	0.76		2,212	14,661	12,226	0.83	8,094		0.55	
	2035 Without Project	318,650		2,212	14,661	7,580	0.52	12,465	0.85		2,212	14,661	13,790	0.94	9,035		0.62	
	2035 With Project	323,475		2,212	14,661	7,800	0.53	12,745	0.87		2,212	14,661	13,995	0.95	9,300		0.63	
	Grapevine Specific Plan Net New Project Impacts	4,825				220	0.02	280	0.02				205	0.01	265		0.02	
24	Btw. I-405 & San Fernando Mission Blvd		3M (+1H)						3M (+1H)							LOS E		
	2014 Count	141,000		2,190	8,171	3,370	0.41	5,541	0.68		2,190	8,171	6,091	0.75	4,033		0.49	
	2035 Without Project	161,650		2,190	8,171	3,830	0.47	6,295	0.77		2,190	8,171	7,010	0.86	4,545		0.56	
	2035 With Project	166,475		2,190	8,171	4,050	0.50	6,575	0.80		2,190	8,171	7,215	0.88	4,810		0.59	
	Grapevine Specific Plan Net New Project Impacts	4,825				220	0.03	280	0.03				205	0.03	265		0.03	
SR-14																		
25	Btw Dawn Rd & Rosamond Blvd		2M						2M							LOS D		
	2014 Count	23,000		2,332	4,665	1,083	0.23	849	0.18		2,332	4,665	499	0.11	1,323		0.28	
	2035 Without Project	29,825		2,332	4,665	1,345	0.29	1,095	0.23		2,332	4,665	610	0.13	1,535		0.33	
	2035 With Project	30,100		2,332	4,665	1,355	0.29	1,105	0.24		2,332	4,665	635	0.14	1,560		0.33	
	Grapevine Specific Plan Net New Project Impacts	275				10	0.00	10	0.00				25	0.01	25		0.01	
26	Btw. Rosamond Blvd & Ave A		2M						2M							LOS D		
	2014 Count	30,000		2,339	4,679	1,413	0.3	1,107	0.24		2,339	4,679	651	0.14	1,725		0.37	
	2035 Without Project	34,825		2,339	4,679	1,715	0.37	1,335	0.29		2,339	4,679	720	0.15	1,855		0.40	
	2035 With Project	35,100		2,339	4,679	1,725	0.37	1,345	0.29		2,339	4,679	745	0.16	1,880		0.40	
	Grapevine Specific Plan Net New Project Impacts	275				10	0.00	10	0.00				25	0.01	25		0.01	
27	Ave A & N Jct Rte 138/Ave D		2M						2M							LOS D		
	2014 Count	34,000		2,339	4,679	1,129	0.24	1,261	0.27		2,339	4,679	1,244	0.27	1,567		0.34	
	2035 Without Project	55,825		2,339	4,679	2,115	0.45	2,125	0.45		2,339	4,679	1,950	0.42	2,335		0.50	
	2035 With Project	56,100		2,339	4,679	2,125	0.45	2,135	0.46		2,339	4,679	1,975	0.42	2,360		0.50	
	Grapevine Specific Plan Net New Project Impacts	275				10	0.00	10	0.00				25	0.01	25		0.01	

Table 8
Cumulative Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

		ADT Volume	NORTHBOUND/EASTBOUND						SOUTHBOUND/WESTBOUND						LOS Threshold	Exceeds Threshold?		
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C			PM Vol	PM V/C
28	Btw. Jct Rte 138/Ave D & Ave F		2M							2M							LOS D	
	2014 Count	36,000		2,332	4,665	1,195	0.26	1,336	0.29		2,332	4,665	1,318	0.28	1,660	0.36		
	2035 Without Project	87,650		2,332	4,665	3,525	0.76	3,685	0.79		2,332	4,665	3,360	0.72	3,720	0.80		
	2035 With Project	89,325		2,332	4,665	3,595	0.77	3,790	0.81		2,332	4,665	3,435	0.74	3,805	0.82		
	Grapevine Specific Plan Net New Project Impacts	1,675				70	0.02	105	0.02				75	0.02	85	0.02		
29	Btw. Ave F & Ave G		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	102,650		2,332	4,665	4,235	0.91	3,835	0.82		2,332	4,665	3,690	0.79	4,460	0.96		Yes
	2035 With Project	104,325		2,332	4,665	4,305	0.92	3,940	0.84		2,332	4,665	3,765	0.81	4,545	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,675				70	0.01	105	0.02				75	0.02	85	0.01		
30	Btw. Ave G & Ave H		2M							2M							LOS D	
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.3		2,332	4,665	1,391	0.3	1,752	0.38		
	2035 Without Project	107,650		2,332	4,665	4,385	0.94	3,815	0.82		2,332	4,665	3,810	0.82	4,600	0.99		Yes
	2035 With Project	109,325		2,332	4,665	4,455	0.95	3,920	0.84		2,332	4,665	3,885	0.83	4,685	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,675				70	0.01	105	0.02				75	0.02	85	0.01		
31	Btw. Ave H & Ave I		2M							2M							LOS E	
	2014 Count	40,000		2,332	4,665	1,328	0.28	1,484	0.32		2,332	4,665	1,464	0.31	1,844	0.4		
	2035 Without Project	108,650		2,332	4,665	4,345	0.93	4,025	0.86		2,332	4,665	3,880	0.83	4,530	0.97		
	2035 With Project	110,325		2,332	4,665	4,415	0.95	4,130	0.89		2,332	4,665	3,955	0.85	4,615	0.99		
	Grapevine Specific Plan Net New Project Impacts	1,675				70	0.02	105	0.02				75	0.02	85	0.02		
32	Btw. Ave I & Ave J		3M							3M							LOS E	
	2014 Count	47,000		2,332	6,997	1,560	0.22	1,744	0.25		2,332	6,997	1,720	0.25	2,167	0.31		
	2035 Without Project	114,650		2,332	6,997	4,605	0.66	4,365	0.62		2,332	6,997	3,950	0.56	4,890	0.70		
	2035 With Project	117,975		2,332	6,997	4,765	0.68	4,540	0.65		2,332	6,997	4,100	0.59	5,070	0.72		
	Grapevine Specific Plan Net New Project Impacts	3,325				160	0.02	175	0.03				150	0.02	180	0.03		
33	Btw. Ave J & 20th St W		3M							3M							LOS E	
	2014 Count	42,000		2,339	7,016	1,394	0.2	1,558	0.22		2,339	7,016	1,537	0.22	1,936	0.28		
	2035 Without Project	99,650		2,339	7,016	4,105	0.59	3,905	0.56		2,339	7,016	3,500	0.50	4,370	0.62		
	2035 With Project	102,900		2,339	7,016	4,265	0.61	4,075	0.58		2,339	7,016	3,640	0.52	4,550	0.65		
	Grapevine Specific Plan Net New Project Impacts	3,250				160	0.02	170	0.02				140	0.02	180	0.03		
34	Btw. 20th St W & Ave K		3M							3M							LOS E	
	2014 Count	59,000		2,339	7,016	1,959	0.28	2,189	0.31		2,339	7,016	2,159	0.31	2,720	0.39		
	2035 Without Project	118,650		2,339	7,016	4,715	0.67	4,585	0.65		2,339	7,016	4,160	0.59	5,180	0.74		
	2035 With Project	121,900		2,339	7,016	4,875	0.69	4,755	0.68		2,339	7,016	4,300	0.61	5,360	0.76		
	Grapevine Specific Plan Net New Project Impacts	3,250				160	0.02	170	0.02				140	0.02	180	0.03		
35	Btw. Ave K & Ave L		3M							3M							LOS E	
	2014 Count	74,000		2,339	7,016	2,457	0.35	2,745	0.39		2,339	7,016	2,708	0.39	3,411	0.49		
	2035 Without Project	127,650		2,339	7,016	4,975	0.71	4,835	0.69		2,339	7,016	4,440	0.63	5,650	0.81		
	2035 With Project	130,900		2,339	7,016	5,135	0.73	5,005	0.71		2,339	7,016	4,580	0.65	5,830	0.83		
	Grapevine Specific Plan Net New Project Impacts	3,250				160	0.02	170	0.02				140	0.02	180	0.03		
36	Btw. Ave L & Ave M		3M							3M							LOS E	
	2014 Count	89,000		2,339	7,016	2,955	0.42	3,302	0.47		2,339	7,016	3,257	0.46	4,103	0.58		
	2035 Without Project	100,650		2,339	7,016	3,875	0.55	3,435	0.49		2,339	7,016	3,630	0.52	4,540	0.65		
	2035 With Project	103,450		2,339	7,016	4,015	0.57	3,575	0.51		2,339	7,016	3,750	0.53	4,700	0.67		
	Grapevine Specific Plan Net New Project Impacts	2,800				140	0.02	140	0.02				120	0.02	160	0.02		

Table 8
Cumulative Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

		ADT Volume	NORTHBOUND/EASTBOUND						SOUTHBOUND/WESTBOUND						LOS Threshold	Exceeds Threshold?		
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C			PM Vol	PM V/C
37	Btw. Ave M & Ave N		3M							3M							LOS E	
	2014 Count	92,000		2,339	7,016	3,054	0.44	3,413	0.49		2,339	7,016	3,367	0.48	4,241	0.60		
	2035 Without Project	100,650		2,339	7,016	3,895	0.56	3,365	0.48		2,339	7,016	3,550	0.51	4,710	0.67		
	2035 With Project	103,100		2,339	7,016	4,025	0.57	3,475	0.50		2,339	7,016	3,650	0.52	4,860	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,450			130	0.02	110	0.02				100	0.01	150	0.02			
38	Btw. Ave N & 10th St W		3M							3M							LOS E	
	2014 Count	87,000		2,339	7,016	2,888	0.41	3,228	0.46		2,339	7,016	3,184	0.45	4,011	0.57		
	2035 Without Project	98,650		2,339	7,016	4,085	0.58	3,215	0.46		2,339	7,016	3,280	0.47	4,700	0.67		
	2035 With Project	101,000		2,339	7,016	4,215	0.60	3,315	0.47		2,339	7,016	3,380	0.48	4,840	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,350			130	0.02	100	0.01				100	0.01	140	0.02			
39	Btw. 10th St W & Rancho Vista Blvd		3M							3M							LOS E	
	2014 Count	87,000		2,225	6,675	2,888	0.43	3,228	0.48		2,225	6,675	3,184	0.48	4,011	0.60		
	2035 Without Project	93,650		2,225	6,675	3,965	0.59	3,165	0.47		2,225	6,675	3,170	0.47	4,510	0.68		
	2035 With Project	95,700		2,225	6,675	4,085	0.61	3,265	0.49		2,225	6,675	3,240	0.49	4,630	0.69		
	Grapevine Specific Plan Net New Project Impacts	2,050			120	0.02	100	0.01				70	0.01	120	0.02			
40	Btw. Rancho Vista Blvd & S Jct Rte 138		3M							3M							LOS E	
	2014 Count	84,000		2,225	6,675	2,789	0.42	3,116	0.47		2,225	6,675	3,074	0.46	3,872	84,000		
	2035 Without Project	94,650		2,225	6,675	4,015	0.60	3,085	0.46		2,225	6,675	3,140	0.47	4,570	94,650		
	2035 With Project	96,250		2,225	6,675	4,095	0.61	3,185	0.48		2,225	6,675	3,200	0.48	4,650	96,250		
	Grapevine Specific Plan Net New Project Impacts	1,600			80	0.01	100	0.01				60	0.01	80	1,600			
41	Btw. S Jct Rte 138 & Ave S		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	81,000		2,225	6,050	2,689	0.44	3,005	0.5		2,225	8,275	2,965	0.36	3,734	0.45		
	2035 Without Project	91,650		2,225	6,050	3,535	0.58	3,475	0.57		2,225	8,275	3,260	0.39	4,590	0.55		
	2035 With Project	93,100		2,225	6,050	3,605	0.60	3,575	0.59		2,225	8,275	3,315	0.40	4,655	0.56		
	Grapevine Specific Plan Net New Project Impacts	1,450			70	0.01	100	0.02				55	0.01	65	0.01			
42	Btw. Ave S & Pearlblossom/Sierra Hwy		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	71,000		2,225	6,050	2,357	0.39	2,634	0.44		2,225	8,275	2,599	0.31	3,273	0.4		
	2035 Without Project	75,650		2,225	6,050	3,015	0.50	2,655	0.44		2,225	8,275	2,660	0.32	3,820	0.46		
	2035 With Project	77,100		2,225	6,050	3,085	0.51	2,755	0.46		2,225	8,275	2,715	0.33	3,885	0.47		
	Grapevine Specific Plan Net New Project Impacts	1,450			70	0.01	100	0.02				55	0.01	65	0.01			
43	Btw. Pearlblossom/Sierra Hwy & Angeles Forest		2M (+1H)							3M (+1H)							LOS E	
	2014 Count	83,000		2,225	6,050	2,756	0.46	3,079	0.51		2,225	8,275	3,038	0.37	3,826	0.46		
	2035 Without Project	88,650		2,225	6,050	3,225	0.53	3,065	0.51		2,225	8,275	3,100	0.37	4,380	0.53		
	2035 With Project	90,100		2,225	6,050	3,295	0.54	3,165	0.52		2,225	8,275	3,155	0.38	4,445	0.54		
	Grapevine Specific Plan Net New Project Impacts	1,450			70	0.01	100	0.02				55	0.01	65	0.01			
44	Btw. Angeles Forest Hwy & Soledad		3M (+1H)							2M (+1H)							LOS E	
	2014 Count	144,000		2,225	8,275	3,154	0.38	3,525	0.43		2,225	6,050	3,477	0.57	4,380	0.72		
	2035 Without Project	114,650		2,225	8,275	3,845	0.46	3,875	0.47		2,225	6,050	3,620	0.60	6,000	0.99		
	2035 With Project	116,100		2,225	8,275	3,915	0.47	3,975	0.48		2,225	6,050	3,675	0.61	6,065	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,450			70	0.01	100	0.01				55	0.01	65	0.01			
45	Btw. Soledad & Santiago Rd		2M (+1H)							2M (+1H)							LOS E	
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	113,650		2,236	6,071	3,845	0.63	3,905	0.64		2,236	6,071	3,430	0.56	5,640	0.93		
	2035 With Project	115,100		2,236	6,071	3,915	0.64	4,005	0.66		2,236	6,071	3,485	0.57	5,705	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,450			70	0.01	100	0.02				55	0.01	65	0.01			

Table 8
Cumulative Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location	ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold?
		Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
46 Btw. Santiago Rd & Crown Valley Rd		2M (+1H)							2M (+1H)							LOS E	
2014 Count	94,000		2,236	6,071	3,121	0.51	3,487	0.57		2,236	6,071	3,440	0.57	4,333	0.71		
2035 Without Project	108,650		2,236	6,071	3,625	0.60	3,955	0.65		2,236	6,071	3,430	0.56	5,420	0.89		
2035 With Project	110,100		2,236	6,071	3,695	0.61	4,055	0.67		2,236	6,071	3,485	0.57	5,485	0.90		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.02				55	0.01	65	0.01		
47 Btw. Crown Valley Rd & Ward Rd		2M (+1H)							2M (+1H)							LOS E	
2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
2035 Without Project	138,650		2,236	6,071	3,765	0.62	3,875	0.64		2,236	6,071	3,460	0.57	5,670	0.93		
2035 With Project	140,100		2,236	6,071	3,835	0.63	3,975	0.65		2,236	6,071	3,515	0.58	5,735	0.94		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.02				55	0.01	65	0.01		
48 Btw. Ward Rd & Escondido Cyn Rd		3M (+1H)							2M (+1H)							LOS E	
2014 Count	93,000		2,189	8,167	3,088	0.38	3,450	0.42		2,189	5,978	3,404	0.57	4,287	0.72		
2035 Without Project	115,650		2,189	8,167	3,745	0.46	4,445	0.54		2,189	5,978	3,650	0.61	5,720	0.96		
2035 With Project	117,100		2,189	8,167	3,815	0.47	4,545	0.56		2,189	5,978	3,705	0.62	5,785	0.97		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.01				55	0.01	65	0.01		
49 Btw. Escondido Cyn Rd & Agua Dulce Cyn Rd		2M (+1H)							3M (+1H)							LOS E	
2014 Count	93,000		2,236	8,307	1,776	0.21	4,669	0.56		2,236	6,071	4994	0.82	2,613	0.43		
2035 Without Project	114,650		2,236	8,307	2,285	0.28	5,555	0.67		2,236	6,071	5,320	0.88	3,950	0.65		
2035 With Project	116,100		2,236	8,307	2,355	0.28	5,655	0.68		2,236	6,071	5,375	0.89	4,015	0.66		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.01				55	0.01	65	0.01		
50 Btw. Agua Dulce Cyn Rd & Soledad Rd		3M (+1H)							2M (+1H)							LOS E	
2014 Count	96,000		2,236	8,307	1,834	0.22	4,819	0.58		2,236	6,071	5,155	0.85	2,698	0.44		
2035 Without Project	116,850		2,236	8,307	2,415	0.29	5,565	0.67		2,236	6,071	5,220	0.86	4,070	0.67		
2035 With Project	118,300		2,236	8,307	2,485	0.30	5,665	0.68		2,236	6,071	5,275	0.87	4,135	0.68		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.01				55	0.01	65	0.01		
51 Btw. Shadow Pines/Soledad Rd & Sand Cyn Rd		2M (+1H)							2M (+1H)							LOS E	
2014 Count	99,000		2,236	6,071	1,891	0.31	4,970	0.82		2,236	6,071	5,316	0.88	2,782	0.46		
2035 Without Project	115,650		2,236	6,071	2,395	0.39	5,205	0.86		2,236	6,071	5,380	0.89	3,820	0.63		
2035 With Project	117,100		2,236	6,071	2,465	0.41	5,305	0.87		2,236	6,071	5,435	0.90	3,885	0.64		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.02				55	0.01	65	0.01		
52 Btw. Sand Cyn Rd & Via Princessa		3M (+1H)							3M (+1H)							LOS E	
2014 Count	112,000		2,215	8,246	2,139	0.26	5,622	0.68		2,215	8,246	6,014	0.73	3,147	0.38		
2035 Without Project	135,650		2,215	8,246	2,575	0.31	6,365	0.77		2,215	8,246	6,840	0.83	4,770	0.58		
2035 With Project	137,100		2,215	8,246	2,645	0.32	6,465	0.78		2,215	8,246	6,895	0.84	4,835	0.59		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.01				55	0.01	65	0.01		
53 Btw. Via Princessa & Golden Valley Rd		3M (+1H+1A)							3M (+1H+1A)							LOS E	
2014 Count	144,000		2,215	9,246	2,750	0.3	7,229	0.78		2,215	9,246	7,733	0.84	4,046	0.44		
2035 Without Project	172,650		2,215	9,246	3,255	0.35	7,895	0.85		2,215	9,246	8,590	0.93	5,470	0.59		
2035 With Project	174,100		2,215	9,246	3,325	0.36	7,995	0.86		2,215	9,246	8,645	0.93	5,535	0.60		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.01				55	0.01	65	0.01		
54 Btw. Golden Valley Rd & Placerita Cyn Rd		3M (+1H)							3M (+1H)							LOS E	
2014 Count	144,000		2,215	8,246	2,750	0.33	7,229	0.88		2,215	8,246	7,733	0.94	4,046	0.49		
2035 Without Project	169,650		2,215	8,246	3,105	0.38	7,645	0.93		2,215	8,246	8,520	1.03	5,140	0.62		Yes
2035 With Project	171,100		2,215	8,246	3,175	0.39	7,745	0.94		2,215	8,246	8,575	1.04	5,205	0.63		
Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.01				55	0.01	65	0.01		

Table 8
Cumulative Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

		ADT Volume	NORTHBOUND/EASTBOUND						SOUTHBOUND/WESTBOUND						LOS Threshold	Exceeds Threshold?	
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C			PM Vol
55	Btw. Placerita Cyn Rd & San Fernando Rd		3M (+1H)							3M (+1H)							
	2014 Count	151,000		2,215	8,246	2,884	0.35	7,580	0.92		2,215	8,246	8,109	0.98	4,243	0.51	
	2035 Without Project	173,650		2,215	8,246	3,155	0.38	7,995	0.97		2,215	8,246	8,520	1.03	5,110	0.62	Yes
	2035 With Project	175,100		2,215	8,246	3,225	0.39	8,095	0.98		2,215	8,246	8,575	1.04	5,175	0.63	
	Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.01				55	0.01	65	0.01	
56	Btw. San Fernando Rd//Newhall Ave & Jct I-5		5M (+1H)							5M (+1H)							
	2014 Count	166,000		2,215	12,676	3,171	0.25	8,333	0.66		2,215	12,676	8,914	0.7	4,665	0.37	
	2035 Without Project	180,650		2,215	12,676	3,145	0.25	8,625	0.68		2,215	12,676	9,310	0.73	5,050	0.40	
	2035 With Project	182,100		2,215	12,676	3,215	0.25	8,725	0.69		2,215	12,676	9,365	0.74	5,115	0.40	
	Grapevine Specific Plan Net New Project Impacts	1,450				70	0.01	100	0.01				55	0.00	65	0.01	
SR-138																	
57	Between Jct I-5 and Gorman Post Rd		2M							2M							
	2014 Count	4,500		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05	
	2035 Without Project	71,675		1,904	3,808	2,525	0.66	3,830	1.01		1,904	3,808	3,855	1.01	2,725	0.72	Yes
	2035 With Project	76,525		1,904	3,808	2,740	0.72	4,090	1.07		1,904	3,808	4,090	1.07	2,990	0.79	Yes
	Grapevine Specific Plan Net New Project Impacts	4,850				215	0.06	260	0.07				235	0.06	265	0.07	
58	Between Gorman Post Rd and Old Ridge Route Rd		1M							1M							
	2014 Count	4,900		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05	
	2035 Without Project	83,675		1,904	1,904	2,785	1.46	4,680	2.46		1,904	1,904	4,525	2.38	3,055	1.60	Yes
	2035 With Project	88,550		1,904	1,904	3,000	1.58	4,940	2.59		1,904	1,904	4,760	2.50	3,320	1.74	Yes
	Grapevine Specific Plan Net New Project Impacts	4,875				215	0.11	260	0.14				235	0.12	265	0.14	
59	Between Old Ridge Route Rd and 300th St West		1M							1M							
	2014 Count	4,700		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05	
	2035 Without Project	87,225		1,904	1,904	2,855	1.50	4,805	2.52		1,904	1,904	4,645	2.44	3,130	1.64	Yes
	2035 With Project	90,775		1,904	1,904	3,015	1.58	4,995	2.62		1,904	1,904	4,830	2.54	3,330	1.75	Yes
	Grapevine Specific Plan Net New Project Impacts	3,550				160	0.08	190	0.10				185	0.10	200	0.11	
60	Between 300th St West and 245TH St		1M							1M							
	2014 Count	4,700		1,700	1,700	73	0.04	152	0.09			1,700	122	0.07	87	0.05	
	2035 Without Project	72,225		1,904	1,904	3,495	1.84	2,885	1.52		1,904	1,904	2,915	1.53	3,830	2.01	Yes
	2035 With Project	75,775		1,904	1,904	3,655	1.92	3,075	1.62		1,904	1,904	3,100	1.63	4,030	2.12	Yes
	Grapevine Specific Plan Net New Project Impacts	3,550				160	0.08	190	0.10				185	0.10	200	0.11	
61	Between 245th St West and 190th St West		1M							1M							
	2014 Count	4,700		1,700	1,700	89	0.05	147	0.09			1,700	113	0.07	87	0.05	
	2035 Without Project	62,225		1,904	1,904	2,595	1.36	2,325	1.22		1,904	1,904	2,465	1.29	3,050	1.60	Yes
	2035 With Project	65,775		1,904	1,904	2,755	1.45	2,515	1.32		1,904	1,904	2,650	1.39	3,250	1.71	Yes
	Grapevine Specific Plan Net New Project Impacts	3,550				160	0.08	190	0.10				185	0.10	200	0.11	
62	Between 190th St West and 110th St West		1M							1M							
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06	
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23	Yes
	2035 With Project	53,775		1,962	1,962	2,155	1.10	1,945	0.99		1,962	1,962	2,200	1.12	2,620	1.34	Yes
	Grapevine Specific Plan Net New Project Impacts	3,550				160	0.08	190	0.10				185	0.09	200	0.10	
63	Between 110th St West and 60th St West		1M							1M							
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06	
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23	Yes
	2035 With Project	53,775		1,962	1,962	2,115	1.08	1,905	0.97		1,962	1,962	2,160	1.10	2,575	1.31	Yes
	Grapevine Specific Plan Net New Project Impacts	3,550				120	0.06	150	0.08				145	0.07	155	0.08	

Table 8
Cumulative Freeway Level of Service Analysis– South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location		ADT Volume	NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND							LOS Threshold	Exceeds Threshold?
			Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C		
64	Between 60th St West and Jct Rte 14 North		1M							1M							LOS D	
	2014 Count	4,700		1,700	1,700	141	0.08	177	0.1			1,700	123	0.07	148	0.09		
	2035 Without Project	55,225		1,962	1,962	2,355	1.20	1,895	0.97		1,962	1,962	1,985	1.01	2,700	1.38		Yes
	2035 With Project	58,775		1,962	1,962	2,435	1.24	2,010	1.02		1,962	1,962	2,085	1.06	2,810	1.43		Yes
	Grapevine Specific Plan Net New Project Impacts	3,550				80	0.04	115	0.06				100	0.05	110	0.06		
SR-126																		
65	Btw. N Jct SR-126 & Henry Mayo Dr		3M							3M							LOS D	
	2014 Count	29,025			6,288	1,264	0.20	1,618	0.26			6,288	1,406	0.22	1,517	0.24		
	2035 Without Project	31,145			6,288	1,369	0.22	1,802	0.29			6,288	1,518	0.24	1,540	0.24		
	2035 With Project	31,395			6,288	1,379	0.22	1,822	0.29			6,288	1,538	0.24	1,565	0.25		
	Project Impact	250			6,288	10	0.00	20	0.00			6,288	20	0.00	25	0.00		
66	Btw. Henry Mayo Dr & Commerce Center Dr		2M							2M							LOS D	
	2014 Count	29,025			4,665	1,264	0.27	1,618	0.35			4,665	1,406	0.30	1,517	0.33		
	2035 Without Project	31,145			4,665	1,369	0.29	1,802	0.39			4,665	1,518	0.33	1,540	0.33		
	2035 With Project	31,395			4,665	1,379	0.30	1,822	0.39			4,665	1,538	0.33	1,565	0.34		
	Grapevine Specific Plan Net New Project Impacts	250			4,665	10	0.00	20	0.00			4,665	20	0.00	25	0.01		

Notes:

Bold – denotes LOS exceeds the threshold

ADT – annual average daily traffic

L – Lanes

Cap/Ln – Capacity per lane

Vol – Volume

V/C – Volume/Capacity

M = Multi-flow lane

HOV = High Occupancy Vehicle Lane

T = Truck Lane

NC = No Change

LOS	Freeway Segment V/C Ranges
A	0 - 0.3
B	0.31 - 0.56
C	0.57 - 0.76
D	0.77 - 0.9
E	0.91 - 1
F	> 1

As discussed in DEIR Section 4.16, Impact 4.16-7 MM 4.16-1 through MM 4.16-9 and MM 4.16-11 through MM 4.16- 12 would avoid potential project contributions to cumulative traffic impacts, including cumulative traffic and transportation hazards, inadequate emergency access, or programs supporting alternative transportation. These measures would also avoid project contribution to cumulative impacts at all local roadways and intersections (subject to the KCGP smart growth and multimodal transportation development goals, policies and implementation measures) and would reduce, but not avoid the impacts to the Grapevine Grade and I-5 and in Los Angeles County as described above. MM 4.16-12 as modified in the Global Response requires that, prior to the issuance of any building permit, the project proponent must execute a traffic impact mitigation agreement with Caltrans that identifies project funding that would be paid to Caltrans to mitigate the project's incremental contribution to I-5 cumulative impacts to the Grapevine Grade in Kern County and Los Angeles County and cumulative impacts to SR-138 in Los Angeles County. The DEIR determined that with the implementation of this mitigation requirement, the project would provide funding sufficient to mitigate for project-related cumulative transportation facility impacts in Kern and Los Angeles counties. As discussed in the Global Response and in Exhibit 5, Caltrans has accepted the lower capture rate scenario for determining the project's fair share mitigation obligations for impacts to state facilities. As a result, MM 4.16-12 will also provide funding sufficient to mitigate for project-related cumulative transportation facility impacts in Kern and Los Angeles counties under the lower internal capture rate scenario.

Transportation Operation Under Interim I-5 Access Conditions

As discussed in DEIR Section 4.16 and in DEIR Chapter 3, Project Description, Phase 1 of the project would use the existing I-5/Wheeler Ridge Road/Laval Road interchange for access from I-5 (Interim A), or the I-5/Wheeler Ridge Road/Laval Road and the existing I-5/Grapevine Road interchanges, provided Caltrans approves the use of operational enhancements to this interchange (Interim B). The Interim B operational enhancements are summarized in DEIR Section 4.16, Impact 4.16-1 and in Global Response Exhibit 2. Caltrans also requested that an Interim B option be considered in the analysis which would include an interim interchange (or if Variant 2 is implemented, an early phase of Variant 2) approximately 0.5 miles north of the existing Grapevine interchange (see Global Response Exhibit 6). The Interim B option would connect from I-5 to internal project roadways extending south on both sides of I-5 to the existing underpass at the existing Grapevine Road. The ramps at the existing Grapevine interchange would be closed. The location and layout of the Interim B option are shown in Exhibit 6 of this Global Response. All of the Interim B option facilities would be located entirely within the project development footprint analyzed in the DEIR and on land owned by the project proponent adjacent to I-5.

Due to the additional external trips that would occur under the lower internalization rates described in Global Response Exhibit 5, up to 1,700 homes and 850,000 square feet of non-residential land uses could be constructed under Interim A (see Exhibit 1) and up to 5,000 homes and 1.7 million square feet of non-residential land uses could be constructed under Interim B (see Global Response Exhibit 2) or the Interim B option (see Global Response Exhibit 6) while maintaining acceptable LOS standards at the applicable

intersections. For ease of reference, in the following sections, "Interim B" refers to the Interim B project described in the DEIR and shown in Exhibit 2 of the Global Response and the Interim B option (Global Response Exhibit 6) that Caltrans requested be analyzed. As a result, the amount of development that could occur under Interim A and Interim B in the lower capture rate scenario is lower than in the DEIR analysis and the new and relocated interchange would require construction at an earlier point in the buildout process.

Project impacts from interim access conditions in DEIR Section 4.16, Impact 4.16-1 were evaluated under Interim B conditions which would generate the largest amount of project related Phase 1 traffic. Under Interim A conditions, Phase 1 traffic volumes would be lower and impacts would be reduced compared with Interim B. The same methodology was used to analyze Interim impacts under the lower capture rate scenario. Based on the 19-year period assumed for full project development, the construction of 5,000 dwelling units and 1,750,000 square feet of commercial uses that could occur under Interim B under the lower capture rate scenario was estimated to occur in about nine years, or by the end of 2025. The analysis considered interim cumulative traffic conditions that are projected to occur in 2025 without the Interim B project, and interim cumulative conditions with the Interim B project.

The results of the analysis of potential interim condition intersection impacts are shown in Table 9, Peak Hour Intersection Operations – Interim B with 2025 Cumulative Traffic Volumes. Table 9 shows that all intersections would operate at LOS D or better under cumulative with Interim B conditions. Project impacts from Interim A would be less than under Interim B due to the smaller scale of development and related traffic that would occur in Phase 1. For informational purposes, Table 10 also includes intersection LOS levels under existing plus full buildout project traffic conditions.

Table 9
Peak Hour Intersection Operations – Interim B with 2025 Cumulative Traffic Volumes

Intersection	Traffic Control	Peak Hour	Existing		Existing + Full Buildout of Project		2025 Cumulative Conditions, No Interim B		2025 Cumulative Conditions Plus Interim B	
			Delay ²	LOS ³	Delay ²	LOS ³	Delay ²	LOS ³	Delay ²	LOS ³
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	13	B	16	B	16	B	16	B
		P.M.	17	B	18	B	21	C	21	C
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	9	A	11	B	7	A	9	A
		P.M.	12	B	15	B	10	A	14	B
3. S. Wheeler Ridge Road / I-5 Northbound Ramps ¹	Traffic Signal	A.M.	3	A	3	A	3	A	3	A
		P.M.	3	A	3	A	3	A	8	A

Table 9
Peak Hour Intersection Operations – Interim B with 2025 Cumulative Traffic Volumes

Intersection	Traffic Control	Peak Hour	Existing		Existing + Full Buildout of Project		2025 Cumulative Conditions, No Interim B		2025 Cumulative Conditions Plus Interim B	
			Delay ²	LOS ³	Delay ²	LOS ³	Delay ²	LOS ³	Delay ²	LOS ³
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	13	B	18	B	16	B	18	B
		P.M.	10	B	26	C	25	C	54	D

Notes: ¹Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.

²The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.

³Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.

Source: Fehr & Peers, August 2016.

Table 10 summarizes the AM and PM peak hour LOS on the project area freeway segments under 2025 cumulative conditions without Interim B and interim cumulative conditions with Interim B. The results show that all freeway segments would operate at LOS D or better under 2025 cumulative conditions with Interim B, including the northbound and southbound portions of I-5 within the Grapevine Grade. For informational purposes, Table 10 also includes freeway LOS levels under existing plus full buildout project traffic conditions.

Table 10
Peak Hour Freeway Operations – Interim B with (2025) Cumulative Traffic Volumes

Segment	Segment Type	Peak Hour	Existing		Existing + Full Buildout of Project		2025 Cumulative No Project Conditions		2025 Cumulative Conditions Plus Interim B	
			Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
I-5 Northbound										
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade) ⁷	Basic	A.M.	9	A	15	B	16	B	18	C
		P.M.	13	B	20	C	24	C	33	D
2. Base of Grapevine Grade to Relocated Grapevine Interchange ³	Basic	A.M.	N/A		12	B	N/A		N/A	
		P.M.			16	B				

Table 10
Peak Hour Freeway Operations – Interim B with (2025) Cumulative Traffic Volumes

Segment	Segment Type	Peak Hour	Existing		Existing + Full Buildout of Project		2025 Cumulative No Project Conditions		2025 Cumulative Conditions Plus Interim B	
			Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
3. Grapevine Off-Ramp ⁵	Diverge	A.M.	10	B	15	B	15	B	19	B
		P.M.	13	B	19	B	21	C	31	D
4. Grapevine Loop On-Ramp ³	Merge	A.M.	Does Not Exist		16	B	Does Not Exist		Does Not Exist	
		P.M.			17	B				
5. Grapevine Slip On-Ramp	Merge	A.M.	9	A	23	C	13	B	25	C
		P.M.	11	B	22	C	18	B	31	D
6. Grapevine to Laval Road	Basic	A.M.	7	A	16	B	11	B	17	B
		P.M.	9	A	16	B	16	B	24	C
7. Laval Road East Off-Ramp ⁶	Diverge	A.M.	11	B	18	B	18	B	23	C
		P.M.	14	B	18	B	23	C	30	D
8. Laval Road West Off-Ramp	Diverge	A.M.	9	A	18	B	13	B	21	C
		P.M.	12	B	18	B	18	B	28	C
9. Laval Road On-Ramp	Merge	A.M.	9	A	20	B	15	B	24	C
		P.M.	13	B	23	C	21	C	32	D
10. Laval Road to SR-99	Basic	A.M.	7	A	17	B	11	A	18	B
		P.M.	9	A	18	B	16	B	26	C
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	7	A	17	B	11	A	18	B
		P.M.	9	A	18	B	16	B	26	C
12. North of SR 99 Junction	Basic	A.M.	5	A	12	B	10	A	14	B
		P.M.	8	A	13	B	17	B	21	C
SR 99 Northbound										
13. North of I-5 Junction	Basic	A.M.	6	A	15	B	8	A	15	B
		P.M.	7	A	15	B	11	B	19	C
SR 99 Southbound										
1. North of I-5 Junction	Basic	A.M.	6	A	12	B	9	A	15	B

Table 10
Peak Hour Freeway Operations – Interim B with (2025) Cumulative Traffic Volumes

Segment	Segment Type	Peak Hour	Existing		Existing + Full Buildout of Project		2025 Cumulative No Project Conditions		2025 Cumulative Conditions Plus Interim B	
			Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
		P.M.	7	A	17	B	11	B	22	C
2. CVEF Off-Ramp ³	Diverge	A.M.	Does Not Exist		18	B	Does Not Exist		Does Not Exist	
		P.M.			23	C				
3. Truck Bypass Off-Ramp ³	Basic (Major Diverge)	A.M.	6	A	11	A	9	A	15	B
		P.M.	7	A	15	B	11	B	22	C
4. SR 99 Auto Lanes to I-5 Southbound ³	Basic (2 Lanes)	A.M.	7	A	15	B	10	A	17	B
		P.M.	7	A	21	C	12	B	27	D
I-5 Southbound										
5. North of SR 99 Junction	Basic	A.M.	5	A	8	A	11	B	14	B
		P.M.	9	A	13	B	16	B	21	C
6. CVEF Off-Ramp ³	Basic (Major Diverge)	A.M.	Does Not Exist		4	A	Does Not Exist		Does Not Exist	
		P.M.			7	A				
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction ³	Basic (2 lanes)	A.M.	Does Not Exist		6	A	Does Not Exist		Does Not Exist	
		P.M.			11	A				
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	6	A	11	A	12	B	18	C
		P.M.	9	A	16	B	15	B	29	D
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	6	A	9	A	11	B	16	B
		P.M.	8	A	13	B	15	B	24	C
10. I-5/SR 99 CVEF On-Ramp ³	Merge	A.M.	Does Not Exist		10	B	Does Not Exist		Does Not Exist	
		P.M.			14	B				
11. SR 99 to Laval Road	Basic	A.M.	7	A	11	B	13	B	19	C
		P.M.	9	A	16	B	15	B	25	C

Table 10
Peak Hour Freeway Operations – Interim B with (2025) Cumulative Traffic Volumes

Segment	Segment Type	Peak Hour	Existing		Existing + Full Buildout of Project		2025 Cumulative No Project Conditions		2025 Cumulative Conditions Plus Interim B	
			Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²	Density ¹	LOS ²
12. Laval Road West Off-Ramp	Diverge	A.M.	12	B	11	B	19	B	24	C
		P.M.	14	B	16	B	22	C	31	D
13. Laval Road East Off-Ramp	Diverge	A.M.	10	A	17	B	15	B	25	C
		P.M.	10	B	22	C	16	B	31	D
14. Laval Road On-Ramp	Merge	A.M.	9	A	15	B	16	B	20	C
		P.M.	10	B	18	B	18	B	27	C
15. Laval Road to Grapevine ⁴	Basic	A.M.	7	A	14	B	13	B	18	B
		P.M.	8	A	17	B	15	B	23	C
16. Grapevine Off-Ramp ⁵	Diverge	A.M.	10	A	19	B	16	B	25	C
		P.M.	11	B	24	C	18	B	34	D
17. Grapevine Loop On-Ramp	Merge	A.M.	9	A	13	B	11	B	16	B
		P.M.	7	A	16	B	12	B	19	B
18. Grapevine Slip On-Ramp ³	Merge	A.M.	Does Not Exist		13	B	Does Not Exist		Does Not Exist	
		P.M.			17	B				
19. Relocated Grapevine Interchange to Base of Grapevine Grade ³	Basic	A.M.	Exists as Laval Road to Grapevine		11	A	Exists as Laval Road to Grapevine		Exists as Laval Road to Grapevine	
		P.M.			14	B				
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade) ⁷	Basic	A.M.	12	B	19	C	23	C	29	D
		P.M.	14	B	22	C	25	C	32	D

Notes: ¹Density is reported in passenger car equivalents per mile per lane (pc/mp/l).

²Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).

³These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.

⁴This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval to Grapevine segment.

⁵Existing + Project segment analysis includes modification for two-lane off-ramp with 500-foot deceleration lane.

⁶Existing + Project segment analysis increases deceleration lane from 170 feet to 500 feet.

⁷Density and LOS was incorrectly reported for Grapevine Grade segments in the TIS. Results were reported as follows:

- NB Segment 1 AM: 22/C
- SB Segment 20 AM: 19/C
- NB Segment 1 PM: 16/B
- SB Segment 20 PM: 22/C

BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.

UNDERLINED text indicates a potentially significant impact based on the significance criteria.






















Source: Fehr & Peers, 2016.

Appendix B
Adjusted Final EIR - AM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary

1: Dennis McCarthy Drive & Laval Road

Cumulative Plus AFEIR Project Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	10	610	10	10	100	280	330	10	10	90	270	20
Future Volume (veh/h)	10	610	10	10	100	280	330	10	10	90	270	20
Number	5	2	12		1	6	16	3	8	18	7	4
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1566	1900		1739	1520	1845	1863	1726	1900	1827	1723
Adj Flow Rate, veh/h	11	663	10		109	304	147	11	11	0	316	0
Adj No. of Lanes	1	2	0		2	3	1	1	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	20	20		10	25	3	2	2	2	4	2
Cap, veh/h	20	972	15		373	1733	651	73	71	0	643	318
Arrive On Green	0.02	0.32	0.32		0.12	0.42	0.42	0.04	0.04	0.00	0.18	0.00
Sat Flow, veh/h	905	3001	45		3213	4150	1559	1774	1726	0	3480	1723
Grp Volume(v), veh/h	11	329	344		109	304	147	11	11	0	316	0
Grp Sat Flow(s),veh/h/ln	905	1488	1558		1606	1383	1559	1774	1726	0	1740	1723
Q Serve(g_s), s	0.7	10.8	10.8		1.7	2.6	3.4	0.3	0.3	0.0	4.6	0.0
Cycle Q Clear(g_c), s	0.7	10.8	10.8		1.7	2.6	3.4	0.3	0.3	0.0	4.6	0.0
Prop In Lane	1.00		0.03		1.00		1.00	1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	20	482	505		373	1733	651	73	71	0	643	318
V/C Ratio(X)	0.54	0.68	0.68		0.29	0.18	0.23	0.15	0.15	0.00	0.49	0.00
Avail Cap(c_a), veh/h	259	874	916		462	1849	695	252	245	0	1359	673
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	27.2	16.5	16.5		22.8	10.3	10.5	26.0	26.0	0.0	20.6	0.0
Incr Delay (d2), s/veh	13.0	2.4	2.3		0.3	0.1	0.2	0.6	0.6	0.0	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.7	4.9		0.8	1.0	1.5	0.2	0.2	0.0	2.3	0.0
LnGrp Delay(d),s/veh	40.2	18.9	18.8		23.0	10.4	10.8	26.6	26.7	0.0	21.7	0.0
LnGrp LOS	D	B	B		C	B	B	C	C		C	
Approach Vol, veh/h		684				560			22			316
Approach Delay, s/veh		19.2				12.9			26.6			21.7
Approach LOS		B				B			C			C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	24.1		14.4	6.2	29.4		6.3				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	33.1		22.0	16.1	25.1		8.0				
Max Q Clear Time (g_c+I1), s	3.7	12.8		6.6	2.7	5.4		2.3				
Green Ext Time (p_c), s	0.1	5.3		2.0	0.0	3.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			17.6									
HCM 2010 LOS			B									
Notes												












Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	10
Future Volume (veh/h)	10
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	0
Adj No. of Lanes	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	0
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	0
V/C Ratio(X)	0.00
Avail Cap(c_a), veh/h	0
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary

2: I-5 Southbound Ramps & Laval Road

Cumulative Plus AFEIR Project Conditions
AM Peak Hour

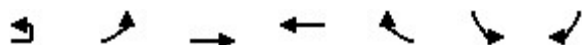
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	570	410	10	270	300	0		
Future Volume (veh/h)	570	410	10	270	300	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1743	1624	1863	1652	1545	0		
Adj Flow Rate, veh/h	613	0	11	290	323	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	9	17	2	15	23	0		
Cap, veh/h	765	636	30	1021	669	0		
Arrive On Green	0.46	0.00	0.02	0.33	0.23	0.00		
Sat Flow, veh/h	1660	1380	1774	3222	3089	0		
Grp Volume(v), veh/h	613	0	11	290	323	0		
Grp Sat Flow(s),veh/h/ln	1660	1380	1774	1570	1467	0		
Q Serve(g_s), s	14.6	0.0	0.3	3.2	4.4	0.0		
Cycle Q Clear(g_c), s	14.6	0.0	0.3	3.2	4.4	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	765	636	30	1021	669	0		
V/C Ratio(X)	0.80	0.00	0.36	0.28	0.48	0.00		
Avail Cap(c_a), veh/h	1307	1087	230	3014	2158	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	10.7	0.0	22.5	11.6	15.5	0.0		
Incr Delay (d2), s/veh	4.0	0.0	7.1	0.3	1.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	7.5	0.0	0.2	1.4	1.9	0.0		
LnGrp Delay(d),s/veh	14.7	0.0	29.6	11.9	16.9	0.0		
LnGrp LOS	B		C	B	B			
Approach Vol, veh/h	613			301	323			
Approach Delay, s/veh	14.7			12.6	16.9			
Approach LOS	B			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		20.3		25.9	4.5	15.8		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 44		36.4	6.0	34.0		
Max Q Clear Time (g_c+I1), s		5.2		16.6	2.3	6.4		
Green Ext Time (p_c), s		3.5		4.7	0.0	4.1		
Intersection Summary								
HCM 2010 Ctrl Delay			14.7					
HCM 2010 LOS			B					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

Cumulative Plus AFEIR Project Conditions
AM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↔		↔
Traffic Volume (vph)	20	330	1088	490	390	0	140
Future Volume (vph)	20	330	1088	490	390	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3142	4673	3085	1352		1442
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3142	4673	3085	1352		1442
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	351	1157	521	415	0	149
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1157	521	415	0	149
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	12%	11%	17%	18%	2%	14%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		10.6	36.4	16.1	36.4		36.4
Effective Green, g (s)		10.6	36.4	16.1	36.4		36.4
Actuated g/C Ratio		0.29	1.00	0.44	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		914	4673	1364	1352		1442
v/s Ratio Prot		0.12	0.25	0.17			
v/s Ratio Perm					c0.31		0.10
v/c Ratio		0.41	0.25	0.38	0.31		0.10
Uniform Delay, d1		10.4	0.0	6.8	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.1	0.5	0.6		0.1
Delay (s)		10.5	0.1	7.3	0.6		0.1
Level of Service		B	A	A	A		A
Approach Delay (s)			2.6	4.3		0.1	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.1		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.42				
Actuated Cycle Length (s)			36.4		Sum of lost time (s)		9.7
Intersection Capacity Utilization			31.9%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary






4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus AFEIR Project Conditions
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	10	10	30	10	490	10	108	10	40	608	300	10
Future Volume (veh/h)	10	10	30	10	490	10	108	10	40	608	300	10
Number	5	2	12		1	6	16		3	8	18	
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1863	950	1863		1863	1601	1900		1863	1583	1863	
Adj Flow Rate, veh/h	11	11	0		533	11	28		43	661	94	
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	
Percent Heavy Veh, %	2	100	2		2	100	100		2	20	2	
Cap, veh/h	30	21	36		751	89	227		93	1499	547	
Arrive On Green	0.02	0.02	0.00		0.22	0.22	0.22		0.05	0.35	0.35	
Sat Flow, veh/h	1774	950	1583		3442	399	1015		1774	4323	1576	
Grp Volume(v), veh/h	11	11	0		533	0	39		43	661	94	
Grp Sat Flow(s),veh/h/ln	1774	950	1583		1721	0	1414		1774	1441	1576	
Q Serve(g_s), s	0.3	0.6	0.0		7.9	0.0	1.2		1.3	6.5	2.3	
Cycle Q Clear(g_c), s	0.3	0.6	0.0		7.9	0.0	1.2		1.3	6.5	2.3	
Prop In Lane	1.00		1.00		1.00		0.72		1.00		1.00	
Lane Grp Cap(c), veh/h	30	21	36		751	0	317		93	1499	547	
V/C Ratio(X)	0.37	0.51	0.00		0.71	0.00	0.12		0.46	0.44	0.17	
Avail Cap(c_a), veh/h	236	195	325		1709	0	805		491	5041	1838	
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	
Uniform Delay (d), s/veh	26.7	26.6	0.0		19.9	0.0	17.0		25.3	13.8	12.5	
Incr Delay (d2), s/veh	4.5	29.2	0.0		0.8	0.0	0.1		2.2	0.4	0.3	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.2	0.3	0.0		3.8	0.0	0.5		0.7	2.6	1.0	
LnGrp Delay(d),s/veh	31.3	55.8	0.0		20.6	0.0	17.1		27.4	14.2	12.8	
LnGrp LOS	C	E			C		B		C	B	B	
Approach Vol, veh/h		22				572				798		
Approach Delay, s/veh		43.5				20.4				14.8		
Approach LOS		D				C				B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.7	6.9	7.1	24.2	5.6	18.0	7.4	24.0				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 27	11.3	* 15	76.7	* 7.3	31.3	28.0	64.1				
Max Q Clear Time (g_c+I1), s	9.9	2.6	3.3	6.1	2.3	3.2	3.9	8.5				
Green Ext Time (p_c), s	1.2	0.0	0.0	4.9	0.0	0.1	0.1	10.3				
Intersection Summary												
HCM 2010 Ctrl Delay			17.0									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary 4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus AFEIR Project Conditions
AM Peak Hour

			
Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	50	350	10
Future Volume (veh/h)	50	350	10
Number	7	4	14
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1625	1339	1900
Adj Flow Rate, veh/h	54	380	8
Adj No. of Lanes	1	3	0
Peak Hour Factor	0.92	0.92	0.92
Percent Heavy Veh, %	20	43	43
Cap, veh/h	95	1297	27
Arrive On Green	0.06	0.35	0.35
Sat Flow, veh/h	1547	3686	77
Grp Volume(v), veh/h	54	251	137
Grp Sat Flow(s),veh/h/ln	1547	1219	1325
Q Serve(g_s), s	1.9	4.1	4.1
Cycle Q Clear(g_c), s	1.9	4.1	4.1
Prop In Lane	1.00		0.06
Lane Grp Cap(c), veh/h	95	858	466
V/C Ratio(X)	0.57	0.29	0.29
Avail Cap(c_a), veh/h	788	3402	1849
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	12.9	12.9
Incr Delay (d2), s/veh	3.3	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	1.4	1.6
LnGrp Delay(d),s/veh	28.4	13.2	13.6
LnGrp LOS	C	B	B
Approach Vol, veh/h		442	
Approach Delay, s/veh		15.2	
Approach LOS		B	
Timer			

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

SimTraffic Performance Report
Cumulative Plus AFEIR Project Conditions

AM Peak Hour

5: Street A & Street C Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0		0.0	0.2	0.5	0.0	0.0	0.2
Total Delay (hr)	1.3	0.0	0.6	0.4	4.2	1.5	0.1	8.1
Total Del/Veh (s)	21.8		12.4	32.4	50.9	36.0	9.4	31.9
Stop Delay (hr)	0.9	0.0	0.3	0.3	3.7	1.3	0.1	6.5
Stop Del/Veh (s)	15.0		7.2	25.5	44.7	30.1	6.4	25.9
Total Stops	136	0	99	42	376	137	13	803
Stop/Veh	0.63		0.60	1.08	1.26	0.91	0.32	0.88
Travel Dist (mi)	28.0	0.0	21.4	3.0	25.9	14.1	3.6	96.1
Travel Time (hr)	2.4	0.0	1.4	0.5	5.4	2.1	0.2	11.9
Avg Speed (mph)	12	22	15	7	5	7	16	8
Fuel Used (gal)	1.3	0.0	0.8	0.2	1.8	0.8	0.2	5.2
Fuel Eff. (mpg)	21.1	14.3	25.5	14.6	14.1	17.8	21.3	18.6
HC Emissions (g)	69	0	36	13	40	23	13	193
CO Emissions (g)	1380	1	809	233	736	465	266	3891
NOx Emissions (g)	182	0	97	32	90	55	34	490
Vehicles Entered	208	0	158	36	283	144	39	868
Vehicles Exited	207	0	159	37	279	145	40	867
Hourly Exit Rate	828	0	636	148	1116	580	160	3468
Input Volume	959	1	717	174	1333	591	163	3938
% of Volume	86	0	89	85	84	98	98	88
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0
Density (ft/veh)								106
Occupancy (veh)	9	0	6	2	21	8	1	47

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.2	0.1	0.0	0.0	1.0	1.0	2.2
Denied Del/Veh (s)	1.6	4.3	0.0	0.0	17.9	18.0	7.2
Total Delay (hr)	6.3	0.8	1.0	0.2	3.0	4.9	16.2
Total Del/Veh (s)	61.2	32.8	18.8	6.5	47.3	81.5	48.8
Stop Delay (hr)	4.4	0.5	0.7	0.0	0.8	2.5	8.9
Stop Del/Veh (s)	43.2	21.2	11.7	0.1	12.1	41.5	26.7
Total Stops	548	66	141	0	141	187	1083
Stop/Veh	1.49	0.74	0.70	0.00	0.61	0.86	0.90
Travel Dist (mi)	46.6	10.7	37.4	16.3	212.2	197.7	520.9
Travel Time (hr)	8.1	1.3	2.2	0.7	9.0	10.6	31.9
Avg Speed (mph)	6	9	17	25	27	21	18
Fuel Used (gal)	3.1	0.6	1.5	0.5	6.1	5.7	17.6
Fuel Eff. (mpg)	15.1	17.7	24.3	31.3	34.9	34.4	29.7
HC Emissions (g)	78	31	63	29	438	331	971
CO Emissions (g)	1374	551	1487	588	7646	5482	17128
NOx Emissions (g)	182	71	173	82	1194	892	2594
Vehicles Entered	343	84	194	93	201	187	1102
Vehicles Exited	336	83	194	92	192	172	1069
Hourly Exit Rate	1344	332	776	368	768	688	4276
Input Volume	1550	395	920	556	800	759	4980
% of Volume	87	84	84	66	96	91	86
Denied Entry Before	0	0	0	0	1	1	2
Denied Entry After	1	1	0	0	4	4	10
Density (ft/veh)							188
Occupancy (veh)	32	5	9	3	32	38	119

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.2	0.0	0.0	0.4	0.2	0.1
Total Delay (hr)	1.8	0.8	0.8	1.0	0.9	0.8	6.1
Total Del/Veh (s)	19.9	12.5	15.1	13.5	27.7	16.1	16.8
Stop Delay (hr)	0.9	0.0	0.3	0.1	0.6	0.5	2.4
Stop Del/Veh (s)	10.6	0.4	5.6	0.7	17.8	10.9	6.7
Total Stops	181	28	90	50	89	103	541
Stop/Veh	0.56	0.12	0.48	0.18	0.72	0.61	0.41
Travel Dist (mi)	58.6	41.1	39.2	55.3	78.8	108.5	381.5
Travel Time (hr)	3.6	2.1	2.0	2.8	2.9	3.4	16.9
Avg Speed (mph)	16	20	19	20	28	32	23
Fuel Used (gal)	2.6	1.5	1.7	2.0	2.0	2.7	12.5
Fuel Eff. (mpg)	22.7	27.4	23.2	28.0	39.4	40.1	30.6
HC Emissions (g)	138	42	89	53	105	172	599
CO Emissions (g)	2799	933	1947	1278	2042	3413	12413
NOx Emissions (g)	380	133	248	163	305	498	1727
Vehicles Entered	307	226	175	260	115	158	1241
Vehicles Exited	309	229	177	258	112	155	1240
Hourly Exit Rate	1236	916	708	1032	448	620	4960
Input Volume	1327	1039	1031	1526	462	621	6006
% of Volume	93	88	69	68	97	100	83
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							257
Occupancy (veh)	15	8	8	11	11	14	67

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.5	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	3.6	1.0	0.2	0.9	52.2	8.3	8.8	0.3	0.0	0.8	0.4	4.0
Total Del/Veh (s)	65.3	16.6	7.4	308.1	303.2	288.8	310.5	49.2	18.5	46.0	47.5	84.7
Stop Delay (hr)	3.0	0.6	0.1	0.9	48.4	7.9	8.6	0.3	0.0	0.8	0.4	3.1
Stop Del/Veh (s)	55.0	10.0	2.6	279.1	281.0	277.3	305.1	44.4	18.1	42.0	41.5	66.1
Total Stops	181	82	28	14	699	114	119	19	5	49	25	132
Stop/Veh	0.92	0.37	0.36	1.27	1.13	1.11	1.17	0.83	0.83	0.74	0.78	0.79
Travel Dist (mi)	37.4	44.5	16.0	13.0	719.1	123.0	38.6	12.2	2.9	38.2	20.1	96.2
Travel Time (hr)	4.8	2.4	0.7	1.3	73.1	11.9	9.9	0.7	0.1	2.0	1.0	6.9
Avg Speed (mph)	8	19	23	10	10	10	4	18	24	19	20	14
Fuel Used (gal)	2.1	1.8	0.6	0.5	28.3	4.6	2.9	0.4	0.1	1.1	0.6	3.2
Fuel Eff. (mpg)	17.9	24.2	27.6	25.8	25.4	26.5	13.4	32.3	40.0	34.6	34.3	29.8
HC Emissions (g)	72	99	27	3	648	112	56	25	0	40	22	139
CO Emissions (g)	1462	2036	600	73	11128	1965	967	433	13	708	381	2389
NOx Emissions (g)	184	274	78	9	1552	274	106	67	2	111	61	353
Vehicles Entered	174	206	74	7	415	71	77	22	6	55	28	140
Vehicles Exited	166	206	75	5	247	40	52	22	5	55	27	131
Hourly Exit Rate	664	824	300	20	988	160	208	88	20	220	108	524
Input Volume	749	864	298	32	1673	263	312	84	21	221	105	553
% of Volume	89	95	101	62	59	61	67	105	95	100	103	95
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	19	10	3	5	292	47	40	3	0	8	4	28

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.2
Total Delay (hr)	80.5
Total Del/Veh (s)	178.7
Stop Delay (hr)	74.0
Stop Del/Veh (s)	164.3
Total Stops	1467
Stop/Veh	0.90
Travel Dist (mi)	1161.1
Travel Time (hr)	114.8
Avg Speed (mph)	10
Fuel Used (gal)	46.1
Fuel Eff. (mpg)	25.2
HC Emissions (g)	1243
CO Emissions (g)	22153
NOx Emissions (g)	3071
Vehicles Entered	1275
Vehicles Exited	1031
Hourly Exit Rate	4124
Input Volume	5175
% of Volume	80
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	163
Occupancy (veh)	459

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.6	0.3	0.2	0.0	0.1	0.1	0.2
Total Delay (hr)	0.1	0.1	0.8	0.1	0.5	0.0	1.5
Total Del/Veh (s)	56.8	4.6	47.9	2.2	12.6	4.4	13.7
Stop Delay (hr)	0.1	0.1	0.7	0.0	0.3	0.0	1.2
Stop Del/Veh (s)	54.7	3.9	43.6	1.0	8.4	3.1	11.0
Total Stops	6	34	46	8	48	1	143
Stop/Veh	1.00	0.65	0.78	0.06	0.36	0.25	0.36
Travel Dist (mi)	1.3	11.5	5.3	12.8	63.5	1.8	96.2
Travel Time (hr)	0.1	0.5	1.0	0.6	2.3	0.1	4.6
Avg Speed (mph)	10	25	5	22	28	30	21
Fuel Used (gal)	0.1	0.3	0.4	0.8	1.7	0.0	3.3
Fuel Eff. (mpg)	23.9	40.4	12.4	16.8	37.7	44.2	29.6
HC Emissions (g)	0	11	13	40	92	0	155
CO Emissions (g)	13	222	289	1024	1573	7	3128
NOx Emissions (g)	1	30	31	111	258	1	432
Vehicles Entered	6	50	55	137	128	4	380
Vehicles Exited	6	49	54	138	128	4	379
Hourly Exit Rate	24	196	216	552	512	16	1516
Input Volume	21	207	258	621	520	11	1638
% of Volume	114	95	84	89	98	145	93
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							501
Occupancy (veh)	1	2	4	2	9	0	18

10: Street C & Street H Performance by movement






















Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.4	3.6	2.1	0.3	0.0	0.0	0.3
Total Delay (hr)	2.3	0.2	0.2	4.9	0.3	0.0	7.9
Total Del/Veh (s)	117.2	66.3	59.1	55.9	5.0	3.5	43.2
Stop Delay (hr)	2.2	0.2	0.2	4.2	0.2	0.0	6.9
Stop Del/Veh (s)	110.6	61.4	51.7	47.5	3.0	1.3	37.5
Total Stops	76	13	19	253	34	9	404
Stop/Veh	1.09	1.18	1.27	0.80	0.17	0.20	0.61
Travel Dist (mi)	15.3	2.6	3.9	83.2	19.1	4.4	128.4
Travel Time (hr)	2.8	0.3	0.4	7.3	1.1	0.3	12.1
Avg Speed (mph)	6	9	11	11	18	17	11
Fuel Used (gal)	0.9	0.1	0.1	3.0	0.9	0.2	5.2
Fuel Eff. (mpg)	17.2	22.1	27.1	28.0	20.9	23.6	24.6
HC Emissions (g)	32	1	1	91	44	15	185
CO Emissions (g)	578	45	40	1686	935	270	3554
NOx Emissions (g)	64	4	4	217	126	40	456
Vehicles Entered	66	11	14	302	197	44	634
Vehicles Exited	53	9	13	259	196	44	574
Hourly Exit Rate	212	36	52	1036	784	176	2296
Input Volume	266	42	53	1214	902	196	2673
% of Volume	80	86	98	85	87	90	86
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							179
Occupancy (veh)	11	1	1	29	4	1	48

Appendix C
Adjusted Final EIR - PM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic 10 Results

HCM 2010 Signalized Intersection Summary




1: Dennis McCarthy Drive & Laval Road

Cumulative Plus AFEIR Project Conditions
PM Peak Hour

												
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	10	580	10	10	150	870	290	10	20	150	330
Future Volume (veh/h)	10	10	580	10	10	150	870	290	10	20	150	330
Number		5	2	12		1	6	16	3	8	18	7
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		0.99	1.00		0.99	1.00
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1258	1628	1900		1781	1638	1827	1863	1786	1900	1845
Adj Flow Rate, veh/h		11	630	10		163	946	116	11	22	6	391
Adj No. of Lanes		1	2	0		2	3	1	1	1	0	2
Peak Hour Factor		0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %		100	17	17		7	16	4	2	2	2	3
Cap, veh/h		27	954	15		415	1834	633	114	86	24	649
Arrive On Green		0.02	0.31	0.31		0.13	0.41	0.41	0.06	0.06	0.06	0.18
Sat Flow, veh/h		1198	3115	49		3291	4472	1543	1774	1348	368	3514
Grp Volume(v), veh/h		11	313	327		163	946	116	11	0	28	391
Grp Sat Flow(s),veh/h/ln		1198	1546	1619		1645	1491	1543	1774	0	1716	1757
Q Serve(g_s), s		0.5	10.4	10.4		2.7	9.3	2.8	0.3	0.0	0.9	6.0
Cycle Q Clear(g_c), s		0.5	10.4	10.4		2.7	9.3	2.8	0.3	0.0	0.9	6.0
Prop In Lane		1.00		0.03		1.00		1.00	1.00		0.21	1.00
Lane Grp Cap(c), veh/h		27	473	496		415	1834	633	114	0	110	649
V/C Ratio(X)		0.41	0.66	0.66		0.39	0.52	0.18	0.10	0.00	0.25	0.60
Avail Cap(c_a), veh/h		207	1054	1103		452	2889	997	478	0	463	1311
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		28.4	17.8	17.8		23.7	13.0	11.1	26.0	0.0	26.3	22.1
Incr Delay (d2), s/veh		6.0	2.2	2.1		0.4	0.3	0.2	0.2	0.0	0.7	1.8
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.2	4.7	4.9		1.2	3.8	1.2	0.2	0.0	0.5	3.0
LnGrp Delay(d),s/veh		34.5	20.0	19.9		24.1	13.3	11.3	26.2	0.0	27.0	23.8
LnGrp LOS		C	C	B		C	B	B	C		C	C
Approach Vol, veh/h			651				1225			39		
Approach Delay, s/veh			20.2				14.6			26.8		
Approach LOS			C				B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.3	24.0		14.9	6.2	30.1		7.8				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	40.2		22.0	10.2	38.1		15.9				
Max Q Clear Time (g_c+l1), s	4.7	12.4		8.0	2.5	11.3		2.9				
Green Ext Time (p_c), s	0.1	5.5		2.4	0.0	10.2		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			17.9									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary
1: Dennis McCarthy Drive & Laval Road

Cumulative Plus AFEIR Project Conditions
PM Peak Hour












		
Movement	SBT	SBR
Lane Configurations		
Traffic Volume (veh/h)	20	20
Future Volume (veh/h)	20	20
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		1.00
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1900
Adj Flow Rate, veh/h	0	0
Adj No. of Lanes	1	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	2	2
Cap, veh/h	325	0
Arrive On Green	0.00	0.00
Sat Flow, veh/h	1759	0
Grp Volume(v), veh/h	0	0
Grp Sat Flow(s),veh/h/ln	1759	0
Q Serve(g_s), s	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0
Prop In Lane		0.00
Lane Grp Cap(c), veh/h	325	0
V/C Ratio(X)	0.00	0.00
Avail Cap(c_a), veh/h	656	0
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0
LnGrp LOS		
Approach Vol, veh/h	391	
Approach Delay, s/veh	23.8	
Approach LOS	C	
Timer		

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary

2: I-5 Southbound Ramps & Laval Road

Cumulative Plus AFEIR Project Conditions
PM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	770	300	10	480	344	0		
Future Volume (veh/h)	770	300	10	480	344	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1712	1681	1863	1652	1667	0		
Adj Flow Rate, veh/h	828	0	11	516	370	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	11	13	2	15	14	0		
Cap, veh/h	956	838	29	863	655	0		
Arrive On Green	0.59	0.00	0.02	0.27	0.21	0.00		
Sat Flow, veh/h	1630	1429	1774	3222	3333	0		
Grp Volume(v), veh/h	828	0	11	516	370	0		
Grp Sat Flow(s),veh/h/ln	1630	1429	1774	1570	1583	0		
Q Serve(g_s), s	30.5	0.0	0.4	10.2	7.5	0.0		
Cycle Q Clear(g_c), s	30.5	0.0	0.4	10.2	7.5	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	956	838	29	863	655	0		
V/C Ratio(X)	0.87	0.00	0.38	0.60	0.57	0.00		
Avail Cap(c_a), veh/h	1864	1634	149	2597	2158	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	12.4	0.0	34.8	22.5	25.5	0.0		
Incr Delay (d2), s/veh	5.0	0.0	7.8	1.4	2.0	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	14.9	0.0	0.3	4.5	3.5	0.0		
LnGrp Delay(d),s/veh	17.4	0.0	42.6	23.8	27.5	0.0		
LnGrp LOS	B		D	C	C			
Approach Vol, veh/h	828			527	370			
Approach Delay, s/veh	17.4			24.2	27.5			
Approach LOS	B			C	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		24.9		46.5	4.9	20.1		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 59		81.7	6.0	48.7		
Max Q Clear Time (g_c+I1), s		12.2		32.5	2.4	9.5		
Green Ext Time (p_c), s		7.0		9.4	0.0	5.3		
Intersection Summary								
HCM 2010 Ctrl Delay			21.6					
HCM 2010 LOS			C					
Notes								

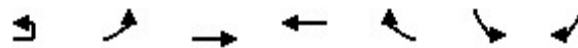
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

Cumulative Plus AFEIR Project Conditions

PM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩↩	↑↑↑	↑↑	↗		↗
Traffic Volume (vph)	30	320	1340	804	540	0	110
Future Volume (vph)	30	320	1340	804	540	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3125	4590	3312	1340		1208
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3125	4590	3312	1340		1208
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	340	1426	855	574	0	117
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1426	855	574	0	117
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	13%	13%	9%	19%	2%	36%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		11.4	45.6	24.5	45.6		45.6
Effective Green, g (s)		11.4	45.6	24.5	45.6		45.6
Actuated g/C Ratio		0.25	1.00	0.54	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		781	4590	1779	1340		1208
v/s Ratio Prot		0.12	0.31	0.26			
v/s Ratio Perm					c0.43		0.10
v/c Ratio		0.48	0.31	0.48	0.43		0.10
Uniform Delay, d1		14.6	0.0	6.6	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.2	0.2	0.6	1.0		0.2
Delay (s)		14.7	0.2	7.2	1.0		0.2
Level of Service		B	A	A	A		A
Approach Delay (s)			3.2	4.7		0.2	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.7		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.54				
Actuated Cycle Length (s)			45.6		Sum of lost time (s)		9.7
Intersection Capacity Utilization			40.5%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus AFEIR Project Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	40	60	10	770	40	190	10	70	400	490	254
Future Volume (veh/h)	10	40	60	10	770	40	190	10	70	400	490	254
Number	5	2	12		1	6	16		3	8	18	7
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99		1.00		1.00		1.00		0.99	1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863		1863	1697	1900		1863	1338	1863	1652
Adj Flow Rate, veh/h	11	43	1		837	43	68		76	435	93	276
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2		2	42	2	15
Cap, veh/h	29	117	98		973	195	308		110	768	331	313
Arrive On Green	0.02	0.06	0.06		0.28	0.33	0.33		0.06	0.21	0.21	0.20
Sat Flow, veh/h	1774	1863	1560		3442	592	936		1774	3653	1572	1573
Grp Volume(v), veh/h	11	43	1		837	0	111		76	435	93	276
Grp Sat Flow(s),veh/h/ln	1774	1863	1560		1721	0	1527		1774	1218	1572	1573
Q Serve(g_s), s	0.5	1.7	0.0		18.2	0.0	4.1		3.3	8.4	3.9	13.4
Cycle Q Clear(g_c), s	0.5	1.7	0.0		18.2	0.0	4.1		3.3	8.4	3.9	13.4
Prop In Lane	1.00		1.00		1.00		0.61		1.00		1.00	1.00
Lane Grp Cap(c), veh/h	29	117	98		973	0	503		110	768	331	313
V/C Ratio(X)	0.38	0.37	0.01		0.86	0.00	0.22		0.69	0.57	0.28	0.88
Avail Cap(c_a), veh/h	180	244	204		2678	0	1233		266	1674	720	459
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	0.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.3	35.4	34.6		26.8	0.0	19.1		36.2	27.9	26.1	30.6
Incr Delay (d2), s/veh	5.0	3.3	0.1		1.5	0.0	0.1		4.8	1.3	0.9	10.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.0	0.0		8.8	0.0	1.7		1.8	2.9	1.8	6.8
LnGrp Delay(d),s/veh	43.3	38.7	34.7		28.2	0.0	19.2		41.0	29.2	27.0	41.4
LnGrp LOS	D	D	C		C		B		D	C	C	D
Approach Vol, veh/h	55			948			604					
Approach Delay, s/veh	39.5			27.2			30.3					
Approach LOS	D			C			C					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	27.0	10.6	9.1	32.1	6.0	31.6	19.7	21.5				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 61	10.3	* 12	47.1	* 8	63.6	23.0	36.1				
Max Q Clear Time (g_c+I1), s	20.2	3.7	5.3	10.3	2.5	6.1	15.4	10.4				
Green Ext Time (p_c), s	2.1	0.1	0.0	6.8	0.0	0.5	0.3	5.7				
Intersection Summary												
HCM 2010 Ctrl Delay	28.3											
HCM 2010 LOS	C											
Notes												

HCM 2010 Signalized Intersection Summary 4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus AFEIR Project Conditions
PM Peak Hour

	↓	↙
Movement	SBT	SBR
Lane Configurations	↑↑↑	
Traffic Volume (veh/h)	504	10
Future Volume (veh/h)	504	10
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		0.99
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1435	1900
Adj Flow Rate, veh/h	548	10
Adj No. of Lanes	3	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	33	33
Cap, veh/h	1368	25
Arrive On Green	0.35	0.35
Sat Flow, veh/h	3962	72
Grp Volume(v), veh/h	361	197
Grp Sat Flow(s),veh/h/ln	1306	1422
Q Serve(g_s), s	8.3	8.3
Cycle Q Clear(g_c), s	8.3	8.3
Prop In Lane		0.05
Lane Grp Cap(c), veh/h	902	491
V/C Ratio(X)	0.40	0.40
Avail Cap(c_a), veh/h	1562	850
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	1.00	1.00
Uniform Delay (d), s/veh	19.6	19.6
Incr Delay (d2), s/veh	0.6	1.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	3.4
LnGrp Delay(d),s/veh	20.1	20.6
LnGrp LOS	C	C
Approach Vol, veh/h	834	
Approach Delay, s/veh	27.3	
Approach LOS	C	
Timer		

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.7	0.2	0.8
Denied Del/Veh (s)	0.1	0.0	0.0	0.2	0.1	20.5	11.2	3.1
Total Delay (hr)	3.2	0.0	1.1	1.1	2.6	6.7	0.3	15.0
Total Del/Veh (s)	38.0	7.3	22.0	62.5	32.2	175.2	19.8	52.2
Stop Delay (hr)	2.2	0.0	0.7	1.0	2.1	6.4	0.2	12.6
Stop Del/Veh (s)	26.8	1.5	13.3	56.4	26.0	167.6	15.0	44.0
Total Stops	231	0	122	55	234	143	22	807
Stop/Veh	0.77	0.00	0.66	0.85	0.80	1.04	0.42	0.78
Travel Dist (mi)	36.7	0.2	23.6	5.6	25.9	10.4	4.7	107.1
Travel Time (hr)	4.5	0.0	2.0	1.3	3.8	7.7	0.6	19.9
Avg Speed (mph)	8	18	12	4	7	1	11	6
Fuel Used (gal)	2.0	0.0	1.0	0.4	1.4	2.0	0.3	7.0
Fuel Eff. (mpg)	18.8	15.8	24.2	13.2	19.0	5.2	15.3	15.2
HC Emissions (g)	40	3	29	11	36	26	29	175
CO Emissions (g)	874	46	658	207	651	454	516	3406
NOx Emissions (g)	114	7	79	23	83	39	73	419
Vehicles Entered	271	2	173	63	283	111	53	956
Vehicles Exited	271	2	173	63	278	108	53	948
Hourly Exit Rate	1084	8	692	252	1112	432	212	3792
Input Volume	1297	10	815	252	1172	882	343	4771
% of Volume	84	80	85	100	95	49	62	79
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	4	1	5
Density (ft/veh)								66
Occupancy (veh)	18	0	8	5	15	28	2	76

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	8.2	4.0	12.1
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	89.5	87.6	32.7
Total Delay (hr)	7.2	1.1	2.8	0.5	4.9	1.8	18.3
Total Del/Veh (s)	79.0	40.4	31.0	13.5	54.7	41.8	48.0
Stop Delay (hr)	5.8	0.8	1.7	0.0	2.4	0.7	11.5
Stop Del/Veh (s)	63.9	29.9	18.2	0.8	27.3	16.8	30.0
Total Stops	442	62	263	11	268	101	1147
Stop/Veh	1.35	0.65	0.80	0.07	0.83	0.64	0.83
Travel Dist (mi)	40.3	11.5	59.5	25.6	301.2	148.4	586.4
Travel Time (hr)	8.6	1.5	4.7	1.3	20.0	9.3	45.5
Avg Speed (mph)	5	8	13	19	25	28	18
Fuel Used (gal)	2.9	0.7	2.6	0.9	10.3	4.9	22.2
Fuel Eff. (mpg)	13.9	17.6	22.7	29.7	29.2	30.6	26.4
HC Emissions (g)	63	24	90	35	219	60	490
CO Emissions (g)	1104	448	2030	704	4208	1341	9835
NOx Emissions (g)	137	58	246	100	718	234	1493
Vehicles Entered	296	90	312	145	279	138	1260
Vehicles Exited	289	89	308	145	266	137	1234
Hourly Exit Rate	1156	356	1232	580	1064	548	4936
Input Volume	1576	478	1502	800	1258	616	6230
% of Volume	73	74	82	72	85	89	79
Denied Entry Before	0	0	0	0	13	8	21
Denied Entry After	0	0	0	0	49	25	74
Density (ft/veh)							167
Occupancy (veh)	35	6	19	5	48	21	134

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.2	1.0	0.0	0.0	0.6	0.3	0.2
Total Delay (hr)	9.1	1.3	1.8	0.3	2.6	2.7	17.8
Total Del/Veh (s)	66.0	39.8	18.3	8.6	60.3	41.1	43.2
Stop Delay (hr)	5.6	0.6	0.7	0.0	1.8	2.0	10.7
Stop Del/Veh (s)	40.2	17.9	7.5	0.2	43.2	29.7	25.9
Total Stops	830	130	166	7	178	197	1508
Stop/Veh	1.67	1.14	0.48	0.05	1.16	0.82	1.02
Travel Dist (mi)	86.2	19.5	73.7	27.4	95.0	150.1	451.9
Travel Time (hr)	11.8	1.9	4.1	1.2	4.9	6.5	30.4
Avg Speed (mph)	7	10	18	22	20	23	15
Fuel Used (gal)	4.5	0.9	3.0	1.0	2.8	4.1	16.3
Fuel Eff. (mpg)	19.3	21.4	24.7	26.1	34.5	36.4	27.8
HC Emissions (g)	86	36	115	47	123	198	604
CO Emissions (g)	1574	683	2614	1067	2394	4100	12431
NOx Emissions (g)	218	90	328	133	346	561	1676
Vehicles Entered	449	107	327	126	141	218	1368
Vehicles Exited	440	107	326	128	130	216	1347
Hourly Exit Rate	1760	428	1304	512	520	864	5388
Input Volume	2249	588	1756	653	544	876	6666
% of Volume	78	73	74	78	96	99	81
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							143
Occupancy (veh)	47	7	16	5	19	26	121

SimTraffic Performance Report
Cumulative Plus AFEIR Project Conditions

PM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.4	0.4	0.4	0.3	0.3	0.3	0.1	0.1	0.1	0.2	0.2	0.2
Total Delay (hr)	3.5	6.2	1.2	1.1	14.2	5.6	12.8	1.1	0.3	6.2	2.7	21.6
Total Del/Veh (s)	78.2	55.5	31.5	151.3	158.4	114.1	255.3	54.6	49.9	111.8	132.8	262.3
Stop Delay (hr)	2.6	3.7	0.5	0.9	10.9	4.0	11.9	0.9	0.3	5.0	2.1	19.0
Stop Del/Veh (s)	58.5	33.1	13.4	119.9	121.5	81.6	238.2	46.8	45.9	90.1	102.7	229.8
Total Stops	187	351	117	37	443	219	280	53	16	251	130	319
Stop/Veh	1.15	0.88	0.88	1.37	1.37	1.24	1.56	0.75	0.76	1.26	1.78	1.07
Travel Dist (mi)	32.2	82.6	27.1	36.0	469.4	266.4	93.1	45.4	13.4	112.2	39.2	133.3
Travel Time (hr)	4.6	8.7	2.1	2.2	27.8	13.4	15.5	2.4	0.7	9.6	3.8	25.7
Avg Speed (mph)	7	9	13	16	17	20	6	19	19	12	10	5
Fuel Used (gal)	1.9	4.0	1.1	1.1	14.9	7.6	5.1	1.3	0.4	4.2	1.6	8.1
Fuel Eff. (mpg)	17.3	20.6	24.7	31.6	31.6	35.0	18.4	34.3	34.3	26.7	23.8	16.4
HC Emissions (g)	67	91	29	11	564	179	88	22	5	86	27	201
CO Emissions (g)	1211	1813	642	242	9346	3161	1572	454	98	1724	676	3582
NOx Emissions (g)	164	250	83	36	1495	507	195	68	15	233	77	396
Vehicles Entered	148	385	126	17	236	134	131	60	18	169	60	228
Vehicles Exited	147	380	125	17	193	111	96	58	17	154	53	164
Hourly Exit Rate	588	1520	500	68	772	444	384	232	68	616	212	656
Input Volume	688	1827	621	84	944	537	539	242	74	695	242	921
% of Volume	85	83	81	81	82	83	71	96	92	89	88	71
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	1	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	18	35	8	9	111	54	62	10	3	38	15	103

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.3
Total Delay (hr)	76.5
Total Del/Veh (s)	133.5
Stop Delay (hr)	61.7
Stop Del/Veh (s)	107.8
Total Stops	2403
Stop/Veh	1.17
Travel Dist (mi)	1350.2
Travel Time (hr)	116.4
Avg Speed (mph)	12
Fuel Used (gal)	51.3
Fuel Eff. (mpg)	26.3
HC Emissions (g)	1370
CO Emissions (g)	24521
NOx Emissions (g)	3519
Vehicles Entered	1712
Vehicles Exited	1515
Hourly Exit Rate	6060
Input Volume	7414
% of Volume	82
Denied Entry Before	0
Denied Entry After	1
Density (ft/veh)	170
Occupancy (veh)	465

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	2.9	0.4	0.2	0.0	0.2	0.2	0.2
Total Delay (hr)	0.1	6.4	0.8	0.1	15.6	0.2	23.1
Total Del/Veh (s)	147.1	228.9	40.3	2.9	240.7	199.1	144.1
Stop Delay (hr)	0.1	6.2	0.7	0.1	14.9	0.2	22.1
Stop Del/Veh (s)	140.6	222.4	36.1	1.4	230.4	188.2	137.8
Total Stops	3	91	41	11	311	5	462
Stop/Veh	1.00	0.91	0.59	0.06	1.33	1.67	0.80
Travel Dist (mi)	0.7	24.9	6.5	16.0	93.1	1.4	142.5
Travel Time (hr)	0.1	7.1	1.1	0.7	18.3	0.2	27.6
Avg Speed (mph)	5	3	6	22	5	7	5
Fuel Used (gal)	0.0	2.0	0.5	0.9	5.8	0.1	9.3
Fuel Eff. (mpg)	15.9	12.5	14.1	17.4	16.0	18.5	15.3
HC Emissions (g)	0	25	10	46	274	0	356
CO Emissions (g)	8	525	261	1202	4450	11	6457
NOx Emissions (g)	0	48	27	128	566	1	771
Vehicles Entered	3	92	67	167	206	3	538
Vehicles Exited	2	45	67	167	107	1	389
Hourly Exit Rate	8	180	268	668	428	4	1556
Input Volume	11	349	315	746	806	11	2238
% of Volume	73	52	85	90	53	36	70
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							101
Occupancy (veh)	1	29	4	3	73	1	110

SimTraffic Performance Report
Cumulative Plus AFEIR Project Conditions

PM Peak Hour

10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.3	1.2	2.1	0.4	0.0	0.1	0.3
Total Delay (hr)	0.7	0.1	0.2	2.7	0.7	0.1	4.5
Total Del/Veh (s)	35.3	12.5	38.5	32.4	9.2	6.2	21.9
Stop Delay (hr)	0.6	0.0	0.2	1.7	0.4	0.0	3.0
Stop Del/Veh (s)	30.1	8.9	32.5	20.0	5.6	2.7	14.5
Total Stops	66	12	19	227	86	25	435
Stop/Veh	0.87	0.75	1.06	0.76	0.33	0.41	0.59
Travel Dist (mi)	28.6	6.1	4.8	80.4	24.6	6.0	150.4
Travel Time (hr)	1.6	0.3	0.4	5.1	1.7	0.4	9.3
Avg Speed (mph)	18	25	14	16	15	15	16
Fuel Used (gal)	0.8	0.1	0.2	2.7	1.2	0.2	5.2
Fuel Eff. (mpg)	35.8	40.8	27.6	30.2	21.0	25.8	29.0
HC Emissions (g)	7	2	1	101	39	3	154
CO Emissions (g)	164	53	55	2004	851	84	3210
NOx Emissions (g)	22	8	4	261	117	12	425
Vehicles Entered	71	15	17	284	255	61	703
Vehicles Exited	72	15	16	269	258	61	691
Hourly Exit Rate	288	60	64	1076	1032	244	2764
Input Volume	293	63	63	1111	1266	316	3112
% of Volume	98	95	102	97	82	77	89
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							275
Occupancy (veh)	6	1	1	20	7	2	37

Appendix D
Adjusted FEIR - AM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name														
Define Freeway Segment	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	2,000	2,000
Accel Length					500	500					500			
Decel Length			500					500	185					
Mainline Volume	4,869	4,869	4,869	3,840	3,840	4,827	6,277	6,277	5,679	5,539	5,539	6,259	6,259	3,669
On Ramp Volume					987	1,450					720			
Off Ramp Volume			1,029					598	140				2,590	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	4,869	4,869	4,869	3,840	4,827	6,277	6,277	6,277	5,679	5,539	6,259	6,259	6,259	3,669
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	22.0%	22.0%	22.0%	26.0%	26.0%	26.0%	17.8%	17.8%	17.8%	18.5%	18.5%	18.0%	18.0%	14.9%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.694	0.901	0.901	0.885	0.885	0.885	0.918	0.918	0.918	0.915	0.915	0.917	0.917	0.931
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,459	5,750	5,750	4,616	5,803	7,546	7,272	7,272	6,579	6,438	7,274	7,258	7,258	4,194
GP Flow (pcphpl)	1,865	1,437	1,437	1,154	1,451	1,886	1,818	1,818	1,645	1,609	1,819	1,814	1,814	1,398
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	0.79	0.61	0.61	0.49	0.62	0.80	0.76	0.76	0.69	0.67	0.76	0.76	0.76	0.58
Speed (mph)	61.9	65.0	65.0	65.0	65.0	61.6	65.6	65.6	67.7	68.1	65.6	65.6	65.6	69.5
Density (pcphpl)	30.1	22.1	22.1	17.8	22.3	30.6	27.7	27.7	24.3	23.6	27.7	27.7	27.7	20.1
LOS	D	C	C	B	C	D	D	D	C	C	D	D	D	C
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			5,750		4,707	5,941		7,272	6,579		6,437			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.61		0.50	0.63		0.76	0.69		0.67			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			4,593		5,803	7,546		6,583	6,416		7,274		4,129	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.49		0.62	0.80		0.69	0.67		0.76		0.57	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					987	1,450					720			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.3%	3.7%					13.9%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _W					0.979	0.982					0.935			
f _p					1.00	1.00					1.00			
On Flow (pcph)					1,096	1,605					837			
On Flow (pcphpl)					1,096	1,605					837			

Fehr & Peers

Fehr & Peers

Location	1

Key	
↔ Express Lane (HOV)	
No Trucks	
Name	
I-5 North of Split Mixed Flow	
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	2,590
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	2,590
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.3%
RV %	0.0%
E _T	1.5
E _R	1.2
f _{RV}	0.900
f _p	1.00
GP Flow (pcph)	3,063
GP Flow (pcphpl)	1,531
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.64
Speed (mph)	68.7
Density (pcphpl)	22.3
LOS	C
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segment	
Calculate Mainline to Off Ramp Flow Rate for Weave Segment	
Calculate General Purpose Lanes to General Purpose Lanes I	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.64
Segment Density	22.3
Segment LOS	C
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Level Road	Level Road West Off-Ramp	Level Road East Off-Ramp	Level Road Off to On-Ramp	Level Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	3,028	3,028	2,698	2,528	2,528	4,681	4,851	5,511	5,511	5,151	4,871	4,871
On Ramp Volume					2,153	170	660					710
Off Ramp Volume		330	170						360	280		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	3,028	3,028	2,698	2,528	4,681	4,851	5,511	5,511	5,511	5,151	4,871	5,581
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	16.5%	16.5%	6.3%	0.0%	0.0%	3.4%	6.8%	18.0%	18.0%	18.0%	18.5%	18.5%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{sv}	0.924	0.924	0.969	1.000	1.000	0.983	0.967	0.917	0.917	0.917	0.915	0.915
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,451	3,451	2,929	2,661	4,927	5,194	5,998	6,323	6,323	5,910	5,602	6,418
GP Flow (pcphpl)	1,150	1,150	976	1,331	1,232	1,039	1,200	1,265	1,265	1,478	1,400	1,605
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _{lw}												
f _{LC}												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.49	0.49	0.42	0.57	0.52	0.44	0.51	0.54	0.54	0.63	0.60	0.68
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.9	65.0	64.4
Density (pcphpl)	17.7	17.7	15.0	20.5	19.0	16.0	18.5	19.5	19.5	22.8	21.5	24.9
LOS	B	B	B	C	C	B	C	C	C	C	C	C
Calculate Operations for Entering GP Lanes												
GP _{IN} Vol (pcph)		3,451			2,500	4,916	4,922			5,910		5,565
GP _{IN} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{IN} v/c ratio		0.49			0.53	0.52	0.42			0.63		0.59
Calculate Operations for Exiting GP Lanes												
GP _{OUT} Vol (pcph)		2,912	2,652				5,998		5,910	5,579		6,418
GP _{OUT} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{OUT} v/c ratio		0.41	0.56				0.51		0.63	0.59		0.68
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,153	170	660					710
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					7.4%	100.0%	100.0%					21.1%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _{sv}					0.964	0.667	0.667					0.905
f _p					1.00	1.00	1.00					1.00
On Flow (pcph)					2,427	277	1,076					853
On Flow (pcphpl)					1,214	277	1,076					853

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<-> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.51	0.13	0.49					0.41
Calculate Off Ramp Flow Rate												
Off Volume (vph)		330	170						380	280		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						11.1%	17.9%		
RV %		0.0%	0.0%						0.0%	0.0%		
E _T		1.5	1.5						1.5	1.5		
E _B		1.2	1.2						1.2	1.2		
t _{av}		0.667	0.667						0.947	0.918		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		538	277						413	332		
Off Flow (pcphpl)		538	277						413	332		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.26	0.13						0.20	0.17		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			538									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		277										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							3,839					5,565
Up Ramp L _{EO}												
Down Ramp L _{EO}												
P _M (Eqn 13-3)							0.606					0.593
P _M (Eqn 13-4)												
P _M (Eqn 13-5)												
P _M							0.286					0.111
v ₁₂ (pcph)							1,098					619
v ₅ (pcph)												
v ₈ (pcph)							2,741					4,946
v ₁₃ (pcph)							1,536					2,226
v _{13A} (pcph)							2,612					3,079
Merge Speed Index							0.26					0.36
Merge Area Speed							58.9					56.8
Outer Lanes Volume							1,152					1,669
Outer Lanes Speed							62.7					60.8
Segment Speed							60.6					58.8
Merge v/c ratio							0.57					0.67
Merge Density							19.1					25.6
Merge LOS							B					C
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		3,451								5,910		
Up Ramp L _{EO}												
Down Ramp L _{EO}		330										
P _D (Eqn 13-9)		0.649								0.597		
P _D (Eqn 13-10)												
P _D (Eqn 13-11)		0.578										
P _D		0.649								0.436		
v ₁₂ (pcph)		2,428								2,764		
v ₅ (pcph)		1,022										
v ₈ (pcph)										3,146		
v ₁₃ (pcph)		2,428								2,764		
Diverge Speed Index		0.35								0.65		
Diverge Area Speed		57.0								50.0		
Outer Lanes Volume		1,022								1,573		
Outer Lanes Speed		71.2								69.1		
Segment Speed		60.6								58.6		
Diverge v/c ratio		0.55								0.63		
Diverge Density		23.8								26.5		
Diverge LOS		C								C		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segments												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.49	0.55	0.42	0.57	0.52	0.44	0.57	0.54	0.54	0.63	0.60	0.67
Segment Density	17.7	23.8	15.0	20.5	19.0	16.0	19.1	19.5	19.5	26.5	21.5	25.6
Segment LOS	B	C	B	C	C	B	B	C	C	C	C	C
Over Capacity												

Fehr & Peers

Fehr & Peers

Fehr & Peers

Appendix E
Adjusted FEIR - PM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name														
Define Freeway Segment	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	1,500	
Accel Length					500	500					500			
Decel Length			500					500	185					
Mainline Volume	6,829	6,829	6,829	5,480	5,480	6,039	6,659	6,659	6,219	6,109	6,109	6,969	6,969	3,767
On Ramp Volume					559	620					860			
Off Ramp Volume			1,349					440	110				3,202	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	6,829	6,829	6,829	5,480	6,039	6,659	6,659	6,659	6,219	6,109	6,969	6,969	6,969	3,767
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.7%	20.7%	20.7%	24.1%	24.1%	24.1%	20.2%	20.2%	20.2%	20.2%	20.2%	19.7%	19.7%	17.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.707	0.906	0.906	0.892	0.892	0.892	0.908	0.908	0.908	0.908	0.908	0.910	0.910	0.919
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	10,273	8,017	8,017	6,532	7,199	7,938	7,800	7,800	7,284	7,155	8,163	8,144	8,144	4,362
GP Flow (pcphpl)	2,568	2,004	2,004	1,633	1,800	1,984	1,950	1,950	1,821	1,789	2,041	2,036	2,036	1,454
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	1.09	0.85	0.85	0.69	0.77	0.84	0.81	0.81	0.76	0.75	0.85	0.85	0.85	0.61
Speed (mph)	-	59.8	59.8	64.2	62.7	60.2	63.5	63.5	65.5	66.0	61.8	61.9	61.9	69.3
Density (pcphpl)	-	33.5	33.5	25.4	28.7	33.0	30.7	30.7	27.8	27.1	33.0	32.9	32.9	21.0
LOS	F	D	D	C	D	D	D	D	D	D	D	D	D	C
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			8,017		6,578	7,242		7,800	7,284		7,152			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.85		0.70	0.77		0.81	0.76		0.74			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			6,497		7,199	7,938		7,281	7,143		8,163		4,277	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.69		0.77	0.84		0.76	0.74		0.85		0.59	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					559	620					860			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.4%	6.6%					16.3%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _W					0.978	0.968					0.925			
f _p					1.00	1.00					1.00			
On Flow (pcph)					621	696					1,011			
On Flow (pcphpl)					621	696					1,011			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.33	0.33					0.48			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			1,349					440	110				3,202	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			7.3%					17.0%	36.4%				22.2%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _W			0.965					0.922	0.846				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,520					519	141				3,867	
Off Flow (pcphpl)			760					519	141				1,933	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.36					0.25	0.07				0.82	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective v _P (pcph)					6,578	7,242					7,152			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{FM} (Eqn 13-3)					0.592	0.592					0.592			
P _{FM} (Eqn 13-4)														
P _{FM} (Eqn 13-5)														
P _{FM}					0.140	0.131					0.091			
v ₁₂ (pcph)					922	947					654			
v ₃ (pcph)														
v ₃₄ (pcph)					5,656	6,294					6,498			
v _{12a} (pcph)					2,631	2,897					2,861			
v _{612a} (pcph)					3,252	3,593					3,872			
Merge Speed Index					0.40	0.42					0.46			
Merge Area Speed					55.9	55.4					57.0			
Outer Lanes Volume					1,973	2,172					2,145			
Outer Lanes Speed					59.7	59.0					64.1			
Segment Speed					57.9	57.3					60.5			
Merge v/c ratio					0.71	0.78					0.84			
Merge Density					27.4	30.0					32.1			
Merge LOS					C	D					D			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_F (pcph)			8,017					7,800	7,284					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.490					0.541	0.571					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			3,209					3,693	3,256					
v_3 (pcph)														
v_{34} (pcph)			4,808					4,106	4,029					
v_{12a} (pcph)			3,209					3,693	3,256					
Diverge Speed Index			0.43					0.34	0.57					
Diverge Area Speed			55.0					60.3	54.0					
Outer Lanes Volume			2,404					2,053	2,014					
Outer Lanes Speed			65.8					72.7	72.8					
Segment Speed			61.0					66.3	63.0					
Diverge v/c ratio			0.73					0.84	0.74					
Diverge Density			27.3					31.5	30.6					
Diverge LOS			C					D	D					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	1.09	0.85	0.73	0.69	0.71	0.78	0.81	0.84	0.74	0.75	0.84	0.85	0.85	0.61
Segment Density	-	33.5	27.3	25.4	27.4	30.0	30.7	31.5	30.6	27.1	32.1	32.9	32.9	21.0
Segment LOS	F	D	C	C	C	D	D	D	D	D	D	D	D	C
Over Capacity	Segment GP Lanes													

Location	1

Key	
<> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	3,202
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	3,202
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.2%
RV %	0.0%
E _T	1.5
E _B	1.2
f _{HV}	0.900
f _p	1.00
GP Flow (pcph)	3,784
GP Flow (pcphpl)	1,892
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{SW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.79
Speed (mph)	64.4
Density (pcphpl)	29.4
LOS	D
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segment	
Calculate Mainline to Off Ramp Flow Rate for Weave Segment	
Calculate General Purpose Lanes to General Purpose Lanes	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.79
Segment Density	29.4
Segment LOS	D
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<-> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	4,051	4,051	3,584	3,354	3,354	5,870	6,100	7,106	7,106	6,396	5,906	5,906
On Ramp Volume							1,006					644
Off Ramp Volume		467	230		2,516	230			710	490		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	4,051	4,051	3,584	3,354	5,870	6,100	7,106	7,106	7,106	6,396	5,906	6,550
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	17.3%	17.3%	6.4%	0.0%	0.0%	4.6%	8.2%	21.1%	21.1%	21.1%	22.7%	22.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.920	0.920	0.969	1.000	1.000	0.978	0.961	0.905	0.905	0.905	0.898	0.898
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	4,633	4,633	3,894	3,531	6,179	6,569	7,787	8,269	8,269	7,443	6,922	7,677
GP Flow (pcphpl)	1,544	1,544	1,298	1,765	1,545	1,314	1,557	1,654	1,654	1,861	1,731	1,919
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _{LW}												
f _{LC}												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.66	0.66	0.55	0.75	0.66	0.56	0.66	0.70	0.70	0.79	0.74	0.82
Speed (mph)	64.7	64.7	65.0	63.1	64.7	65.0	64.6	64.1	64.1	62.0	63.5	61.2
Density (pcphpl)	23.9	23.9	20.0	28.0	23.9	20.2	23.9	25.8	25.8	30.0	27.3	31.4
LOS	C	C	C	D	C	C	C	C	C	D	D	D
Calculate Operations for Entering GP Lanes												
GP _{in} Vol (pcph)		4,633			3,297	6,194	6,146			7,443		6,934
GP _{in} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{in} v/c ratio		0.66			0.70	0.66	0.52			0.79		0.74
Calculate Operations for Exiting GP Lanes												
GP _{out} Vol (pcph)		3,871	3,519				7,787		7,448	6,872		7,677
GP _{out} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{out} v/c ratio		0.55	0.75				0.66		0.79	0.73		0.82
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,516	230	1,006					644
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					10.7%	100.0%	100.0%					12.3%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _W					0.949	0.667	0.667					0.942
f _p					1.00	1.00	1.00					1.00
On Flow (pcph)					2,882	375	1,640					743
On Flow (pcphpl)					1,441	375	1,640					743

Location	4	5	6	7	8	9	10	11	12	13	14	15
<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>												
Key												
<> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.60	0.17	0.75					0.35
Calculate Off Ramp Flow Rate												
Off Volume (vph)		467	230						710	490		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						12.7%	14.3%		
RV %		0.0%	0.0%						0.0%	0.0%		
E ₂		1.5	1.5						1.5	1.5		
E _R		1.2	1.2						1.2	1.2		
f _{sv}		0.667	0.667						0.940	0.933		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		761	375						821	571		
Off Flow (pcphpt)		761	375						821	571		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.36	0.18						0.39	0.30		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			761									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		375										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							4,671					6,934
Up Ramp L _{eq}												
Down Ramp L _{eq}												
P _{1M} (Eqn 13-3)							0.606					0.593
P _{2M} (Eqn 13-4)												
P _{3M} (Eqn 13-5)												
P _{4M}							0.013					0.125
v ₀₂ (pcph)							60					866
v ₀ (pcph)												
v ₀₄ (pcph)							4,612					6,068
v _{12M} (pcph)							1,868					2,774
v _{112M} (pcph)							3,509					3,517
Merge Speed Index							0.34					0.40
Merge Area Speed							57.2					55.8
Outer Lanes Volume							1,401					2,080
Outer Lanes Speed							61.8					59.3
Segment Speed							59.1					57.6
Merge v/c ratio							0.76					0.76
Merge Density							25.8					29.1
Merge LOS							C					D
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		4,633								7,443		
Up Ramp L _{eq}												
Down Ramp L _{eq}		520										
P _{1D} (Eqn 13-9)		0.609								0.548		
P _{2D} (Eqn 13-10)												
P _{3D} (Eqn 13-11)		0.566										
P _{4D}		0.609								0.436		
v ₀₂ (pcph)		3,120								3,567		
v ₀ (pcph)		1,513										
v ₀₄ (pcph)										3,876		
v _{12M} (pcph)		3,120								3,567		
Diverge Speed Index		0.37								0.67		
Diverge Area Speed		56.6								49.5		
Outer Lanes Volume		1,513								1,938		
Outer Lanes Speed		69.3								67.6		
Segment Speed		60.2								57.5		
Diverge v/c ratio		0.71								0.61		
Diverge Density		29.7								33.4		
Diverge LOS		D								D		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segm												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.66	0.71	0.55	0.75	0.66	0.56	0.76	0.70	0.70	0.81	0.74	0.76
Segment Density	23.9	29.7	20.0	28.0	23.9	20.2	25.8	25.8	25.8	33.4	27.3	29.1
Segment LOS	C	D	C	D	C	C	C	C	C	D	D	D
Over Capacity												

Fehr & Peers

Fehr & Peers

Fehr & Peers























Appendix F
Scenario 1 - AM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic 10 Results

HCM 2010 Signalized Intersection Summary

1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Sceanrio 1 Project Conditions

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	10	610	10	10	100	449	330	10	10	90	270	20
Future Volume (veh/h)	10	610	10	10	100	449	330	10	10	90	270	20
Number	5	2	12		1	6	16	3	8	18	7	4
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1566	1900		1739	1520	1845	1863	1726	1900	1827	1723
Adj Flow Rate, veh/h	11	663	10		109	488	147	11	11	0	316	0
Adj No. of Lanes	1	2	0		2	3	1	1	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	20	20		10	25	3	2	2	2	4	2
Cap, veh/h	20	972	15		373	1733	651	73	71	0	643	318
Arrive On Green	0.02	0.32	0.32		0.12	0.42	0.42	0.04	0.04	0.00	0.18	0.00
Sat Flow, veh/h	905	3001	45		3213	4150	1559	1774	1726	0	3480	1723
Grp Volume(v), veh/h	11	329	344		109	488	147	11	11	0	316	0
Grp Sat Flow(s),veh/h/ln	905	1488	1558		1606	1383	1559	1774	1726	0	1740	1723
Q Serve(g_s), s	0.7	10.8	10.8		1.7	4.4	3.4	0.3	0.3	0.0	4.6	0.0
Cycle Q Clear(g_c), s	0.7	10.8	10.8		1.7	4.4	3.4	0.3	0.3	0.0	4.6	0.0
Prop In Lane	1.00		0.03		1.00		1.00	1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	20	482	505		373	1733	651	73	71	0	643	318
V/C Ratio(X)	0.54	0.68	0.68		0.29	0.28	0.23	0.15	0.15	0.00	0.49	0.00
Avail Cap(c_a), veh/h	259	874	916		462	1849	695	252	245	0	1359	673
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	27.2	16.5	16.5		22.8	10.8	10.5	26.0	26.0	0.0	20.6	0.0
Incr Delay (d2), s/veh	13.0	2.4	2.3		0.3	0.1	0.2	0.6	0.6	0.0	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.7	4.9		0.8	1.7	1.5	0.2	0.2	0.0	2.3	0.0
LnGrp Delay(d),s/veh	40.2	18.9	18.8		23.0	10.9	10.8	26.6	26.7	0.0	21.7	0.0
LnGrp LOS	D	B	B		C	B	B	C	C		C	
Approach Vol, veh/h		684				744			22			316
Approach Delay, s/veh		19.2				12.7			26.6			21.7
Approach LOS		B				B			C			C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	24.1		14.4	6.2	29.4		6.3				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	33.1		22.0	16.1	25.1		8.0				
Max Q Clear Time (g_c+I1), s	3.7	12.8		6.6	2.7	6.4		2.3				
Green Ext Time (p_c), s	0.1	5.3		2.0	0.0	4.7		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			17.0									
HCM 2010 LOS			B									
Notes												

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	10
Future Volume (veh/h)	10
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	0
Adj No. of Lanes	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	0
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	0
V/C Ratio(X)	0.00
Avail Cap(c_a), veh/h	0
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	












User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary

2: I-5 Southbound Ramps & Laval Road

Cumulative Plus Sceanrio 1 Project Conditions

AM Peak Hour

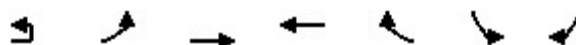
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	570	410	10	401	382	0		
Future Volume (veh/h)	570	410	10	401	382	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1743	1624	1863	1652	1545	0		
Adj Flow Rate, veh/h	613	0	11	431	411	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	9	17	2	15	23	0		
Cap, veh/h	748	622	30	1111	774	0		
Arrive On Green	0.45	0.00	0.02	0.35	0.26	0.00		
Sat Flow, veh/h	1660	1380	1774	3222	3089	0		
Grp Volume(v), veh/h	613	0	11	431	411	0		
Grp Sat Flow(s),veh/h/ln	1660	1380	1774	1570	1467	0		
Q Serve(g_s), s	16.3	0.0	0.3	5.2	6.1	0.0		
Cycle Q Clear(g_c), s	16.3	0.0	0.3	5.2	6.1	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	748	622	30	1111	774	0		
V/C Ratio(X)	0.82	0.00	0.37	0.39	0.53	0.00		
Avail Cap(c_a), veh/h	1193	992	210	2752	1970	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	12.1	0.0	24.6	12.3	16.0	0.0		
Incr Delay (d2), s/veh	4.7	0.0	7.2	0.5	1.5	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	8.3	0.0	0.2	2.3	2.6	0.0		
LnGrp Delay(d),s/veh	16.8	0.0	31.9	12.7	17.4	0.0		
LnGrp LOS	B		C	B	B			
Approach Vol, veh/h	613			442	411			
Approach Delay, s/veh	16.8			13.2	17.4			
Approach LOS	B			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		23.2		27.4	4.6	18.7		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 44		36.4	6.0	34.0		
Max Q Clear Time (g_c+I1), s		7.2		18.3	2.3	8.1		
Green Ext Time (p_c), s		5.4		4.5	0.0	5.3		
Intersection Summary								
HCM 2010 Ctrl Delay			15.9					
HCM 2010 LOS			B					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Sceanrio 1 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

AM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↔		↔
Traffic Volume (vph)	20	330	1308	572	390	0	140
Future Volume (vph)	20	330	1308	572	390	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3142	4673	3085	1352		1442
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3142	4673	3085	1352		1442
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	351	1391	609	415	0	149
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1391	609	415	0	149
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	12%	11%	17%	18%	2%	14%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		10.7	38.6	18.2	38.6		38.6
Effective Green, g (s)		10.7	38.6	18.2	38.6		38.6
Actuated g/C Ratio		0.28	1.00	0.47	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		870	4673	1454	1352		1442
v/s Ratio Prot		c0.12	0.30	c0.20			
v/s Ratio Perm					0.31		0.10
v/c Ratio		0.43	0.30	0.42	0.31		0.10
Uniform Delay, d1		11.4	0.0	6.7	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.2	0.6	0.6		0.1
Delay (s)		11.6	0.2	7.3	0.6		0.1
Level of Service		B	A	A	A		A
Approach Delay (s)			2.6	4.6		0.1	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.1		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.42				
Actuated Cycle Length (s)			38.6		Sum of lost time (s)		9.7
Intersection Capacity Utilization			34.1%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road






Cumulative Plus Sceanrio 1 Project Conditions

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	10	10	30	10	490	10	197	10	40	697	431	10
Future Volume (veh/h)	10	10	30	10	490	10	197	10	40	697	431	10
Number	5	2	12		1	6	16		3	8	18	
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1863	950	1863		1863	1647	1900		1863	1583	1863	
Adj Flow Rate, veh/h	11	11	0		533	11	43		43	758	150	
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	
Percent Heavy Veh, %	2	100	2		2	100	100		2	20	2	
Cap, veh/h	30	21	35		675	59	230		89	1583	577	
Arrive On Green	0.02	0.02	0.00		0.20	0.20	0.20		0.05	0.37	0.37	
Sat Flow, veh/h	1774	950	1583		3442	292	1143		1774	4323	1577	
Grp Volume(v), veh/h	11	11	0		533	0	54		43	758	150	
Grp Sat Flow(s),veh/h/ln	1774	950	1583		1721	0	1435		1774	1441	1577	
Q Serve(g_s), s	0.4	0.7	0.0		9.5	0.0	2.0		1.5	8.7	4.3	
Cycle Q Clear(g_c), s	0.4	0.7	0.0		9.5	0.0	2.0		1.5	8.7	4.3	
Prop In Lane	1.00		1.00		1.00		0.80		1.00		1.00	
Lane Grp Cap(c), veh/h	30	21	35		675	0	289		89	1583	577	
V/C Ratio(X)	0.37	0.52	0.00		0.79	0.00	0.19		0.48	0.48	0.26	
Avail Cap(c_a), veh/h	201	167	278		1458	0	697		418	4299	1568	
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	
Uniform Delay (d), s/veh	31.4	31.2	0.0		24.6	0.0	21.3		29.8	15.7	14.3	
Incr Delay (d2), s/veh	4.7	30.3	0.0		1.3	0.0	0.2		2.5	0.4	0.5	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.2	0.4	0.0		4.6	0.0	0.8		0.8	3.5	1.9	
LnGrp Delay(d),s/veh	36.1	61.5	0.0		25.9	0.0	21.5		32.3	16.1	14.8	
LnGrp LOS	D	E			C		C		C	B	B	
Approach Vol, veh/h		22				587				951		
Approach Delay, s/veh		48.8				25.5				16.7		
Approach LOS		D				C				B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.3	7.1	7.4	32.6	5.8	18.7	11.5	28.5				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 27	11.3	* 15	76.7	* 7.3	31.3	28.0	64.1				
Max Q Clear Time (g_c+I1), s	11.5	2.7	3.5	7.4	2.4	4.0	7.9	10.7				
Green Ext Time (p_c), s	1.1	0.0	0.0	6.2	0.0	0.2	0.2	12.8				
Intersection Summary												
HCM 2010 Ctrl Delay			19.5									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary 4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Sceanrio 1 Project Conditions
AM Peak Hour

			
Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	132	432	10
Future Volume (veh/h)	132	432	10
Number	7	4	14
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1600	1337	1900
Adj Flow Rate, veh/h	143	470	9
Adj No. of Lanes	1	3	0
Peak Hour Factor	0.92	0.92	0.92
Percent Heavy Veh, %	20	43	43
Cap, veh/h	177	1583	30
Arrive On Green	0.12	0.43	0.43
Sat Flow, veh/h	1524	3688	70
Grp Volume(v), veh/h	143	310	169
Grp Sat Flow(s),veh/h/ln	1524	1217	1325
Q Serve(g_s), s	5.9	5.4	5.4
Cycle Q Clear(g_c), s	5.9	5.4	5.4
Prop In Lane	1.00		0.05
Lane Grp Cap(c), veh/h	177	1045	568
V/C Ratio(X)	0.81	0.30	0.30
Avail Cap(c_a), veh/h	662	2897	1576
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.8	12.0	12.0
Incr Delay (d2), s/veh	5.3	0.3	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	1.9	2.1
LnGrp Delay(d),s/veh	33.1	12.3	12.6
LnGrp LOS	C	B	B
Approach Vol, veh/h		622	
Approach Delay, s/veh		17.2	
Approach LOS		B	
Timer			

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.0	0.0	2.4	1.4	0.8	0.0	0.7
Total Delay (hr)	0.9	0.0	0.3	0.2	4.7	3.0	0.1	9.2
Total Del/Veh (s)	17.6	1.7	7.6	21.1	69.6	66.5	9.1	40.8
Stop Delay (hr)	0.6	0.0	0.1	0.2	4.4	2.7	0.1	8.1
Stop Del/Veh (s)	12.1	0.7	3.6	17.5	65.4	59.7	6.1	35.9
Total Stops	107	0	71	23	256	173	15	645
Stop/Veh	0.56	0.00	0.51	0.70	1.06	1.07	0.36	0.80
Travel Dist (mi)	24.7	0.1	18.1	2.7	20.2	14.3	3.8	83.9
Travel Time (hr)	1.9	0.0	1.0	0.3	5.6	3.6	0.2	12.7
Avg Speed (mph)	13	18	17	9	4	4	16	7
Fuel Used (gal)	1.2	0.0	0.7	0.1	1.7	1.1	0.2	5.0
Fuel Eff. (mpg)	21.3	11.3	24.9	18.8	12.0	12.6	21.3	16.7
HC Emissions (g)	62	3	30	9	34	29	12	179
CO Emissions (g)	1320	59	747	177	576	530	256	3664
NOx Emissions (g)	166	9	83	24	64	59	32	437
Vehicles Entered	186	2	136	31	220	146	41	762
Vehicles Exited	182	2	135	31	219	146	41	756
Hourly Exit Rate	728	8	540	124	876	584	164	3024
Input Volume	840	11	627	174	1333	591	163	3739
% of Volume	87	73	86	71	66	99	101	81
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0	0	1
Density (ft/veh)								101
Occupancy (veh)	8	0	4	1	22	14	1	50

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.3	0.4	0.0	0.0	13.0	13.0	26.7
Denied Del/Veh (s)	4.2	16.9	0.0	0.1	166.7	173.4	84.0
Total Delay (hr)	6.9	1.1	0.9	0.1	2.6	3.9	15.6
Total Del/Veh (s)	77.4	47.2	22.5	5.7	39.9	61.1	50.8
Stop Delay (hr)	5.4	0.9	0.6	0.0	0.7	1.8	9.5
Stop Del/Veh (s)	60.4	37.3	16.6	0.2	11.4	28.0	30.9
Total Stops	482	61	118	0	134	180	975
Stop/Veh	1.51	0.70	0.84	0.00	0.57	0.78	0.88
Travel Dist (mi)	39.4	10.4	25.5	15.6	220.6	210.9	522.5
Travel Time (hr)	8.6	1.9	1.7	0.6	20.8	22.0	55.6
Avg Speed (mph)	5	7	15	26	28	24	18
Fuel Used (gal)	3.0	0.7	1.2	0.5	9.2	8.9	23.5
Fuel Eff. (mpg)	13.1	14.5	22.1	31.5	23.9	23.6	22.2
HC Emissions (g)	75	45	48	32	470	389	1059
CO Emissions (g)	1292	712	1192	641	8264	6574	18675
NOx Emissions (g)	156	81	128	88	1202	991	2646
Vehicles Entered	290	80	132	90	203	196	991
Vehicles Exited	286	81	135	89	208	190	989
Hourly Exit Rate	1144	324	540	356	832	760	3956
Input Volume	1512	436	513	614	1012	966	5053
% of Volume	76	74	105	58	82	79	78
Denied Entry Before	1	1	0	0	32	28	62
Denied Entry After	1	2	0	0	78	74	155
Density (ft/veh)							193
Occupancy (veh)	33	6	7	2	31	36	116

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.4	0.0	0.2	0.5	0.2	0.2
Total Delay (hr)	1.5	1.0	0.6	1.5	1.2	0.7	6.5
Total Del/Veh (s)	20.8	13.6	17.8	17.0	30.4	13.7	18.1
Stop Delay (hr)	0.9	0.0	0.2	0.2	0.7	0.4	2.5
Stop Del/Veh (s)	12.5	0.7	6.5	1.7	19.1	8.3	6.9
Total Stops	156	49	66	99	106	106	582
Stop/Veh	0.60	0.18	0.59	0.30	0.77	0.58	0.45
Travel Dist (mi)	47.8	45.5	22.3	65.1	88.0	117.2	385.9
Travel Time (hr)	3.1	2.4	1.3	3.7	3.3	3.6	17.3
Avg Speed (mph)	16	19	18	18	27	33	22
Fuel Used (gal)	2.2	1.7	1.1	2.4	2.3	2.9	12.5
Fuel Eff. (mpg)	22.0	27.1	21.2	27.5	38.7	39.8	30.9
HC Emissions (g)	113	47	80	62	114	193	609
CO Emissions (g)	2317	1035	1615	1424	2227	3855	12473
NOx Emissions (g)	313	147	212	188	331	553	1744
Vehicles Entered	251	254	104	308	129	172	1218
Vehicles Exited	251	257	105	309	124	168	1214
Hourly Exit Rate	1004	1028	420	1236	496	672	4856
Input Volume	1203	1360	664	1997	501	675	6400
% of Volume	83	76	63	62	99	100	76
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							251
Occupancy (veh)	12	10	5	15	13	14	69

SimTraffic Performance Report
Cumulative Plus Scenario 1 Project Conditions

AM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.4	0.4	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	2.7	0.8	0.1	1.1	70.1	8.0	8.9	0.4	0.0	0.7	0.4	7.6
Total Del/Veh (s)	52.5	14.8	5.9	360.2	369.3	348.0	314.2	54.4	22.6	44.3	52.8	150.0
Stop Delay (hr)	2.2	0.5	0.0	1.1	68.4	8.0	8.8	0.4	0.0	0.6	0.4	6.5
Stop Del/Veh (s)	44.4	9.5	2.1	346.5	360.3	348.4	309.3	49.9	21.5	40.5	45.8	127.7
Total Stops	144	70	20	13	661	84	112	22	6	42	26	158
Stop/Veh	0.79	0.36	0.32	1.18	0.97	1.01	1.10	0.85	1.00	0.75	0.90	0.86
Travel Dist (mi)	34.8	40.1	13.1	11.2	701.1	86.9	36.6	13.4	3.4	34.5	17.8	100.7
Travel Time (hr)	3.9	2.1	0.5	1.4	90.3	10.6	10.0	0.8	0.1	1.7	0.9	10.7
Avg Speed (mph)	9	20	24	8	8	8	4	17	24	20	19	9
Fuel Used (gal)	1.8	1.7	0.5	0.5	31.2	3.8	2.9	0.4	0.1	1.0	0.5	4.1
Fuel Eff. (mpg)	18.9	24.3	27.6	23.1	22.5	23.1	12.7	32.4	37.7	35.4	32.8	24.5
HC Emissions (g)	75	82	20	4	659	85	55	18	0	36	22	161
CO Emissions (g)	1534	1755	460	95	11349	1500	953	314	19	612	402	2732
NOx Emissions (g)	191	230	57	12	1463	196	102	50	2	100	61	362
Vehicles Entered	161	186	61	7	431	55	75	25	6	50	26	151
Vehicles Exited	159	185	61	4	224	26	48	25	6	46	22	127
Hourly Exit Rate	636	740	244	16	896	104	192	100	24	184	88	508
Input Volume	712	820	283	32	1713	223	312	84	21	187	105	586
% of Volume	89	90	86	50	52	47	62	119	114	98	84	87
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	15	8	2	6	361	42	40	3	1	7	4	43

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.2
Total Delay (hr)	100.8
Total Del/Veh (s)	223.6
Stop Delay (hr)	96.9
Stop Del/Veh (s)	215.0
Total Stops	1358
Stop/Veh	0.84
Travel Dist (mi)	1093.6
Travel Time (hr)	133.0
Avg Speed (mph)	8
Fuel Used (gal)	48.4
Fuel Eff. (mpg)	22.6
HC Emissions (g)	1218
CO Emissions (g)	21727
NOx Emissions (g)	2825
Vehicles Entered	1234
Vehicles Exited	933
Hourly Exit Rate	3732
Input Volume	5078
% of Volume	73
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	140
Occupancy (veh)	532

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.4	0.3	0.1	0.0	0.1	0.1	0.1
Total Delay (hr)	0.1	0.1	0.7	0.1	1.2	0.0	2.1
Total Del/Veh (s)	54.1	6.7	48.3	2.2	31.5	13.0	21.0
Stop Delay (hr)	0.1	0.1	0.6	0.0	1.0	0.0	1.8
Stop Del/Veh (s)	52.2	6.0	44.1	1.0	26.0	10.5	17.8
Total Stops	4	40	40	7	71	1	163
Stop/Veh	0.80	0.74	0.77	0.06	0.52	0.50	0.44
Travel Dist (mi)	1.1	12.1	4.7	10.9	64.6	1.0	94.4
Travel Time (hr)	0.1	0.5	0.9	0.5	3.1	0.0	5.1
Avg Speed (mph)	10	24	5	22	21	26	18
Fuel Used (gal)	0.0	0.3	0.4	0.6	1.9	0.0	3.3
Fuel Eff. (mpg)	24.9	39.0	12.3	17.2	34.2	41.2	28.7
HC Emissions (g)	0	12	11	32	100	0	155
CO Emissions (g)	9	245	251	859	1716	4	3085
NOx Emissions (g)	1	33	27	89	272	1	423
Vehicles Entered	5	52	48	117	131	2	355
Vehicles Exited	4	52	50	117	128	2	353
Hourly Exit Rate	16	208	200	468	512	8	1412
Input Volume	21	207	232	557	520	11	1548
% of Volume	76	100	86	84	98	73	91
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							447
Occupancy (veh)	0	2	4	2	12	0	21





















10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.2	5.0	0.0	0.0	5.2
Denied Del/Veh (s)	0.4	3.7	63.5	58.4	0.0	0.0	30.6
Total Delay (hr)	1.5	0.1	0.7	19.7	0.2	0.0	22.3
Total Del/Veh (s)	78.5	29.7	220.0	246.8	4.2	3.0	132.2
Stop Delay (hr)	1.4	0.1	0.7	19.5	0.1	0.0	21.8
Stop Del/Veh (s)	72.3	24.5	214.8	243.5	2.7	1.2	129.1
Total Stops	72	12	20	332	26	7	469
Stop/Veh	1.04	1.09	1.67	1.15	0.14	0.19	0.77
Travel Dist (mi)	15.5	2.7	2.6	58.5	17.7	3.4	100.4
Travel Time (hr)	2.0	0.2	1.0	26.4	0.9	0.2	30.7
Avg Speed (mph)	8	15	3	3	19	17	4
Fuel Used (gal)	0.7	0.1	0.3	7.1	0.8	0.1	9.1
Fuel Eff. (mpg)	21.4	28.4	9.3	8.3	21.1	23.6	11.0
HC Emissions (g)	25	2	1	134	43	12	216
CO Emissions (g)	459	56	39	2339	929	220	4042
NOx Emissions (g)	56	6	3	204	121	33	422
Vehicles Entered	64	11	10	238	183	34	540
Vehicles Exited	58	10	9	188	183	35	483
Hourly Exit Rate	232	40	36	752	732	140	1932
Input Volume	266	42	53	1214	806	174	2555
% of Volume	87	95	68	62	91	80	76
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	2	68	0	0	70
Density (ft/veh)							84
Occupancy (veh)	8	1	3	86	4	1	102

Appendix G
Scenario 1 - PM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary 1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Scenario 1 Project Conditions
PM Peak Hour

												
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	10	580	10	10	150	1047	290	10	20	150	330
Future Volume (veh/h)	10	10	580	10	10	150	1047	290	10	20	150	330
Number		5	2	12		1	6	16	3	8	18	7
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		0.99	1.00		0.99	1.00
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1258	1628	1900		1781	1638	1827	1863	1786	1900	1845
Adj Flow Rate, veh/h		11	630	10		163	1138	117	11	22	5	391
Adj No. of Lanes		1	2	0		2	3	1	1	1	0	2
Peak Hour Factor		0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %		100	17	17		7	16	4	2	2	2	3
Cap, veh/h		27	1006	16		405	1895	654	111	88	20	641
Arrive On Green		0.02	0.32	0.32		0.12	0.42	0.42	0.06	0.06	0.06	0.18
Sat Flow, veh/h		1198	3115	49		3291	4472	1544	1774	1405	319	3514
Grp Volume(v), veh/h		11	313	327		163	1138	117	11	0	27	391
Grp Sat Flow(s),veh/h/ln		1198	1546	1619		1645	1491	1544	1774	0	1725	1757
Q Serve(g_s), s		0.6	10.4	10.4		2.8	12.0	2.9	0.4	0.0	0.9	6.2
Cycle Q Clear(g_c), s		0.6	10.4	10.4		2.8	12.0	2.9	0.4	0.0	0.9	6.2
Prop In Lane		1.00		0.03		1.00		1.00	1.00		0.19	1.00
Lane Grp Cap(c), veh/h		27	499	523		405	1895	654	111	0	108	641
V/C Ratio(X)		0.41	0.63	0.63		0.40	0.60	0.18	0.10	0.00	0.25	0.61
Avail Cap(c_a), veh/h		201	1022	1070		438	2802	967	464	0	451	1271
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		29.3	17.5	17.5		24.6	13.5	10.9	26.9	0.0	27.2	22.9
Incr Delay (d2), s/veh		6.1	1.8	1.8		0.4	0.4	0.2	0.2	0.0	0.7	1.8
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.2	4.7	4.9		1.3	4.9	1.2	0.2	0.0	0.4	3.1
LnGrp Delay(d),s/veh		35.4	19.3	19.2		25.0	14.0	11.1	27.1	0.0	27.9	24.7
LnGrp LOS		D	B	B		C	B	B	C		C	C
Approach Vol, veh/h			651				1418			38		
Approach Delay, s/veh			19.5				15.0			27.7		
Approach LOS			B				B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.4	25.5		15.1	6.3	31.7		7.8				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	40.2		22.0	10.2	38.1		15.9				
Max Q Clear Time (g_c+I1), s	4.8	12.4		8.2	2.6	14.0		2.9				
Green Ext Time (p_c), s	0.1	5.5		2.4	0.0	11.8		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			17.9									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary

1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Scenario 1 Project Conditions












PM Peak Hour

	↓	↙
Movement	SBT	SBR
Lane Configurations	↕	
Traffic Volume (veh/h)	20	20
Future Volume (veh/h)	20	20
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		1.00
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1900
Adj Flow Rate, veh/h	0	0
Adj No. of Lanes	1	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	2	2
Cap, veh/h	321	0
Arrive On Green	0.00	0.00
Sat Flow, veh/h	1759	0
Grp Volume(v), veh/h	0	0
Grp Sat Flow(s),veh/h/ln	1759	0
Q Serve(g_s), s	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0
Prop In Lane		0.00
Lane Grp Cap(c), veh/h	321	0
V/C Ratio(X)	0.00	0.00
Avail Cap(c_a), veh/h	637	0
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0
LnGrp LOS		
Approach Vol, veh/h	391	
Approach Delay, s/veh	24.7	
Approach LOS	C	
Timer		

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary 2: I-5 Southbound Ramps & Laval Road

Cumulative Plus Scenario 1 Project Conditions
PM Peak Hour

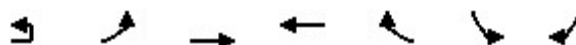
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	770	300	10	603	439	0		
Future Volume (veh/h)	770	300	10	603	439	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1712	1681	1863	1652	1667	0		
Adj Flow Rate, veh/h	828	0	11	648	472	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	11	13	2	15	14	0		
Cap, veh/h	934	819	29	973	792	0		
Arrive On Green	0.57	0.00	0.02	0.31	0.25	0.00		
Sat Flow, veh/h	1630	1429	1774	3222	3333	0		
Grp Volume(v), veh/h	828	0	11	648	472	0		
Grp Sat Flow(s),veh/h/ln	1630	1429	1774	1570	1583	0		
Q Serve(g_s), s	37.3	0.0	0.5	15.2	11.1	0.0		
Cycle Q Clear(g_c), s	37.3	0.0	0.5	15.2	11.1	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	934	819	29	973	792	0		
V/C Ratio(X)	0.89	0.00	0.38	0.67	0.60	0.00		
Avail Cap(c_a), veh/h	1575	1381	126	2194	1824	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	15.7	0.0	41.2	25.4	28.0	0.0		
Incr Delay (d2), s/veh	6.3	0.0	8.2	1.6	1.9	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	18.2	0.0	0.3	6.8	5.1	0.0		
LnGrp Delay(d),s/veh	22.0	0.0	49.4	27.0	29.8	0.0		
LnGrp LOS	C		D	C	C			
Approach Vol, veh/h	828			659	472			
Approach Delay, s/veh	22.0			27.4	29.8			
Approach LOS	C			C	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		31.5		53.1	5.1	26.4		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 59		81.7	6.0	48.7		
Max Q Clear Time (g_c+l1), s		17.2		39.3	2.5	13.1		
Green Ext Time (p_c), s		9.0		9.2	0.0	6.8		
Intersection Summary								
HCM 2010 Ctrl Delay			25.7					
HCM 2010 LOS			C					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Scenario 1 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

PM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↔↔↔	↔↔	↔		↔
Traffic Volume (vph)	30	320	1555	899	540	0	110
Future Volume (vph)	30	320	1555	899	540	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3125	4590	3312	1340		1208
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3125	4590	3312	1340		1208
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	340	1654	956	574	0	117
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1654	956	574	0	117
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	13%	13%	9%	19%	2%	36%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		11.5	48.2	27.0	48.2		48.2
Effective Green, g (s)		11.5	48.2	27.0	48.2		48.2
Actuated g/C Ratio		0.24	1.00	0.56	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		745	4590	1855	1340		1208
v/s Ratio Prot		0.12	0.36	0.29			
v/s Ratio Perm					c0.43		0.10
v/c Ratio		0.50	0.36	0.52	0.43		0.10
Uniform Delay, d1		15.9	0.0	6.6	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.2	0.2	0.7	1.0		0.2
Delay (s)		16.1	0.2	7.2	1.0		0.2
Level of Service		B	A	A	A		A
Approach Delay (s)			3.1	4.9		0.2	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.8		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.54				
Actuated Cycle Length (s)			48.2		Sum of lost time (s)		9.7
Intersection Capacity Utilization			43.2%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Scenario 1 Project Conditions

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	40	60	10	770	40	282	10	70	492	613	349
Future Volume (veh/h)	10	40	60	10	770	40	282	10	70	492	613	349
Number	5	2	12		1	6	16		3	8	18	7
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00		1.00		0.99	1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863		1863	1689	1900		1863	1338	1863	1652
Adj Flow Rate, veh/h	11	43	0		837	43	99		76	535	132	379
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2		2	42	2	15
Cap, veh/h	28	106	90		949	144	331		98	826	356	378
Arrive On Green	0.02	0.06	0.00		0.28	0.32	0.32		0.06	0.23	0.23	0.24
Sat Flow, veh/h	1774	1863	1583		3442	454	1045		1774	3653	1573	1573
Grp Volume(v), veh/h	11	43	0		837	0	142		76	535	132	379
Grp Sat Flow(s),veh/h/ln	1774	1863	1583		1721	0	1498		1774	1218	1573	1573
Q Serve(g_s), s	0.6	2.1	0.0		22.3	0.0	6.9		4.1	12.7	6.8	23.0
Cycle Q Clear(g_c), s	0.6	2.1	0.0		22.3	0.0	6.9		4.1	12.7	6.8	23.0
Prop In Lane	1.00		1.00		1.00		0.70		1.00		1.00	1.00
Lane Grp Cap(c), veh/h	28	106	90		949	0	474		98	826	356	378
V/C Ratio(X)	0.39	0.41	0.00		0.88	0.00	0.30		0.78	0.65	0.37	1.00
Avail Cap(c_a), veh/h	148	200	170		2201	0	994		218	1376	592	378
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	43.6	0.0		33.2	0.0	24.7		44.7	33.6	31.3	36.4
Incr Delay (d2), s/veh	5.3	4.2	0.0		1.8	0.0	0.2		7.8	1.7	1.3	47.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.2	0.0		10.8	0.0	2.9		2.2	4.4	3.1	14.8
LnGrp Delay(d),s/veh	52.0	47.9	0.0		35.0	0.0	24.9		52.5	35.3	32.6	83.7
LnGrp LOS	D	D			D		C		D	D	C	F
Approach Vol, veh/h		54				979				743		
Approach Delay, s/veh		48.7				33.6				36.6		
Approach LOS		D				C				D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	31.1	11.2	9.5	44.1	6.2	36.0	27.0	26.6				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 61	10.3	* 12	47.1	* 8	63.6	23.0	36.1				
Max Q Clear Time (g_c+I1), s	24.3	4.1	6.1	13.1	2.6	8.9	25.0	14.7				
Green Ext Time (p_c), s	2.1	0.1	0.0	8.1	0.0	0.6	0.0	6.7				
Intersection Summary												
HCM 2010 Ctrl Delay			38.4									
HCM 2010 LOS			D									
Notes												

HCM 2010 Signalized Intersection Summary 4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Scenario 1 Project Conditions
PM Peak Hour

	↓	↙
Movement	SBT	SBR
Lane Configurations	↑↑↑	
Traffic Volume (veh/h)	599	10
Future Volume (veh/h)	599	10
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		0.99
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1434	1900
Adj Flow Rate, veh/h	651	10
Adj No. of Lanes	3	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	33	33
Cap, veh/h	1624	25
Arrive On Green	0.41	0.41
Sat Flow, veh/h	3972	61
Grp Volume(v), veh/h	427	234
Grp Sat Flow(s),veh/h/ln	1305	1423
Q Serve(g_s), s	11.1	11.1
Cycle Q Clear(g_c), s	11.1	11.1
Prop In Lane		0.04
Lane Grp Cap(c), veh/h	1067	582
V/C Ratio(X)	0.40	0.40
Avail Cap(c_a), veh/h	1283	699
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	1.00	1.00
Uniform Delay (d), s/veh	20.0	20.0
Incr Delay (d2), s/veh	0.5	0.9
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	4.5
LnGrp Delay(d),s/veh	20.5	20.9
LnGrp LOS	C	C
Approach Vol, veh/h	1040	
Approach Delay, s/veh	43.6	
Approach LOS	D	
Timer		

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.0		0.0	0.1	0.0	2.5	0.8	0.5
Total Delay (hr)	2.2	0.0	0.7	1.1	1.4	4.9	0.5	10.9
Total Del/Veh (s)	30.5		15.8	63.2	19.8	92.5	22.0	38.3
Stop Delay (hr)	1.6	0.0	0.4	1.0	1.1	4.4	0.4	8.8
Stop Del/Veh (s)	21.8		9.0	57.3	14.7	82.2	16.6	31.0
Total Stops	160	0	96	54	144	210	36	700
Stop/Veh	0.61		0.57	0.84	0.56	1.10	0.42	0.68
Travel Dist (mi)	32.4	0.0	21.7	5.5	23.0	16.7	7.4	106.8
Travel Time (hr)	3.4	0.0	1.6	1.3	2.4	5.7	0.8	15.2
Avg Speed (mph)	10	21	14	4	9	3	10	7
Fuel Used (gal)	1.6	0.0	0.9	0.4	1.0	1.7	0.4	6.0
Fuel Eff. (mpg)	20.0	16.5	25.2	13.2	22.8	9.8	17.4	17.7
HC Emissions (g)	33	1	28	9	29	25	37	162
CO Emissions (g)	814	11	669	184	576	472	660	3385
NOx Emissions (g)	99	2	77	20	73	52	95	418
Vehicles Entered	238	0	160	62	249	174	83	966
Vehicles Exited	238	0	159	63	250	170	82	962
Hourly Exit Rate	952	0	636	252	1000	680	328	3848
Input Volume	1317	1	827	250	1026	773	334	4528
% of Volume	72	0	77	101	97	88	98	85
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0
Density (ft/veh)								84
Occupancy (veh)	14	0	6	5	10	22	3	60

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	37.8	19.1	56.9
Denied Del/Veh (s)	0.0	0.3	0.0	0.1	284.8	281.8	131.7
Total Delay (hr)	4.2	0.8	1.5	0.4	3.4	1.4	11.8
Total Del/Veh (s)	47.0	21.6	19.9	10.4	38.2	33.8	31.3
Stop Delay (hr)	2.7	0.4	0.8	0.0	1.2	0.5	5.6
Stop Del/Veh (s)	30.8	9.9	10.6	0.1	13.8	10.9	14.9
Total Stops	382	64	181	1	187	83	898
Stop/Veh	1.19	0.49	0.65	0.01	0.59	0.54	0.66
Travel Dist (mi)	40.8	16.3	50.5	26.4	301.6	147.2	582.8
Travel Time (hr)	5.7	1.4	3.1	1.2	48.2	24.0	83.7
Avg Speed (mph)	7	11	16	21	29	30	22
Fuel Used (gal)	2.4	0.8	2.1	0.8	16.9	8.3	31.2
Fuel Eff. (mpg)	16.7	21.4	24.4	31.6	17.9	17.8	18.7
HC Emissions (g)	61	30	74	40	327	71	603
CO Emissions (g)	1218	583	1824	757	6012	1608	12001
NOx Emissions (g)	161	80	207	111	882	239	1681
Vehicles Entered	295	125	264	150	279	135	1248
Vehicles Exited	296	125	263	150	277	137	1248
Hourly Exit Rate	1184	500	1052	600	1108	548	4992
Input Volume	1265	538	1381	905	1573	769	6431
% of Volume	94	93	76	66	70	71	78
Denied Entry Before	0	0	0	0	94	47	141
Denied Entry After	0	0	0	0	199	109	308
Density (ft/veh)							208
Occupancy (veh)	23	6	12	5	42	20	107

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.1	0.0	0.0	0.6	0.3	0.1
Total Delay (hr)	1.3	0.8	1.4	0.5	6.4	3.6	14.1
Total Del/Veh (s)	12.3	13.1	17.6	10.2	127.2	49.5	33.5
Stop Delay (hr)	0.6	0.0	0.5	0.0	5.0	2.3	8.5
Stop Del/Veh (s)	5.5	0.5	6.8	0.4	99.8	31.5	20.3
Total Stops	104	36	142	20	313	268	883
Stop/Veh	0.28	0.16	0.49	0.11	1.72	1.01	0.58
Travel Dist (mi)	69.3	40.0	61.9	35.6	104.4	162.8	474.1
Travel Time (hr)	3.5	2.1	3.4	1.7	9.0	7.7	27.3
Avg Speed (mph)	20	20	18	21	12	21	17
Fuel Used (gal)	2.9	1.5	2.5	1.4	3.7	4.8	16.8
Fuel Eff. (mpg)	24.2	27.5	24.3	26.3	27.9	33.8	28.3
HC Emissions (g)	88	43	105	63	136	222	656
CO Emissions (g)	2022	911	2390	1366	2591	4835	14114
NOx Emissions (g)	271	132	298	180	346	612	1839
Vehicles Entered	357	218	274	165	158	240	1412
Vehicles Exited	357	218	272	167	140	236	1390
Hourly Exit Rate	1428	872	1088	668	560	944	5560
Input Volume	1898	948	1671	1053	609	980	7159
% of Volume	75	92	65	63	92	96	78
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							159
Occupancy (veh)	14	8	13	7	36	31	109

SimTraffic Performance Report
Cumulative Plus Scenario 1 Project Conditions

PM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.3	0.3	0.2	0.1	0.2	0.2	0.2	0.2
Total Delay (hr)	2.1	3.2	0.5	2.1	27.3	11.2	21.6	1.9	0.5	7.1	3.4	30.5
Total Del/Veh (s)	52.3	32.8	13.3	240.3	251.8	218.8	349.2	91.5	80.7	127.3	173.8	313.6
Stop Delay (hr)	1.7	2.1	0.2	1.7	22.7	9.6	20.8	1.5	0.4	5.4	2.7	27.9
Stop Del/Veh (s)	43.0	21.0	4.9	195.6	209.5	187.6	335.9	71.6	64.7	97.4	141.3	286.5
Total Stops	108	197	62	48	565	231	295	91	27	307	132	387
Stop/Veh	0.76	0.56	0.51	1.55	1.45	1.26	1.32	1.25	1.17	1.53	1.89	1.11
Travel Dist (mi)	28.7	73.8	25.6	39.5	503.5	250.4	94.4	44.3	14.2	102.2	32.6	135.0
Travel Time (hr)	3.0	5.5	1.3	3.2	41.8	18.5	24.4	3.1	0.9	10.2	4.3	34.6
Avg Speed (mph)	9	13	20	12	12	14	4	14	15	10	8	4
Fuel Used (gal)	1.4	3.0	0.9	1.4	18.3	8.3	7.1	1.5	0.5	4.2	1.7	10.1
Fuel Eff. (mpg)	20.2	24.3	29.0	28.5	27.5	30.1	13.4	29.6	30.9	24.3	19.8	13.4
HC Emissions (g)	65	87	25	13	614	160	99	25	4	71	21	229
CO Emissions (g)	1271	1934	624	295	10083	2883	1840	584	105	1548	582	4021
NOx Emissions (g)	163	246	76	41	1508	427	196	73	13	193	62	406
Vehicles Entered	132	341	118	21	266	133	155	61	20	168	57	261
Vehicles Exited	131	342	118	15	188	89	90	54	18	145	45	162
Hourly Exit Rate	524	1368	472	60	752	356	360	216	72	580	180	648
Input Volume	632	1671	571	84	1069	537	611	242	74	695	242	1043
% of Volume	83	82	83	71	70	66	59	89	97	83	74	62
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	12	22	5	13	167	74	98	13	4	41	17	138

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.2
Total Delay (hr)	111.2
Total Del/Veh (s)	185.0
Stop Delay (hr)	96.6
Stop Del/Veh (s)	160.7
Total Stops	2450
Stop/Veh	1.13
Travel Dist (mi)	1344.2
Travel Time (hr)	150.9
Avg Speed (mph)	9
Fuel Used (gal)	58.3
Fuel Eff. (mpg)	23.0
HC Emissions (g)	1415
CO Emissions (g)	25772
NOx Emissions (g)	3402
Vehicles Entered	1733
Vehicles Exited	1397
Hourly Exit Rate	5588
Input Volume	7471
% of Volume	75
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	131
Occupancy (veh)	603

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.1	0.3	0.1	0.0	0.1	0.1	0.1
Total Delay (hr)	0.0	1.0	0.9	0.2	3.6	0.0	5.7
Total Del/Veh (s)	87.0	46.1	47.5	3.5	65.1	24.3	39.9
Stop Delay (hr)	0.0	0.9	0.8	0.1	3.0	0.0	4.8
Stop Del/Veh (s)	82.6	41.3	42.9	1.7	54.8	19.6	34.0
Total Stops	2	60	43	14	184	2	305
Stop/Veh	1.00	0.74	0.66	0.09	0.93	0.67	0.60
Travel Dist (mi)	0.8	26.4	6.1	15.1	101.0	1.6	150.9
Travel Time (hr)	0.1	1.9	1.1	0.7	6.5	0.1	10.4
Avg Speed (mph)	11	14	5	21	16	23	15
Fuel Used (gal)	0.0	0.8	0.5	0.9	3.4	0.0	5.6
Fuel Eff. (mpg)	25.5	31.9	13.1	17.5	29.9	38.9	26.9
HC Emissions (g)	0	17	9	42	222	0	289
CO Emissions (g)	6	328	232	1088	3709	7	5369
NOx Emissions (g)	0	45	23	118	582	1	769
Vehicles Entered	2	76	62	158	180	3	481
Vehicles Exited	2	74	63	158	168	3	468
Hourly Exit Rate	8	296	252	632	672	12	1872
Input Volume	11	316	319	754	731	11	2142
% of Volume	73	94	79	84	92	109	87
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							269
Occupancy (veh)	0	8	5	3	26	0	41

SimTraffic Performance Report
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PM Peak Hour

10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.4	1.6	2.4	0.3	0.0	0.0	0.3
Total Delay (hr)	0.6	0.1	0.2	0.7	0.5	0.1	2.1
Total Del/Veh (s)	30.2	11.5	35.1	10.5	6.9	4.9	11.3
Stop Delay (hr)	0.5	0.0	0.1	0.3	0.3	0.0	1.3
Stop Del/Veh (s)	25.1	9.3	32.3	4.2	3.8	2.1	6.8
Total Stops	55	13	14	79	64	20	245
Stop/Veh	0.80	0.76	0.88	0.31	0.25	0.34	0.37
Travel Dist (mi)	26.0	6.5	4.2	69.9	24.3	5.6	136.5
Travel Time (hr)	1.4	0.3	0.3	2.8	1.5	0.3	6.5
Avg Speed (mph)	19	25	15	25	17	16	21
Fuel Used (gal)	0.7	0.2	0.1	1.9	1.1	0.2	4.2
Fuel Eff. (mpg)	36.9	39.8	30.1	36.8	21.7	26.7	32.2
HC Emissions (g)	7	3	1	76	42	2	130
CO Emissions (g)	156	62	31	1481	916	68	2714
NOx Emissions (g)	22	9	3	212	126	8	379
Vehicles Entered	65	16	14	242	251	57	645
Vehicles Exited	65	16	15	242	252	58	648
Hourly Exit Rate	260	64	60	968	1008	232	2592
Input Volume	262	63	63	996	1281	320	2985
% of Volume	99	102	95	97	79	72	87
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							393
Occupancy (veh)	5	1	1	11	6	1	26

Appendix H
Scenario 1 - AM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<- Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment														
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	2,000	2,000
Accel Length														
Decel Length			500		500	500		500	185		500			
Mainline Volume	4,957	4,957	4,957	3,840	3,840	5,132	7,029	7,029	6,342	6,202	6,202	6,922	6,922	4,192
On Ramp Volume					1,292	1,897					720			
Off Ramp Volume			1,117					687	140				2,730	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	4,957	4,957	4,957	3,840	5,132	7,029	7,029	7,029	6,342	6,202	6,922	6,922	6,922	4,192
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	22.0%	22.0%	22.0%	26.0%	26.0%	26.0%	17.8%	17.8%	17.8%	18.5%	18.5%	18.0%	18.0%	14.9%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{HV}	0.694	0.901	0.901	0.885	0.885	0.885	0.918	0.918	0.918	0.915	0.915	0.917	0.917	0.931
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,594	5,853	5,853	4,616	6,169	8,450	8,143	8,143	7,347	7,208	8,045	8,027	8,027	4,792
GP Flow (pcphpl)	1,898	1,463	1,463	1,154	1,542	2,112	2,036	2,036	1,837	1,802	2,011	2,007	2,007	1,597
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	0.81	0.62	0.62	0.49	0.66	0.90	0.85	0.85	0.77	0.75	0.84	0.84	0.84	0.67
Speed (mph)	61.5	64.9	64.9	65.0	64.7	57.8	61.9	61.9	65.3	65.8	62.4	62.5	62.5	68.2
Density (pcphpl)	30.9	22.5	22.5	17.8	23.8	36.5	32.9	32.9	28.1	27.4	32.2	32.1	32.1	23.4
LOS	D	C	C	B	C	E	D	D	D	D	D	D	D	C
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			5,853		4,735	6,350		8,143	7,347		7,208			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.62		0.50	0.68		0.85	0.77		0.75			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			4,598		6,169	8,450		7,351	7,184		8,045		4,728	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.49		0.66	0.90		0.77	0.75		0.84		0.66	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					1,292	1,897					720			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.3%	3.7%					13.9%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _{HV}					0.979	0.982					0.935			
f _p					1.00	1.00					1.00			
On Flow (pcph)					1,435	2,100					837			
On Flow (pcphpl)					1,435	2,100					837			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.76	1.00					0.40			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			1,117					687	140				2,730	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			6.8%					12.1%	14.3%				22.3%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _{RV}			0.967					0.943	0.933				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,255					792	163				3,298	
Off Flow (pcphpl)			628					792	163				1,649	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.30					0.38	0.09				0.70	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Up Type														
Up Distance														
Up Flow (pcph)														
Down Type														
Down Distance														
Down Flow (pcph)														
Calculate Merge Influence Area Operations														
Effective v _p (pcph)					4,735	6,350					7,208			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{RM} (Eqn 13-3)					0.592	0.592					0.592			
P _{RM} (Eqn 13-4)														
P _{RM} (Eqn 13-5)														
P _{RM}					0.038	-0.045					0.113			
v ₁₂ (pcph)					182	-284					816			
v ₃ (pcph)														
v ₃₄ (pcph)					4,553	6,634					6,392			
v _{12a} (pcph)					1,894	2,540					2,883			
v _{R12a} (pcph)					3,328	4,640					3,720			
Merge Speed Index					0.40	-					0.44			
Merge Area Speed					55.7	-					57.8			
Outer Lanes Volume					1,420						2,162			
Outer Lanes Speed					61.7						64.0			
Segment Speed					58.3						61.0			
Merge v/c ratio					0.72	1.01					0.81			
Merge Density					27.6	-					31.0			
Merge LOS					C	F					D			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_p (pcph)			5,853					8,143	7,347					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.556					0.520	0.569					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			2,451					3,997	3,295					
v_3 (pcph)														
v_{34} (pcph)			3,403					4,146	4,052					
v_{12a} (pcph)			2,451					3,997	3,295					
Diverge Speed Index			0.41					0.37	0.57					
Diverge Area Speed			55.5					59.7	54.0					
Outer Lanes Volume			1,701					2,073	2,026					
Outer Lanes Speed			68.6					72.6	72.8					
Segment Speed			62.4					65.6	62.9					
Diverge v/c ratio			0.56					0.91	0.75					
Diverge Density			20.8					34.1	30.9					
Diverge LOS			C					D	D					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	0.81	0.62	0.56	0.49	0.72	1.01	0.85	0.91	0.75	0.75	0.81	0.84	0.84	0.67
Segment Density	30.9	22.5	20.8	17.8	27.6	-	32.9	34.1	30.9	27.4	31.0	32.1	32.1	23.4
Segment LOS	D	C	C	B	C	F	D	D	D	D	D	D	D	C
Over Capacity						On Ramp Roadway Merge								

Location	1

Key	
<-> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	2,730
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	2,730
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.3%
RV %	0.0%
E _T	1.5
E _R	1.2
f _{HV}	0.900
f _p	1.00
GP Flow (pcph)	3,228
GP Flow (pcphpl)	1,614
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.67
Speed (mph)	68.0
Density (pcphpl)	23.7
LOS	C
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes Flow	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.67
Segment Density	23.7
Segment LOS	C
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Level Road	Level Road West Off-Ramp	Level Road East Off-Ramp	Level Road Off to On-Ramp	Level Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	3,519	3,519	3,179	3,009	3,009	5,288	5,458	6,133	6,133	5,604	5,193	5,193
On Ramp Volume					2,279	170	675					792
Off Ramp Volume		340	170						529	411		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	3,519	3,519	3,179	3,009	5,288	5,458	6,133	6,133	6,133	5,604	5,193	5,985
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	14.5%	14.5%	5.3%	0.0%	0.0%	3.0%	6.0%	18.0%	18.0%	18.0%	18.5%	18.5%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.932	0.932	0.974	1.000	1.000	0.985	0.971	0.917	0.917	0.917	0.915	0.915
f _P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,973	3,973	3,436	3,167	5,566	5,832	6,651	7,037	7,037	6,430	5,972	6,883
GP Flow (pcphpl)	1,324	1,324	1,145	1,584	1,392	1,166	1,330	1,407	1,407	1,607	1,493	1,721
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _W												
f _C												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.56	0.56	0.49	0.67	0.59	0.50	0.57	0.60	0.60	0.68	0.64	0.73
Speed (mph)	65.0	65.0	65.0	64.5	65.0	65.0	65.0	65.0	65.0	64.4	64.9	63.5
Density (pcphpl)	20.4	20.4	17.6	24.5	21.4	17.9	20.5	21.7	21.7	25.0	23.0	27.1
LOS	C	C	B	C	C	B	C	C	C	C	C	D
Calculate Operations for Entering GP Lanes												
GP _{IN} Vol (pcph)		3,973			3,002	5,555	5,550			6,430		5,931
GP _{IN} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{IN} v/c ratio		0.56			0.64	0.59	0.47			0.68		0.63
Calculate Operations for Exiting GP Lanes												
GP _{OUT} Vol (pcph)		3,418	3,159				6,651		6,430	5,943		6,883
GP _{OUT} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{OUT} v/c ratio		0.48	0.67				0.57		0.68	0.63		0.73
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,279	170	675					792
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					7.0%	100.0%	100.0%					21.1%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _W					0.966	0.667	0.667					0.905
f _P					1.00	1.00	1.00					1.00
On Flow (pcph)					2,564	277	1,101					952
On Flow (pcphpl)					1,282	277	1,101					952

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<=> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.53	0.13	0.50					0.45
Calculate Off Ramp Flow Rate												
Off Volume (vph)		340	170						529	411		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						11.1%	17.9%		
RV %		0.0%	0.0%						0.0%	0.0%		
E _T		1.5	1.5						1.5	1.5		
E _B		1.2	1.2						1.2	1.2		
t _{av}		0.667	0.667						0.947	0.918		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		554	277						607	487		
Off Flow (pcphpl)		554	277						607	487		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.26	0.13						0.29	0.26		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			554									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		277										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							4,218					5,931
Up Ramp L _{EO}												
Down Ramp L _{EO}												
P _{TM} (Eqn 13-3)							0.606					0.593
P _{TM} (Eqn 13-4)												
P _{TM} (Eqn 13-5)												
P _{TM}							0.080					0.099
v ₁₂ (pcph)							338					586
v ₅ (pcph)												
v ₁₄ (pcph)							3,880					5,345
v ₁₃₄ (pcph)							1,687					2,372
v ₁₁₃₄ (pcph)							2,788					3,324
Merge Speed Index							0.27					0.38
Merge Area Speed							58.7					56.3
Outer Lanes Volume							1,265					1,779
Outer Lanes Speed							62.2					60.4
Segment Speed							60.3					58.3
Merge v/c ratio							0.61					0.72
Merge Density							20.4					27.5
Merge LOS							C					C
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		3,973								6,430		
Up Ramp L _{EO}												
Down Ramp L _{EO}		339										
P _{TD} (Eqn 13-9)		0.635								0.577		
P _{TD} (Eqn 13-10)												
P _{TD} (Eqn 13-11)		0.567										
P _{TD}		0.635								0.436		
v ₁₂ (pcph)		2,726								3,078		
v ₅ (pcph)		1,247										
v ₁₄ (pcph)										3,352		
v ₁₃₄ (pcph)		2,726								3,078		
Diverge Speed Index		0.35								0.67		
Diverge Area Speed		57.0								49.7		
Outer Lanes Volume		1,247								1,676		
Outer Lanes Speed		70.3								68.7		
Segment Speed		60.6								58.0		
Diverge v/c ratio		0.62								0.70		
Diverge Density		26.3								29.2		
Diverge LOS		C								D		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segments												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.56	0.62	0.49	0.67	0.59	0.50	0.61	0.60	0.60	0.70	0.64	0.72
Segment Density	20.4	26.3	17.6	24.5	21.4	17.9	20.4	21.7	21.7	29.2	23.0	27.5
Segment LOS	C	C	B	C	C	B	C	C	C	D	C	C
Over Capacity												

Fehr & Peers

Location	16	17	18	19	20	21	22
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Key							
<-> Express Lane (HOV)							
No Trucks							
Name	Level Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Calculate On Ramp Roadway Operations							
On Ramp Type				Right	Right		
On Ramp Speed (mph)				25	45		
On Ramp Cap (pcph)				1,900	2,100		
On Ramp v/c ratio				0.35	0.22		
Calculate Off Ramp Flow Rate							
Off Volume (vph)		1,885					
PHF		0.92					
Total Lanes		2					
Terrain		Level					
Grade %		0.0%					
Grade Length (mi)		0.00					
Truck & Bus %		7.4%					
RV %		0.0%					
E _T		1.5					
E _R		1.2					
f _W		0.964					
f _p		1.00					
Off Flow (pcph)		2,125					
Off Flow (pcphpl)		1,062					
Calculate Off Ramp Roadway Operations							
Off Ramp Type		Right					
Off Ramp Speed		45					
Off Ramp Cap (pcph)		4,200					
Off Ramp v/c ratio		0.51					
Determine Adjacent Ramp for Through Traffic							
Up Type							
Up Distance							
Up Flow (pcph)							
Down Type							
Down Distance							
Down Flow (pcph)							
Calculate Merge Influence Area Operations							
Effective v ₀ (pcph)				4,834	5,470		
Up Ramp L _{EO}							
Down Ramp L _{EO}							
P _M (Eqn 13-3)				0.592	0.592		
P _M (Eqn 13-4)							
P _M (Eqn 13-5)							
P _M				0.135	0.159		
v ₁₂ (pcph)				654	870		
v ₅ (pcph)							
v _W (pcph)				4,180	4,600		
v _{12W} (pcph)				1,934	2,188		
v _{12W} (pcph)				2,593	2,657		
Merge Speed Index				0.35	0.33		
Merge Area Speed				57.0	57.4		
Outer Lanes Volume				1,450	1,641		
Outer Lanes Speed				61.6	60.9		
Segment Speed				59.3	59.3		
Merge v/c ratio				0.56	0.58		
Merge Density				22.3	22.9		
Merge LOS				C	C		
Calculate Diverge Influence Area Operations							
Effective v ₀ (pcph)		6,892					
Up Ramp L _{EO}							
Down Ramp L _{EO}							
P _D (Eqn 13-9)		0.490					
P _D (Eqn 13-10)							
P _D (Eqn 13-11)							
P _D		0.260					
v ₁₂ (pcph)		3,364					
v ₅ (pcph)							
v _W (pcph)		3,528					
v _{12W} (pcph)		3,364					
Diverge Speed Index		0.49					
Diverge Area Speed		53.7					
Outer Lanes Volume		1,764					
Outer Lanes Speed		68.3					
Segment Speed		60.3					
Diverge v/c ratio		0.76					
Diverge Density		28.7					
Diverge LOS		D					
Calculate On Ramp to Off Ramp Flow							
Calculate On Ramp to Mainline Flow							
Calculate Mainline to Off Ramp Flow							
Calculate General Purpose Lanes							
Calculate Weave Segment Operations							
Summarize Segment Operations							
Segment v/c ratio	0.73	0.76	0.51	0.56	0.58	0.63	0.90
Segment Density	27.1	28.7	18.5	22.3	22.9	22.8	37.8
Segment LOS	D	D	C	C	C	C	E
Over Capacity							

Fehr & Peers

Appendix I
Scenario 1 - PM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment														
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	1,500	
Accel Length					500	500					500			
Decel Length			500					500	185					
Mainline Volume	6,990	6,990	6,990	5,480	5,480	6,381	7,381	7,381	6,849	6,739	6,739	7,599	7,599	4,261
On Ramp Volume					901	1,000					860			
Off Ramp Volume			1,510					532	110				3,338	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	6,990	6,990	6,990	5,480	6,381	7,381	7,381	7,381	6,849	6,739	7,599	7,599	7,599	4,261
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.7%	20.7%	20.7%	24.1%	24.1%	24.1%	20.2%	20.2%	20.2%	20.2%	20.2%	19.7%	19.7%	17.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.707	0.906	0.906	0.892	0.892	0.892	0.908	0.908	0.908	0.908	0.908	0.910	0.910	0.919
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	10,515	8,206	8,206	6,532	7,606	8,798	8,645	8,645	8,022	7,893	8,901	8,880	8,880	4,934
GP Flow (pcphpl)	2,629	2,051	2,051	1,633	1,902	2,200	2,161	2,161	2,006	1,973	2,225	2,220	2,220	1,645
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	1.12	0.87	0.87	0.69	0.81	0.94	0.90	0.90	0.84	0.82	0.93	0.93	0.93	0.69
Speed (mph)	-	59.0	59.0	64.2	61.4	55.9	59.3	59.3	62.5	63.1	57.8	57.9	57.9	67.7
Density (pcphpl)	-	34.8	34.8	25.4	31.0	39.3	36.5	36.5	32.1	31.3	38.5	38.3	38.3	24.3
LOS	F	D	D	C	D	E	E	E	D	D	E	E	E	C
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			8,206		6,605	7,675		8,645	8,022		7,890			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.87		0.70	0.82		0.90	0.84		0.82			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			6,505		7,606	8,798		8,018	7,881		8,901		4,849	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.69		0.81	0.94		0.84	0.82		0.93		0.67	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					901	1,000					860			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.4%	6.6%					16.3%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _W					0.978	0.968					0.925			
f _p					1.00	1.00					1.00			
On Flow (pcph)					1,001	1,123					1,011			
On Flow (pcphpl)					1,001	1,123					1,011			

Fehr & Peers

Fehr & Peers

Location	1

Key	
<=> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	3,338
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	3,338
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.2%
RV %	0.0%
E _T	1.5
E _B	1.2
f _{WV}	0.900
f _p	1.00
GP Flow (pcph)	3,945
GP Flow (pcphpl)	1,973
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.82
Speed (mph)	63.1
Density (pcphpl)	31.3
LOS	D
Calculate Operations for Entering GP Lanes	
GP _{in} Vol (pcph)	
GP _{in} Cap (pcph)	
GP _{in} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{out} Vol (pcph)	
GP _{out} Cap (pcph)	
GP _{out} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segmen	
Calculate On Ramp to Mainline Flow Rate for Weave Segmen	
Calculate Mainline to Off Ramp Flow Rate for Weave Segmen	
Calculate General Purpose Lanes to General Purpose Lanes	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.82
Segment Density	31.3
Segment LOS	D
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
↔ Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	4,561	4,561	4,081	3,851	3,851	6,501	6,731	7,756	7,756	6,869	6,256	6,256
On Ramp Volume					2,650	230	1,025					739
Off Ramp Volume		480	230						887	613		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	4,561	4,561	4,081	3,851	6,501	6,731	7,756	7,756	7,756	6,869	6,256	6,995
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	15.3%	15.3%	5.6%	0.0%	0.0%	4.2%	7.4%	21.1%	21.1%	21.1%	22.7%	22.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _B	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
t _{lv}	0.929	0.929	0.973	1.000	1.000	0.980	0.964	0.905	0.905	0.905	0.898	0.898
t _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	5,169	5,169	4,417	4,054	6,843	7,232	8,467	9,026	9,026	7,993	7,333	8,199
GP Flow (pcphpl)	1,723	1,723	1,472	2,027	1,711	1,446	1,693	1,805	1,805	1,998	1,833	2,050
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
t _{lv}												
t _c												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.73	0.73	0.63	0.86	0.73	0.62	0.72	0.77	0.77	0.85	0.78	0.87
Speed (mph)	63.5	63.5	64.9	59.4	63.6	65.0	63.8	62.7	62.7	59.9	62.3	59.0
Density (pcphpl)	27.1	27.1	22.7	34.1	26.9	22.3	26.6	28.8	28.8	33.3	29.4	34.7
LOS	D	D	C	D	D	C	D	D	D	D	D	D
Calculate Operations for Entering GP Lanes												
GP _{IN} Vol (pcph)		5,169			3,816	6,857	6,796			7,993		7,346
GP _{IN} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{IN} v/c ratio		0.73			0.81	0.73	0.58			0.85		0.78
Calculate Operations for Exiting GP Lanes												
GP _{OUT} Vol (pcph)		4,387	4,042				8,467		8,000	7,279		8,199
GP _{OUT} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{OUT} v/c ratio		0.62	0.86				0.72		0.85	0.77		0.87
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,650	230	1,025					739
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					10.2%	100.0%	100.0%					12.3%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _B					1.2	1.2	1.2					1.2
t _{lv}					0.952	0.667	0.667					0.942
t _p					1.00	1.00	1.00					1.00
On Flow (pcph)					3,027	375	1,671					853
On Flow (pcphpl)					1,514	375	1,671					853

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
↔ Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.63	0.17	0.76					0.41
Calculate Off Ramp Flow Rate												
Off Volume (vph)		480	230						887	613		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						12.7%	14.3%		
RV %		0.0%	0.0%						0.0%	0.0%		
E _T		1.5	1.5						1.5	1.5		
E _R		1.2	1.2						1.2	1.2		
t _{tr}		0.667	0.667						0.940	0.933		
t _b		1.00	1.00						1.00	1.00		
Off Flow (pcph)		783	375						1,025	714		
Off Flow (pcphpl)		783	375						1,025	714		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.37	0.18						0.49	0.38		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			783									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		375										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							4,961					7,346
Up Ramp L _{EQ}												
Down Ramp L _{EQ}												
P _{RU} (Eqn 13-3)							0.606					0.593
P _{RU} (Eqn 13-4)												
P _{RU} (Eqn 13-5)												
P _{RU}							0.009					0.111
v _{U2} (pcph)							44					817
v _U (pcph)												
v _{RU} (pcph)							4,917					6,529
v _{RU} (pcph)							1,985					2,938
v _{RU2} (pcph)							3,656					3,791
Merge Speed Index							0.36					0.44
Merge Area Speed							56.7					54.8
Outer Lanes Volume							1,488					2,204
Outer Lanes Speed							61.4					58.9
Segment Speed							58.7					56.9
Merge v/c ratio							0.79					0.82
Merge Density							27.0					31.1
Merge LOS							C					D
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		5,169								7,993		
Up Ramp L _{EQ}												
Down Ramp L _{EQ}		539										
P _{RD} (Eqn 13-9)		0.595								0.527		
P _{RD} (Eqn 13-10)												
P _{RD} (Eqn 13-11)		0.554										
P _{RD}		0.595								0.436		
v _{U2} (pcph)		3,392								3,888		
v _U (pcph)		1,778										
v _{RU} (pcph)										4,106		
v _{RU2} (pcph)		3,392								3,888		
Diverge Speed Index		0.37								0.69		
Diverge Area Speed		56.5								49.2		
Outer Lanes Volume		1,778								2,053		
Outer Lanes Speed		68.3								67.2		
Segment Speed		60.1								57.0		
Diverge v/c ratio		0.77								0.88		
Diverge Density		32.1								36.2		
Diverge LOS		D								E		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segment												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.73	0.77	0.63	0.86	0.73	0.62	0.79	0.77	0.77	0.88	0.78	0.82
Segment Density	27.1	32.1	22.7	34.1	26.9	22.3	27.0	28.8	28.8	36.2	29.4	31.1
Segment LOS	D	D	C	D	D	C	C	D	D	E	D	D
Over Capacity												

Fehr & Peers

Fehr & Peers

Fehr & Peers























Appendix J
Scenario 2 - AM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary

1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Sceanrio 2 Project Conditions

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	10	610	10	10	100	505	330	10	10	90	270	20
Future Volume (veh/h)	10	610	10	10	100	505	330	10	10	90	270	20
Number	5	2	12		1	6	16	3	8	18	7	4
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1566	1900		1739	1520	1845	1863	1726	1900	1827	1723
Adj Flow Rate, veh/h	11	663	10		109	549	147	11	11	0	316	0
Adj No. of Lanes	1	2	0		2	3	1	1	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	20	20		10	25	3	2	2	2	4	2
Cap, veh/h	20	972	15		373	1733	651	73	71	0	643	318
Arrive On Green	0.02	0.32	0.32		0.12	0.42	0.42	0.04	0.04	0.00	0.18	0.00
Sat Flow, veh/h	905	3001	45		3213	4150	1559	1774	1726	0	3480	1723
Grp Volume(v), veh/h	11	329	344		109	549	147	11	11	0	316	0
Grp Sat Flow(s),veh/h/ln	905	1488	1558		1606	1383	1559	1774	1726	0	1740	1723
Q Serve(g_s), s	0.7	10.8	10.8		1.7	5.0	3.4	0.3	0.3	0.0	4.6	0.0
Cycle Q Clear(g_c), s	0.7	10.8	10.8		1.7	5.0	3.4	0.3	0.3	0.0	4.6	0.0
Prop In Lane	1.00		0.03		1.00		1.00	1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	20	482	505		373	1733	651	73	71	0	643	318
V/C Ratio(X)	0.54	0.68	0.68		0.29	0.32	0.23	0.15	0.15	0.00	0.49	0.00
Avail Cap(c_a), veh/h	259	874	916		462	1849	695	252	245	0	1359	673
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	27.2	16.5	16.5		22.8	11.0	10.5	26.0	26.0	0.0	20.6	0.0
Incr Delay (d2), s/veh	13.0	2.4	2.3		0.3	0.1	0.2	0.6	0.6	0.0	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.7	4.9		0.8	1.9	1.5	0.2	0.2	0.0	2.3	0.0
LnGrp Delay(d),s/veh	40.2	18.9	18.8		23.0	11.2	10.8	26.6	26.7	0.0	21.7	0.0
LnGrp LOS	D	B	B		C	B	B	C	C		C	
Approach Vol, veh/h		684				805			22			316
Approach Delay, s/veh		19.2				12.7			26.6			21.7
Approach LOS		B				B			C			C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	24.1		14.4	6.2	29.4		6.3				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	33.1		22.0	16.1	25.1		8.0				
Max Q Clear Time (g_c+I1), s	3.7	12.8		6.6	2.7	7.0		2.3				
Green Ext Time (p_c), s	0.1	5.3		2.0	0.0	5.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			16.9									
HCM 2010 LOS			B									
Notes												

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	10
Future Volume (veh/h)	10
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	0
Adj No. of Lanes	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	0
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	0
V/C Ratio(X)	0.00
Avail Cap(c_a), veh/h	0
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	












User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary

2: I-5 Southbound Ramps & Laval Road

Cumulative Plus Sceanrio 2 Project Conditions

AM Peak Hour

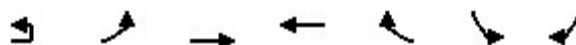
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	570	410	10	270	471	0		
Future Volume (veh/h)	570	410	10	270	471	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1743	1624	1863	1652	1545	0		
Adj Flow Rate, veh/h	613	0	11	290	506	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	9	17	2	15	23	0		
Cap, veh/h	732	608	30	1197	875	0		
Arrive On Green	0.44	0.00	0.02	0.38	0.30	0.00		
Sat Flow, veh/h	1660	1380	1774	3222	3089	0		
Grp Volume(v), veh/h	613	0	11	290	506	0		
Grp Sat Flow(s),veh/h/ln	1660	1380	1774	1570	1467	0		
Q Serve(g_s), s	18.2	0.0	0.3	3.5	8.1	0.0		
Cycle Q Clear(g_c), s	18.2	0.0	0.3	3.5	8.1	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	732	608	30	1197	875	0		
V/C Ratio(X)	0.84	0.00	0.37	0.24	0.58	0.00		
Avail Cap(c_a), veh/h	1086	903	191	2504	1793	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	13.8	0.0	27.1	11.7	16.6	0.0		
Incr Delay (d2), s/veh	6.0	0.0	7.4	0.2	1.6	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	9.4	0.0	0.2	1.5	3.5	0.0		
LnGrp Delay(d),s/veh	19.8	0.0	34.4	11.9	18.2	0.0		
LnGrp LOS	B		C	B	B			
Approach Vol, veh/h	613			301	506			
Approach Delay, s/veh	19.8			12.8	18.2			
Approach LOS	B			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		26.5		29.1	4.6	21.9		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 44		36.4	6.0	34.0		
Max Q Clear Time (g_c+I1), s		5.5		20.2	2.3	10.1		
Green Ext Time (p_c), s		3.5		4.3	0.0	6.4		
Intersection Summary								
HCM 2010 Ctrl Delay			17.7					
HCM 2010 LOS			B					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Sceanrio 2 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

AM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	20	330	1446	661	390	0	140
Future Volume (vph)	20	330	1446	661	390	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3142	4673	3085	1352		1442
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3142	4673	3085	1352		1442
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	351	1538	703	415	0	149
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1538	703	415	0	149
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	12%	11%	17%	18%	2%	14%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		10.8	40.5	20.0	40.5		40.5
Effective Green, g (s)		10.8	40.5	20.0	40.5		40.5
Actuated g/C Ratio		0.27	1.00	0.49	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		837	4673	1523	1352		1442
v/s Ratio Prot		c0.12	0.33	c0.23			
v/s Ratio Perm					0.31		0.10
v/c Ratio		0.44	0.33	0.46	0.31		0.10
Uniform Delay, d1		12.4	0.0	6.7	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.2	0.6	0.6		0.1
Delay (s)		12.5	0.2	7.4	0.6		0.1
Level of Service		B	A	A	A		A
Approach Delay (s)			2.6	4.8		0.1	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.3		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.46				
Actuated Cycle Length (s)			40.5		Sum of lost time (s)		9.7
Intersection Capacity Utilization			36.6%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road






Cumulative Plus Sceanrio 2 Project Conditions

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	10	10	30	10	490	10	291	10	40	791	475	10
Future Volume (veh/h)	10	10	30	10	490	10	291	10	40	791	475	10
Number	5	2	12		1	6	16		3	8	18	
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1863	950	1863		1863	1667	1900		1863	1583	1863	
Adj Flow Rate, veh/h	11	11	0		533	11	49		43	860	173	
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	
Percent Heavy Veh, %	2	100	2		2	100	100		2	20	2	
Cap, veh/h	29	21	34		645	51	228		82	1594	582	
Arrive On Green	0.02	0.02	0.00		0.19	0.19	0.19		0.05	0.37	0.37	
Sat Flow, veh/h	1774	950	1583		3442	265	1182		1774	4323	1577	
Grp Volume(v), veh/h	11	11	0		533	0	60		43	860	173	
Grp Sat Flow(s),veh/h/ln	1774	950	1583		1721	0	1447		1774	1441	1577	
Q Serve(g_s), s	0.5	0.9	0.0		12.0	0.0	2.8		1.9	12.6	6.3	
Cycle Q Clear(g_c), s	0.5	0.9	0.0		12.0	0.0	2.8		1.9	12.6	6.3	
Prop In Lane	1.00		1.00		1.00		0.82		1.00		1.00	
Lane Grp Cap(c), veh/h	29	21	34		645	0	279		82	1594	582	
V/C Ratio(X)	0.38	0.53	0.00		0.83	0.00	0.21		0.53	0.54	0.30	
Avail Cap(c_a), veh/h	161	134	223		1169	0	563		335	3446	1257	
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	
Uniform Delay (d), s/veh	39.1	38.9	0.0		31.4	0.0	27.3		37.5	20.0	18.0	
Incr Delay (d2), s/veh	5.0	32.2	0.0		1.7	0.0	0.2		3.2	0.6	0.6	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.3	0.4	0.0		5.9	0.0	1.1		1.0	5.1	2.8	
LnGrp Delay(d),s/veh	44.1	71.1	0.0		33.1	0.0	27.6		40.7	20.5	18.5	
LnGrp LOS	D	E			C		C		D	C	B	
Approach Vol, veh/h		22				593				1076		
Approach Delay, s/veh		57.6				32.6				21.0		
Approach LOS		E				C				C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.8	7.4	7.9	45.3	6.0	21.2	18.6	34.6				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 27	11.3	* 15	76.7	* 7.3	31.3	28.0	64.1				
Max Q Clear Time (g_c+I1), s	14.0	2.9	3.9	9.3	2.5	4.8	14.4	14.6				
Green Ext Time (p_c), s	1.1	0.0	0.0	7.7	0.0	0.2	0.3	15.1				
Intersection Summary												
HCM 2010 Ctrl Delay			23.6									
HCM 2010 LOS			C									
Notes												

HCM 2010 Signalized Intersection Summary 4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Sceanrio 2 Project Conditions
AM Peak Hour

			
Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	221	521	10
Future Volume (veh/h)	221	521	10
Number	7	4	14
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1594	1336	1900
Adj Flow Rate, veh/h	240	566	10
Adj No. of Lanes	1	3	0
Peak Hour Factor	0.92	0.92	0.92
Percent Heavy Veh, %	20	43	43
Cap, veh/h	276	1854	33
Arrive On Green	0.18	0.50	0.50
Sat Flow, veh/h	1518	3691	65
Grp Volume(v), veh/h	240	372	204
Grp Sat Flow(s),veh/h/ln	1518	1216	1324
Q Serve(g_s), s	12.4	7.2	7.3
Cycle Q Clear(g_c), s	12.4	7.2	7.3
Prop In Lane	1.00		0.05
Lane Grp Cap(c), veh/h	276	1221	665
V/C Ratio(X)	0.87	0.30	0.31
Avail Cap(c_a), veh/h	529	2320	1263
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.0	11.8	11.8
Incr Delay (d2), s/veh	5.2	0.3	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	2.5	2.7
LnGrp Delay(d),s/veh	37.2	12.0	12.3
LnGrp LOS	D	B	B
Approach Vol, veh/h		816	
Approach Delay, s/veh		19.5	
Approach LOS		B	
Timer			

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.3
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	5.2	0.0	0.0	1.3
Total Delay (hr)	0.9	0.0	0.3	0.0	5.3	2.1	0.0	8.7
Total Del/Veh (s)	17.6	2.3	7.6	21.3	96.0	42.6	5.3	42.7
Stop Delay (hr)	0.6	0.0	0.1	0.0	5.2	1.8	0.0	7.8
Stop Del/Veh (s)	12.0	0.3	3.5	18.3	93.8	36.1	2.8	38.1
Total Stops	105	0	73	5	211	166	2	562
Stop/Veh	0.54	0.00	0.50	0.62	1.06	0.93	0.20	0.76
Travel Dist (mi)	24.9	0.2	18.8	0.6	16.1	16.3	0.8	77.6
Travel Time (hr)	1.9	0.0	1.1	0.1	6.3	2.7	0.0	12.1
Avg Speed (mph)	13	17	17	9	3	6	20	7
Fuel Used (gal)	1.2	0.0	0.7	0.0	1.7	1.0	0.0	4.7
Fuel Eff. (mpg)	21.2	11.8	25.4	16.1	9.3	16.5	20.8	16.4
HC Emissions (g)	62	4	31	5	33	29	7	171
CO Emissions (g)	1315	73	769	84	558	552	119	3470
NOx Emissions (g)	168	11	87	12	58	64	17	418
Vehicles Entered	187	3	141	8	177	167	10	693
Vehicles Exited	185	3	141	8	176	165	10	688
Hourly Exit Rate	740	12	564	32	704	660	40	2752
Input Volume	1040	15	777	58	1448	706	45	4089
% of Volume	71	80	73	55	49	93	89	67
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0	0	1
Density (ft/veh)								106
Occupancy (veh)	8	0	4	0	24	11	0	47

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.5	0.4	0.0	0.0	44.2	41.7	86.7
Denied Del/Veh (s)	6.0	17.0	0.0	0.2	360.3	356.3	217.0
Total Delay (hr)	6.9	1.2	0.9	0.1	2.6	3.7	15.5
Total Del/Veh (s)	82.4	52.1	22.2	5.5	39.5	58.8	51.4
Stop Delay (hr)	5.6	1.0	0.7	0.0	0.8	1.6	9.6
Stop Del/Veh (s)	66.0	43.6	16.0	0.2	11.7	25.6	31.8
Total Stops	464	58	125	0	136	180	963
Stop/Veh	1.53	0.72	0.84	0.00	0.57	0.80	0.89
Travel Dist (mi)	37.4	9.5	27.1	14.7	221.5	208.3	518.3
Travel Time (hr)	8.7	1.9	1.8	0.6	52.0	50.3	115.4
Avg Speed (mph)	5	6	15	26	28	24	18
Fuel Used (gal)	3.0	0.7	1.2	0.5	16.4	15.4	37.1
Fuel Eff. (mpg)	12.5	14.0	22.2	31.5	13.5	13.6	14.0
HC Emissions (g)	89	41	52	25	732	541	1481
CO Emissions (g)	1469	662	1276	522	12057	8748	24734
NOx Emissions (g)	173	73	139	70	1558	1141	3154
Vehicles Entered	272	74	140	85	204	194	969
Vehicles Exited	270	73	144	84	207	188	966
Hourly Exit Rate	1080	292	576	336	828	752	3864
Input Volume	1703	476	554	672	1343	1276	6024
% of Volume	63	61	104	50	62	59	64
Denied Entry Before	1	1	0	0	109	107	218
Denied Entry After	3	2	0	0	238	227	470
Density (ft/veh)							194
Occupancy (veh)	33	6	7	2	31	35	114

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.6	0.0	0.2	0.5	0.3	0.3
Total Delay (hr)	1.5	1.1	0.5	1.7	1.4	0.7	6.8
Total Del/Veh (s)	21.4	14.0	17.3	17.7	33.1	13.6	18.7
Stop Delay (hr)	0.9	0.1	0.2	0.2	0.8	0.4	2.6
Stop Del/Veh (s)	13.1	0.7	6.4	1.7	20.8	7.9	7.1
Total Stops	151	52	59	111	119	109	601
Stop/Veh	0.61	0.19	0.57	0.32	0.81	0.57	0.46
Travel Dist (mi)	44.6	46.1	20.9	68.0	92.5	120.4	392.5
Travel Time (hr)	2.9	2.5	1.2	3.9	3.6	3.7	17.8
Avg Speed (mph)	15	19	18	17	26	33	22
Fuel Used (gal)	2.1	1.7	1.0	2.5	2.4	3.0	12.7
Fuel Eff. (mpg)	21.5	26.8	21.2	27.4	38.2	39.8	30.9
HC Emissions (g)	122	59	67	62	119	201	630
CO Emissions (g)	2431	1220	1407	1425	2337	4014	12834
NOx Emissions (g)	334	176	180	188	344	576	1798
Vehicles Entered	236	260	98	327	135	175	1231
Vehicles Exited	240	264	99	323	133	175	1234
Hourly Exit Rate	960	1056	396	1292	532	700	4936
Input Volume	1429	1679	747	2465	541	727	7588
% of Volume	67	63	53	52	98	96	65
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							244
Occupancy (veh)	12	10	5	16	14	15	71

SimTraffic Performance Report
Cumulative Plus Scenario 2 Project Conditions

AM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.6	0.5	0.5	0.1	0.1	0.1	0.2	0.1	0.1
Total Delay (hr)	2.3	0.7	0.1	0.8	83.7	2.0	14.3	0.1	0.0	0.1	0.1	26.5
Total Del/Veh (s)	47.6	12.5	6.2	341.4	393.5	362.8	384.3	58.4	8.7	51.4	122.0	326.1
Stop Delay (hr)	2.0	0.4	0.0	0.8	83.5	2.0	14.1	0.1	0.0	0.1	0.1	24.8
Stop Del/Veh (s)	39.9	7.6	2.0	339.6	392.5	368.2	378.5	54.3	8.5	47.2	93.1	304.9
Total Stops	132	53	19	7	646	18	142	3	3	6	5	312
Stop/Veh	0.75	0.28	0.31	0.88	0.84	0.90	1.06	0.75	0.75	1.00	1.67	1.06
Travel Dist (mi)	34.5	38.8	12.9	7.8	734.8	19.7	41.8	1.8	2.0	3.8	1.8	113.9
Travel Time (hr)	3.5	1.9	0.5	1.0	105.0	2.6	15.6	0.1	0.1	0.2	0.2	30.0
Avg Speed (mph)	10	21	24	8	7	8	3	15	28	19	12	4
Fuel Used (gal)	1.8	1.6	0.5	0.3	34.9	0.9	4.2	0.1	0.0	0.1	0.1	8.7
Fuel Eff. (mpg)	19.6	24.3	27.1	23.3	21.1	22.3	10.0	31.1	42.0	31.6	27.3	13.0
HC Emissions (g)	72	90	24	1	677	13	82	2	0	6	2	267
CO Emissions (g)	1498	1888	534	35	11889	258	1397	45	7	114	45	4397
NOx Emissions (g)	186	247	68	4	1505	33	134	6	1	17	5	461
Vehicles Entered	160	180	61	5	477	13	94	3	4	5	3	213
Vehicles Exited	155	180	59	2	226	5	55	4	3	6	2	124
Hourly Exit Rate	620	720	236	8	904	20	220	16	12	24	8	496
Input Volume	813	936	322	21	1894	53	396	11	11	21	11	847
% of Volume	76	77	73	38	48	38	56	145	109	114	73	59
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	14	8	2	4	420	10	62	0	0	1	1	120

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.2
Total Delay (hr)	130.7
Total Del/Veh (s)	283.0
Stop Delay (hr)	127.8
Stop Del/Veh (s)	276.7
Total Stops	1346
Stop/Veh	0.81
Travel Dist (mi)	1013.5
Travel Time (hr)	160.6
Avg Speed (mph)	6
Fuel Used (gal)	53.1
Fuel Eff. (mpg)	19.1
HC Emissions (g)	1236
CO Emissions (g)	22106
NOx Emissions (g)	2667
Vehicles Entered	1218
Vehicles Exited	821
Hourly Exit Rate	3284
Input Volume	5336
% of Volume	62
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	116
Occupancy (veh)	642

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.6	0.3	0.1	0.0	0.1	0.1	0.2
Total Delay (hr)	0.1	0.1	0.6	0.1	0.4	0.0	1.3
Total Del/Veh (s)	47.0	4.4	51.7	2.4	11.7	1.6	13.5
Stop Delay (hr)	0.1	0.1	0.6	0.0	0.3	0.0	1.0
Stop Del/Veh (s)	45.1	3.8	48.0	1.4	7.2	1.4	10.9
Total Stops	6	40	35	9	40	0	130
Stop/Veh	0.86	0.77	0.78	0.08	0.30	0.00	0.37
Travel Dist (mi)	1.5	11.6	3.9	9.9	61.6	0.9	89.4
Travel Time (hr)	0.1	0.5	0.8	0.5	2.2	0.0	4.2
Avg Speed (mph)	11	25	5	21	28	32	22
Fuel Used (gal)	0.1	0.3	0.3	0.6	1.6	0.0	2.9
Fuel Eff. (mpg)	26.5	42.0	11.7	16.9	37.8	45.0	30.8
HC Emissions (g)	0	8	7	31	94	0	140
CO Emissions (g)	13	171	189	804	1582	3	2762
NOx Emissions (g)	1	22	19	84	264	0	390
Vehicles Entered	7	50	41	107	125	2	332
Vehicles Exited	7	50	42	106	123	2	330
Hourly Exit Rate	28	200	168	424	492	8	1320
Input Volume	21	207	241	580	520	11	1580
% of Volume	133	97	70	73	95	73	84
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							554
Occupancy (veh)	1	2	3	2	9	0	17

10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.3	0.1	1.0	22.2	0.0	0.0	23.5
Denied Del/Veh (s)	14.1	17.6	251.2	252.9	0.0	0.0	141.6
Total Delay (hr)	7.0	0.9	0.7	24.0	0.1	0.0	32.8
Total Del/Veh (s)	316.0	270.8	295.1	359.5	2.3	2.4	218.4
Stop Delay (hr)	7.0	0.9	0.7	24.3	0.1	0.0	33.0
Stop Del/Veh (s)	313.9	268.9	298.3	364.3	1.2	0.7	219.8
Total Stops	74	13	10	141	10	4	252
Stop/Veh	0.92	1.08	1.11	0.59	0.06	0.11	0.47
Travel Dist (mi)	12.1	2.0	1.6	40.3	15.1	3.3	74.4
Travel Time (hr)	7.7	1.0	1.8	47.3	0.7	0.2	58.7
Avg Speed (mph)	2	2	2	2	20	18	2
Fuel Used (gal)	1.9	0.3	0.4	11.5	0.7	0.1	15.0
Fuel Eff. (mpg)	6.3	7.3	3.6	3.5	20.7	23.9	5.0
HC Emissions (g)	51	3	0	186	38	11	290
CO Emissions (g)	811	73	34	3001	830	202	4950
NOx Emissions (g)	64	5	2	206	107	29	414
Vehicles Entered	62	10	6	144	157	33	412
Vehicles Exited	42	6	6	138	157	33	382
Hourly Exit Rate	168	24	24	552	628	132	1528
Input Volume	266	42	53	1214	875	189	2639
% of Volume	63	57	45	45	72	70	58
Denied Entry Before	0	0	0	9	0	0	9
Denied Entry After	4	1	8	172	0	0	185
Density (ft/veh)							61
Occupancy (veh)	30	4	3	101	3	1	141





















Appendix K
Scenario 2 - PM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary

1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Scenario 2 Project Conditions

PM Peak Hour

												
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	10	580	10	10	150	1140	290	10	20	150	330
Future Volume (veh/h)	10	10	580	10	10	150	1140	290	10	20	150	330
Number		5	2	12		1	6	16	3	8	18	7
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		0.99	1.00		0.99	1.00
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1258	1628	1900		1781	1638	1827	1863	1786	1900	1845
Adj Flow Rate, veh/h		11	630	10		163	1239	117	11	22	5	391
Adj No. of Lanes		1	2	0		2	3	1	1	1	0	2
Peak Hour Factor		0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %		100	17	17		7	16	4	2	2	2	3
Cap, veh/h		27	1071	17		391	1970	680	109	87	20	630
Arrive On Green		0.02	0.34	0.34		0.12	0.44	0.44	0.06	0.06	0.06	0.18
Sat Flow, veh/h		1198	3115	49		3291	4472	1544	1774	1405	319	3514
Grp Volume(v), veh/h		11	313	327		163	1239	117	11	0	27	391
Grp Sat Flow(s),veh/h/ln		1198	1546	1619		1645	1491	1544	1774	0	1725	1757
Q Serve(g_s), s		0.6	10.5	10.6		2.9	13.6	2.9	0.4	0.0	0.9	6.5
Cycle Q Clear(g_c), s		0.6	10.5	10.6		2.9	13.6	2.9	0.4	0.0	0.9	6.5
Prop In Lane		1.00		0.03		1.00		1.00	1.00		0.19	1.00
Lane Grp Cap(c), veh/h		27	532	557		391	1970	680	109	0	106	630
V/C Ratio(X)		0.41	0.59	0.59		0.42	0.63	0.17	0.10	0.00	0.25	0.62
Avail Cap(c_a), veh/h		193	980	1026		420	2686	927	445	0	432	1219
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		30.6	17.1	17.1		25.9	13.7	10.7	28.1	0.0	28.4	24.0
Incr Delay (d2), s/veh		6.1	1.5	1.4		0.4	0.5	0.2	0.2	0.0	0.8	2.0
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.2	4.7	4.9		1.3	5.6	1.3	0.2	0.0	0.5	3.3
LnGrp Delay(d),s/veh		36.7	18.6	18.5		26.3	14.2	10.9	28.4	0.0	29.1	26.0
LnGrp LOS		D	B	B		C	B	B	C		C	C
Approach Vol, veh/h			651				1519			38		
Approach Delay, s/veh			18.9				15.3			28.9		
Approach LOS			B				B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.4	27.7		15.4	6.3	33.9		7.9				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	40.2		22.0	10.2	38.1		15.9				
Max Q Clear Time (g_c+I1), s	4.9	12.6		8.5	2.6	15.6		2.9				
Green Ext Time (p_c), s	0.1	5.5		2.4	0.0	12.4		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			18.0									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary 1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Scenario 2 Project Conditions
PM Peak Hour

	↓	↙
Movement	SBT	SBR
Lane Configurations	↕	
Traffic Volume (veh/h)	20	20
Future Volume (veh/h)	20	20
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		1.00
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1900
Adj Flow Rate, veh/h	0	0
Adj No. of Lanes	1	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	2	2
Cap, veh/h	315	0
Arrive On Green	0.00	0.00
Sat Flow, veh/h	1759	0
Grp Volume(v), veh/h	0	0
Grp Sat Flow(s),veh/h/ln	1759	0
Q Serve(g_s), s	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0
Prop In Lane		0.00
Lane Grp Cap(c), veh/h	315	0
V/C Ratio(X)	0.00	0.00
Avail Cap(c_a), veh/h	610	0
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0
LnGrp LOS		
Approach Vol, veh/h	391	
Approach Delay, s/veh	26.0	
Approach LOS	C	
Timer		












User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary

2: I-5 Southbound Ramps & Laval Road

Cumulative Plus Scenario 2 Project Conditions

PM Peak Hour

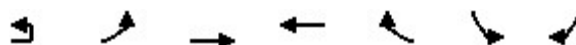
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	770	300	10	685	534	0		
Future Volume (veh/h)	770	300	10	685	534	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1712	1681	1863	1652	1667	0		
Adj Flow Rate, veh/h	828	0	11	737	574	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	11	13	2	15	14	0		
Cap, veh/h	919	806	28	1045	882	0		
Arrive On Green	0.56	0.00	0.02	0.33	0.28	0.00		
Sat Flow, veh/h	1630	1429	1774	3222	3333	0		
Grp Volume(v), veh/h	828	0	11	737	574	0		
Grp Sat Flow(s),veh/h/ln	1630	1429	1774	1570	1583	0		
Q Serve(g_s), s	43.2	0.0	0.6	19.6	15.3	0.0		
Cycle Q Clear(g_c), s	43.2	0.0	0.6	19.6	15.3	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	919	806	28	1045	882	0		
V/C Ratio(X)	0.90	0.00	0.39	0.71	0.65	0.00		
Avail Cap(c_a), veh/h	1388	1217	111	1934	1607	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	18.5	0.0	46.7	27.9	30.5	0.0		
Incr Delay (d2), s/veh	8.2	0.0	8.6	1.8	2.1	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	21.4	0.0	0.4	8.8	7.0	0.0		
LnGrp Delay(d),s/veh	26.8	0.0	55.3	29.7	32.6	0.0		
LnGrp LOS	C		E	C	C			
Approach Vol, veh/h	828			748	574			
Approach Delay, s/veh	26.8			30.1	32.6			
Approach LOS	C			C	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		37.2		58.7	5.2	32.0		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 59		81.7	6.0	48.7		
Max Q Clear Time (g_c+I1), s		21.6		45.2	2.6	17.3		
Green Ext Time (p_c), s		10.3		8.9	0.0	8.2		
Intersection Summary								
HCM 2010 Ctrl Delay			29.5					
HCM 2010 LOS			C					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Scenario 2 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

PM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↗		↗
Traffic Volume (vph)	30	320	1729	994	540	0	110
Future Volume (vph)	30	320	1729	994	540	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3125	4590	3312	1340		1208
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3125	4590	3312	1340		1208
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	340	1839	1057	574	0	117
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1839	1057	574	0	117
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	13%	13%	9%	19%	2%	36%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		11.5	50.3	29.1	50.3		50.3
Effective Green, g (s)		11.5	50.3	29.1	50.3		50.3
Actuated g/C Ratio		0.23	1.00	0.58	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		714	4590	1916	1340		1208
v/s Ratio Prot		0.12	0.40	c0.32			
v/s Ratio Perm					c0.43		0.10
v/c Ratio		0.52	0.40	0.55	0.43		0.10
Uniform Delay, d1		17.0	0.0	6.6	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.3	0.3	0.8	1.0		0.2
Delay (s)		17.3	0.3	7.3	1.0		0.2
Level of Service		B	A	A	A		A
Approach Delay (s)			3.1	5.1		0.2	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.9		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.56				
Actuated Cycle Length (s)			50.3		Sum of lost time (s)		9.7
Intersection Capacity Utilization			45.8%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Scenario 2 Project Conditions

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	40	60	10	770	40	374	10	70	584	695	444
Future Volume (veh/h)	10	40	60	10	770	40	374	10	70	584	695	444
Number	5	2	12		1	6	16		3	8	18	7
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00		1.00		0.99	1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863		1863	1684	1900		1863	1338	1863	1652
Adj Flow Rate, veh/h	11	43	0		837	43	129		76	635	171	483
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2		2	42	2	15
Cap, veh/h	28	103	88		943	116	349		98	919	396	358
Arrive On Green	0.02	0.06	0.00		0.27	0.31	0.31		0.06	0.25	0.25	0.23
Sat Flow, veh/h	1774	1863	1583		3442	370	1111		1774	3653	1574	1573
Grp Volume(v), veh/h	11	43	0		837	0	172		76	635	171	483
Grp Sat Flow(s),veh/h/ln	1774	1863	1583		1721	0	1481		1774	1218	1574	1573
Q Serve(g_s), s	0.6	2.3	0.0		23.6	0.0	9.1		4.3	15.9	9.2	23.0
Cycle Q Clear(g_c), s	0.6	2.3	0.0		23.6	0.0	9.1		4.3	15.9	9.2	23.0
Prop In Lane	1.00		1.00		1.00		0.75		1.00		1.00	1.00
Lane Grp Cap(c), veh/h	28	103	88		943	0	465		98	919	396	358
V/C Ratio(X)	0.39	0.42	0.00		0.89	0.00	0.37		0.78	0.69	0.43	1.35
Avail Cap(c_a), veh/h	141	190	162		2090	0	933		207	1306	563	358
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.2	46.1	0.0		35.2	0.0	26.9		47.1	34.2	31.7	39.0
Incr Delay (d2), s/veh	5.4	4.5	0.0		1.9	0.0	0.3		7.9	1.8	1.4	173.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.3	0.0		11.4	0.0	3.8		2.3	5.5	4.2	27.3
LnGrp Delay(d),s/veh	54.6	50.6	0.0		37.1	0.0	27.2		55.0	36.1	33.2	212.8
LnGrp LOS	D	D			D		C		D	D	C	F
Approach Vol, veh/h	54			1009			882					
Approach Delay, s/veh	51.4			35.4			37.1					
Approach LOS	D			D			D					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	32.4	11.3	9.8	47.5	6.3	37.4	27.0	30.3				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 61	10.3	* 12	47.1	* 8	63.6	23.0	36.1				
Max Q Clear Time (g_c+I1), s	25.6	4.3	6.3	15.6	2.6	11.1	25.0	17.9				
Green Ext Time (p_c), s	2.1	0.1	0.0	9.4	0.0	0.8	0.0	7.5				
Intersection Summary												
HCM 2010 Ctrl Delay	59.7											
HCM 2010 LOS	E											
Notes												

HCM 2010 Signalized Intersection Summary 4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Scenario 2 Project Conditions
PM Peak Hour

	↓	↙
Movement	SBT	SBR
Lane Configurations	↑↑↑	
Traffic Volume (veh/h)	694	10
Future Volume (veh/h)	694	10
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		0.99
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1433	1900
Adj Flow Rate, veh/h	754	10
Adj No. of Lanes	3	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	33	33
Cap, veh/h	1681	22
Arrive On Green	0.42	0.42
Sat Flow, veh/h	3980	53
Grp Volume(v), veh/h	494	270
Grp Sat Flow(s),veh/h/ln	1304	1424
Q Serve(g_s), s	13.6	13.6
Cycle Q Clear(g_c), s	13.6	13.6
Prop In Lane		0.04
Lane Grp Cap(c), veh/h	1102	601
V/C Ratio(X)	0.45	0.45
Avail Cap(c_a), veh/h	1217	664
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	1.00	1.00
Uniform Delay (d), s/veh	20.8	20.8
Incr Delay (d2), s/veh	0.6	1.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	5.5
LnGrp Delay(d),s/veh	21.3	21.8
LnGrp LOS	C	C
Approach Vol, veh/h	1247	
Approach Delay, s/veh	95.6	
Approach LOS	F	
Timer		

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	1.0	0.2	1.2
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.3	30.6	16.2	5.3
Total Delay (hr)	1.4	0.0	0.4	1.0	3.3	6.9	0.3	13.4
Total Del/Veh (s)	24.0	2.4	12.1	62.1	41.1	182.2	18.9	54.4
Stop Delay (hr)	1.0	0.0	0.3	0.9	2.8	6.6	0.2	11.8
Stop Del/Veh (s)	17.4	0.2	7.2	55.8	34.1	174.6	14.1	47.9
Total Stops	107	0	69	50	264	138	18	646
Stop/Veh	0.50	0.00	0.51	0.86	0.91	1.01	0.35	0.73
Travel Dist (mi)	26.1	0.2	17.1	5.0	25.4	10.1	4.4	88.3
Travel Time (hr)	2.4	0.0	1.1	1.2	4.5	8.3	0.6	18.1
Avg Speed (mph)	11	23	15	4	6	1	11	5
Fuel Used (gal)	1.3	0.0	0.7	0.4	1.5	2.1	0.3	6.4
Fuel Eff. (mpg)	20.3	17.7	24.3	13.2	16.5	4.8	14.0	13.9
HC Emissions (g)	33	0	25	9	41	23	25	156
CO Emissions (g)	834	5	623	168	711	417	465	3224
NOx Emissions (g)	96	0	68	19	91	36	69	378
Vehicles Entered	194	3	126	57	275	106	50	811
Vehicles Exited	194	3	129	57	274	106	50	813
Hourly Exit Rate	776	12	516	228	1096	424	200	3252
Input Volume	1172	18	736	252	1182	889	344	4593
% of Volume	66	67	70	90	93	48	58	71
Denied Entry Before	0	0	0	0	0	1	0	1
Denied Entry After	0	0	0	0	0	6	2	8
Density (ft/veh)								75
Occupancy (veh)	9	0	5	5	18	29	2	67

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	81.4	40.2	121.7
Denied Del/Veh (s)	0.2	0.8	0.0	0.0	405.8	401.4	245.1
Total Delay (hr)	6.5	1.3	1.1	0.3	3.7	1.3	14.2
Total Del/Veh (s)	75.2	43.4	20.3	7.9	41.8	29.4	41.5
Stop Delay (hr)	4.9	1.0	0.7	0.0	1.5	0.3	8.3
Stop Del/Veh (s)	56.5	31.6	12.7	0.1	16.7	7.3	24.3
Total Stops	464	74	155	0	203	78	974
Stop/Veh	1.50	0.67	0.78	0.00	0.63	0.50	0.79
Travel Dist (mi)	38.2	13.2	35.5	24.3	302.6	147.1	560.9
Travel Time (hr)	7.9	1.9	2.3	1.0	92.2	45.0	150.2
Avg Speed (mph)	5	7	16	23	28	31	20
Fuel Used (gal)	2.9	0.8	1.5	0.7	27.0	13.2	46.1
Fuel Eff. (mpg)	13.4	17.0	23.3	32.5	11.2	11.2	12.2
HC Emissions (g)	71	29	62	34	374	81	650
CO Emissions (g)	1252	534	1493	667	6937	1936	12818
NOx Emissions (g)	162	69	168	95	876	232	1602
Vehicles Entered	279	102	185	138	279	136	1119
Vehicles Exited	277	102	185	138	278	136	1116
Hourly Exit Rate	1108	408	740	552	1112	544	4464
Input Volume	1519	554	905	931	2061	1007	6977
% of Volume	73	74	82	59	54	54	64
Denied Entry Before	0	0	0	0	203	97	300
Denied Entry After	0	0	0	0	443	225	668
Density (ft/veh)							195
Occupancy (veh)	31	7	9	4	43	19	114

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.5	0.0	0.0	0.6	0.3	0.2
Total Delay (hr)	1.5	1.0	0.9	0.9	7.1	3.9	15.4
Total Del/Veh (s)	15.8	15.3	17.7	13.3	143.7	51.5	37.8
Stop Delay (hr)	0.8	0.1	0.4	0.1	5.8	2.5	9.6
Stop Del/Veh (s)	8.5	1.6	6.7	1.1	115.8	33.0	23.6
Total Stops	105	54	104	56	328	278	925
Stop/Veh	0.30	0.22	0.54	0.23	1.83	1.01	0.63
Travel Dist (mi)	63.8	42.3	41.1	49.0	100.9	167.3	464.4
Travel Time (hr)	3.6	2.4	2.2	2.5	9.6	8.1	28.3
Avg Speed (mph)	18	18	18	19	11	21	16
Fuel Used (gal)	2.7	1.6	1.8	1.9	3.8	4.9	16.7
Fuel Eff. (mpg)	23.4	26.4	23.4	26.5	26.3	34.0	27.8
HC Emissions (g)	81	58	68	84	140	197	627
CO Emissions (g)	1884	1144	1623	1758	2617	4436	13462
NOx Emissions (g)	247	168	193	237	341	550	1736
Vehicles Entered	330	231	183	229	152	247	1372
Vehicles Exited	325	232	184	228	138	242	1349
Hourly Exit Rate	1300	928	736	912	552	968	5396
Input Volume	2232	1367	1215	1518	625	1006	7963
% of Volume	58	68	61	60	88	96	68
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							153
Occupancy (veh)	14	9	9	10	38	32	113

SimTraffic Performance Report
Cumulative Plus Scenario 2 Project Conditions

PM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.1	0.0	0.2	0.3	0.3	0.3	0.2	0.2	0.2	1.4	1.4	0.8
Total Delay (hr)	2.2	3.6	0.5	2.1	28.9	12.3	23.6	2.4	0.7	8.1	3.9	31.7
Total Del/Veh (s)	59.6	37.7	14.3	245.8	267.1	239.6	385.1	113.4	118.7	138.0	188.3	326.1
Stop Delay (hr)	1.8	2.5	0.2	1.8	24.7	10.9	23.1	1.9	0.6	6.4	3.2	29.3
Stop Del/Veh (s)	50.5	26.3	6.2	205.2	228.4	212.4	375.8	91.1	96.5	108.9	154.7	301.2
Total Stops	108	197	58	45	529	231	259	107	33	317	143	371
Stop/Veh	0.83	0.57	0.50	1.45	1.36	1.25	1.17	1.43	1.57	1.50	1.91	1.06
Travel Dist (mi)	26.5	71.3	23.8	38.9	497.3	238.7	86.8	44.2	13.3	101.4	35.3	131.6
Travel Time (hr)	3.1	5.8	1.3	3.2	43.3	19.3	26.2	3.6	1.1	11.2	5.0	35.8
Avg Speed (mph)	9	12	19	12	11	12	3	12	12	9	7	4
Fuel Used (gal)	1.4	3.0	0.9	1.4	18.5	8.3	7.3	1.6	0.5	4.5	1.9	10.3
Fuel Eff. (mpg)	19.6	23.4	27.9	28.4	26.9	28.6	11.8	26.9	27.2	22.7	19.1	12.8
HC Emissions (g)	64	78	27	14	583	167	97	36	5	97	27	233
CO Emissions (g)	1256	1803	655	292	9602	2995	1801	752	130	1934	694	4076
NOx Emissions (g)	156	221	78	40	1414	436	179	97	16	245	74	407
Vehicles Entered	123	332	111	21	266	128	149	61	19	172	62	260
Vehicles Exited	119	326	110	12	171	87	78	54	15	153	47	160
Hourly Exit Rate	476	1304	440	48	684	348	312	216	60	612	188	640
Input Volume	709	1879	641	84	1069	537	611	242	74	695	242	1043
% of Volume	67	69	69	57	64	65	51	89	81	88	78	61
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	3	1	2
Density (ft/veh)												
Occupancy (veh)	12	23	5	13	173	77	105	15	4	45	20	143

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.2
Denied Del/Veh (s)	0.4
Total Delay (hr)	120.0
Total Del/Veh (s)	201.1
Stop Delay (hr)	106.4
Stop Del/Veh (s)	178.3
Total Stops	2398
Stop/Veh	1.12
Travel Dist (mi)	1309.2
Travel Time (hr)	158.8
Avg Speed (mph)	8
Fuel Used (gal)	59.5
Fuel Eff. (mpg)	22.0
HC Emissions (g)	1428
CO Emissions (g)	25992
NOx Emissions (g)	3363
Vehicles Entered	1704
Vehicles Exited	1332
Hourly Exit Rate	5328
Input Volume	7826
% of Volume	68
Denied Entry Before	0
Denied Entry After	6
Density (ft/veh)	125
Occupancy (veh)	635

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	4.8	4.3	0.1	0.0	0.2	0.2	0.9
Total Delay (hr)	0.2	10.7	0.5	0.1	21.3	0.2	33.0
Total Del/Veh (s)	191.4	372.1	34.2	2.3	306.1	196.6	216.2
Stop Delay (hr)	0.2	10.6	0.5	0.0	20.6	0.2	32.0
Stop Del/Veh (s)	188.6	366.9	31.0	0.9	295.7	183.8	209.7
Total Stops	3	86	29	6	359	5	488
Stop/Veh	1.00	0.83	0.52	0.04	1.43	1.67	0.89
Travel Dist (mi)	0.4	20.2	5.3	12.5	87.5	1.1	127.0
Travel Time (hr)	0.2	11.5	0.8	0.6	23.9	0.2	37.1
Avg Speed (mph)	3	2	7	22	4	6	3
Fuel Used (gal)	0.0	2.9	0.4	0.7	6.9	0.1	11.0
Fuel Eff. (mpg)	9.3	6.9	14.6	17.2	12.6	18.1	11.5
HC Emissions (g)	0	31	9	39	297	0	376
CO Emissions (g)	6	625	236	996	4718	10	6590
NOx Emissions (g)	0	44	24	110	541	1	720
Vehicles Entered	2	86	54	132	206	2	482
Vehicles Exited	1	37	54	131	106	2	331
Hourly Exit Rate	4	148	216	524	424	8	1324
Input Volume	11	352	291	689	812	11	2166
% of Volume	36	42	74	76	52	73	61
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	5	0	0	0	0	5
Density (ft/veh)							75
Occupancy (veh)	1	46	3	2	95	1	148

10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Denied Del/Veh (s)	0.4	1.5	3.7	1.2	0.0	0.1	0.7
Total Delay (hr)	1.3	0.1	0.3	8.7	0.4	0.1	10.8
Total Del/Veh (s)	59.2	22.8	73.0	99.1	7.4	4.0	58.8
Stop Delay (hr)	1.2	0.1	0.2	6.8	0.2	0.0	8.6
Stop Del/Veh (s)	52.6	18.3	58.4	78.2	4.5	1.3	46.6
Total Stops	82	15	28	542	56	12	735
Stop/Veh	1.02	1.00	2.00	1.72	0.29	0.27	1.11
Travel Dist (mi)	28.9	5.6	3.5	77.0	18.4	4.3	137.7
Travel Time (hr)	2.2	0.3	0.4	11.0	1.1	0.3	15.3
Avg Speed (mph)	13	21	9	7	16	17	9
Fuel Used (gal)	0.9	0.2	0.2	4.1	0.9	0.2	6.4
Fuel Eff. (mpg)	30.7	36.3	20.4	18.7	21.2	26.2	21.5
HC Emissions (g)	10	1	1	125	32	2	173
CO Emissions (g)	230	40	57	2416	724	76	3543
NOx Emissions (g)	31	5	4	279	95	9	423
Vehicles Entered	73	14	13	287	192	44	623
Vehicles Exited	74	14	12	252	191	45	588
Hourly Exit Rate	296	56	48	1008	764	180	2352
Input Volume	295	63	63	1119	1168	291	2999
% of Volume	100	89	76	90	65	62	78
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	2	0	0	2
Density (ft/veh)							169
Occupancy (veh)	9	1	2	44	5	1	61

Appendix L
Scenario 2 - AM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment														
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	2,000	2,000
Accel Length														
Decel Length			500		500	500		500	185		500			
Mainline Volume	5,045	5,045	5,045	3,840	3,840	5,435	7,777	7,777	6,996	6,856	6,856	7,576	7,576	4,715
On Ramp Volume					1,595	2,342					720			
Off Ramp Volume			1,205					781	140				2,861	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	5,045	5,045	5,045	3,840	5,435	7,777	7,777	7,777	6,996	6,856	7,576	7,576	7,576	4,715
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	22.0%	22.0%	22.0%	26.0%	26.0%	26.0%	17.8%	17.8%	17.8%	18.5%	18.5%	18.0%	18.0%	14.9%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{HV}	0.694	0.901	0.901	0.885	0.885	0.885	0.918	0.918	0.918	0.915	0.915	0.917	0.917	0.931
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,729	5,957	5,957	4,616	6,534	9,349	9,010	9,010	8,105	7,968	8,805	8,785	8,785	5,390
GP Flow (pcphpl)	1,932	1,489	1,489	1,154	1,633	2,337	2,252	2,252	2,026	1,992	2,201	2,196	2,196	1,797
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	0.82	0.63	0.63	0.49	0.70	0.99	0.94	0.94	0.84	0.83	0.92	0.92	0.92	0.75
Speed (mph)	61.0	64.9	64.9	65.0	64.2	52.5	57.2	57.2	62.1	62.7	58.4	58.5	58.5	65.9
Density (pcphpl)	31.7	23.0	23.0	17.8	25.4	44.5	39.4	39.4	32.6	31.8	37.7	37.6	37.6	27.3
LOS	D	C	C	B	C	E	E	E	D	D	E	E	E	D
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			5,957		4,763	6,756		9,010	8,105		7,968			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.63		0.51	0.72		0.94	0.84		0.83			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			4,603		6,534	9,349		8,109	7,942		8,805		5,328	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.49		0.70	0.99		0.84	0.83		0.92		0.74	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					1,595	2,342					720			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.3%	3.7%					13.9%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _{HV}					0.979	0.982					0.935			
f _p					1.00	1.00					1.00			
On Flow (pcph)					1,771	2,593					837			
On Flow (pcphpl)					1,771	2,593					837			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.93	1.23					0.40			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			1,205					781	140				2,861	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			6.8%					12.1%	14.3%				22.3%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _{RV}			0.967					0.943	0.933				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,354					900	163				3,457	
Off Flow (pcphpl)			677					900	163				1,728	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.32					0.43	0.09				0.74	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective v _F (pcph)					4,763	6,756					7,968			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{FM} (Eqn 13-3)					0.592	0.592					0.592			
P _{FM} (Eqn 13-4)														
P _{FM} (Eqn 13-5)														
P _{FM}					-0.004	-0.106					0.113			
v ₁₂ (pcph)					-17	-718					902			
v ₃ (pcph)														
v ₃₄ (pcph)					4,780	7,474					7,066			
v _{12a} (pcph)					1,905	2,702					3,187			
v _{R12a} (pcph)					3,676	5,295					4,024			
Merge Speed Index					0.45	-					0.49			
Merge Area Speed					54.6	-					56.2			
Outer Lanes Volume					1,429						2,390			
Outer Lanes Speed					61.7						62.9			
Segment Speed					57.5						59.6			
Merge v/c ratio					0.80	1.15					0.87			
Merge Density					30.2	-					33.3			
Merge LOS					D	F					D			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_p (pcph)			5,957					9,010	8,105					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.549					0.493	0.550					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			2,551					4,436	3,626					
v_3 (pcph)														
v_{34} (pcph)			3,406					4,574	4,479					
v_{12a} (pcph)			2,551					4,436	3,626					
Diverge Speed Index			0.42					0.38	0.57					
Diverge Area Speed			55.3					59.4	54.0					
Outer Lanes Volume			1,703					2,287	2,240					
Outer Lanes Speed			68.6					71.8	72.0					
Segment Speed			62.2					65.1	62.6					
Diverge v/c ratio			0.58					1.01	0.82					
Diverge Density			21.7					37.9	33.8					
Diverge LOS			C					F	D					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	0.82	0.63	0.58	0.49	0.80	1.15	0.94	1.01	0.82	0.83	0.87	0.92	0.92	0.75
Segment Density	31.7	23.0	21.7	17.8	30.2	-	39.4	-	33.8	31.8	33.3	37.6	37.6	27.3
Segment LOS	D	C	C	B	D	F	E	F	D	D	D	E	E	D
Over Capacity						On Ramp Roadway Merge		Diverge						

Location	1

Key	
<-> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	2,861
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	2,861
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.3%
RV %	0.0%
E _T	1.5
E _R	1.2
f _{HV}	0.900
f _p	1.00
GP Flow (pcph)	3,383
GP Flow (pcphpl)	1,691
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.70
Speed (mph)	67.2
Density (pcphpl)	25.2
LOS	C
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes F	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.70
Segment Density	25.2
Segment LOS	C
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Level Road	Level Road West Off-Ramp	Level Road East Off-Ramp	Level Road Off to On-Ramp	Level Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	4,010	4,010	3,660	3,490	3,490	5,887	6,057	6,747	6,747	6,162	5,707	5,707
On Ramp Volume					2,397	170	690					881
Off Ramp Volume		350	170						585	455		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	4,010	4,010	3,660	3,490	5,887	6,057	6,747	6,747	6,747	6,162	5,707	6,588
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	13.0%	13.0%	4.6%	0.0%	0.0%	2.7%	5.4%	18.0%	18.0%	18.0%	18.5%	18.5%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{lv}	0.939	0.939	0.977	1.000	1.000	0.987	0.973	0.917	0.917	0.917	0.915	0.915
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	4,495	4,495	3,942	3,674	6,197	6,462	7,296	7,741	7,741	7,070	6,563	7,576
GP Flow (pcphp)	1,498	1,498	1,314	1,837	1,549	1,292	1,459	1,548	1,548	1,768	1,641	1,894
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _{lw}												
f _{LC}												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.64	0.64	0.56	0.78	0.66	0.55	0.62	0.66	0.66	0.75	0.70	0.81
Speed (mph)	64.9	64.9	65.0	62.3	64.7	65.0	64.7	64.7	64.7	63.1	64.2	61.5
Density (pcphp)	23.1	23.1	20.2	29.5	24.0	19.9	22.5	23.9	23.9	28.0	25.6	30.8
LOS	C	C	C	D	C	C	C	C	C	D	C	D
Calculate Operations for Entering GP Lanes												
GP _{in} Vol (pcph)		4,495			3,504	6,185	6,171			7,070		6,518
GP _{in} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{in} v/c ratio		0.64			0.75	0.66	0.53			0.75		0.69
Calculate Operations for Exiting GP Lanes												
GP _{out} Vol (pcph)		3,924	3,665				7,296		7,070	6,531		7,576
GP _{out} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{out} v/c ratio		0.56	0.78				0.62		0.75	0.69		0.81
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,397	170	690					881
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					6.7%	100.0%	100.0%					21.1%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _{lv}					0.968	0.667	0.667					0.905
f _p					1.00	1.00	1.00					1.00
On Flow (pcph)					2,692	277	1,125					1,059
On Flow (pcphp)					1,346	277	1,125					1,059

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.56	0.13	0.51					0.50
Calculate Off Ramp Flow Rate												
Off Volume (vph)		350	170						585	455		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						11.1%	17.9%		
RV %		0.0%	0.0%						0.0%	0.0%		
E _T		1.5	1.5						1.5	1.5		
E _B		1.2	1.2						1.2	1.2		
t _{av}		0.667	0.667						0.947	0.918		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		571	277						671	539		
Off Flow (pcphpl)		571	277						671	539		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.27	0.13						0.32	0.28		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			571									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		277										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							4,800					6,518
Up Ramp L _{EO}												
Down Ramp L _{EO}												
P _M (Eqn 13-3)							0.606					0.593
P _M (Eqn 13-4)												
P _M (Eqn 13-5)												
P _M							0.077					0.085
v ₁₂ (pcph)							362					557
v ₅ (pcph)												
v ₆ (pcph)							4,328					5,961
v ₁₃ (pcph)							1,876					2,607
v _{13A} (pcph)							3,001					3,666
Merge Speed Index							0.29					0.42
Merge Area Speed							58.3					55.3
Outer Lanes Volume							1,407					1,955
Outer Lanes Speed							61.7					59.8
Segment Speed							59.9					57.5
Merge v/c ratio							0.65					0.80
Merge Density							22.1					30.1
Merge LOS							C					D
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		4,495								7,070		
Up Ramp L _{EO}												
Down Ramp L _{EO}		348										
P _D (Eqn 13-9)		0.621								0.558		
P _D (Eqn 13-10)												
P _D (Eqn 13-11)		0.558										
P _D		0.621								0.436		
v ₁₂ (pcph)		3,009								3,386		
v ₅ (pcph)		1,486										
v ₆ (pcph)										3,684		
v ₁₃ (pcph)		3,009								3,386		
Diverge Speed Index		0.35								0.67		
Diverge Area Speed		57.0								49.6		
Outer Lanes Volume		1,486								1,842		
Outer Lanes Speed		69.4								68.0		
Segment Speed		60.6								57.7		
Diverge v/c ratio		0.68								0.77		
Diverge Density		28.8								31.8		
Diverge LOS		D								D		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segments												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.64	0.68	0.56	0.78	0.66	0.55	0.65	0.66	0.66	0.77	0.70	0.80
Segment Density	23.1	28.8	20.2	29.5	24.0	19.9	22.1	23.9	23.9	31.8	25.6	30.1
Segment LOS	C	D	C	D	C	C	C	C	C	D	C	D
Over Capacity												

Fehr & Peers

Fehr & Peers

Fehr & Peers

Appendix M
Scenario 2 - PM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment														
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	1,500	
Accel Length														
Decel Length			500		500	500		500	185		500			
Mainline Volume	7,030	7,030	7,030	5,480	5,480	6,779	8,221	8,221	7,597	7,487	7,487	8,347	8,347	4,863
On Ramp Volume														
Off Ramp Volume			1,550		1,299	1,442		624	110		860		3,484	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	7,030	7,030	7,030	5,480	6,779	8,221	8,221	8,221	7,597	7,487	8,347	8,347	8,347	4,863
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.7%	20.7%	20.7%	24.1%	24.1%	24.1%	20.2%	20.2%	20.2%	20.2%	20.2%	19.7%	19.7%	17.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{HV}	0.707	0.906	0.906	0.892	0.892	0.892	0.908	0.908	0.908	0.908	0.908	0.910	0.910	0.919
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	10,575	8,253	8,253	6,532	8,081	9,800	9,629	9,629	8,898	8,769	9,777	9,754	9,754	5,631
GP Flow (pcphpl)	2,644	2,063	2,063	1,633	2,020	2,450	2,407	2,407	2,225	2,192	2,444	2,439	2,439	1,877
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	1.12	0.88	0.88	0.69	0.86	1.04	1.00	1.00	0.93	0.91	1.02	1.02	1.02	0.78
Speed (mph)	-	58.8	58.8	64.2	59.5	-	-	-	57.8	58.6	-	-	-	64.7
Density (pcphpl)	-	35.1	35.1	25.4	33.9	-	-	-	38.5	37.4	-	-	-	29.0
LOS	F	E	E	C	D	F	F	F	E	E	F	F	F	D
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			8,253		6,638	8,180		9,629	8,898		8,766			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.88		0.71	0.87		1.00	0.93		0.91			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			6,506		8,081	9,800		8,893	8,757		9,777		5,547	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.69		0.86	1.04		0.93	0.91		1.02		0.77	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					1,299	1,442					860			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.4%	6.6%					16.3%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _{HV}					0.978	0.968					0.925			
f _p					1.00	1.00					1.00			
On Flow (pcph)					1,443	1,619					1,011			
On Flow (pcphpl)					1,443	1,619					1,011			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.76	0.77					0.48			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			1,550					624	110				3,484	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			7.3%					17.0%	36.4%				22.2%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _{RV}			0.965					0.922	0.846				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,746					736	141				4,207	
Off Flow (pcphpl)			873					736	141				2,104	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.42					0.35	0.07				0.90	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective V _E (pcph)					6,638	8,180					8,766			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{FM} (Eqn 13-3)					0.592	0.592					0.592			
P _{FM} (Eqn 13-4)														
P _{FM} (Eqn 13-5)														
P _{FM}					0.037	0.015					0.091			
V ₁₂ (pcph)					248	126					801			
V ₃ (pcph)														
V ₃₄ (pcph)					6,389	8,054					7,964			
V _{12a} (pcph)					2,655	3,272					3,506			
V _{612a} (pcph)					4,098	4,891					4,517			
Merge Speed Index					0.53	-					-			
Merge Area Speed					52.8	-					-			
Outer Lanes Volume					1,991									
Outer Lanes Speed					59.6									
Segment Speed					56.0									
Merge v/c ratio					0.89	1.06					0.98			
Merge Density					33.6	-					-			
Merge LOS					D	F					F			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_p (pcph)			8,253					9,629	8,898					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.473					0.485	0.531					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			3,438					4,613	3,959					
v_3 (pcph)														
v_{34} (pcph)			4,815					5,016	4,939					
v_{12a} (pcph)			3,438					4,613	3,959					
Diverge Speed Index			0.46					-	0.57					
Diverge Area Speed			54.5					-	54.0					
Outer Lanes Volume			2,407						2,469					
Outer Lanes Speed			65.8						71.1					
Segment Speed			60.6						62.3					
Diverge v/c ratio			0.78					1.05	0.90					
Diverge Density			29.3					-	36.6					
Diverge LOS			D					F	E					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	1.12	0.88	0.78	0.69	0.89	1.06	1.00	1.05	0.90	0.91	0.98	1.02	1.02	0.78
Segment Density	-	35.1	29.3	25.4	33.6	-	-	-	36.6	37.4	-	-	-	29.0
Segment LOS	F	E	D	C	D	F	F	F	E	E	F	F	F	D
Over Capacity	Segment GP Lanes					Segment GP Lanes Out GP Lanes Merge	Segment GP Lanes	Segment GP Lanes In GP Lanes Diverge			Segment GP Lanes Out GP Lanes	Segment GP Lanes	Segment GP Lanes	

Location	1

Key	
<-> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	3,484
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	3,484
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.2%
RV %	0.0%
E _T	1.5
E _R	1.2
f _{HV}	0.900
f _p	1.00
GP Flow (pcph)	4,118
GP Flow (pcphpl)	2,059
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.86
Speed (mph)	61.4
Density (pcphpl)	33.5
LOS	D
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes F	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.86
Segment Density	33.5
Segment LOS	D
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					
Decel Length		150								170		560
Mainline Volume	5,181	5,181	4,691	4,461	4,461	7,256	7,486	8,526	8,526	7,546	6,851	6,851
On Ramp Volume						2,795	1,040					834
Off Ramp Volume		490	230						980	695		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	5,181	5,181	4,691	4,461	7,256	7,486	8,526	8,526	8,526	7,546	6,851	7,685
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	13.5%	13.5%	4.9%	0.0%	0.0%	3.7%	6.7%	21.1%	21.1%	21.1%	22.7%	22.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.937	0.937	0.976	1.000	1.000	0.982	0.968	0.905	0.905	0.905	0.898	0.898
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	5,822	5,822	5,059	4,696	7,638	8,027	9,274	9,922	9,922	8,781	8,030	9,008
GP Flow (pcphpl)	1,941	1,941	1,686	2,348	1,909	1,605	1,855	1,984	1,984	2,195	2,008	2,252
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _{LW}												
f _{LC}												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.83	0.83	0.72	1.00	0.81	0.68	0.79	0.84	0.84	0.93	0.85	0.96
Speed (mph)	60.9	60.9	63.8	52.3	61.3	64.4	62.1	60.2	60.2	56.0	59.8	54.7
Density (pcphpl)	31.9	31.9	26.4	44.9	31.1	24.9	33.0	33.0	33.0	39.2	33.6	41.2
LOS	D	D	D	E	D	C	D	D	D	E	D	E
Calculate Operations for Entering GP Lanes												
GP _{in} Vol (pcph)		5,822			4,453	7,652	7,579			8,781		8,045
GP _{in} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{in} v/c ratio		0.83			0.95	0.81	0.65			0.93		0.86
Calculate Operations for Exiting GP Lanes												
GP _{out} Vol (pcph)		5,023	4,684				9,274		8,789	7,972		9,008
GP _{out} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{out} v/c ratio		0.71	1.00				0.79		0.93	0.85		0.96
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,795	230	1,040					834
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					9.7%	100.0%	100.0%					12.3%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _W					0.954	0.667	0.667					0.942
f _p					1.00	1.00	1.00					1.00
On Flow (pcph)					3,185	375	1,696					962
On Flow (pcphpl)					1,592	375	1,696					962

Location	4	5	6	7	8	9	10	11	12	13	14	15
Key												
<-> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.66	0.17	0.77					0.46
Calculate Off Ramp Flow Rate												
Off Volume (vph)		490	230						980	695		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						12.7%	14.3%		
RV %		0.0%	0.0%						0.0%	0.0%		
E ₂		1.5	1.5						1.5	1.5		
E _R		1.2	1.2						1.2	1.2		
f _{ov}		0.667	0.667						0.940	0.933		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		799	375						1,133	809		
Off Flow (pcphpt)		799	375						1,133	809		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.38	0.18						0.54	0.43		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			799									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		375										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							5,419					8,045
Up Ramp L _{eq}												
Down Ramp L _{eq}												
P _{1M} (Eqn 13-3)							0.606					0.593
P _{2M} (Eqn 13-4)												
P _{3M} (Eqn 13-5)												
P _{4M}							0.006					0.098
v ₀₂ (pcph)							32					785
v ₀ (pcph)												
v ₀₄ (pcph)							5,387					7,261
v _{12M} (pcph)							2,168					3,218
v _{112M} (pcph)							3,863					4,180
Merge Speed Index							0.40					0.53
Merge Area Speed							55.9					52.9
Outer Lanes Volume							1,626					2,414
Outer Lanes Speed							60.9					57.8
Segment Speed							58.1					55.4
Merge v/c ratio							0.84					0.91
Merge Density							28.6					34.1
Merge LOS							D					D
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		5,822								8,781		
Up Ramp L _{eq}												
Down Ramp L _{eq}		561										
P _{1D} (Eqn 13-9)		0.578								0.503		
P _{2D} (Eqn 13-10)												
P _{3D} (Eqn 13-11)		0.541										
P _{4D}		0.578								0.436		
v ₀₂ (pcph)		3,701								4,285		
v ₀ (pcph)		2,121										
v ₀₄ (pcph)										4,496		
v _{12M} (pcph)		3,701								4,285		
Diverge Speed Index		0.37								0.70		
Diverge Area Speed		56.5								49.0		
Outer Lanes Volume		2,121								2,248		
Outer Lanes Speed		66.9								66.4		
Segment Speed		59.9								56.6		
Diverge v/c ratio		0.84								0.97		
Diverge Density		34.7								39.6		
Diverge LOS		D								E		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segm												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.83	0.84	0.72	1.00	0.81	0.68	0.84	0.84	0.84	0.97	0.85	0.91
Segment Density	31.9	34.7	26.4	44.9	31.1	24.9	28.6	33.0	33.0	39.6	33.6	34.1
Segment LOS	D	D	D	E	D	C	D	D	D	E	D	D
Over Capacity												

Fehr & Peers

Fehr & Peers

Fehr & Peers























Appendix N
Scenario 4 - AM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary

1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Sceanrio 4 Project Conditions

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	10	610	10	10	100	350	330	10	10	90	270	20
Future Volume (veh/h)	10	610	10	10	100	350	330	10	10	90	270	20
Number	5	2	12		1	6	16	3	8	18	7	4
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1566	1900		1739	1520	1845	1863	1726	1900	1827	1723
Adj Flow Rate, veh/h	11	663	10		109	380	157	11	11	0	316	0
Adj No. of Lanes	1	2	0		2	3	1	1	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	20	20		10	25	3	2	2	2	4	2
Cap, veh/h	35	1058	16		427	1855	697	73	71	0	648	321
Arrive On Green	0.04	0.35	0.32		0.13	0.45	0.45	0.04	0.04	0.00	0.19	0.00
Sat Flow, veh/h	905	3001	45		3213	4150	1559	1774	1726	0	3480	1723
Grp Volume(v), veh/h	11	329	344		109	380	157	11	11	0	316	0
Grp Sat Flow(s),veh/h/ln	905	1488	1558		1606	1383	1559	1774	1726	0	1740	1723
Q Serve(g_s), s	0.7	10.2	10.3		1.7	3.1	3.5	0.3	0.3	0.0	4.5	0.0
Cycle Q Clear(g_c), s	0.7	10.2	10.3		1.7	3.1	3.5	0.3	0.3	0.0	4.5	0.0
Prop In Lane	1.00		0.03		1.00		1.00	1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	35	525	549		427	1855	697	73	71	0	648	321
V/C Ratio(X)	0.31	0.63	0.63		0.26	0.20	0.23	0.15	0.15	0.00	0.49	0.00
Avail Cap(c_a), veh/h	276	933	977		518	2008	754	254	247	0	1372	679
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	26.1	15.0	15.0		21.7	9.4	9.5	25.8	25.8	0.0	20.3	0.0
Incr Delay (d2), s/veh	3.1	1.8	1.7		0.2	0.1	0.2	0.6	0.6	0.0	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.5	4.7		0.8	1.2	1.5	0.2	0.2	0.0	2.3	0.0
LnGrp Delay(d),s/veh	29.2	16.8	16.7		21.9	9.5	9.7	26.4	26.4	0.0	21.4	0.0
LnGrp LOS	C	B	B		C	A	A	C	C		C	
Approach Vol, veh/h		684				646			22			316
Approach Delay, s/veh		16.9				11.6			26.4			21.4
Approach LOS		B				B			C			C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	23.7		14.4	6.2	28.9		6.3				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	33.1		22.0	16.1	25.1		8.0				
Max Q Clear Time (g_c+l1), s	3.7	12.3		6.5	2.7	5.5		2.3				
Green Ext Time (p_c), s	0.1	5.3		2.0	0.0	3.9		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			15.9									
HCM 2010 LOS			B									
Notes												

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	10
Future Volume (veh/h)	10
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	0
Adj No. of Lanes	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	0
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	0
V/C Ratio(X)	0.00
Avail Cap(c_a), veh/h	0
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	

User approved volume balancing among the lanes for turning movement.












User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary

2: I-5 Southbound Ramps & Laval Road

Cumulative Plus Sceanrio 4 Project Conditions

AM Peak Hour

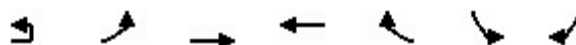
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	570	410	10	325	363	0		
Future Volume (veh/h)	570	410	10	325	363	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1743	1624	1863	1652	1545	0		
Adj Flow Rate, veh/h	613	0	11	349	390	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	9	17	2	15	23	0		
Cap, veh/h	768	622	19	1128	824	0		
Arrive On Green	0.46	0.00	0.01	0.36	0.28	0.00		
Sat Flow, veh/h	1660	1380	1774	3222	3089	0		
Grp Volume(v), veh/h	613	0	11	349	390	0		
Grp Sat Flow(s),veh/h/ln	1660	1380	1774	1570	1467	0		
Q Serve(g_s), s	15.4	0.0	0.3	3.9	5.4	0.0		
Cycle Q Clear(g_c), s	15.4	0.0	0.3	3.9	5.4	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	768	622	19	1128	824	0		
V/C Ratio(X)	0.80	0.00	0.57	0.31	0.47	0.00		
Avail Cap(c_a), veh/h	1257	1028	207	2891	2121	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	11.2	0.0	24.0	11.3	14.6	0.0		
Incr Delay (d2), s/veh	3.9	0.0	23.7	0.3	1.1	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	7.8	0.0	0.3	1.7	2.3	0.0		
LnGrp Delay(d),s/veh	15.1	0.0	47.8	11.6	15.7	0.0		
LnGrp LOS	B		D	B	B			
Approach Vol, veh/h	613			360	390			
Approach Delay, s/veh	15.1			12.7	15.7			
Approach LOS	B			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		22.3		26.6	4.5	17.7		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 44		36.4	6.0	34.0		
Max Q Clear Time (g_c+I1), s		5.9		17.4	2.3	7.4		
Green Ext Time (p_c), s		4.3		4.6	0.0	5.0		
Intersection Summary								
HCM 2010 Ctrl Delay			14.6					
HCM 2010 LOS			B					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Sceanrio 4 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

AM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↗		↗
Traffic Volume (vph)	20	330	1211	553	390	0	140
Future Volume (vph)	20	330	1211	553	390	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3142	4673	3085	1352		1442
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3142	4673	3085	1352		1442
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	351	1288	588	415	0	149
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1288	588	415	0	149
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	12%	11%	17%	18%	2%	14%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		10.7	38.2	17.8	38.2		38.2
Effective Green, g (s)		10.4	38.2	19.8	38.2		38.2
Actuated g/C Ratio		0.27	1.00	0.52	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		855	4673	1599	1352		1442
v/s Ratio Prot		c0.12	0.28	0.19			
v/s Ratio Perm					c0.31		0.10
v/c Ratio		0.44	0.28	0.37	0.31		0.10
Uniform Delay, d1		11.5	0.0	5.5	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.1	0.4	0.6		0.1
Delay (s)		11.6	0.1	5.9	0.6		0.1
Level of Service		B	A	A	A		A
Approach Delay (s)			2.7	3.7		0.1	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			2.9		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.39				
Actuated Cycle Length (s)			38.2		Sum of lost time (s)		8.0
Intersection Capacity Utilization			31.9%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road






Cumulative Plus Sceanrio 4 Project Conditions

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	10	10	30	10	490	10	176	10	40	676	355	10
Future Volume (veh/h)	10	10	30	10	490	10	176	10	40	676	355	10
Number	5	2	12		1	6	16		3	8	18	
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1863	950	1863		1863	1640	1900		1863	1583	1863	
Adj Flow Rate, veh/h	11	11	0		533	11	44		43	735	122	
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	
Percent Heavy Veh, %	2	100	2		2	100	100		2	20	2	
Cap, veh/h	50	48	80		720	66	264		96	1628	594	
Arrive On Green	0.03	0.05	0.00		0.21	0.23	0.20		0.05	0.38	0.38	
Sat Flow, veh/h	1774	950	1583		3442	286	1143		1774	4323	1577	
Grp Volume(v), veh/h	11	11	0		533	0	55		43	735	122	
Grp Sat Flow(s),veh/h/ln	1774	950	1583		1721	0	1428		1774	1441	1577	
Q Serve(g_s), s	0.4	0.7	0.0		8.8	0.0	1.9		1.4	7.8	3.2	
Cycle Q Clear(g_c), s	0.4	0.7	0.0		8.8	0.0	1.9		1.4	7.8	3.2	
Prop In Lane	1.00		1.00		1.00		0.80		1.00		1.00	
Lane Grp Cap(c), veh/h	50	48	80		720	0	330		96	1628	594	
V/C Ratio(X)	0.22	0.23	0.00		0.74	0.00	0.17		0.45	0.45	0.21	
Avail Cap(c_a), veh/h	234	203	339		1588	0	777		450	4629	1689	
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	
Uniform Delay (d), s/veh	28.8	27.7	0.0		22.5	0.0	19.2		27.8	14.2	12.8	
Incr Delay (d2), s/veh	1.3	4.1	0.0		0.9	0.0	0.1		2.0	0.4	0.3	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.2	0.2	0.0		4.2	0.0	0.8		0.7	3.1	1.4	
LnGrp Delay(d),s/veh	30.2	31.8	0.0		23.4	0.0	19.4		29.8	14.6	13.1	
LnGrp LOS	C	C			C		B		C	B	B	
Approach Vol, veh/h		22				588				900		
Approach Delay, s/veh		31.0				23.0				15.1		
Approach LOS		C				C				B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.7	7.1	7.3	29.6	5.7	18.0	10.1	26.9				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 27	11.3	* 15	76.7	* 7.3	31.3	28.0	64.1				
Max Q Clear Time (g_c+I1), s	10.8	2.7	3.4	6.9	2.4	3.9	6.8	9.8				
Green Ext Time (p_c), s	1.2	0.0	0.0	5.9	0.0	0.2	0.2	12.1				
Intersection Summary												
HCM 2010 Ctrl Delay			17.8									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary 4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Sceanrio 4 Project Conditions
AM Peak Hour

			
Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	113	413	10
Future Volume (veh/h)	113	413	10
Number	7	4	14
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1603	1338	1900
Adj Flow Rate, veh/h	123	449	9
Adj No. of Lanes	1	3	0
Peak Hour Factor	0.92	0.92	0.92
Percent Heavy Veh, %	20	43	43
Cap, veh/h	153	1557	31
Arrive On Green	0.10	0.42	0.41
Sat Flow, veh/h	1527	3686	74
Grp Volume(v), veh/h	123	296	162
Grp Sat Flow(s),veh/h/ln	1527	1217	1324
Q Serve(g_s), s	4.8	4.9	4.9
Cycle Q Clear(g_c), s	4.8	4.9	4.9
Prop In Lane	1.00		0.06
Lane Grp Cap(c), veh/h	153	1029	560
V/C Ratio(X)	0.80	0.29	0.29
Avail Cap(c_a), veh/h	704	3113	1693
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.7	11.5	11.5
Incr Delay (d2), s/veh	5.9	0.3	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	1.6	1.8
LnGrp Delay(d),s/veh	32.7	11.8	12.1
LnGrp LOS	C	B	B
Approach Vol, veh/h		581	
Approach Delay, s/veh		16.3	
Approach LOS		B	
Timer			

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.0	0.0	0.7	0.9	0.0	0.0	0.3
Total Delay (hr)	1.0	0.0	0.3	0.2	4.1	1.7	0.1	7.5
Total Del/Veh (s)	17.7	2.4	8.1	24.0	59.3	47.7	9.2	34.1
Stop Delay (hr)	0.6	0.0	0.2	0.2	3.8	1.6	0.1	6.4
Stop Del/Veh (s)	11.9	1.0	4.0	20.4	55.0	42.4	6.7	29.4
Total Stops	106	0	71	22	250	123	12	584
Stop/Veh	0.55	0.00	0.49	0.71	1.00	0.93	0.38	0.74
Travel Dist (mi)	25.2	0.1	18.7	2.5	21.3	12.1	2.9	82.8
Travel Time (hr)	1.9	0.0	1.1	0.3	5.1	2.2	0.2	10.8
Avg Speed (mph)	13	18	17	9	4	5	16	8
Fuel Used (gal)	1.2	0.0	0.8	0.1	1.6	0.8	0.1	4.6
Fuel Eff. (mpg)	21.3	11.4	24.8	19.2	13.5	15.7	22.9	18.2
HC Emissions (g)	63	3	30	7	33	22	9	168
CO Emissions (g)	1320	58	756	144	586	435	182	3480
NOx Emissions (g)	169	9	85	19	67	48	23	419
Vehicles Entered	189	2	140	29	233	124	31	748
Vehicles Exited	186	2	138	29	228	122	31	736
Hourly Exit Rate	744	8	552	116	912	488	124	2944
Input Volume	894	9	668	134	1175	520	124	3524
% of Volume	83	89	83	87	78	94	100	84
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0
Density (ft/veh)								117
Occupancy (veh)	8	0	4	1	20	9	1	43

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.2	0.2	0.0	0.0	14.1	13.1	27.6
Denied Del/Veh (s)	2.8	11.3	0.0	0.0	177.3	177.4	88.3
Total Delay (hr)	6.9	1.0	0.9	0.1	2.8	4.1	15.7
Total Del/Veh (s)	78.9	47.5	21.0	5.5	41.9	65.2	52.3
Stop Delay (hr)	5.4	0.8	0.6	0.0	0.7	1.9	9.5
Stop Del/Veh (s)	62.4	38.6	15.0	0.2	11.0	30.3	31.5
Total Stops	458	48	115	0	132	181	934
Stop/Veh	1.46	0.67	0.79	0.00	0.55	0.79	0.86
Travel Dist (mi)	38.9	8.5	27.0	14.1	225.6	205.8	519.8
Travel Time (hr)	8.5	1.5	1.7	0.5	22.2	22.1	56.5
Avg Speed (mph)	5	7	16	26	28	23	18
Fuel Used (gal)	3.0	0.6	1.1	0.4	9.6	8.9	23.7
Fuel Eff. (mpg)	13.1	14.8	23.6	32.1	23.5	23.1	22.0
HC Emissions (g)	71	34	48	25	517	400	1095
CO Emissions (g)	1253	568	1150	489	9049	6719	19228
NOx Emissions (g)	152	66	129	69	1306	1006	2728
Vehicles Entered	286	67	140	80	209	190	972
Vehicles Exited	281	66	142	80	209	189	967
Hourly Exit Rate	1124	264	568	320	836	756	3868
Input Volume	1379	334	616	472	1001	952	4754
% of Volume	82	79	92	68	84	79	81
Denied Entry Before	0	0	0	0	37	34	71
Denied Entry After	1	1	0	0	78	75	155
Density (ft/veh)							193
Occupancy (veh)	33	5	7	2	32	36	116

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.4	0.0	0.1	0.3	0.2	0.2
Total Delay (hr)	1.3	1.0	0.5	1.3	0.8	0.2	5.2
Total Del/Veh (s)	18.3	13.6	14.6	15.3	25.2	8.8	16.0
Stop Delay (hr)	0.8	0.1	0.2	0.1	0.5	0.2	1.8
Stop Del/Veh (s)	10.6	0.7	4.9	1.3	17.0	6.2	5.5
Total Stops	147	52	63	80	79	52	473
Stop/Veh	0.57	0.19	0.47	0.26	0.71	0.59	0.40
Travel Dist (mi)	47.1	45.8	27.1	62.9	71.0	56.6	310.5
Travel Time (hr)	2.9	2.5	1.4	3.4	2.5	1.6	14.2
Avg Speed (mph)	16	19	19	19	29	36	22
Fuel Used (gal)	2.1	1.7	1.2	2.2	1.7	1.4	10.4
Fuel Eff. (mpg)	22.3	26.8	22.1	28.1	40.6	40.6	29.8
HC Emissions (g)	116	47	83	58	80	101	486
CO Emissions (g)	2386	1044	1725	1358	1562	1973	10048
NOx Emissions (g)	322	146	226	177	243	294	1408
Vehicles Entered	247	256	126	298	103	83	1113
Vehicles Exited	249	259	126	295	102	82	1113
Hourly Exit Rate	996	1036	504	1180	408	328	4452
Input Volume	1158	1267	721	1859	404	324	5733
% of Volume	86	82	70	63	101	101	78
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							305
Occupancy (veh)	11	10	6	14	10	6	57

SimTraffic Performance Report
Cumulative Plus Scenario 4 Project Conditions

AM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.4	0.4	0.1	0.1	0.2	0.1	0.1	0.1
Total Delay (hr)	1.7	0.7	0.1	0.9	62.8	7.0	7.3	0.3	0.0	0.6	0.3	5.7
Total Del/Veh (s)	43.6	17.1	6.8	350.4	342.3	325.6	286.2	53.8	17.7	46.6	45.2	116.3
Stop Delay (hr)	1.4	0.5	0.0	0.8	60.1	6.9	7.2	0.2	0.0	0.6	0.3	4.7
Stop Del/Veh (s)	36.9	11.7	2.5	329.5	327.6	321.8	280.0	49.5	16.8	43.0	39.5	94.1
Total Stops	98	57	18	12	677	79	108	14	4	37	18	149
Stop/Veh	0.70	0.37	0.35	1.33	1.03	1.03	1.17	0.82	1.00	0.79	0.78	0.84
Travel Dist (mi)	27.4	31.2	10.8	10.1	719.5	85.5	36.5	8.5	2.3	29.4	14.2	99.7
Travel Time (hr)	2.6	1.7	0.5	1.2	83.5	9.5	8.4	0.5	0.1	1.5	0.7	8.8
Avg Speed (mph)	10	19	24	9	9	9	4	17	25	20	20	11
Fuel Used (gal)	1.3	1.2	0.4	0.4	30.4	3.5	2.5	0.3	0.1	0.8	0.4	3.7
Fuel Eff. (mpg)	21.0	25.0	28.6	23.8	23.7	24.4	14.5	32.2	39.5	34.9	34.4	27.2
HC Emissions (g)	52	66	17	7	623	79	52	12	0	32	16	171
CO Emissions (g)	1077	1357	384	135	10872	1390	884	202	11	548	281	2849
NOx Emissions (g)	137	182	49	17	1452	185	100	31	1	89	45	400
Vehicles Entered	126	145	50	6	427	52	73	16	4	43	21	149
Vehicles Exited	127	146	49	4	236	27	51	16	4	40	18	127
Hourly Exit Rate	508	584	196	16	944	108	204	64	16	160	72	508
Input Volume	558	645	220	26	1673	198	312	63	16	168	79	553
% of Volume	91	91	89	62	56	55	65	102	100	95	91	92
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	10	7	2	5	334	38	34	2	0	6	3	35

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.2
Total Delay (hr)	87.4
Total Del/Veh (s)	216.3
Stop Delay (hr)	82.6
Stop Del/Veh (s)	204.5
Total Stops	1271
Stop/Veh	0.87
Travel Dist (mi)	1075.2
Travel Time (hr)	118.8
Avg Speed (mph)	9
Fuel Used (gal)	45.0
Fuel Eff. (mpg)	23.9
HC Emissions (g)	1129
CO Emissions (g)	19991
NOx Emissions (g)	2689
Vehicles Entered	1112
Vehicles Exited	845
Hourly Exit Rate	3380
Input Volume	4511
% of Volume	75
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	157
Occupancy (veh)	475

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.6	0.2	0.1	0.0	0.1	0.1	0.1
Total Delay (hr)	0.1	0.1	0.7	0.1	0.3	0.0	1.2
Total Del/Veh (s)	54.1	4.6	50.7	1.9	9.8	2.3	13.1
Stop Delay (hr)	0.1	0.1	0.7	0.0	0.2	0.0	1.0
Stop Del/Veh (s)	52.7	4.1	46.5	0.9	6.2	1.8	10.8
Total Stops	3	32	42	5	30	1	113
Stop/Veh	0.75	0.71	0.81	0.04	0.26	0.33	0.34
Travel Dist (mi)	0.6	10.2	4.6	11.0	53.4	1.4	81.4
Travel Time (hr)	0.1	0.4	0.9	0.5	1.9	0.0	3.8
Avg Speed (mph)	8	25	5	22	29	31	21
Fuel Used (gal)	0.0	0.3	0.4	0.7	1.4	0.0	2.8
Fuel Eff. (mpg)	22.4	40.6	11.9	16.9	38.0	44.7	29.5
HC Emissions (g)	0	9	10	30	83	0	133
CO Emissions (g)	6	184	234	835	1414	5	2679
NOx Emissions (g)	0	24	25	85	234	1	370
Vehicles Entered	3	44	48	117	108	3	323
Vehicles Exited	3	43	49	117	107	3	322
Hourly Exit Rate	12	172	196	468	428	12	1288
Input Volume	16	178	233	559	445	11	1442
% of Volume	75	97	84	84	96	109	89
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							600
Occupancy (veh)	0	2	4	2	7	0	15

SimTraffic Performance Report
Cumulative Plus Scenario 4 Project Conditions

AM Peak Hour

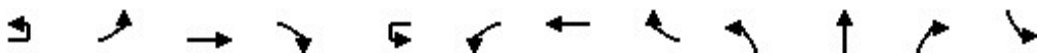
10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.3	0.0	0.0	0.4
Denied Del/Veh (s)	0.4	3.8	6.0	4.6	0.0	0.0	2.4
Total Delay (hr)	0.9	0.0	0.3	9.0	0.2	0.0	10.4
Total Del/Veh (s)	50.2	11.5	101.1	118.4	3.6	3.0	65.5
Stop Delay (hr)	0.8	0.0	0.3	8.3	0.1	0.0	9.5
Stop Del/Veh (s)	45.0	9.1	92.4	108.3	2.2	1.1	59.3
Total Stops	58	8	19	353	20	7	465
Stop/Veh	0.95	1.00	1.73	1.28	0.11	0.17	0.81
Travel Dist (mi)	14.1	2.0	2.8	65.6	16.8	3.8	105.1
Travel Time (hr)	1.3	0.1	0.4	11.3	0.9	0.2	14.2
Avg Speed (mph)	11	22	7	6	19	17	8
Fuel Used (gal)	0.5	0.1	0.1	3.8	0.8	0.2	5.5
Fuel Eff. (mpg)	26.1	34.9	19.5	17.2	20.9	23.6	19.1
HC Emissions (g)	20	1	1	98	39	15	175
CO Emissions (g)	385	38	39	1932	860	265	3518
NOx Emissions (g)	48	4	3	211	111	39	417
Vehicles Entered	57	8	10	254	173	40	542
Vehicles Exited	56	8	9	201	174	40	488
Hourly Exit Rate	224	32	36	804	696	160	1952
Input Volume	228	32	42	1057	821	178	2358
% of Volume	98	100	86	76	85	90	83
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	6	0	0	6
Density (ft/veh)							156
Occupancy (veh)	5	0	2	44	3	1	55

Appendix O
Scenario 4 - PM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary 1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Scenario 4 Project Conditions
PM Peak Hour

												
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	10	580	10	10	150	959	290	10	20	150	330
Future Volume (veh/h)	10	10	580	10	10	150	959	290	10	20	150	330
Number		5	2	12		1	6	16	3	8	18	7
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		0.99	1.00		0.99	1.00
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1258	1628	1900		1781	1638	1827	1863	1786	1900	1845
Adj Flow Rate, veh/h		11	630	10		163	1042	117	11	22	5	391
Adj No. of Lanes		1	2	0		2	3	1	1	1	0	2
Peak Hour Factor		0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %		100	17	17		7	16	4	2	2	2	3
Cap, veh/h		27	955	15		416	1836	634	112	88	20	650
Arrive On Green		0.02	0.31	0.31		0.13	0.41	0.41	0.06	0.06	0.06	0.18
Sat Flow, veh/h		1198	3115	49		3291	4472	1543	1774	1406	319	3514
Grp Volume(v), veh/h		11	313	327		163	1042	117	11	0	27	391
Grp Sat Flow(s),veh/h/ln		1198	1546	1619		1645	1491	1543	1774	0	1725	1757
Q Serve(g_s), s		0.5	10.3	10.4		2.7	10.5	2.8	0.3	0.0	0.9	6.0
Cycle Q Clear(g_c), s		0.5	10.3	10.4		2.7	10.5	2.8	0.3	0.0	0.9	6.0
Prop In Lane		1.00		0.03		1.00		1.00	1.00		0.19	1.00
Lane Grp Cap(c), veh/h		27	474	496		416	1836	634	112	0	108	650
V/C Ratio(X)		0.41	0.66	0.66		0.39	0.57	0.18	0.10	0.00	0.25	0.60
Avail Cap(c_a), veh/h		208	1056	1105		453	2894	999	479	0	466	1313
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		28.4	17.7	17.7		23.6	13.3	11.1	26.0	0.0	26.3	22.0
Incr Delay (d2), s/veh		6.0	2.2	2.1		0.4	0.4	0.2	0.2	0.0	0.7	1.7
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.2	4.7	4.9		1.2	4.4	1.2	0.2	0.0	0.4	3.0
LnGrp Delay(d),s/veh		34.4	20.0	19.9		24.0	13.7	11.3	26.2	0.0	27.0	23.8
LnGrp LOS		C	B	B		C	B	B	C		C	C
Approach Vol, veh/h			651				1322			38		
Approach Delay, s/veh			20.2				14.8			26.8		
Approach LOS			C				B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.3	23.9		14.9	6.2	30.1		7.7				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	40.2		22.0	10.2	38.1		15.9				
Max Q Clear Time (g_c+l1), s	4.7	12.4		8.0	2.5	12.5		2.9				
Green Ext Time (p_c), s	0.1	5.5		2.4	0.0	11.1		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			17.9									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary 1: Dennis McCarthy Drive & Laval Road












Cumulative Plus Scenario 4 Project Conditions
PM Peak Hour

	↓	↙
Movement	SBT	SBR
Lane Configurations	↕	
Traffic Volume (veh/h)	20	20
Future Volume (veh/h)	20	20
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		1.00
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1900
Adj Flow Rate, veh/h	0	0
Adj No. of Lanes	1	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	2	2
Cap, veh/h	325	0
Arrive On Green	0.00	0.00
Sat Flow, veh/h	1759	0
Grp Volume(v), veh/h	0	0
Grp Sat Flow(s),veh/h/ln	1759	0
Q Serve(g_s), s	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0
Prop In Lane		0.00
Lane Grp Cap(c), veh/h	325	0
V/C Ratio(X)	0.00	0.00
Avail Cap(c_a), veh/h	657	0
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0
LnGrp LOS		
Approach Vol, veh/h	391	
Approach Delay, s/veh	23.8	
Approach LOS	C	
Timer		

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary 2: I-5 Southbound Ramps & Laval Road

Cumulative Plus Scenario 4 Project Conditions
PM Peak Hour

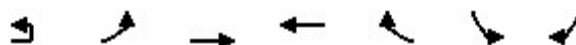
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	770	300	10	541	424	0		
Future Volume (veh/h)	770	300	10	541	424	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1712	1681	1863	1652	1667	0		
Adj Flow Rate, veh/h	828	0	11	582	456	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	11	13	2	15	14	0		
Cap, veh/h	941	825	29	937	747	0		
Arrive On Green	0.58	0.00	0.02	0.30	0.24	0.00		
Sat Flow, veh/h	1630	1429	1774	3222	3333	0		
Grp Volume(v), veh/h	828	0	11	582	456	0		
Grp Sat Flow(s),veh/h/ln	1630	1429	1774	1570	1583	0		
Q Serve(g_s), s	34.8	0.0	0.5	12.7	10.3	0.0		
Cycle Q Clear(g_c), s	34.8	0.0	0.5	12.7	10.3	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	941	825	29	937	747	0		
V/C Ratio(X)	0.88	0.00	0.38	0.62	0.61	0.00		
Avail Cap(c_a), veh/h	1668	1462	133	2323	1931	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	14.5	0.0	38.9	24.1	27.2	0.0		
Incr Delay (d2), s/veh	5.6	0.0	8.1	1.4	2.1	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	16.9	0.0	0.3	5.7	4.7	0.0		
LnGrp Delay(d),s/veh	20.1	0.0	46.9	25.5	29.3	0.0		
LnGrp LOS	C		D	C	C			
Approach Vol, veh/h	828			593	456			
Approach Delay, s/veh	20.1			25.9	29.3			
Approach LOS	C			C	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.1		50.7	5.0	24.1		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 59		81.7	6.0	48.7		
Max Q Clear Time (g_c+I1), s		14.7		36.8	2.5	12.3		
Green Ext Time (p_c), s		8.0		9.3	0.0	6.6		
Intersection Summary								
HCM 2010 Ctrl Delay			24.2					
HCM 2010 LOS			C					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Scenario 4 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

PM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↗		↗
Traffic Volume (vph)	30	320	1479	884	540	0	110
Future Volume (vph)	30	320	1479	884	540	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3125	4590	3312	1340		1208
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3125	4590	3312	1340		1208
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	340	1573	940	574	0	117
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1573	940	574	0	117
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	13%	13%	9%	19%	2%	36%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		11.4	47.9	26.8	47.9		47.9
Effective Green, g (s)		11.4	47.9	26.8	47.9		47.9
Actuated g/C Ratio		0.24	1.00	0.56	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		743	4590	1853	1340		1208
v/s Ratio Prot		0.12	0.34	0.28			
v/s Ratio Perm					c0.43		0.10
v/c Ratio		0.50	0.34	0.51	0.43		0.10
Uniform Delay, d1		15.8	0.0	6.5	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.2	0.2	0.6	1.0		0.2
Delay (s)		16.0	0.2	7.1	1.0		0.2
Level of Service		B	A	A	A		A
Approach Delay (s)			3.2	4.8		0.2	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.8		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.54				
Actuated Cycle Length (s)			47.9		Sum of lost time (s)		9.7
Intersection Capacity Utilization			42.8%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Scenario 4 Project Conditions
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	40	60	10	770	40	268	10	70	478	551	334
Future Volume (veh/h)	10	40	60	10	770	40	268	10	70	478	551	334
Number	5	2	12		1	6	16		3	8	18	7
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00		1.00		0.99	1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863		1863	1690	1900		1863	1338	1863	1652
Adj Flow Rate, veh/h	11	43	0		837	43	94		76	520	114	363
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2		2	42	2	15
Cap, veh/h	28	106	90		950	150	327		98	809	348	381
Arrive On Green	0.02	0.06	0.00		0.28	0.32	0.32		0.06	0.22	0.22	0.24
Sat Flow, veh/h	1774	1863	1583		3442	471	1031		1774	3653	1573	1573
Grp Volume(v), veh/h	11	43	0		837	0	137		76	520	114	363
Grp Sat Flow(s),veh/h/ln	1774	1863	1583		1721	0	1502		1774	1218	1573	1573
Q Serve(g_s), s	0.6	2.1	0.0		22.1	0.0	6.5		4.0	12.3	5.8	21.6
Cycle Q Clear(g_c), s	0.6	2.1	0.0		22.1	0.0	6.5		4.0	12.3	5.8	21.6
Prop In Lane	1.00		1.00		1.00		0.69		1.00		1.00	1.00
Lane Grp Cap(c), veh/h	28	106	90		950	0	476		98	809	348	381
V/C Ratio(X)	0.39	0.40	0.00		0.88	0.00	0.29		0.78	0.64	0.33	0.95
Avail Cap(c_a), veh/h	149	202	172		2222	0	1006		220	1389	598	381
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.3	43.2	0.0		32.9	0.0	24.4		44.3	33.6	31.0	35.4
Incr Delay (d2), s/veh	5.3	4.2	0.0		1.8	0.0	0.2		7.8	1.7	1.1	33.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.2	0.0		10.7	0.0	2.7		2.2	4.3	2.6	12.9
LnGrp Delay(d),s/veh	51.5	47.4	0.0		34.7	0.0	24.6		52.1	35.2	32.1	69.1
LnGrp LOS	D	D			C		C		D	D	C	E
Approach Vol, veh/h		54				974				710		
Approach Delay, s/veh		48.2				33.3				36.5		
Approach LOS		D				C				D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.9	11.1	9.4	43.5	6.2	35.8	27.0	25.9				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 61	10.3	* 12	47.1	* 8	63.6	23.0	36.1				
Max Q Clear Time (g_c+I1), s	24.1	4.1	6.0	12.8	2.6	8.5	23.6	14.3				
Green Ext Time (p_c), s	2.1	0.1	0.0	7.9	0.0	0.6	0.0	6.5				
Intersection Summary												
HCM 2010 Ctrl Delay			36.1									
HCM 2010 LOS			D									
Notes												

	↓	↙
Movement	SBT	SBR
Lane Configurations	↑↑↑	
Traffic Volume (veh/h)	584	10
Future Volume (veh/h)	584	10
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		0.99
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1434	1900
Adj Flow Rate, veh/h	635	10
Adj No. of Lanes	3	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	33	33
Cap, veh/h	1614	25
Arrive On Green	0.41	0.41
Sat Flow, veh/h	3971	62
Grp Volume(v), veh/h	417	228
Grp Sat Flow(s),veh/h/ln	1305	1423
Q Serve(g_s), s	10.7	10.8
Cycle Q Clear(g_c), s	10.7	10.8
Prop In Lane		0.04
Lane Grp Cap(c), veh/h	1061	578
V/C Ratio(X)	0.39	0.39
Avail Cap(c_a), veh/h	1295	706
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	1.00	1.00
Uniform Delay (d), s/veh	19.9	19.9
Incr Delay (d2), s/veh	0.5	0.9
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	4.3
LnGrp Delay(d),s/veh	20.4	20.8
LnGrp LOS	C	C
Approach Vol, veh/h	1008	
Approach Delay, s/veh	38.0	
Approach LOS	D	
Timer		

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

SimTraffic Performance Report
Cumulative Plus Scenario 4 Project Conditions

PM Peak Hour

5: Street A & Street C Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.6	0.1	0.7
Denied Del/Veh (s)	0.0		0.0	0.1	0.0	14.8	5.5	2.5
Total Delay (hr)	2.9	0.0	0.9	1.1	2.2	6.6	0.4	14.0
Total Del/Veh (s)	35.9		18.1	61.9	26.2	144.4	21.8	47.9
Stop Delay (hr)	2.0	0.0	0.5	1.0	1.7	6.2	0.3	11.6
Stop Del/Veh (s)	25.5		10.3	55.9	20.1	135.2	16.6	39.9
Total Stops	212	0	106	54	220	171	26	789
Stop/Veh	0.73		0.60	0.84	0.74	1.04	0.43	0.75
Travel Dist (mi)	35.6	0.0	22.6	5.5	26.1	13.0	5.3	108.2
Travel Time (hr)	4.2	0.0	1.8	1.3	3.3	7.7	0.6	18.8
Avg Speed (mph)	9	19	13	4	8	2	10	6
Fuel Used (gal)	1.9	0.0	0.9	0.4	1.3	2.0	0.3	6.8
Fuel Eff. (mpg)	19.1	14.9	25.3	13.3	20.5	6.4	15.4	15.8
HC Emissions (g)	43	0	28	10	36	21	32	172
CO Emissions (g)	934	6	657	190	665	402	574	3429
NOx Emissions (g)	122	1	78	21	88	38	84	431
Vehicles Entered	263	0	166	62	283	138	60	972
Vehicles Exited	262	0	166	62	280	133	60	963
Hourly Exit Rate	1048	0	664	248	1120	532	240	3852
Input Volume	1401	3	881	252	1182	889	344	4952
% of Volume	75	0	75	98	95	60	70	78
Denied Entry Before	0	0	0	0	0	1	0	1
Denied Entry After	0	0	0	0	0	3	1	4
Density (ft/veh)								69
Occupancy (veh)	17	0	7	5	13	28	2	72

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	39.6	19.5	59.0
Denied Del/Veh (s)	0.0	0.1	0.0	0.0	285.4	282.6	135.7
Total Delay (hr)	6.4	0.9	2.3	0.4	3.4	1.9	15.3
Total Del/Veh (s)	63.7	35.1	26.7	11.4	38.9	43.8	40.6
Stop Delay (hr)	4.6	0.6	1.3	0.0	1.3	0.8	8.6
Stop Del/Veh (s)	45.6	23.0	15.2	0.9	14.4	18.9	22.8
Total Stops	523	69	224	6	190	100	1112
Stop/Veh	1.44	0.78	0.73	0.05	0.60	0.63	0.82
Travel Dist (mi)	45.4	10.7	55.4	20.5	300.4	150.0	582.3
Travel Time (hr)	8.1	1.3	4.0	1.0	50.0	24.9	89.3
Avg Speed (mph)	6	8	14	21	29	27	19
Fuel Used (gal)	3.0	0.6	2.4	0.7	17.2	8.5	32.3
Fuel Eff. (mpg)	15.0	18.3	23.5	30.5	17.5	17.7	18.0
HC Emissions (g)	74	20	88	29	263	78	553
CO Emissions (g)	1318	396	2007	591	5060	1717	11088
NOx Emissions (g)	179	51	241	81	734	257	1543
Vehicles Entered	331	83	289	116	279	138	1236
Vehicles Exited	330	83	291	117	275	138	1234
Hourly Exit Rate	1320	332	1164	468	1100	552	4936
Input Volume	1647	425	1494	715	1620	793	6694
% of Volume	80	78	78	65	68	70	74
Denied Entry Before	0	0	0	0	94	47	141
Denied Entry After	0	0	0	0	220	110	330
Density (ft/veh)							184
Occupancy (veh)	32	5	16	4	42	22	121

SimTraffic Performance Report
Cumulative Plus Scenario 4 Project Conditions

PM Peak Hour

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.5	0.2	0.1
Total Delay (hr)	2.4	0.7	1.4	0.5	1.5	1.8	8.2
Total Del/Veh (s)	18.9	13.0	16.5	9.6	41.2	29.6	20.1
Stop Delay (hr)	1.1	0.0	0.5	0.0	1.0	1.3	4.1
Stop Del/Veh (s)	9.2	0.8	6.5	0.2	28.8	21.2	10.0
Total Stops	179	20	138	13	116	156	622
Stop/Veh	0.40	0.11	0.46	0.07	0.89	0.72	0.42
Travel Dist (mi)	81.7	33.9	64.5	36.1	81.3	138.7	436.1
Travel Time (hr)	4.9	1.7	3.4	1.7	3.5	5.2	20.4
Avg Speed (mph)	17	20	19	22	24	27	21
Fuel Used (gal)	3.3	1.2	2.6	1.4	2.2	3.6	14.3
Fuel Eff. (mpg)	24.7	27.3	24.6	26.7	37.0	38.8	30.5
HC Emissions (g)	85	41	96	61	119	158	560
CO Emissions (g)	1976	843	2286	1343	2285	3312	12046
NOx Emissions (g)	261	127	278	173	337	468	1643
Vehicles Entered	421	185	286	168	118	201	1379
Vehicles Exited	422	183	284	168	119	199	1375
Hourly Exit Rate	1688	732	1136	672	476	796	5500
Input Volume	2366	909	1715	1008	489	786	7273
% of Volume	71	81	66	67	97	101	76
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							212
Occupancy (veh)	20	7	14	7	14	21	82

SimTraffic Performance Report
Cumulative Plus Scenario 4 Project Conditions

PM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.0	0.1	0.2	0.3	0.3	0.1	0.2	0.2	0.2	0.2	0.2
Total Delay (hr)	2.2	3.5	0.5	1.3	22.7	6.4	18.0	1.2	0.3	3.8	2.7	30.2
Total Del/Veh (s)	53.8	34.3	15.0	214.3	215.0	166.7	306.3	77.3	57.3	88.8	170.6	314.3
Stop Delay (hr)	1.8	2.2	0.2	1.1	18.6	5.2	17.1	1.0	0.2	2.8	2.2	27.7
Stop Del/Veh (s)	43.3	21.3	5.2	176.0	176.4	135.5	290.9	63.9	48.8	64.8	138.6	288.3
Total Stops	112	201	62	35	563	187	313	57	17	194	105	374
Stop/Veh	0.75	0.55	0.47	1.59	1.48	1.36	1.48	1.06	1.00	1.25	1.88	1.08
Travel Dist (mi)	30.4	77.0	27.2	30.4	519.1	196.8	97.7	33.0	10.2	83.7	27.6	133.4
Travel Time (hr)	3.3	5.9	1.5	2.2	37.7	12.1	20.9	2.1	0.6	6.3	3.5	34.3
Avg Speed (mph)	9	13	19	14	14	16	5	16	17	13	8	4
Fuel Used (gal)	1.5	3.2	1.0	1.0	17.8	6.2	6.3	1.0	0.3	3.0	1.3	10.0
Fuel Eff. (mpg)	19.8	23.8	28.3	30.9	29.2	31.9	15.5	31.5	32.5	28.2	20.5	13.3
HC Emissions (g)	66	78	25	5	596	144	94	13	4	67	23	222
CO Emissions (g)	1300	1766	620	147	9797	2535	1721	320	87	1393	541	3950
NOx Emissions (g)	169	230	76	20	1526	390	196	39	12	185	60	399
Vehicles Entered	140	358	126	15	269	102	152	44	13	133	46	253
Vehicles Exited	140	356	127	11	195	73	94	42	14	118	38	164
Hourly Exit Rate	560	1424	508	44	780	292	376	168	56	472	152	656
Input Volume	693	1842	626	63	1069	400	611	184	58	521	184	1043
% of Volume	81	77	81	70	73	73	62	91	97	91	83	63
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	13	23	6	9	151	49	84	8	2	25	14	137

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.1
Total Delay (hr)	92.8
Total Del/Veh (s)	165.0
Stop Delay (hr)	80.0
Stop Del/Veh (s)	142.2
Total Stops	2220
Stop/Veh	1.10
Travel Dist (mi)	1266.5
Travel Time (hr)	130.2
Avg Speed (mph)	10
Fuel Used (gal)	52.6
Fuel Eff. (mpg)	24.1
HC Emissions (g)	1336
CO Emissions (g)	24177
NOx Emissions (g)	3302
Vehicles Entered	1651
Vehicles Exited	1372
Hourly Exit Rate	5488
Input Volume	7294
% of Volume	75
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	152
Occupancy (veh)	521

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	4.6	3.0	0.1	0.0	0.1	0.1	0.6
Total Delay (hr)	0.1	6.6	0.7	0.2	14.5	0.1	22.3
Total Del/Veh (s)	143.0	244.1	39.5	3.4	218.7	131.6	139.7
Stop Delay (hr)	0.1	6.4	0.7	0.1	13.6	0.1	21.0
Stop Del/Veh (s)	137.2	236.5	35.6	1.6	205.4	120.8	131.8
Total Stops	3	83	40	14	339	5	484
Stop/Veh	1.00	0.85	0.59	0.08	1.42	1.25	0.84
Travel Dist (mi)	0.7	24.8	6.3	15.4	98.9	1.7	147.7
Travel Time (hr)	0.1	7.5	1.0	0.7	17.3	0.2	26.9
Avg Speed (mph)	5	3	6	21	6	8	6
Fuel Used (gal)	0.0	2.1	0.4	0.9	5.7	0.1	9.3
Fuel Eff. (mpg)	14.9	11.9	14.1	17.3	17.2	22.6	15.9
HC Emissions (g)	0	28	9	45	275	0	358
CO Emissions (g)	7	564	253	1167	4477	12	6480
NOx Emissions (g)	0	52	25	128	580	1	786
Vehicles Entered	2	85	65	162	204	3	521
Vehicles Exited	2	54	66	162	130	2	416
Hourly Exit Rate	8	216	264	648	520	8	1664
Input Volume	11	352	335	793	812	11	2314
% of Volume	73	61	79	82	64	73	72
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	2	0	0	0	0	2
Density (ft/veh)							104
Occupancy (veh)	1	30	4	3	69	1	107

10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.3	1.4	2.1	0.3	0.0	0.0	0.2
Total Delay (hr)	0.8	0.0	0.1	1.8	0.5	0.1	3.4
Total Del/Veh (s)	34.5	9.7	39.4	23.1	7.8	5.6	17.3
Stop Delay (hr)	0.6	0.0	0.1	1.0	0.3	0.0	2.1
Stop Del/Veh (s)	29.2	7.0	35.7	12.2	4.5	2.4	10.7
Total Stops	66	10	9	177	73	24	359
Stop/Veh	0.82	0.71	0.90	0.62	0.29	0.37	0.51
Travel Dist (mi)	30.0	5.1	2.8	78.0	23.7	6.4	145.9
Travel Time (hr)	1.7	0.2	0.2	4.1	1.5	0.4	8.1
Avg Speed (mph)	18	25	14	19	16	16	18
Fuel Used (gal)	0.8	0.1	0.1	2.4	1.1	0.2	4.8
Fuel Eff. (mpg)	36.2	39.6	28.3	32.3	21.1	26.4	30.2
HC Emissions (g)	10	2	1	98	43	3	156
CO Emissions (g)	207	45	39	1929	914	87	3222
NOx Emissions (g)	30	6	3	259	126	12	436
Vehicles Entered	76	13	10	270	246	65	680
Vehicles Exited	74	13	10	268	247	65	677
Hourly Exit Rate	296	52	40	1072	988	260	2708
Input Volume	295	47	47	1119	1345	338	3191
% of Volume	100	111	85	96	73	77	85
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							316
Occupancy (veh)	7	1	1	16	6	2	32

Appendix P
Scenario 4 - AM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment														
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	2,000	2,000
Accel Length			500		500	500					500			
Decel Length								500	185					
Mainline Volume	4,740	4,740	4,740	3,840	3,840	5,044	6,810	6,810	6,144	6,004	6,004	6,724	6,724	4,036
On Ramp Volume					1,204	1,766					720			
Off Ramp Volume			900					666	140				2,688	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	4,740	4,740	4,740	3,840	5,044	6,810	6,810	6,810	6,144	6,004	6,724	6,724	6,724	4,036
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	22.0%	22.0%	22.0%	26.0%	26.0%	26.0%	17.8%	17.8%	17.8%	18.5%	18.5%	18.0%	18.0%	14.9%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _B	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{HV}	0.694	0.901	0.901	0.885	0.885	0.885	0.918	0.918	0.918	0.915	0.915	0.917	0.917	0.931
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,261	5,597	5,597	4,616	6,064	8,186	7,889	7,889	7,118	6,978	7,815	7,797	7,797	4,613
GP Flow (pcphpl)	1,815	1,399	1,399	1,154	1,516	2,047	1,972	1,972	1,779	1,745	1,954	1,949	1,949	1,538
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LV}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	0.77	0.60	0.60	0.49	0.65	0.87	0.82	0.82	0.74	0.73	0.81	0.81	0.81	0.64
Speed (mph)	62.6	65.0	65.0	65.0	64.8	59.1	63.1	63.1	66.1	66.6	63.4	63.5	63.5	68.7
Density (pcphpl)	29.0	21.5	21.5	17.8	23.4	34.6	31.3	31.3	26.9	26.2	30.8	30.7	30.7	22.4
LOS	D	C	C	B	C	D	D	D	D	D	D	D	D	C
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			5,597		4,727	6,231		7,889	7,118		6,978			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.60		0.50	0.66		0.82	0.74		0.73			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			4,586		6,064	8,186		7,122	6,955		7,815		4,549	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.49		0.65	0.87		0.74	0.72		0.81		0.63	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Flow Rate														
On Volume (vph)					1,204	1,766					720			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.3%	3.7%					13.9%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _{RV}					0.979	0.982					0.935			
f _P					1.00	1.00					1.00			
On Flow (pcph)					1,337	1,955					837			
On Flow (pcphpl)					1,337	1,955					837			
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.70	0.93					0.40			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			900					666	140				2,688	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			6.8%					12.1%	14.3%				22.3%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _{RV}			0.967					0.943	0.933				0.900	
f _P			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,012					768	163				3,248	
Off Flow (pcphpl)			506					768	163				1,624	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.24					0.37	0.09				0.69	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective v _P (pcph)					4,727	6,231					6,978			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{FM} (Eqn 13-3)					0.592	0.592					0.592			
P _{FM} (Eqn 13-4)														
P _{FM} (Eqn 13-5)														
P _{FM}					0.051	-0.027					0.113			
V ₁₂ (pcph)					240	-166					790			
v ₃ (pcph)														
v ₃₄ (pcph)					4,487	6,397					6,188			
v ₁₂₄ (pcph)					1,891	2,493					2,791			
v _{R124} (pcph)					3,228	4,448					3,628			
Merge Speed Index					0.39	0.61					0.42			
Merge Area Speed					55.9	51.0					58.2			
Outer Lanes Volume					1,418	1,869					2,093			
Outer Lanes Speed					61.7	60.1					64.3			
Segment Speed					58.5	54.8					61.3			
Merge v/c ratio					0.70	0.97					0.79			
Merge Density					26.9	36.1					30.3			
Merge LOS					C	E					D			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_p (pcph)			5,597					7,889	7,118					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.574					0.527	0.575					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			2,204					3,873	3,195					
v_3 (pcph)														
v_{34} (pcph)			3,393					4,017	3,923					
v_{124} (pcph)			2,239					3,873	3,195					
Diverge Speed Index			0.39					0.37	0.57					
Diverge Area Speed			56.1					59.7	54.0					
Outer Lanes Volume			1,679					2,008	1,961					
Outer Lanes Speed			68.7					72.9	73.0					
Segment Speed			63.0					65.8	63.0					
Diverge v/c ratio			0.51					0.88	0.73					
Diverge Density			19.0					33.1	30.1					
Diverge LOS			B					D	D					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segments														
Calculate Mainline to Off Ramp Flow Rate for Weave Segments														
Calculate General Purpose Lanes to General Purpose Lanes F														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	0.77	0.60	0.51	0.49	0.70	0.97	0.82	0.88	0.73	0.73	0.79	0.81	0.81	0.64
Segment Density	29.0	21.5	19.0	17.8	26.9	36.1	31.3	33.1	30.1	26.2	30.3	30.7	30.7	22.4
Segment LOS	D	C	B	B	C	E	D	D	D	D	D	D	D	C
Over Capacity														

Location	1

Key	
<-> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	2,688
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	2,688
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.3%
RV %	0.0%
E _T	1.5
E _R	1.2
f _{HV}	0.900
f _p	1.00
GP Flow (pcph)	3,178
GP Flow (pcphpl)	1,589
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.66
Speed (mph)	68.2
Density (pcphpl)	23.3
LOS	C
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes Flow	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.66
Segment Density	23.3
Segment LOS	C
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<-> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Level Road	Level Road West Off-Ramp	Level Road East Off-Ramp	Level Road Off to On-Ramp	Level Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	3,372	3,372	3,035	2,865	2,865	5,107	5,277	5,947	5,947	5,517	5,182	5,182
On Ramp Volume					2,242	170	670					773
Off Ramp Volume		337	170						430	335		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	3,372	3,372	3,035	2,865	5,107	5,277	5,947	5,947	5,947	5,517	5,182	5,955
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	15.0%	15.0%	5.6%	0.0%	0.0%	3.1%	6.3%	18.0%	18.0%	18.0%	18.5%	18.5%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.930	0.930	0.973	1.000	1.000	0.985	0.970	0.917	0.917	0.917	0.915	0.915
f _P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,816	3,816	3,284	3,016	5,376	5,642	6,456	6,823	6,823	6,330	5,959	6,848
GP Flow (pcphpl)	1,272	1,272	1,095	1,508	1,344	1,128	1,291	1,365	1,365	1,583	1,490	1,712
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _W												
f _C												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.54	0.54	0.47	0.64	0.57	0.48	0.55	0.58	0.58	0.67	0.63	0.73
Speed (mph)	65.0	65.0	65.0	64.8	65.0	65.0	65.0	65.0	65.0	64.5	64.9	63.6
Density (pcphpl)	19.6	19.6	18.8	23.3	20.7	17.4	19.9	21.0	21.0	24.5	23.0	26.9
LOS	C	C	B	C	C	B	C	C	C	C	C	D
Calculate Operations for Entering GP Lanes												
GP _{IN} Vol (pcph)		3,816			2,852	5,365	5,363			6,330		5,919
GP _{IN} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{IN} v/c ratio		0.54			0.61	0.57	0.46			0.67		0.63
Calculate Operations for Exiting GP Lanes												
GP _{OUT} Vol (pcph)		3,267	3,007				6,456		6,330	5,933		6,848
GP _{OUT} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{OUT} v/c ratio		0.46	0.64				0.55		0.67	0.63		0.73
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,242	170	670					773
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					7.1%	100.0%	100.0%					21.1%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _W					0.966	0.667	0.667					0.905
f _P					1.00	1.00	1.00					1.00
On Flow (pcph)					2,524	277	1,092					929
On Flow (pcphpl)					1,262	277	1,092					929

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<=> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.53	0.13	0.50					0.44
Calculate Off Ramp Flow Rate												
Off Volume (vph)		337	170						430	335		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						11.1%	17.9%		
RV %		0.0%	0.0%						0.0%	0.0%		
E _T		1.5	1.5						1.5	1.5		
E _B		1.2	1.2						1.2	1.2		
t _{av}		0.667	0.667						0.947	0.918		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		549	277						493	397		
Off Flow (pcphpl)		549	277						493	397		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.26	0.13						0.23	0.21		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			549									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		277										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							4,183					5,919
Up Ramp L _{EO}												
Down Ramp L _{EO}												
P _{MU} (Eqn 13-3)							0.606					0.593
P _{MU} (Eqn 13-4)												
P _{MU} (Eqn 13-5)												
P _{MU}							0.081					0.102
v _{U2} (pcph)							340					602
v _U (pcph)												
v _{MU} (pcph)							3,844					5,317
v _{UM} (pcph)							1,673					2,368
v _{UMU} (pcph)							2,766					3,297
Merge Speed Index							0.27					0.38
Merge Area Speed							58.7					56.4
Outer Lanes Volume							1,255					1,776
Outer Lanes Speed							62.3					60.4
Segment Speed							60.4					58.4
Merge v/c ratio							0.60					0.72
Merge Density							20.3					27.3
Merge LOS							C					C
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		3,816								6,330		
Up Ramp L _{EO}												
Down Ramp L _{EO}		336										
P _{UD} (Eqn 13-9)		0.639								0.584		
P _{UD} (Eqn 13-10)												
P _{UD} (Eqn 13-11)		0.570										
P _{UD}		0.639								0.436		
v _{U2} (pcph)		2,638								2,984		
v _U (pcph)		1,178										
v _{MU} (pcph)										3,346		
v _{UM} (pcph)		2,638								2,984		
Diverge Speed Index		0.35								0.66		
Diverge Area Speed		57.0								49.8		
Outer Lanes Volume		1,178								1,673		
Outer Lanes Speed		70.6								68.7		
Segment Speed		60.6								58.3		
Diverge v/c ratio		0.60								0.68		
Diverge Density		25.6								28.4		
Diverge LOS		C								D		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segments												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.54	0.60	0.47	0.64	0.57	0.48	0.60	0.58	0.58	0.68	0.63	0.72
Segment Density	19.6	25.6	16.8	23.3	20.7	17.4	20.3	21.0	21.0	28.4	23.0	27.3
Segment LOS	C	C	B	C	C	B	C	C	C	D	C	C
Over Capacity												

Fehr & Peers

Location	16	17	18	19	20	21	22
	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>						
Key							
<-> Express Lane (HOV)							
No Trucks							
Name	Level Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Calculate On Ramp Roadway Operations							
On Ramp Type				Right	Right		
On Ramp Speed (mph)				25	45		
On Ramp Cap (pcph)				1,900	2,100		
On Ramp v/c ratio				0.27	0.17		
Calculate Off Ramp Flow Rate							
Off Volume (vph)		1,855					
PHF		0.92					
Total Lanes		2					
Terrain		Level					
Grade %		0.0%					
Grade Length (mi)		0.00					
Truck & Bus %		7.4%					
RV %		0.0%					
E _T		1.5					
E _B		1.2					
f _W		0.964					
f _p		1.00					
Off Flow (pcph)		2,091					
Off Flow (pcphpl)		1,045					
Calculate Off Ramp Roadway Operations							
Off Ramp Type		Right					
Off Ramp Speed		45					
Off Ramp Cap (pcph)		4,200					
Off Ramp v/c ratio		0.50					
Determine Adjacent Ramp for Through Traffic							
Up Type							
Up Distance							
Up Flow (pcph)							
Down Type							
Down Distance							
Down Flow (pcph)							
Calculate Merge Influence Area Operations							
Effective v ₀ (pcph)				4,829	5,309		
Up Ramp L _{EO}							
Down Ramp L _{EO}							
P _M (Eqn 13-3)				0.592	0.592		
P _M (Eqn 13-4)							
P _M (Eqn 13-5)							
P _M				0.154	0.173		
v ₁₂ (pcph)				746	918		
v ₅ (pcph)							
v _W (pcph)				4,083	4,392		
v _{12W} (pcph)				1,931	2,124		
v _{12W} (pcph)				2,438	2,483		
Merge Speed Index				0.34	0.32		
Merge Area Speed				57.2	57.6		
Outer Lanes Volume				1,449	1,593		
Outer Lanes Speed				61.6	61.1		
Segment Speed				59.5	59.5		
Merge v/c ratio				0.53	0.54		
Merge Density				21.1	21.5		
Merge LOS				C	C		
Calculate Diverge Influence Area Operations							
Effective v ₀ (pcph)		6,858					
Up Ramp L _{EO}							
Down Ramp L _{EO}							
P _D (Eqn 13-9)		0.492					
P _D (Eqn 13-10)							
P _D (Eqn 13-11)							
P _D		0.260					
v ₁₂ (pcph)		3,330					
v ₅ (pcph)							
v _W (pcph)		3,527					
v _{12W} (pcph)		3,330					
Diverge Speed Index		0.49					
Diverge Area Speed		53.8					
Outer Lanes Volume		1,764					
Outer Lanes Speed		68.3					
Segment Speed		60.4					
Diverge v/c ratio		0.76					
Diverge Density		28.4					
Diverge LOS		D					
Calculate On Ramp to Off Ramp Flow							
Calculate On Ramp to Mainline Flow							
Calculate Mainline to Off Ramp Flow							
Calculate General Purpose Lanes							
Calculate Weave Segment Operations							
Summarize Segment Operations							
Segment v/c ratio	0.73	0.76	0.51	0.53	0.54	0.60	0.86
Segment Density	27.0	28.4	18.5	21.1	21.5	21.7	35.5
Segment LOS	D	D	C	C	C	C	E
Over Capacity							

Fehr & Peers

Appendix Q
Scenario 4 - PM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<- Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment														
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	1,500	
Accel Length			500		500	500					500			
Decel Length								500	185					
Mainline Volume	6,692	6,692	6,692	5,480	5,480	6,344	7,302	7,302	6,784	6,674	6,674	7,534	7,534	4,216
On Ramp Volume					864	958					860			
Off Ramp Volume			1,212					518	110				3,318	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	6,692	6,692	6,692	5,480	6,344	7,302	7,302	7,302	6,784	6,674	7,534	7,534	7,534	4,216
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.7%	20.7%	20.7%	24.1%	24.1%	24.1%	20.2%	20.2%	20.2%	20.2%	20.2%	19.7%	19.7%	17.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{HV}	0.707	0.908	0.906	0.892	0.892	0.892	0.908	0.908	0.908	0.908	0.908	0.910	0.910	0.919
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	10,066	7,856	7,856	6,532	7,562	8,704	8,553	8,553	7,946	7,817	8,824	8,804	8,804	4,882
GP Flow (pcphpl)	2,517	1,964	1,964	1,633	1,891	2,176	2,138	2,138	1,986	1,954	2,206	2,201	2,201	1,627
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	1.07	0.84	0.84	0.69	0.80	0.93	0.89	0.89	0.83	0.81	0.92	0.92	0.92	0.68
Speed (mph)	-	60.5	60.5	64.2	61.6	56.5	59.8	59.8	62.8	63.4	58.3	58.4	58.4	67.9
Density (pcphpl)	-	32.5	32.5	25.4	30.7	38.5	35.8	35.8	31.6	30.8	37.9	37.7	37.7	24.0
LOS	F	D	D	C	D	E	E	E	D	D	E	E	E	C
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			7,856		6,602	7,628		8,553	7,946		7,813			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.84		0.70	0.81		0.89	0.83		0.81			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			6,491		7,562	8,704		7,942	7,805		8,824		4,798	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.69		0.80	0.93		0.83	0.81		0.92		0.67	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					864	958					860			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.4%	6.6%					16.3%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _{HV}					0.978	0.968					0.925			
f _p					1.00	1.00					1.00			
On Flow (pcph)					960	1,076					1,011			
On Flow (pcphpl)					960	1,076					1,011			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.51	0.51					0.48			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			1,212					518	110				3,318	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			7.3%					17.0%	36.4%				22.2%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _{RV}			0.965					0.922	0.846				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,365					611	141				4,007	
Off Flow (pcphpl)			683					611	141				2,003	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.33					0.29	0.07				0.85	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective v _F (pcph)					6,602	7,628					7,813			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{FM} (Eqn 13-3)					0.592	0.592					0.592			
P _{FM} (Eqn 13-4)														
P _{FM} (Eqn 13-5)														
P _{FM}					0.098	0.083					0.091			
v ₁₂ (pcph)					646	636					714			
v ₃ (pcph)														
v ₃₄ (pcph)					5,957	6,993					7,099			
v _{12a} (pcph)					2,641	3,051					3,125			
v _{612a} (pcph)					3,601	4,127					4,136			
Merge Speed Index					0.44	0.52					0.52			
Merge Area Speed					54.9	53.1					55.4			
Outer Lanes Volume					1,981	2,289					2,344			
Outer Lanes Speed					59.7	58.6					63.2			
Segment Speed					57.3	55.8					59.3			
Merge v/c ratio					0.78	0.90					0.90			
Merge Density					30.0	34.0					34.1			
Merge LOS					D	D					D			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_p (pcph)			7,856					8,553	7,946					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.501					0.518	0.555					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			3,053					4,074	3,544					
v_3 (pcph)														
v_{34} (pcph)			4,803					4,479	4,402					
v_{12a} (pcph)			3,142					4,074	3,544					
Diverge Speed Index			0.42					0.35	0.57					
Diverge Area Speed			55.3					60.1	54.0					
Outer Lanes Volume			2,357					2,240	2,201					
Outer Lanes Speed			66.0					72.0	72.1					
Segment Speed			61.3					65.8	62.7					
Diverge v/c ratio			0.71					0.93	0.81					
Diverge Density			26.8					34.8	33.1					
Diverge LOS			C					D	D					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	1.07	0.84	0.71	0.69	0.78	0.90	0.89	0.93	0.81	0.81	0.90	0.92	0.92	0.68
Segment Density	-	32.5	26.8	25.4	30.0	34.0	35.8	34.8	33.1	30.8	34.1	37.7	37.7	24.0
Segment LOS	F	D	C	C	D	D	E	D	D	D	D	E	E	C
Over Capacity	Segment GP Lanes													

Location	1

Key	
<-> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	3,318
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	3,318
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.2%
RV %	0.0%
E _T	1.5
E _R	1.2
f _W	0.900
f _p	1.00
GP Flow (pcph)	3,922
GP Flow (pcphpl)	1,961
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.82
Speed (mph)	63.3
Density (pcphpl)	31.0
LOS	D
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes F	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.82
Segment Density	31.0
Segment LOS	D
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<-> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					
Decel Length		150								170		560
Mainline Volume	4,513	4,513	4,035	3,805	3,805	6,432	6,662	7,688	7,688	6,889	6,338	6,338
On Ramp Volume												
Off Ramp Volume		478	230		2,627	230	1,026		799	551		724
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	4,513	4,513	4,035	3,805	6,432	6,662	7,688	7,688	7,688	6,889	6,338	7,062
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	15.5%	15.5%	5.7%	0.0%	0.0%	4.2%	7.5%	21.1%	21.1%	21.1%	22.7%	22.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{HV}	0.928	0.928	0.972	1.000	1.000	0.979	0.964	0.905	0.905	0.905	0.898	0.898
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	5,119	5,119	4,368	4,005	6,771	7,160	8,396	8,946	8,946	8,017	7,429	8,277
GP Flow (pcphpl)	1,706	1,706	1,456	2,003	1,693	1,432	1,679	1,789	1,789	2,004	1,857	2,069
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _{LW}												
f _{LC}												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.73	0.73	0.62	0.85	0.72	0.61	0.71	0.76	0.76	0.85	0.79	0.88
Speed (mph)	63.7	63.7	65.0	59.9	63.8	65.0	63.9	62.9	62.9	59.8	62.0	58.6
Density (pcphpl)	26.8	26.8	22.4	33.5	26.5	22.0	26.3	28.5	28.5	33.5	29.9	35.3
LOS	D	D	C	D	D	C	D	D	D	D	D	E
Calculate Operations for Entering GP Lanes												
GP _{in} Vol (pcph)		5,119			3,768	6,785	6,723			8,017		7,442
GP _{in} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{in} v/c ratio		0.73			0.80	0.72	0.57			0.85		0.79
Calculate Operations for Exiting GP Lanes												
GP _{out} Vol (pcph)		4,340	3,993				8,396		8,023	7,375		8,277
GP _{out} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{out} v/c ratio		0.62	0.85				0.71		0.85	0.78		0.88
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,627	230	1,026					724
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					10.3%	100.0%	100.0%					12.3%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _{HV}					0.951	0.667	0.667					0.942
f _p					1.00	1.00	1.00					1.00
On Flow (pcph)					3,002	375	1,673					835
On Flow (pcphpl)					1,501	375	1,673					835

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.63	0.17	0.76					0.40
Calculate Off Ramp Flow Rate												
Off Volume (vph)		478	230						799	551		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						12.7%	14.3%		
RV %		0.0%	0.0%						0.0%	0.0%		
E ₂		1.5	1.5						1.5	1.5		
E _R		1.2	1.2						1.2	1.2		
f _{ov}		0.667	0.667						0.940	0.933		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		779	375						924	642		
Off Flow (pcphpt)		779	375						924	642		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.37	0.18						0.44	0.34		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			779									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		375										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							4,908					7,442
Up Ramp L _{eq}												
Down Ramp L _{eq}												
P _{RL} (Eqn 13-3)							0.606					0.593
P _{RL} (Eqn 13-4)												
P _{RL} (Eqn 13-5)												
P _{RL}							0.009					0.113
v ₀₂ (pcph)							43					844
v ₀ (pcph)												
v ₀₄ (pcph)							4,865					6,598
v ₁₂₄ (pcph)							1,963					2,977
v _{RL24} (pcph)							3,636					3,812
Merge Speed Index							0.36					0.45
Merge Area Speed							56.7					54.7
Outer Lanes Volume							1,472					2,233
Outer Lanes Speed							61.5					58.8
Segment Speed							58.8					56.8
Merge v/c ratio							0.79					0.83
Merge Density							26.8					31.3
Merge LOS							C					D
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		5,119								8,017		
Up Ramp L _{eq}												
Down Ramp L _{eq}		537										
P _{RL} (Eqn 13-9)		0.596								0.530		
P _{RL} (Eqn 13-10)												
P _{RL} (Eqn 13-11)		0.555										
P _{RL}		0.596								0.436		
v ₀₂ (pcph)		3,367								3,857		
v ₀ (pcph)		1,752										
v ₀₄ (pcph)										4,159		
v ₁₂₄ (pcph)		3,367								3,857		
Diverge Speed Index		0.37								0.68		
Diverge Area Speed		56.5								49.3		
Outer Lanes Volume		1,752								2,080		
Outer Lanes Speed		68.4								67.1		
Segment Speed		60.1								57.2		
Diverge v/c ratio		0.77								0.88		
Diverge Density		31.9								35.9		
Diverge LOS		D								E		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segm												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.73	0.77	0.62	0.85	0.72	0.61	0.79	0.76	0.76	0.88	0.79	0.83
Segment Density	26.8	31.9	22.4	33.5	26.5	22.0	26.8	28.5	28.5	35.9	29.9	31.3
Segment LOS	D	D	C	D	D	C	C	D	D	E	D	D
Over Capacity												

Fehr & Peers

Fehr & Peers

Fehr & Peers






















Appendix R
Scenario 9 - AM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary

1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Sceanrio 9 Project Conditions

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	10	610	10	10	100	280	330	10	10	90	270	20
Future Volume (veh/h)	10	610	10	10	100	280	330	10	10	90	270	20
Number	5	2	12		1	6	16	3	8	18	7	4
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1566	1900		1739	1520	1845	1863	1726	1900	1827	1723
Adj Flow Rate, veh/h	11	663	10		109	304	147	11	11	0	316	0
Adj No. of Lanes	1	2	0		2	3	1	1	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	20	20		10	25	3	2	2	2	4	2
Cap, veh/h	20	972	15		373	1733	651	73	71	0	643	318
Arrive On Green	0.02	0.32	0.32		0.12	0.42	0.42	0.04	0.04	0.00	0.18	0.00
Sat Flow, veh/h	905	3001	45		3213	4150	1559	1774	1726	0	3480	1723
Grp Volume(v), veh/h	11	329	344		109	304	147	11	11	0	316	0
Grp Sat Flow(s),veh/h/ln	905	1488	1558		1606	1383	1559	1774	1726	0	1740	1723
Q Serve(g_s), s	0.7	10.8	10.8		1.7	2.6	3.4	0.3	0.3	0.0	4.6	0.0
Cycle Q Clear(g_c), s	0.7	10.8	10.8		1.7	2.6	3.4	0.3	0.3	0.0	4.6	0.0
Prop In Lane	1.00		0.03		1.00		1.00	1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	20	482	505		373	1733	651	73	71	0	643	318
V/C Ratio(X)	0.54	0.68	0.68		0.29	0.18	0.23	0.15	0.15	0.00	0.49	0.00
Avail Cap(c_a), veh/h	259	874	916		462	1849	695	252	245	0	1359	673
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	27.2	16.5	16.5		22.8	10.3	10.5	26.0	26.0	0.0	20.6	0.0
Incr Delay (d2), s/veh	13.0	2.4	2.3		0.3	0.1	0.2	0.6	0.6	0.0	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.7	4.9		0.8	1.0	1.5	0.2	0.2	0.0	2.3	0.0
LnGrp Delay(d),s/veh	40.2	18.9	18.8		23.0	10.4	10.8	26.6	26.7	0.0	21.7	0.0
LnGrp LOS	D	B	B		C	B	B	C	C		C	
Approach Vol, veh/h		684				560			22			316
Approach Delay, s/veh		19.2				12.9			26.6			21.7
Approach LOS		B				B			C			C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	24.1		14.4	6.2	29.4		6.3				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	33.1		22.0	16.1	25.1		8.0				
Max Q Clear Time (g_c+I1), s	3.7	12.8		6.6	2.7	5.4		2.3				
Green Ext Time (p_c), s	0.1	5.3		2.0	0.0	3.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			17.6									
HCM 2010 LOS			B									
Notes												

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	10
Future Volume (veh/h)	10
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	0
Adj No. of Lanes	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	0
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	0
V/C Ratio(X)	0.00
Avail Cap(c_a), veh/h	0
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	












User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary

2: I-5 Southbound Ramps & Laval Road

Cumulative Plus Sceanrio 9 Project Conditions

AM Peak Hour

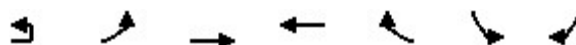
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	570	410	10	270	313	0		
Future Volume (veh/h)	570	410	10	270	313	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1743	1624	1863	1652	1545	0		
Adj Flow Rate, veh/h	613	0	11	290	337	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	9	17	2	15	23	0		
Cap, veh/h	762	634	30	1036	687	0		
Arrive On Green	0.46	0.00	0.02	0.33	0.23	0.00		
Sat Flow, veh/h	1660	1380	1774	3222	3089	0		
Grp Volume(v), veh/h	613	0	11	290	337	0		
Grp Sat Flow(s),veh/h/ln	1660	1380	1774	1570	1467	0		
Q Serve(g_s), s	14.9	0.0	0.3	3.2	4.7	0.0		
Cycle Q Clear(g_c), s	14.9	0.0	0.3	3.2	4.7	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	762	634	30	1036	687	0		
V/C Ratio(X)	0.80	0.00	0.36	0.28	0.49	0.00		
Avail Cap(c_a), veh/h	1288	1071	227	2970	2127	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	10.9	0.0	22.8	11.6	15.6	0.0		
Incr Delay (d2), s/veh	4.1	0.0	7.1	0.3	1.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	7.5	0.0	0.2	1.4	2.0	0.0		
LnGrp Delay(d),s/veh	15.0	0.0	29.9	11.9	17.0	0.0		
LnGrp LOS	B		C	B	B			
Approach Vol, veh/h	613			301	337			
Approach Delay, s/veh	15.0			12.6	17.0			
Approach LOS	B			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		20.8		26.1	4.5	16.3		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 44		36.4	6.0	34.0		
Max Q Clear Time (g_c+I1), s		5.2		16.9	2.3	6.7		
Green Ext Time (p_c), s		3.5		4.7	0.0	4.3		
Intersection Summary								
HCM 2010 Ctrl Delay			14.9					
HCM 2010 LOS			B					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Sceanrio 9 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

AM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↗		↗
Traffic Volume (vph)	20	330	1246	503	390	0	140
Future Volume (vph)	20	330	1246	503	390	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3142	4673	3085	1352		1442
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3142	4673	3085	1352		1442
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	351	1326	535	415	0	149
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1326	535	415	0	149
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	12%	11%	17%	18%	2%	14%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		10.6	36.7	16.4	36.7		36.7
Effective Green, g (s)		10.6	36.7	16.4	36.7		36.7
Actuated g/C Ratio		0.29	1.00	0.45	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		907	4673	1378	1352		1442
v/s Ratio Prot		0.12	0.28	0.17			
v/s Ratio Perm					c0.31		0.10
v/c Ratio		0.41	0.28	0.39	0.31		0.10
Uniform Delay, d1		10.5	0.0	6.8	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.2	0.5	0.6		0.1
Delay (s)		10.6	0.2	7.3	0.6		0.1
Level of Service		B	A	A	A		A
Approach Delay (s)			2.4	4.4		0.1	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.0		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.42				
Actuated Cycle Length (s)			36.7		Sum of lost time (s)		9.7
Intersection Capacity Utilization			32.2%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road






Cumulative Plus Sceanrio 9 Project Conditions

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	10	10	30	10	490	10	266	10	40	766	300	10
Future Volume (veh/h)	10	10	30	10	490	10	266	10	40	766	300	10
Number	5	2	12		1	6	16		3	8	18	
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1863	950	1863		1863	1663	1900		1863	1583	1863	
Adj Flow Rate, veh/h	11	11	0		533	11	65		43	833	112	
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	
Percent Heavy Veh, %	2	100	2		2	100	100		2	20	2	
Cap, veh/h	30	21	35		681	42	250		90	1732	632	
Arrive On Green	0.02	0.02	0.00		0.20	0.20	0.20		0.05	0.40	0.40	
Sat Flow, veh/h	1774	950	1583		3442	208	1228		1774	4323	1577	
Grp Volume(v), veh/h	11	11	0		533	0	76		43	833	112	
Grp Sat Flow(s),veh/h/ln	1774	950	1583		1721	0	1435		1774	1441	1577	
Q Serve(g_s), s	0.4	0.7	0.0		9.1	0.0	2.8		1.5	8.8	2.8	
Cycle Q Clear(g_c), s	0.4	0.7	0.0		9.1	0.0	2.8		1.5	8.8	2.8	
Prop In Lane	1.00		1.00		1.00		0.86		1.00		1.00	
Lane Grp Cap(c), veh/h	30	21	35		681	0	292		90	1732	632	
V/C Ratio(X)	0.37	0.52	0.00		0.78	0.00	0.26		0.48	0.48	0.18	
Avail Cap(c_a), veh/h	210	174	289		1520	0	727		436	4483	1636	
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	
Uniform Delay (d), s/veh	30.1	29.9	0.0		23.5	0.0	20.7		28.5	13.8	12.0	
Incr Delay (d2), s/veh	4.7	30.0	0.0		1.2	0.0	0.3		2.4	0.4	0.3	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.2	0.4	0.0		4.4	0.0	1.1		0.8	3.5	1.3	
LnGrp Delay(d),s/veh	34.7	59.9	0.0		24.8	0.0	21.0		30.9	14.2	12.2	
LnGrp LOS	C	E			C		C		C	B	B	
Approach Vol, veh/h		22				609				988		
Approach Delay, s/veh		47.3				24.3				14.7		
Approach LOS		D				C				B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.9	7.1	7.3	30.5	5.7	18.3	8.1	29.7				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 27	11.3	* 15	76.7	* 7.3	31.3	28.0	64.1				
Max Q Clear Time (g_c+I1), s	11.1	2.7	3.5	6.4	2.4	4.8	4.7	10.8				
Green Ext Time (p_c), s	1.2	0.0	0.0	5.1	0.0	0.3	0.1	13.9				
Intersection Summary												
HCM 2010 Ctrl Delay			17.9									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary 4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Sceanrio 9 Project Conditions
AM Peak Hour

			
Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	63	363	10
Future Volume (veh/h)	63	363	10
Number	7	4	14
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1617	1339	1900
Adj Flow Rate, veh/h	68	395	9
Adj No. of Lanes	1	3	0
Peak Hour Factor	0.92	0.92	0.92
Percent Heavy Veh, %	20	43	43
Cap, veh/h	103	1521	35
Arrive On Green	0.07	0.41	0.41
Sat Flow, veh/h	1540	3677	83
Grp Volume(v), veh/h	68	261	143
Grp Sat Flow(s),veh/h/ln	1540	1219	1324
Q Serve(g_s), s	2.7	4.4	4.4
Cycle Q Clear(g_c), s	2.7	4.4	4.4
Prop In Lane	1.00		0.06
Lane Grp Cap(c), veh/h	103	1008	547
V/C Ratio(X)	0.66	0.26	0.26
Avail Cap(c_a), veh/h	698	3024	1643
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.2	11.9	11.9
Incr Delay (d2), s/veh	4.4	0.3	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	1.5	1.7
LnGrp Delay(d),s/veh	32.5	12.2	12.4
LnGrp LOS	C	B	B
Approach Vol, veh/h		472	
Approach Delay, s/veh		15.2	
Approach LOS		B	
Timer			

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

SimTraffic Performance Report
Cumulative Plus Scenario 9 Project Conditions

AM Peak Hour

5: Street A & Street C Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay (hr)	0.8	0.2	0.1	4.9	1.8	0.0	7.8
Total Del/Veh (s)	15.1	6.5	29.6	69.9	36.8	6.8	36.4
Stop Delay (hr)	0.5	0.1	0.1	4.6	1.5	0.0	6.8
Stop Del/Veh (s)	10.5	2.9	25.9	65.3	31.2	4.7	31.8
Total Stops	93	64	11	268	151	5	592
Stop/Veh	0.51	0.48	0.85	1.07	0.86	0.29	0.77
Travel Dist (mi)	23.8	17.3	1.2	21.4	16.2	1.7	81.6
Travel Time (hr)	1.7	1.0	0.1	5.8	2.4	0.1	11.1
Avg Speed (mph)	14	18	8	4	7	19	7
Fuel Used (gal)	1.1	0.7	0.1	1.7	0.9	0.1	4.5
Fuel Eff. (mpg)	22.2	26.0	18.9	12.3	17.9	25.5	18.1
HC Emissions (g)	16	12	0	11	8	1	48
CO Emissions (g)	629	476	24	292	267	48	1736
NOx Emissions (g)	54	38	2	33	26	4	156
Vehicles Entered	178	129	13	230	162	17	729
Vehicles Exited	177	129	12	227	165	16	726
Hourly Exit Rate	708	516	48	908	660	64	2904
Input Volume	702	525	75	1506	667	69	3544
% of Volume	101	98	64	60	99	93	82
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							114
Occupancy (veh)	7	4	1	23	10	0	44

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.4	0.4	0.8
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	7.1	7.7	2.9
Total Delay (hr)	6.6	1.5	0.8	0.2	1.9	1.9	12.8
Total Del/Veh (s)	77.5	44.1	23.1	5.3	27.9	31.9	41.4
Stop Delay (hr)	5.1	1.1	0.6	0.0	0.7	0.7	8.3
Stop Del/Veh (s)	60.0	33.9	17.5	0.1	11.0	12.1	26.9
Total Stops	456	80	102	0	131	142	911
Stop/Veh	1.48	0.66	0.84	0.00	0.55	0.66	0.81
Travel Dist (mi)	38.6	14.8	22.5	19.1	228.6	204.2	527.8
Travel Time (hr)	8.0	2.1	1.5	0.7	7.6	7.2	27.2
Avg Speed (mph)	5	7	15	26	32	30	20
Fuel Used (gal)	2.9	0.9	1.0	0.6	5.6	4.9	15.7
Fuel Eff. (mpg)	13.5	17.3	23.2	34.4	40.8	42.1	33.6
HC Emissions (g)	22	9	13	8	79	70	201
CO Emissions (g)	599	267	579	270	1755	1374	4844
NOx Emissions (g)	74	31	43	29	317	278	771
Vehicles Entered	280	113	115	109	211	189	1017
Vehicles Exited	276	114	118	107	212	190	1017
Hourly Exit Rate	1104	456	472	428	848	760	4068
Input Volume	1577	597	438	840	831	789	5072
% of Volume	70	76	108	51	102	96	80
Denied Entry Before	0	0	0	0	1	1	2
Denied Entry After	0	0	0	0	3	3	6
Density (ft/veh)							211
Occupancy (veh)	32	8	6	3	29	27	105

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.4	0.2	0.1
Total Delay (hr)	1.3	1.0	0.6	1.5	0.8	0.4	5.7
Total Del/Veh (s)	19.7	13.6	17.8	16.6	24.6	10.6	16.7
Stop Delay (hr)	0.8	0.1	0.2	0.2	0.5	0.3	2.0
Stop Del/Veh (s)	11.9	0.8	6.2	1.8	16.1	6.7	6.0
Total Stops	145	59	74	108	82	89	557
Stop/Veh	0.60	0.22	0.61	0.33	0.69	0.59	0.45
Travel Dist (mi)	45.2	47.6	25.8	65.7	75.6	95.5	355.5
Travel Time (hr)	2.8	2.5	1.4	3.6	2.6	2.8	15.7
Avg Speed (mph)	16	19	19	18	29	34	23
Fuel Used (gal)	1.9	1.7	1.1	2.4	1.8	2.3	11.2
Fuel Eff. (mpg)	23.2	27.5	23.1	27.9	42.0	41.8	31.6
HC Emissions (g)	29	23	17	29	24	40	161
CO Emissions (g)	982	702	676	944	663	1126	5093
NOx Emissions (g)	102	87	58	108	100	154	608
Vehicles Entered	231	257	114	308	109	138	1157
Vehicles Exited	232	261	116	305	108	140	1162
Hourly Exit Rate	928	1044	464	1220	432	560	4648
Input Volume	831	1577	841	2316	438	588	6591
% of Volume	112	66	55	53	99	95	71
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							275
Occupancy (veh)	11	10	6	15	10	11	63

SimTraffic Performance Report
Cumulative Plus Scenario 9 Project Conditions

AM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	1.6	0.5	0.1	0.7	83.8	0.6	14.6	0.1	0.0	0.1	0.2	19.8
Total Del/Veh (s)	36.4	9.8	5.0	382.4	390.5	377.9	387.4	50.2	7.7	36.6	95.1	260.6
Stop Delay (hr)	1.3	0.3	0.0	0.7	83.5	0.6	14.5	0.1	0.0	0.1	0.1	18.2
Stop Del/Veh (s)	30.6	6.0	1.6	379.7	389.0	383.0	383.5	45.4	7.6	34.1	78.7	238.5
Total Stops	98	45	17	7	637	5	133	3	2	6	10	264
Stop/Veh	0.63	0.25	0.29	1.00	0.82	0.83	0.98	0.75	1.00	0.67	1.67	0.96
Travel Dist (mi)	30.5	37.5	12.4	7.2	757.7	6.2	39.4	1.7	1.1	5.2	3.5	122.5
Travel Time (hr)	2.6	1.7	0.5	1.0	105.7	0.8	15.8	0.1	0.0	0.2	0.3	23.5
Avg Speed (mph)	12	23	25	8	7	8	2	16	29	21	13	5
Fuel Used (gal)	1.4	1.4	0.4	0.3	35.3	0.3	4.2	0.1	0.0	0.1	0.1	7.3
Fuel Eff. (mpg)	22.2	27.1	29.1	22.1	21.5	22.8	9.3	32.7	43.6	36.0	28.3	16.7
HC Emissions (g)	18	23	6	1	262	1	25	0	0	1	1	49
CO Emissions (g)	617	763	238	31	6116	32	640	11	3	32	31	1448
NOx Emissions (g)	58	78	21	3	721	3	52	1	1	4	3	142
Vehicles Entered	140	174	57	5	479	4	96	3	2	8	5	206
Vehicles Exited	139	173	57	2	231	2	48	3	2	8	4	142
Hourly Exit Rate	556	692	228	8	924	8	192	12	8	32	16	568
Input Volume	549	647	223	16	1936	16	394	13	11	32	21	826
% of Volume	101	107	102	50	48	50	49	92	73	100	76	69
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	10	7	2	4	423	3	63	0	0	1	1	94

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.2
Total Delay (hr)	122.1
Total Del/Veh (s)	273.1
Stop Delay (hr)	119.5
Stop Del/Veh (s)	267.1
Total Stops	1227
Stop/Veh	0.76
Travel Dist (mi)	1024.9
Travel Time (hr)	152.2
Avg Speed (mph)	7
Fuel Used (gal)	51.0
Fuel Eff. (mpg)	20.1
HC Emissions (g)	386
CO Emissions (g)	9963
NOx Emissions (g)	1087
Vehicles Entered	1179
Vehicles Exited	811
Hourly Exit Rate	3244
Input Volume	4684
% of Volume	69
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	123
Occupancy (veh)	609

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.6	0.2	0.0	0.0	0.1	0.1	0.1
Total Delay (hr)	0.0	0.1	0.6	0.1	0.4	0.0	1.2
Total Del/Veh (s)	45.3	4.2	52.0	2.0	10.1	1.7	12.4
Stop Delay (hr)	0.0	0.1	0.6	0.0	0.2	0.0	0.9
Stop Del/Veh (s)	43.6	3.6	48.4	1.1	6.2	1.2	10.1
Total Stops	2	40	36	6	38	0	122
Stop/Veh	0.67	0.77	0.82	0.06	0.28	0.00	0.36
Travel Dist (mi)	0.6	11.8	3.9	9.5	63.3	1.0	90.2
Travel Time (hr)	0.1	0.5	0.8	0.4	2.2	0.0	4.0
Avg Speed (mph)	11	26	5	22	29	33	23
Fuel Used (gal)	0.0	0.3	0.3	0.5	1.6	0.0	2.7
Fuel Eff. (mpg)	26.7	41.8	11.8	18.1	40.6	46.4	32.8
HC Emissions (g)	0	3	3	11	21	0	39
CO Emissions (g)	6	107	136	475	476	4	1204
NOx Emissions (g)	0	11	11	33	71	1	127
Vehicles Entered	3	51	41	100	128	2	325
Vehicles Exited	3	51	41	100	127	2	324
Hourly Exit Rate	12	204	164	400	508	8	1296
Input Volume	11	209	178	421	526	5	1350
% of Volume	109	98	92	95	97	160	96
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							572
Occupancy (veh)	0	2	3	2	9	0	16





















10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.2	12.1	0.0	0.0	12.4
Denied Del/Veh (s)	0.4	3.4	123.9	130.1	0.0	0.0	72.5
Total Delay (hr)	3.5	0.1	0.3	24.0	0.1	0.0	27.9
Total Del/Veh (s)	150.3	76.3	235.9	297.5	2.1	1.8	173.1
Stop Delay (hr)	3.3	0.1	0.3	24.1	0.0	0.0	27.8
Stop Del/Veh (s)	144.2	71.3	236.4	299.1	1.0	0.3	172.6
Total Stops	88	7	5	253	12	2	367
Stop/Veh	1.06	1.17	1.25	0.87	0.07	0.05	0.63
Travel Dist (mi)	17.1	1.3	0.7	55.2	15.3	3.4	93.1
Travel Time (hr)	4.0	0.2	0.5	37.7	0.7	0.2	43.3
Avg Speed (mph)	4	8	3	2	21	18	3
Fuel Used (gal)	1.2	0.1	0.1	9.7	0.7	0.1	11.9
Fuel Eff. (mpg)	14.3	21.0	5.8	5.7	21.9	25.5	7.8
HC Emissions (g)	9	0	1	39	10	2	63
CO Emissions (g)	280	19	22	1230	395	69	2015
NOx Emissions (g)	22	1	2	90	37	7	159
Vehicles Entered	73	6	3	218	158	35	493
Vehicles Exited	63	5	2	180	156	36	442
Hourly Exit Rate	252	20	8	720	624	144	1768
Input Volume	284	21	26	1296	633	138	2398
% of Volume	89	95	31	56	99	104	74
Denied Entry Before	0	0	0	3	0	0	3
Denied Entry After	0	0	3	118	0	0	121
Density (ft/veh)							70
Occupancy (veh)	16	1	1	102	3	1	124

Appendix S
Scenario 9 - PM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary 1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Scenario 9 Project Conditions
PM Peak Hour

												
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	10	580	10	10	150	1460	290	10	20	150	330
Future Volume (veh/h)	10	10	580	10	10	150	1460	290	10	20	150	330
Number		5	2	12		1	6	16	3	8	18	7
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		0.99	1.00		0.99	1.00
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1258	1628	1900		1781	1638	1827	1863	1786	1900	1845
Adj Flow Rate, veh/h		11	630	10		163	1587	125	11	22	4	391
Adj No. of Lanes		1	2	0		2	3	1	1	1	0	2
Peak Hour Factor		0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %		100	17	17		7	16	4	2	2	2	3
Cap, veh/h		26	1233	20		357	2156	745	104	86	16	603
Arrive On Green		0.02	0.40	0.40		0.11	0.48	0.48	0.06	0.06	0.06	0.17
Sat Flow, veh/h		1198	3115	49		3291	4472	1545	1774	1468	267	3514
Grp Volume(v), veh/h		11	313	327		163	1587	125	11	0	26	391
Grp Sat Flow(s),veh/h/ln		1198	1546	1619		1645	1491	1545	1774	0	1734	1757
Q Serve(g_s), s		0.6	10.8	10.8		3.3	20.1	3.2	0.4	0.0	1.0	7.3
Cycle Q Clear(g_c), s		0.6	10.8	10.8		3.3	20.1	3.2	0.4	0.0	1.0	7.3
Prop In Lane		1.00		0.03		1.00		1.00	1.00		0.15	1.00
Lane Grp Cap(c), veh/h		26	612	640		357	2156	745	104	0	101	603
V/C Ratio(X)		0.42	0.51	0.51		0.46	0.74	0.17	0.11	0.00	0.26	0.65
Avail Cap(c_a), veh/h		173	879	920		377	2409	832	399	0	390	1093
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		34.1	16.2	16.2		29.6	14.7	10.3	31.5	0.0	31.8	27.3
Incr Delay (d2), s/veh		6.3	0.9	0.9		0.6	1.2	0.1	0.3	0.0	0.8	2.3
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.3	4.8	5.0		1.5	8.5	1.4	0.2	0.0	0.5	3.7
LnGrp Delay(d),s/veh		40.4	17.1	17.1		30.1	15.9	10.5	31.8	0.0	32.6	29.6
LnGrp LOS		D	B	B		C	B	B	C		C	C
Approach Vol, veh/h			651				1875			37		
Approach Delay, s/veh			17.5				16.8			32.4		
Approach LOS			B				B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.6	33.9		16.1	6.5	40.0		8.1				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	40.2		22.0	10.2	38.1		15.9				
Max Q Clear Time (g_c+I1), s	5.3	12.8		9.3	2.6	22.1		3.0				
Green Ext Time (p_c), s	0.1	5.5		2.3	0.0	12.0		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			18.8									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary 1: Dennis McCarthy Drive & Laval Road

Cumulative Plus Scenario 9 Project Conditions
PM Peak Hour

	↓	↙
Movement	SBT	SBR
Lane Configurations	↕	
Traffic Volume (veh/h)	20	20
Future Volume (veh/h)	20	20
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		1.00
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1900
Adj Flow Rate, veh/h	0	0
Adj No. of Lanes	1	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	2	2
Cap, veh/h	302	0
Arrive On Green	0.00	0.00
Sat Flow, veh/h	1759	0
Grp Volume(v), veh/h	0	0
Grp Sat Flow(s),veh/h/ln	1759	0
Q Serve(g_s), s	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0
Prop In Lane		0.00
Lane Grp Cap(c), veh/h	302	0
V/C Ratio(X)	0.00	0.00
Avail Cap(c_a), veh/h	547	0
HCM Platoon Ratio	1.00	1.00
Upstream Filter(I)	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0
LnGrp LOS		
Approach Vol, veh/h	391	
Approach Delay, s/veh	29.6	
Approach LOS	C	
Timer		












User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary

2: I-5 Southbound Ramps & Laval Road

Cumulative Plus Scenario 9 Project Conditions

PM Peak Hour

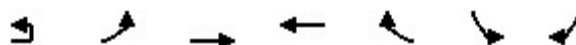
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	770	300	10	890	640	0		
Future Volume (veh/h)	770	300	10	890	640	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1712	1681	1863	1652	1667	0		
Adj Flow Rate, veh/h	828	0	11	957	688	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	11	13	2	15	14	0		
Cap, veh/h	887	777	27	1186	1055	0		
Arrive On Green	0.54	0.00	0.02	0.38	0.33	0.00		
Sat Flow, veh/h	1630	1429	1774	3222	3333	0		
Grp Volume(v), veh/h	828	0	11	957	688	0		
Grp Sat Flow(s),veh/h/ln	1630	1429	1774	1570	1583	0		
Q Serve(g_s), s	59.4	0.0	0.8	34.4	23.4	0.0		
Cycle Q Clear(g_c), s	59.4	0.0	0.8	34.4	23.4	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	887	777	27	1186	1055	0		
V/C Ratio(X)	0.93	0.00	0.41	0.81	0.65	0.00		
Avail Cap(c_a), veh/h	1055	925	84	1470	1222	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	26.7	0.0	61.6	35.2	35.9	0.0		
Incr Delay (d2), s/veh	14.6	0.0	9.6	3.7	2.0	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	30.3	0.0	0.5	15.5	10.5	0.0		
LnGrp Delay(d),s/veh	41.3	0.0	71.2	38.9	37.8	0.0		
LnGrp LOS	D		E	D	D			
Approach Vol, veh/h	828			968	688			
Approach Delay, s/veh	41.3			39.2	37.8			
Approach LOS	D			D	D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		53.0		73.2	5.6	47.4		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 59		81.7	6.0	48.7		
Max Q Clear Time (g_c+I1), s		36.4		61.4	2.8	25.4		
Green Ext Time (p_c), s		11.2		7.2	0.0	8.9		
Intersection Summary								
HCM 2010 Ctrl Delay			39.5					
HCM 2010 LOS			D					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Scenario 9 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

PM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↗		↗
Traffic Volume (vph)	30	320	1856	1100	540	0	110
Future Volume (vph)	30	320	1856	1100	540	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3125	4590	3312	1340		1208
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3125	4590	3312	1340		1208
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	340	1974	1170	574	0	117
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1974	1170	574	0	117
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	13%	13%	9%	19%	2%	36%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		11.5	52.2	31.0	52.2		52.2
Effective Green, g (s)		11.5	52.2	31.0	52.2		52.2
Actuated g/C Ratio		0.22	1.00	0.59	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		688	4590	1966	1340		1208
v/s Ratio Prot		0.12	0.43	c0.35			
v/s Ratio Perm					0.43		0.10
v/c Ratio		0.54	0.43	0.60	0.43		0.10
Uniform Delay, d1		18.0	0.0	6.7	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.5	0.3	0.9	1.0		0.2
Delay (s)		18.5	0.3	7.6	1.0		0.2
Level of Service		B	A	A	A		A
Approach Delay (s)			3.2	5.4		0.2	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			4.0		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.59				
Actuated Cycle Length (s)			52.2		Sum of lost time (s)		9.7
Intersection Capacity Utilization			48.7%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary

4: S. Wheeler Ridge Road & Laval Road

Cumulative Plus Scenario 9 Project Conditions

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	40	60	10	770	40	296	10	70	506	900	550
Future Volume (veh/h)	10	40	60	10	770	40	296	10	70	506	900	550
Number	5	2	12		1	6	16		3	8	18	7
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00		1.00		0.99	1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863		1863	1688	1900		1863	1338	1863	1652
Adj Flow Rate, veh/h	11	43	0		837	43	100		76	550	410	598
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2		2	42	2	15
Cap, veh/h	28	98	83		932	139	322		97	1094	472	322
Arrive On Green	0.02	0.05	0.00		0.27	0.31	0.31		0.05	0.30	0.30	0.20
Sat Flow, veh/h	1774	1863	1583		3442	450	1047		1774	3653	1575	1573
Grp Volume(v), veh/h	11	43	0		837	0	143		76	550	410	598
Grp Sat Flow(s),veh/h/ln	1774	1863	1583		1721	0	1497		1774	1218	1575	1573
Q Serve(g_s), s	0.7	2.5	0.0		26.3	0.0	8.2		4.7	13.9	27.7	23.0
Cycle Q Clear(g_c), s	0.7	2.5	0.0		26.3	0.0	8.2		4.7	13.9	27.7	23.0
Prop In Lane	1.00		1.00		1.00		0.70		1.00		1.00	1.00
Lane Grp Cap(c), veh/h	28	98	83		932	0	461		97	1094	472	322
V/C Ratio(X)	0.40	0.44	0.00		0.90	0.00	0.31		0.78	0.50	0.87	1.85
Avail Cap(c_a), veh/h	126	171	145		1880	0	848		187	1175	507	322
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.7	51.6	0.0		39.4	0.0	29.7		52.4	32.4	37.2	44.6
Incr Delay (d2), s/veh	5.6	5.2	0.0		2.1	0.0	0.2		8.1	0.7	15.6	396.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.4	0.0		12.7	0.0	3.4		2.5	4.8	14.1	45.4
LnGrp Delay(d),s/veh	60.3	56.8	0.0		41.6	0.0	29.9		60.5	33.1	52.8	440.8
LnGrp LOS	E	E			D		C		E	C	D	F
Approach Vol, veh/h	54			980			1036					
Approach Delay, s/veh	57.5			39.9			42.9					
Approach LOS	E			D			D					
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	35.1	11.6	10.3	55.2	6.4	40.3	27.0	38.5				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 61	10.3	* 12	47.1	* 8	63.6	23.0	36.1				
Max Q Clear Time (g_c+I1), s	28.3	4.5	6.7	19.3	2.7	10.2	25.0	29.7				
Green Ext Time (p_c), s	2.1	0.1	0.0	10.6	0.0	0.6	0.0	4.0				
Intersection Summary												
HCM 2010 Ctrl Delay	104.3											
HCM 2010 LOS	F											
Notes												

	↓	↙
Movement	SBT	SBR
Lane Configurations	↑↑↑	
Traffic Volume (veh/h)	800	10
Future Volume (veh/h)	800	10
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		0.99
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1433	1900
Adj Flow Rate, veh/h	870	10
Adj No. of Lanes	3	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	33	33
Cap, veh/h	1786	21
Arrive On Green	0.45	0.45
Sat Flow, veh/h	3986	46
Grp Volume(v), veh/h	569	311
Grp Sat Flow(s),veh/h/ln	1304	1424
Q Serve(g_s), s	17.3	17.3
Cycle Q Clear(g_c), s	17.3	17.3
Prop In Lane		0.03
Lane Grp Cap(c), veh/h	1168	638
V/C Ratio(X)	0.49	0.49
Avail Cap(c_a), veh/h	1168	638
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	1.00	1.00
Uniform Delay (d), s/veh	21.9	21.9
Incr Delay (d2), s/veh	0.6	1.1
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	7.0
LnGrp Delay(d),s/veh	22.5	23.0
LnGrp LOS	C	C
Approach Vol, veh/h	1478	
Approach Delay, s/veh	191.8	
Approach LOS	F	
Timer		

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay (hr)	1.4	0.5	1.0	2.0	6.8	0.3	11.9
Total Del/Veh (s)	23.1	12.6	66.2	27.8	159.6	24.9	50.5
Stop Delay (hr)	1.0	0.3	0.9	1.7	6.5	0.2	10.5
Stop Del/Veh (s)	16.6	7.6	60.2	23.5	150.8	20.4	44.6
Total Stops	106	69	50	190	164	20	599
Stop/Veh	0.50	0.51	0.89	0.75	1.06	0.50	0.70
Travel Dist (mi)	26.4	17.4	5.0	22.7	12.3	3.9	87.8
Travel Time (hr)	2.3	1.1	1.2	2.9	7.3	0.4	15.3
Avg Speed (mph)	11	15	4	8	2	10	6
Fuel Used (gal)	1.2	0.7	0.4	1.1	2.0	0.2	5.6
Fuel Eff. (mpg)	21.3	25.4	13.1	20.9	6.3	19.0	15.8
HC Emissions (g)	14	11	3	10	12	3	53
CO Emissions (g)	536	406	91	295	271	106	1704
NOx Emissions (g)	52	37	9	33	23	10	163
Vehicles Entered	194	128	55	245	126	40	788
Vehicles Exited	195	128	55	242	121	39	780
Hourly Exit Rate	780	512	220	968	484	156	3120
Input Volume	1216	764	232	1002	754	184	4153
% of Volume	64	67	95	97	64	85	75
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							82
Occupancy (veh)	9	5	5	12	29	2	61

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	142.3	47.5	189.8
Denied Del/Veh (s)	0.0	0.2	0.0	0.0	468.0	472.0	317.4
Total Delay (hr)	7.2	1.2	1.3	0.2	4.5	0.9	15.3
Total Del/Veh (s)	81.2	49.0	19.8	7.2	44.2	28.1	44.4
Stop Delay (hr)	5.7	0.9	0.8	0.0	1.8	0.2	9.4
Stop Del/Veh (s)	64.4	39.1	11.9	0.1	17.8	6.4	27.4
Total Stops	458	55	171	0	253	55	992
Stop/Veh	1.44	0.64	0.74	0.00	0.69	0.47	0.80
Travel Dist (mi)	39.0	10.5	42.2	20.3	341.9	112.1	566.0
Travel Time (hr)	8.6	1.6	2.6	0.8	154.8	51.0	219.4
Avg Speed (mph)	5	7	16	24	27	31	19
Fuel Used (gal)	3.0	0.6	1.7	0.6	42.3	14.0	62.2
Fuel Eff. (mpg)	13.1	16.9	24.5	33.8	8.1	8.0	9.1
HC Emissions (g)	20	8	23	9	230	86	376
CO Emissions (g)	568	225	952	275	5450	2091	9560
NOx Emissions (g)	68	24	78	32	595	223	1020
Vehicles Entered	282	81	218	115	317	103	1116
Vehicles Exited	284	80	218	115	314	103	1114
Hourly Exit Rate	1136	320	872	460	1256	412	4456
Input Volume	1376	381	1000	640	2867	980	7244
% of Volume	83	84	87	72	44	42	62
Denied Entry Before	0	0	0	0	369	120	489
Denied Entry After	0	0	0	0	778	259	1037
Density (ft/veh)							188
Occupancy (veh)	34	6	10	3	50	14	119

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.6	0.3	0.1
Total Delay (hr)	1.5	1.0	0.9	1.0	5.4	3.3	13.1
Total Del/Veh (s)	14.0	15.2	15.6	13.2	107.7	42.8	30.3
Stop Delay (hr)	0.7	0.1	0.3	0.1	4.2	2.2	7.6
Stop Del/Veh (s)	6.7	1.0	5.8	1.0	84.3	28.3	17.5
Total Stops	110	66	101	62	269	244	852
Stop/Veh	0.29	0.27	0.51	0.23	1.50	0.87	0.55
Travel Dist (mi)	70.1	44.0	42.5	55.4	104.2	175.5	491.6
Travel Time (hr)	3.7	2.4	2.2	2.8	7.9	7.7	26.7
Avg Speed (mph)	19	18	19	20	13	23	18
Fuel Used (gal)	2.9	1.6	1.7	2.0	3.5	4.8	16.5
Fuel Eff. (mpg)	24.1	27.5	24.4	27.9	29.9	36.4	29.7
HC Emissions (g)	37	19	27	25	35	66	210
CO Emissions (g)	1188	536	1023	875	1045	2284	6950
NOx Emissions (g)	147	74	93	94	132	250	789
Vehicles Entered	358	239	188	258	154	257	1454
Vehicles Exited	358	238	188	258	146	253	1441
Hourly Exit Rate	1432	952	752	1032	584	1012	5764
Input Volume	2974	1269	1010	1408	631	1014	8306
% of Volume	48	75	74	73	93	100	69
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							162
Occupancy (veh)	15	10	9	11	31	31	107

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8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1
Total Delay (hr)	1.9	2.7	0.3	0.8	15.2	3.1	15.1	0.8	0.2	2.3	1.5	20.0
Total Del/Veh (s)	46.8	26.9	10.2	145.0	167.6	100.6	292.7	57.1	49.8	57.2	103.7	245.9
Stop Delay (hr)	1.6	1.7	0.1	0.6	12.3	2.3	14.5	0.7	0.2	1.9	1.2	17.5
Stop Del/Veh (s)	39.4	17.0	3.5	116.1	135.5	72.9	281.1	49.5	45.0	48.2	81.0	214.9
Total Stops	102	182	52	24	410	139	218	38	14	111	82	296
Stop/Veh	0.71	0.50	0.42	1.26	1.25	1.24	1.17	0.78	1.00	0.78	1.58	1.01
Travel Dist (mi)	29.4	77.4	25.7	26.4	475.4	172.3	88.4	29.9	9.5	83.1	29.3	138.6
Travel Time (hr)	2.9	5.1	1.2	1.5	28.9	8.1	17.7	1.6	0.5	4.7	2.3	24.2
Avg Speed (mph)	10	15	21	17	16	21	5	18	20	18	12	6
Fuel Used (gal)	1.4	3.0	0.9	0.8	14.7	4.8	5.5	0.9	0.3	2.5	1.1	7.8
Fuel Eff. (mpg)	21.6	25.8	30.0	34.4	32.3	36.2	16.2	34.1	34.8	33.1	26.9	17.8
HC Emissions (g)	17	34	11	6	165	56	36	7	4	28	11	45
CO Emissions (g)	592	1196	428	138	3314	1174	866	204	84	675	349	1446
NOx Emissions (g)	55	121	41	19	515	178	96	26	12	89	35	137
Vehicles Entered	136	356	120	14	240	85	131	41	13	122	45	230
Vehicles Exited	135	357	119	10	189	70	88	40	12	120	39	169
Hourly Exit Rate	540	1428	476	40	756	280	352	160	48	480	156	676
Input Volume	878	2315	795	58	949	363	542	163	53	489	163	926
% of Volume	62	62	60	69	80	77	65	98	91	98	96	73
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	11	21	5	6	116	33	71	7	2	19	9	97

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.1
Total Delay (hr)	63.9
Total Del/Veh (s)	125.9
Stop Delay (hr)	54.5
Stop Del/Veh (s)	107.4
Total Stops	1668
Stop/Veh	0.91
Travel Dist (mi)	1185.4
Travel Time (hr)	99.0
Avg Speed (mph)	12
Fuel Used (gal)	43.4
Fuel Eff. (mpg)	27.3
HC Emissions (g)	420
CO Emissions (g)	10465
NOx Emissions (g)	1324
Vehicles Entered	1533
Vehicles Exited	1348
Hourly Exit Rate	5392
Input Volume	7694
% of Volume	70
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	200
Occupancy (veh)	396

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.7	0.3	0.0	0.0	0.1	0.2	0.1
Total Delay (hr)	0.1	4.8	0.7	0.1	8.9	0.1	14.6
Total Del/Veh (s)	138.1	211.9	40.6	2.4	172.5	65.0	113.4
Stop Delay (hr)	0.1	4.6	0.6	0.0	8.2	0.1	13.6
Stop Del/Veh (s)	132.8	204.8	37.1	1.0	160.0	56.7	106.3
Total Stops	3	74	30	8	253	5	373
Stop/Veh	1.00	0.91	0.52	0.06	1.37	1.25	0.81
Travel Dist (mi)	0.8	22.4	5.5	12.4	86.5	1.9	129.5
Travel Time (hr)	0.1	5.5	0.9	0.5	11.4	0.1	18.6
Avg Speed (mph)	6	4	6	23	8	15	7
Fuel Used (gal)	0.0	1.6	0.4	0.7	4.1	0.1	6.9
Fuel Eff. (mpg)	18.1	14.0	13.8	18.2	21.2	31.4	18.9
HC Emissions (g)	0	13	5	14	33	0	66
CO Emissions (g)	8	332	184	579	903	15	2020
NOx Emissions (g)	0	31	16	45	100	1	194
Vehicles Entered	2	73	55	128	165	3	426
Vehicles Exited	2	49	56	128	116	3	354
Hourly Exit Rate	8	196	224	512	464	12	1416
Input Volume	11	283	299	697	655	11	1956
% of Volume	73	69	75	73	71	109	72
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							150
Occupancy (veh)	1	22	4	2	45	1	74

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10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.3	0.9	2.4	0.3	0.0	0.0	0.2
Total Delay (hr)	0.6	0.0	0.1	0.9	0.3	0.0	1.9
Total Del/Veh (s)	30.6	8.1	34.3	12.5	5.6	3.6	11.9
Stop Delay (hr)	0.5	0.0	0.1	0.4	0.2	0.0	1.2
Stop Del/Veh (s)	26.1	5.7	31.8	6.2	3.1	1.2	7.5
Total Stops	52	9	9	86	46	11	213
Stop/Veh	0.78	0.69	0.90	0.35	0.24	0.24	0.37
Travel Dist (mi)	24.9	4.8	2.6	68.7	18.2	4.5	123.7
Travel Time (hr)	1.3	0.2	0.2	2.9	1.0	0.3	5.9
Avg Speed (mph)	19	27	15	24	18	17	21
Fuel Used (gal)	0.7	0.1	0.1	1.8	0.8	0.2	3.7
Fuel Eff. (mpg)	36.4	40.4	30.9	37.4	22.3	26.4	33.3
HC Emissions (g)	7	1	0	24	12	2	47
CO Emissions (g)	164	31	16	676	407	68	1362
NOx Emissions (g)	23	4	2	79	43	7	158
Vehicles Entered	63	12	9	238	188	46	556
Vehicles Exited	63	12	9	237	187	46	554
Hourly Exit Rate	252	48	36	948	748	184	2216
Input Volume	257	42	42	977	1118	282	2718
% of Volume	98	114	86	97	67	65	82
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							438
Occupancy (veh)	5	1	1	11	4	1	23

Appendix T
Scenario 9 – AM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment														
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	2,000	2,000
Accel Length			500		500	500		500	185		500			
Decel Length														
Mainline Volume	4,815	4,815	4,815	3,840	3,840	5,338	7,538	7,538	6,782	6,642	6,642	7,362	7,362	4,544
On Ramp Volume					1,498	2,200					720			
Off Ramp Volume			975					756	140				2,818	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	4,815	4,815	4,815	3,840	5,338	7,538	7,538	7,538	6,782	6,642	7,362	7,362	7,362	4,544
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	22.0%	22.0%	22.0%	26.0%	26.0%	26.0%	17.8%	17.8%	17.8%	18.5%	18.5%	18.0%	18.0%	14.9%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{HV}	0.694	0.901	0.901	0.885	0.885	0.885	0.918	0.918	0.918	0.915	0.915	0.917	0.917	0.931
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,376	5,686	5,686	4,616	6,417	9,062	8,733	8,733	7,857	7,720	8,556	8,537	8,537	5,194
GP Flow (pcphpl)	1,844	1,421	1,421	1,154	1,604	2,265	2,183	2,183	1,964	1,930	2,139	2,134	2,134	1,731
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	0.78	0.60	0.60	0.49	0.68	0.96	0.91	0.91	0.82	0.80	0.89	0.89	0.89	0.72
Speed (mph)	62.2	65.0	65.0	65.0	64.4	54.4	58.8	58.8	63.2	63.8	59.8	59.9	59.9	66.7
Density (pcphpl)	29.6	21.9	21.9	17.8	24.9	41.7	37.1	37.1	31.1	30.2	35.8	35.6	35.6	25.9
LOS	D	C	C	B	C	E	E	E	D	D	E	E	E	C
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			5,686		4,754	6,626		8,733	7,857		7,719			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.60		0.51	0.70		0.91	0.82		0.80			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			4,590		6,417	9,062		7,861	7,694		8,556		5,132	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.49		0.68	0.96		0.82	0.80		0.89		0.71	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					1,498	2,200					720			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.3%	3.7%					13.9%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _{HV}					0.979	0.982					0.935			
f _p					1.00	1.00					1.00			
On Flow (pcph)					1,663	2,436					837			
On Flow (pcphpl)					1,663	2,436					837			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.88	1.16					0.40			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			975					756	140				2,818	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			6.8%					12.1%	14.3%				22.3%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _{RV}			0.967					0.943	0.933				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,096					871	163				3,405	
Off Flow (pcphpl)			548					871	163				1,702	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.26					0.41	0.09				0.72	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective v _F (pcph)					4,754	6,626					7,719			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{FM} (Eqn 13-3)					0.592	0.592					0.592			
P _{FM} (Eqn 13-4)														
P _{FM} (Eqn 13-5)														
P _{FM}					0.010	-0.087					0.113			
v ₁₂ (pcph)					47	-574					874			
v ₃ (pcph)														
v ₃₄ (pcph)					4,707	7,200					6,846			
v _{12a} (pcph)					1,901	2,650					3,088			
v _{R12a} (pcph)					3,565	5,086					3,925			
Merge Speed Index					0.43	-					0.47			
Merge Area Speed					55.0	-					56.7			
Outer Lanes Volume					1,426						2,316			
Outer Lanes Speed					61.7						63.4			
Segment Speed					57.8						60.1			
Merge v/c ratio					0.77	1.11					0.85			
Merge Density					29.4	-					32.6			
Merge LOS					D	F					D			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_p (pcph)			5,686					8,733	7,857					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.567					0.502	0.556					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			2,289					4,299	3,518					
v_3 (pcph)														
v_{34} (pcph)			3,397					4,434	4,339					
v_{12a} (pcph)			2,289					4,299	3,518					
Diverge Speed Index			0.40					0.38	0.57					
Diverge Area Speed			55.9					59.5	54.0					
Outer Lanes Volume			1,698					2,217	2,170					
Outer Lanes Speed			68.6					72.0	72.2					
Segment Speed			62.8					65.2	62.7					
Diverge v/c ratio			0.52					0.98	0.80					
Diverge Density			19.4					36.7	32.8					
Diverge LOS			B					E	D					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	0.78	0.60	0.52	0.49	0.77	1.11	0.91	0.98	0.80	0.80	0.85	0.89	0.89	0.72
Segment Density	29.6	21.9	19.4	17.8	29.4	-	37.1	36.7	32.8	30.2	32.6	35.6	35.6	25.9
Segment LOS	D	C	B	B	D	F	E	E	D	D	D	E	E	C
Over Capacity						On Ramp Roadway Merge								

Location	1

Key	
<-> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	2,818
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	2,818
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.3%
RV %	0.0%
E _T	1.5
E _R	1.2
f _W	0.900
f _p	1.00
GP Flow (pcph)	3,332
GP Flow (pcphpl)	1,666
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.69
Speed (mph)	67.5
Density (pcphpl)	24.7
LOS	C
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes F	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.69
Segment Density	24.7
Segment LOS	C
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Level Road	Level Road West Off-Ramp	Level Road East Off-Ramp	Level Road Off to On-Ramp	Level Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	3,060	3,060	2,730	2,560	2,560	4,726	4,896	5,556	5,556	5,196	4,916	4,916
On Ramp Volume					2,166	170	660					723
Off Ramp Volume		330	170						360	280		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	3,060	3,060	2,730	2,560	4,726	4,896	5,556	5,556	5,556	5,196	4,916	5,639
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	16.3%	16.3%	6.2%	0.0%	0.0%	3.4%	6.7%	18.0%	18.0%	18.0%	18.5%	18.5%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _{lv}	0.924	0.924	0.970	1.000	1.000	0.983	0.967	0.917	0.917	0.917	0.915	0.915
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,484	3,484	2,963	2,695	4,975	5,241	6,046	6,375	6,375	5,962	5,653	6,485
GP Flow (pcphpl)	1,161	1,161	988	1,347	1,244	1,048	1,209	1,275	1,275	1,490	1,413	1,621
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _{lw}												
f _{LC}												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.49	0.49	0.42	0.57	0.53	0.45	0.51	0.54	0.54	0.63	0.60	0.69
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.9	65.0	64.3
Density (pcphpl)	17.9	17.9	15.2	20.7	19.1	16.1	18.6	19.6	19.6	23.0	21.7	25.2
LOS	B	B	B	C	C	B	C	C	C	C	C	C
Calculate Operations for Entering GP Lanes												
GP _{IN} Vol (pcph)		3,484			2,533	4,964	4,969			5,962		5,616
GP _{IN} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{IN} v/c ratio		0.49			0.54	0.53	0.42			0.63		0.60
Calculate Operations for Exiting GP Lanes												
GP _{OUT} Vol (pcph)		2,946	2,686				6,046		5,962	5,630		6,485
GP _{OUT} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{OUT} v/c ratio		0.42	0.57				0.51		0.63	0.60		0.69
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,166	170	660					723
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					7.4%	100.0%	100.0%					21.1%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _{lv}					0.964	0.667	0.667					0.905
f _p					1.00	1.00	1.00					1.00
On Flow (pcph)					2,441	277	1,076					869
On Flow (pcphpl)					1,221	277	1,076					869

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
<=> Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.51	0.13	0.49					0.41
Calculate Off Ramp Flow Rate												
Off Volume (vph)		330	170						360	280		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						11.1%	17.9%		
RV %		0.0%	0.0%						0.0%	0.0%		
E _T		1.5	1.5						1.5	1.5		
E _B		1.2	1.2						1.2	1.2		
t _{av}		0.667	0.667						0.947	0.918		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		538	277						413	332		
Off Flow (pcphpl)		538	277						413	332		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.26	0.13						0.20	0.17		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			538									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		277										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							3,876					5,616
Up Ramp L _{EO}												
Down Ramp L _{EO}												
P _{MU} (Eqn 13-3)							0.606					0.593
P _{MU} (Eqn 13-4)												
P _{MU} (Eqn 13-5)												
P _{MU}							0.286					0.109
v _{U2} (pcph)							1,109					613
v _U (pcph)												
v _{UM} (pcph)							2,768					5,003
v _{UM} (pcph)							1,550					2,246
v _{UM} (pcph)							2,627					3,115
Merge Speed Index							0.26					0.36
Merge Area Speed							58.9					56.8
Outer Lanes Volume							1,163					1,685
Outer Lanes Speed							62.6					60.7
Segment Speed							60.6					58.8
Merge v/c ratio							0.57					0.68
Merge Density							19.2					25.9
Merge LOS							B					C
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		3,484								5,962		
Up Ramp L _{EO}												
Down Ramp L _{EO}		330										
P _{UD} (Eqn 13-9)		0.648								0.596		
P _{UD} (Eqn 13-10)												
P _{UD} (Eqn 13-11)		0.577										
P _{UD}		0.648								0.436		
v _{U2} (pcph)		2,448								2,786		
v _U (pcph)		1,037										
v _{UM} (pcph)										3,175		
v _{UM} (pcph)		2,448								2,786		
Diverge Speed Index		0.35								0.65		
Diverge Area Speed		57.0								50.0		
Outer Lanes Volume		1,037								1,588		
Outer Lanes Speed		71.2								69.0		
Segment Speed		60.6								58.6		
Diverge v/c ratio		0.56								0.63		
Diverge Density		24.0								26.7		
Diverge LOS		C								C		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segments												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.49	0.56	0.42	0.57	0.53	0.45	0.57	0.54	0.54	0.63	0.60	0.68
Segment Density	17.9	24.0	15.2	20.7	19.1	16.1	19.2	19.6	19.6	26.7	21.7	25.9
Segment LOS	B	C	B	C	C	B	B	C	C	C	C	C
Over Capacity												

Fehr & Peers

Fehr & Peers

Fehr & Peers

Appendix U
Scenario 9 - PM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name														
Define Freeway Segment	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop on-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	1,500	
Accel Length					500	500					500			
Decel Length			500					500	185					
Mainline Volume	7,042	7,042	7,042	5,480	5,480	6,686	8,024	8,024	7,478	7,368	7,368	8,228	8,228	4,789
On Ramp Volume					1,206	1,338					860			
Off Ramp Volume			1,562					546	110				3,439	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	7,042	7,042	7,042	5,480	6,686	8,024	8,024	8,024	7,478	7,368	8,228	8,228	8,228	4,789
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.7%	20.7%	20.7%	24.1%	24.1%	24.1%	20.2%	20.2%	20.2%	20.2%	20.2%	19.7%	19.7%	17.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.707	0.906	0.906	0.892	0.892	0.892	0.908	0.908	0.908	0.908	0.908	0.910	0.910	0.919
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	10,593	8,267	8,267	6,532	7,970	9,565	9,398	9,398	8,759	8,630	9,637	9,615	9,615	5,546
GP Flow (pcphpl)	2,648	2,067	2,067	1,633	1,992	2,391	2,350	2,350	2,190	2,157	2,409	2,404	2,404	1,849
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _{LW}														
f _{LC}														
Calculated FFS														
Measured FFS	65.0	65.0	65.0	65.0	65.0									
FFS Curve	65	65	65	65	65	65	70	70	70	70	70	70	70	70
Calculate Operations in General Purpose Lanes														
v/c ratio	1.13	0.88	0.88	0.69	0.85	1.02	0.98	0.98	0.91	0.90	1.00	1.00	1.00	0.77
Speed (mph)	-	58.7	58.7	64.2	60.0	-	54.7	54.7	58.6	59.4	-	-	-	65.1
Density (pcphpl)	-	35.2	35.2	25.4	33.2	-	43.0	43.0	37.3	36.3	-	-	-	28.4
LOS	F	E	E	C	D	F	E	E	E	E	F	F	F	D
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			8,267		6,630	8,062		9,398	8,759		8,626			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.88		0.71	0.86		0.98	0.91		0.90			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			6,507		7,970	9,565		8,754	8,617		9,637		5,462	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.69		0.85	1.02		0.91	0.90		1.00		0.76	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					1,206	1,338					860			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.4%	6.6%					16.3%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _R					1.2	1.2					1.2			
f _W					0.978	0.968					0.925			
f _p					1.00	1.00					1.00			
On Flow (pcph)					1,340	1,502					1,011			
On Flow (pcphpl)					1,340	1,502					1,011			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.71	0.72					0.48			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			1,562					546	110				3,439	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			7.3%					17.0%	36.4%				22.2%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _W			0.965					0.922	0.846				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,760					644	141				4,153	
Off Flow (pcphpl)			880					644	141				2,076	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.42					0.31	0.07				0.88	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective v _F (pcph)					6,630	8,062					8,626			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{FM} (Eqn 13-3)					0.592	0.592					0.592			
P _{FM} (Eqn 13-4)														
P _{FM} (Eqn 13-5)														
P _{FM}					0.050	0.030					0.091			
v ₁₂ (pcph)					334	242					789			
v ₃ (pcph)														
v ₃₄ (pcph)					6,296	7,821					7,838			
v _{12a} (pcph)					2,652	3,225					3,451			
v _{612a} (pcph)					3,992	4,727					4,461			
Merge Speed Index					0.51	-					-			
Merge Area Speed					53.3	-					-			
Outer Lanes Volume					1,989									
Outer Lanes Speed					59.6									
Segment Speed					56.3									
Merge v/c ratio					0.87	1.03					0.97			
Merge Density					32.9	-					-			
Merge LOS					D	F					F			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_F (pcph)			8,267					9,398	8,759					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.472					0.495	0.535					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			3,452					4,461	3,899					
v_3 (pcph)														
v_{34} (pcph)			4,815					4,937	4,860					
v_{12a} (pcph)			3,452					4,461	3,899					
Diverge Speed Index			0.46					0.36	0.57					
Diverge Area Speed			54.5					60.0	54.0					
Outer Lanes Volume			2,408					2,469	2,430					
Outer Lanes Speed			65.8					71.1	71.2					
Segment Speed			60.6					65.4	62.4					
Diverge v/c ratio			0.78					1.01	0.89					
Diverge Density			29.4					38.1	36.1					
Diverge LOS			D					F	E					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	1.13	0.88	0.78	0.69	0.87	1.03	0.98	1.01	0.89	0.90	0.97	1.00	1.00	0.77
Segment Density	-	35.2	29.4	25.4	32.9	-	43.0	-	36.1	36.3	-	-	-	28.4
Segment LOS	F	E	D	C	D	F	E	F	E	E	F	F	F	D
Over Capacity	Segment GP Lanes					Segment GP Lanes Out GP Lanes Merge		Diverge			Segment GP Lanes Out GP Lanes	Segment GP Lanes	Segment GP Lanes	

Location	1

Key	
<> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	3,439
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	3,439
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.2%
RV %	0.0%
E _T	1.5
E _R	1.2
f _{HV}	0.900
f _p	1.00
GP Flow (pcph)	4,065
GP Flow (pcphpl)	2,032
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.85
Speed (mph)	62.0
Density (pcphpl)	32.8
LOS	D
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes Flow	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.85
Segment Density	32.8
Segment LOS	D
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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<div><div>Key</div><div><-> Express Lane (HOV)</div><div>No Trucks</div><div>Name</div></div>												
Define Freeway Segment	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	6,455	6,455	5,985	5,755	5,755	8,845	9,075	10,085	10,085	8,785	7,885	7,885
On Ramp Volume					3,090	230	1,010					940
Off Ramp Volume		470	230						1,300	900		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	6,455	6,455	5,985	5,755	8,845	9,075	10,085	10,085	10,085	8,785	7,885	8,825
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	10.8%	10.8%	3.8%	0.0%	0.0%	3.1%	5.5%	21.1%	21.1%	21.1%	22.7%	22.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.949	0.949	0.981	1.000	1.000	0.985	0.973	0.905	0.905	0.905	0.898	0.898
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,163	7,163	6,421	6,058	9,311	9,698	10,908	11,736	11,736	10,223	9,242	10,344
GP Flow (pcphpl)	2,388	2,388	2,140	3,029	2,328	1,940	2,182	2,347	2,347	2,556	2,311	2,586
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
f _{LW}												
f _{LC}												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	1.02	1.02	0.91	1.29	0.99	0.83	0.93	1.00	1.00	1.09	0.98	1.10
Speed (mph)	-	-	57.2	-	52.8	60.9	56.3	52.3	52.3	-	53.2	-
Density (pcphpl)	-	-	37.4	-	44.1	31.9	38.7	44.9	44.9	-	43.4	-
LOS	F	F	E	F	E	D	E	E	E	F	E	F
Calculate Operations for Entering GP Lanes												
GP _{IN} Vol (pcph)		7,163			5,805	9,323	9,261			10,223		9,259
GP _{IN} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{IN} v/c ratio		1.02			1.24	0.99	0.79			1.09		0.99
Calculate Operations for Exiting GP Lanes												
GP _{OUT} Vol (pcph)		6,397	6,046				10,908		10,233	9,175		10,344
GP _{OUT} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{OUT} v/c ratio		0.91	1.29				0.93		1.09	0.98		1.10
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					3,090	230	1,010					940
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					8.7%	100.0%	100.0%					12.3%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _R					1.2	1.2	1.2					1.2
f _W					0.968	0.667	0.667					0.942
f _p					1.00	1.00	1.00					1.00
On Flow (pcph)					3,505	375	1,647					1,085
On Flow (pcphpl)					1,753	375	1,647					1,085

Location	4	5	6	7	8	9	10	11	12	13	14	15
Key	<-> Express Lane (HOV) No Trucks											
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.73	0.17	0.75					0.52
Calculate Off Ramp Flow Rate												
Off Volume (vph)		470	230						1,300	900		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						12.7%	14.3%		
RV %		0.0%	0.0%						0.0%	0.0%		
E ₂		1.5	1.5						1.5	1.5		
E _R		1.2	1.2						1.2	1.2		
f _{ov}		0.667	0.667						0.940	0.933		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		766	375						1,503	1,048		
Off Flow (pcphpt)		766	375						1,503	1,048		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.36	0.18						0.72	0.55		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			766									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		375										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							6,761					9,259
Up Ramp L _{eq}												
Down Ramp L _{eq}												
P _M (Eqn 13-3)							0.606					0.593
P _M (Eqn 13-4)												
P _M (Eqn 13-5)												
P _M							0.012					0.082
v ₀ (pcph)							81					761
v ₀ (pcph)							6,681					8,498
v ₀ (pcph)							2,705					3,859
v _{12.5} (pcph)							4,351					4,944
v _{12.5} (pcph)							0.51					-
Merge Speed Index							53.2					-
Merge Area Speed							2,028					-
Outer Lanes Volume							59.5					
Outer Lanes Speed							56.1					
Segment Speed							0.95					1.07
Merge v/c ratio							32.4					-
Merge Density							D					F
Merge LOS												
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		7,163								10,223		
Up Ramp L _{eq}												
Down Ramp L _{eq}		588										
P _D (Eqn 13-9)		0.546								0.456		
P _D (Eqn 13-10)												
P _D (Eqn 13-11)		0.512										
P _D		0.546								0.436		
v ₀ (pcph)		4,257								5,048		
v ₀ (pcph)		2,906										
v ₀ (pcph)										5,175		
v _{12.5} (pcph)		4,463								5,048		
Diverge Speed Index		-								-		
Diverge Area Speed		-								-		
Outer Lanes Volume												
Outer Lanes Speed												
Segment Speed												
Diverge v/c ratio		1.01								1.15		
Diverge Density		-								-		
Diverge LOS		F								F		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segm												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	1.02	1.01	0.91	1.29	0.99	0.83	0.95	1.00	1.00	1.15	0.98	1.07
Segment Density	-	-	-	-	-	31.9	32.4	44.9	-	-	43.4	-
Segment LOS	F	F	F	F	F	D	D	E	F	F	E	F
Over Capacity	Segment GP Lanes	Segment GP Lanes In GP Lanes Diverge	Out GP Lanes	Segment GP Lanes	In GP Lanes				Out GP Lanes	Segment GP Lanes In GP Lanes Diverge		Segment GP Lanes Out GP Lanes Merge

Fehr & Peers

Fehr & Peers























Fehr & Peers

Appendix V
Scenario 10 - AM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary Cumulative Plus Sceanrio 10 Project Conditions

1: Dennis McCarthy Drive & Laval Road

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	10	610	10	10	100	280	330	10	10	90	270	20
Future Volume (veh/h)	10	610	10	10	100	280	330	10	10	90	270	20
Number	5	2	12		1	6	16	3	8	18	7	4
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1566	1900		1739	1520	1845	1863	1726	1900	1827	1723
Adj Flow Rate, veh/h	11	663	10		109	304	147	11	11	0	316	0
Adj No. of Lanes	1	2	0		2	3	1	1	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	20	20		10	25	3	2	2	2	4	2
Cap, veh/h	20	972	15		373	1733	651	73	71	0	643	318
Arrive On Green	0.02	0.32	0.32		0.12	0.42	0.42	0.04	0.04	0.00	0.18	0.00
Sat Flow, veh/h	905	3001	45		3213	4150	1559	1774	1726	0	3480	1723
Grp Volume(v), veh/h	11	329	344		109	304	147	11	11	0	316	0
Grp Sat Flow(s),veh/h/ln	905	1488	1558		1606	1383	1559	1774	1726	0	1740	1723
Q Serve(g_s), s	0.7	10.8	10.8		1.7	2.6	3.4	0.3	0.3	0.0	4.6	0.0
Cycle Q Clear(g_c), s	0.7	10.8	10.8		1.7	2.6	3.4	0.3	0.3	0.0	4.6	0.0
Prop In Lane	1.00		0.03		1.00		1.00	1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	20	482	505		373	1733	651	73	71	0	643	318
V/C Ratio(X)	0.54	0.68	0.68		0.29	0.18	0.23	0.15	0.15	0.00	0.49	0.00
Avail Cap(c_a), veh/h	259	874	916		462	1849	695	252	245	0	1359	673
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	27.2	16.5	16.5		22.8	10.3	10.5	26.0	26.0	0.0	20.6	0.0
Incr Delay (d2), s/veh	13.0	2.4	2.3		0.3	0.1	0.2	0.6	0.6	0.0	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	4.7	4.9		0.8	1.0	1.5	0.2	0.2	0.0	2.3	0.0
LnGrp Delay(d),s/veh	40.2	18.9	18.8		23.0	10.4	10.8	26.6	26.7	0.0	21.7	0.0
LnGrp LOS	D	B	B		C	B	B	C	C		C	
Approach Vol, veh/h		684				560			22			316
Approach Delay, s/veh		19.2				12.9			26.6			21.7
Approach LOS		B				B			C			C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	24.1		14.4	6.2	29.4		6.3				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	33.1		22.0	16.1	25.1		8.0				
Max Q Clear Time (g_c+I1), s	3.7	12.8		6.6	2.7	5.4		2.3				
Green Ext Time (p_c), s	0.1	5.3		2.0	0.0	3.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			17.6									
HCM 2010 LOS			B									
Notes												














Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	10
Future Volume (veh/h)	10
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	0
Adj No. of Lanes	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	0
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	0
V/C Ratio(X)	0.00
Avail Cap(c_a), veh/h	0
HCM Platoon Ratio	1.00
Upstream Filter(l)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer	

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary Cumulative Plus Sceanrio 10 Project Conditions

2: I-5 Southbound Ramps & Laval Road

AM Peak Hour

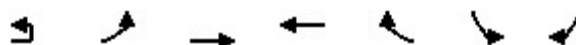
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	570	410	10	270	274	0		
Future Volume (veh/h)	570	410	10	270	274	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1743	1624	1863	1652	1545	0		
Adj Flow Rate, veh/h	613	0	11	290	295	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	9	17	2	15	23	0		
Cap, veh/h	768	639	30	1001	647	0		
Arrive On Green	0.46	0.00	0.02	0.32	0.22	0.00		
Sat Flow, veh/h	1660	1380	1774	3222	3089	0		
Grp Volume(v), veh/h	613	0	11	290	295	0		
Grp Sat Flow(s),veh/h/ln	1660	1380	1774	1570	1467	0		
Q Serve(g_s), s	14.3	0.0	0.3	3.1	4.0	0.0		
Cycle Q Clear(g_c), s	14.3	0.0	0.3	3.1	4.0	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	768	639	30	1001	647	0		
V/C Ratio(X)	0.80	0.00	0.36	0.29	0.46	0.00		
Avail Cap(c_a), veh/h	1332	1107	235	3071	2199	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	10.4	0.0	22.1	11.6	15.3	0.0		
Incr Delay (d2), s/veh	3.9	0.0	7.1	0.3	1.3	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	7.3	0.0	0.2	1.4	1.7	0.0		
LnGrp Delay(d),s/veh	14.3	0.0	29.2	11.9	16.6	0.0		
LnGrp LOS	B		C	B	B			
Approach Vol, veh/h	613			301	295			
Approach Delay, s/veh	14.3			12.5	16.6			
Approach LOS	B			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		19.8		25.6	4.5	15.3		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 44		36.4	6.0	34.0		
Max Q Clear Time (g_c+I1), s		5.1		16.3	2.3	6.0		
Green Ext Time (p_c), s		3.5		4.7	0.0	3.8		
Intersection Summary								
HCM 2010 Ctrl Delay			14.4					
HCM 2010 LOS			B					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Sceanrio 10 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

AM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↗		↗
Traffic Volume (vph)	20	330	1184	464	390	0	140
Future Volume (vph)	20	330	1184	464	390	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3142	4673	3085	1352		1442
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3142	4673	3085	1352		1442
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	351	1260	494	415	0	149
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1260	494	415	0	149
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	12%	11%	17%	18%	2%	14%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		10.5	35.6	15.4	35.6		35.6
Effective Green, g (s)		10.5	35.6	15.4	35.6		35.6
Actuated g/C Ratio		0.29	1.00	0.43	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		926	4673	1334	1352		1442
v/s Ratio Prot		0.12	0.27	0.16			
v/s Ratio Perm					c0.31		0.10
v/c Ratio		0.40	0.27	0.37	0.31		0.10
Uniform Delay, d1		10.0	0.0	6.8	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.1	0.5	0.6		0.1
Delay (s)		10.1	0.1	7.3	0.6		0.1
Level of Service		B	A	A	A		A
Approach Delay (s)			2.4	4.3		0.1	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			2.9		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.42				
Actuated Cycle Length (s)			35.6		Sum of lost time (s)		9.7
Intersection Capacity Utilization			31.1%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary Cumulative Plus Sceanrio 10 Project Conditions

4: S. Wheeler Ridge Road & Laval Road






AM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Traffic Volume (veh/h)	10	10	30	10	490	10	204	10	40	704	300	10
Future Volume (veh/h)	10	10	30	10	490	10	204	10	40	704	300	10
Number	5	2	12		1	6	16		3	8	18	
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1863	950	1863		1863	1649	1900		1863	1583	1863	
Adj Flow Rate, veh/h	11	11	0		533	11	56		43	765	110	
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	
Percent Heavy Veh, %	2	100	2		2	100	100		2	20	2	
Cap, veh/h	30	21	36		729	51	260		92	1685	615	
Arrive On Green	0.02	0.02	0.00		0.21	0.22	0.22		0.05	0.39	0.39	
Sat Flow, veh/h	1774	950	1583		3442	235	1194		1774	4323	1577	
Grp Volume(v), veh/h	11	11	0		533	0	67		43	765	110	
Grp Sat Flow(s),veh/h/ln	1774	950	1583		1721	0	1429		1774	1441	1577	
Q Serve(g_s), s	0.3	0.6	0.0		8.2	0.0	2.2		1.3	7.4	2.6	
Cycle Q Clear(g_c), s	0.3	0.6	0.0		8.2	0.0	2.2		1.3	7.4	2.6	
Prop In Lane	1.00		1.00		1.00		0.84		1.00		1.00	
Lane Grp Cap(c), veh/h	30	21	36		729	0	310		92	1685	615	
V/C Ratio(X)	0.37	0.52	0.00		0.73	0.00	0.22		0.47	0.45	0.18	
Avail Cap(c_a), veh/h	229	189	316		1658	0	789		476	4889	1784	
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	
Uniform Delay (d), s/veh	27.6	27.4	0.0		20.8	0.0	18.2		26.1	12.8	11.3	
Incr Delay (d2), s/veh	4.6	29.4	0.0		0.9	0.0	0.2		2.2	0.4	0.3	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.2	0.3	0.0		3.9	0.0	0.9		0.7	3.0	1.2	
LnGrp Delay(d),s/veh	32.1	56.8	0.0		21.7	0.0	18.4		28.3	13.2	11.6	
LnGrp LOS	C	E			C		B		C	B	B	
Approach Vol, veh/h		22				600				918		
Approach Delay, s/veh		44.5				21.3				13.7		
Approach LOS		D				C				B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.7	7.0	7.2	25.9	5.7	18.0	6.0	27.0				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 27	11.3	* 15	76.7	* 7.3	31.3	28.0	64.1				
Max Q Clear Time (g_c+I1), s	10.2	2.6	3.3	5.8	2.3	4.2	2.9	9.4				
Green Ext Time (p_c), s	1.2	0.0	0.0	4.5	0.0	0.3	0.0	12.5				
Intersection Summary												
HCM 2010 Ctrl Delay			16.5									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary Cumulative Plus Sceanrio 10 Project Conditions

4: S. Wheeler Ridge Road & Laval Road

AM Peak Hour

			
Movement	SBL	SBT	SBR
Lane Configurations			
Traffic Volume (veh/h)	24	324	10
Future Volume (veh/h)	24	324	10
Number	7	4	14
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1657	1340	1900
Adj Flow Rate, veh/h	26	352	8
Adj No. of Lanes	1	3	0
Peak Hour Factor	0.92	0.92	0.92
Percent Heavy Veh, %	20	43	43
Cap, veh/h	56	1361	31
Arrive On Green	0.04	0.37	0.37
Sat Flow, veh/h	1578	3681	83
Grp Volume(v), veh/h	26	233	127
Grp Sat Flow(s),veh/h/ln	1578	1220	1325
Q Serve(g_s), s	0.9	3.8	3.8
Cycle Q Clear(g_c), s	0.9	3.8	3.8
Prop In Lane	1.00		0.06
Lane Grp Cap(c), veh/h	56	902	490
V/C Ratio(X)	0.46	0.26	0.26
Avail Cap(c_a), veh/h	780	3301	1793
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.8	12.4	12.5
Incr Delay (d2), s/veh	3.6	0.3	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.3	1.5
LnGrp Delay(d),s/veh	30.4	12.7	13.0
LnGrp LOS	C	B	B
Approach Vol, veh/h		386	
Approach Delay, s/veh		14.0	
Approach LOS		B	
Timer			

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	1.4	0.4	0.7	0.8	2.1	0.2	5.6
Total Del/Veh (s)	21.3	9.5	67.6	13.6	48.0	23.5	24.3
Stop Delay (hr)	0.9	0.2	0.6	0.6	1.8	0.2	4.4
Stop Del/Veh (s)	13.9	4.6	62.7	10.5	40.8	19.5	18.8
Total Stops	116	67	30	90	136	20	459
Stop/Veh	0.49	0.46	0.86	0.42	0.85	0.53	0.55
Travel Dist (mi)	30.6	19.3	3.0	19.6	15.3	3.8	91.6
Travel Time (hr)	2.5	1.1	0.8	1.7	2.7	0.4	9.2
Avg Speed (mph)	12	17	4	12	6	10	10
Fuel Used (gal)	1.4	0.7	0.2	0.7	1.0	0.2	4.2
Fuel Eff. (mpg)	22.1	27.0	12.8	27.0	15.6	20.5	21.7
HC Emissions (g)	18	10	2	7	9	2	47
CO Emissions (g)	614	430	51	238	278	81	1692
NOx Emissions (g)	62	35	4	24	28	7	161
Vehicles Entered	226	142	33	211	153	38	803
Vehicles Exited	225	143	33	209	151	38	799
Hourly Exit Rate	900	572	132	836	604	152	3196
Input Volume	1363	857	135	833	626	159	3973
% of Volume	66	67	98	100	96	96	80
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							137
Occupancy (veh)	10	5	3	7	11	1	37

SimTraffic Performance Report
Cumulative Plus Scenario 10 Project Conditions

PM Peak Hour

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	120.9	58.4	179.3
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	461.0	455.2	304.3
Total Delay (hr)	3.5	0.4	1.3	0.3	3.5	1.3	10.3
Total Del/Veh (s)	42.4	17.8	19.1	7.5	38.2	31.1	30.1
Stop Delay (hr)	2.4	0.2	0.8	0.0	1.2	0.4	5.0
Stop Del/Veh (s)	28.9	8.2	11.1	0.1	13.7	8.4	14.5
Total Stops	318	36	168	0	191	79	792
Stop/Veh	1.07	0.42	0.67	0.00	0.59	0.52	0.64
Travel Dist (mi)	38.3	10.6	45.4	20.9	307.5	146.3	569.0
Travel Time (hr)	4.9	0.8	2.7	0.9	131.5	63.2	204.1
Avg Speed (mph)	8	13	17	24	29	31	23
Fuel Used (gal)	2.2	0.5	1.8	0.6	36.2	17.4	58.7
Fuel Eff. (mpg)	17.3	22.7	25.3	33.2	8.5	8.4	9.7
HC Emissions (g)	25	5	22	7	202	91	352
CO Emissions (g)	768	190	957	253	4781	2253	9202
NOx Emissions (g)	83	18	77	29	528	246	981
Vehicles Entered	279	81	236	119	284	136	1135
Vehicles Exited	274	82	236	119	287	133	1131
Hourly Exit Rate	1096	328	944	476	1148	532	4524
Input Volume	1126	333	1006	558	2485	1215	6723
% of Volume	97	98	94	85	46	44	67
Denied Entry Before	0	0	0	0	308	145	453
Denied Entry After	0	0	0	0	660	326	986
Density (ft/veh)							224
Occupancy (veh)	20	3	11	4	43	19	99

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.5	0.3	0.1
Total Delay (hr)	1.1	0.9	1.0	0.8	2.1	1.6	7.5
Total Del/Veh (s)	11.6	13.5	15.2	12.0	48.6	23.7	18.5
Stop Delay (hr)	0.5	0.0	0.4	0.0	1.5	1.1	3.5
Stop Del/Veh (s)	5.4	0.6	5.7	0.5	34.1	15.4	8.6
Total Stops	83	40	108	38	156	170	595
Stop/Veh	0.24	0.17	0.47	0.15	1.01	0.69	0.41
Travel Dist (mi)	65.5	41.7	49.3	50.8	96.4	157.5	461.2
Travel Time (hr)	3.2	2.2	2.5	2.5	4.4	5.5	20.4
Avg Speed (mph)	20	19	20	20	22	29	23
Fuel Used (gal)	2.7	1.5	2.0	1.8	2.6	3.9	14.4
Fuel Eff. (mpg)	24.6	28.1	24.9	28.1	37.5	40.6	32.0
HC Emissions (g)	36	21	28	24	23	55	188
CO Emissions (g)	1192	591	1080	826	774	1718	6182
NOx Emissions (g)	137	80	99	89	108	221	732
Vehicles Entered	335	226	218	236	140	232	1387
Vehicles Exited	334	227	217	236	137	226	1377
Hourly Exit Rate	1336	908	868	944	548	904	5508
Input Volume	2592	1021	1012	1134	552	887	7198
% of Volume	52	89	86	83	99	102	77
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							212
Occupancy (veh)	13	9	10	10	18	22	81

SimTraffic Performance Report
Cumulative Plus Scenario 10 Project Conditions

PM Peak Hour

8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	1.6	2.5	0.3	0.4	7.2	0.9	9.9	0.6	0.1	1.6	0.7	9.7
Total Del/Veh (s)	45.8	26.3	10.7	97.3	93.2	32.2	224.5	50.9	29.2	48.4	63.3	143.5
Stop Delay (hr)	1.4	1.6	0.1	0.3	5.4	0.4	9.4	0.5	0.1	1.4	0.6	7.6
Stop Del/Veh (s)	39.1	17.3	4.5	79.1	70.2	13.6	211.9	45.3	26.8	42.5	54.1	113.2
Total Stops	91	165	51	15	263	74	198	30	9	83	40	214
Stop/Veh	0.72	0.49	0.44	1.00	0.95	0.76	1.25	0.70	0.75	0.70	0.98	0.88
Travel Dist (mi)	25.7	71.6	24.2	22.1	426.4	157.5	85.9	26.2	7.7	70.2	24.9	135.6
Travel Time (hr)	2.5	4.7	1.2	1.0	19.5	5.5	12.5	1.4	0.3	3.7	1.4	13.8
Avg Speed (mph)	10	15	21	21	22	29	7	19	23	19	17	10
Fuel Used (gal)	1.2	2.7	0.8	0.6	11.7	3.9	4.2	0.7	0.2	2.0	0.8	5.3
Fuel Eff. (mpg)	22.2	26.2	30.0	37.4	36.3	39.9	20.3	35.6	38.0	35.2	32.1	25.7
HC Emissions (g)	12	34	12	5	132	50	27	8	3	21	8	41
CO Emissions (g)	466	1139	428	122	2637	1035	656	189	56	475	219	1181
NOx Emissions (g)	41	115	42	18	427	163	80	27	8	68	26	129
Vehicles Entered	118	330	112	10	211	78	118	35	10	101	36	209
Vehicles Exited	118	329	112	9	194	75	91	35	10	102	33	169
Hourly Exit Rate	472	1316	448	36	776	300	364	140	40	408	132	676
Input Volume	766	2020	693	47	842	311	481	142	47	405	140	822
% of Volume	62	65	65	77	92	96	76	99	85	101	94	82
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	10	19	5	4	78	22	50	5	1	15	6	55

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.1
Total Delay (hr)	35.5
Total Del/Veh (s)	80.6
Stop Delay (hr)	28.9
Stop Del/Veh (s)	65.6
Total Stops	1233
Stop/Veh	0.78
Travel Dist (mi)	1077.8
Travel Time (hr)	67.5
Avg Speed (mph)	16
Fuel Used (gal)	34.2
Fuel Eff. (mpg)	31.5
HC Emissions (g)	354
CO Emissions (g)	8601
NOx Emissions (g)	1145
Vehicles Entered	1368
Vehicles Exited	1277
Hourly Exit Rate	5108
Input Volume	6716
% of Volume	76
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	293
Occupancy (veh)	270

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	4.3	0.2	0.0	0.0	0.1	0.2	0.1
Total Delay (hr)	0.0	0.2	0.7	0.1	0.6	0.0	1.6
Total Del/Veh (s)	69.7	10.1	45.1	3.1	15.5	5.0	15.0
Stop Delay (hr)	0.0	0.2	0.6	0.1	0.4	0.0	1.3
Stop Del/Veh (s)	67.4	9.4	41.2	1.7	10.2	3.2	11.9
Total Stops	2	38	35	11	49	1	136
Stop/Veh	1.00	0.66	0.65	0.09	0.33	0.33	0.35
Travel Dist (mi)	0.8	19.4	5.0	12.0	76.5	1.5	115.1
Travel Time (hr)	0.1	0.8	0.9	0.6	2.9	0.0	5.2
Avg Speed (mph)	12	25	6	21	27	30	22
Fuel Used (gal)	0.0	0.5	0.4	0.7	1.9	0.0	3.5
Fuel Eff. (mpg)	28.1	41.1	13.1	17.7	39.7	42.8	32.7
HC Emissions (g)	0	7	4	12	23	0	46
CO Emissions (g)	5	164	153	563	516	8	1410
NOx Emissions (g)	0	22	12	40	77	1	153
Vehicles Entered	2	56	52	124	136	2	372
Vehicles Exited	2	56	51	124	135	3	371
Hourly Exit Rate	8	224	204	496	540	12	1484
Input Volume	11	237	298	694	548	11	1799
% of Volume	73	95	68	71	99	109	82
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							533
Occupancy (veh)	0	3	4	2	11	0	21

SimTraffic Performance Report
Cumulative Plus Scenario 10 Project Conditions

PM Peak Hour

10: Street C & Street H Performance by movement






















Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.3	1.3	2.5	0.3	0.0	0.0	0.2
Total Delay (hr)	0.4	0.0	0.1	0.3	0.3	0.1	1.3
Total Del/Veh (s)	29.1	9.0	38.1	5.8	5.1	3.5	8.3
Stop Delay (hr)	0.4	0.0	0.1	0.1	0.1	0.0	0.8
Stop Del/Veh (s)	25.3	7.2	36.0	2.1	2.5	0.8	5.2
Total Stops	43	8	9	43	46	9	158
Stop/Veh	0.78	0.80	0.90	0.22	0.21	0.17	0.29
Travel Dist (mi)	20.7	4.0	2.8	55.3	20.3	5.1	108.3
Travel Time (hr)	1.1	0.2	0.2	1.9	1.1	0.3	4.8
Avg Speed (mph)	19	27	15	29	18	17	23
Fuel Used (gal)	0.6	0.1	0.1	1.4	0.9	0.2	3.2
Fuel Eff. (mpg)	36.5	39.8	31.1	40.1	22.4	26.5	33.4
HC Emissions (g)	6	2	0	17	12	3	40
CO Emissions (g)	139	42	17	447	433	93	1169
NOx Emissions (g)	20	6	2	57	46	11	141
Vehicles Entered	52	10	10	191	210	52	525
Vehicles Exited	51	10	10	192	208	52	523
Hourly Exit Rate	204	40	40	768	832	208	2092
Input Volume	202	37	37	765	1216	306	2563
% of Volume	101	108	108	100	68	68	82
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							535
Occupancy (veh)	4	1	1	8	5	1	19

Appendix W
Scenario 10 - PM Peak Hour
SimTraffic 10 Analysis Results Based on 12 SimTraffic Model Runs
Synchro / SimTraffic Results

HCM 2010 Signalized Intersection Summary Cumulative Plus Scenario 10 Project Conditions

1: Dennis McCarthy Drive & Laval Road

PM Peak Hour

												
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	10	580	10	10	150	1320	290	10	20	150	330
Future Volume (veh/h)	10	10	580	10	10	150	1320	290	10	20	150	330
Number		5	2	12		1	6	16	3	8	18	7
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		0.99	1.00		0.99	1.00
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1258	1628	1900		1781	1638	1827	1863	1786	1900	1845
Adj Flow Rate, veh/h		11	630	10		163	1435	122	11	22	5	391
Adj No. of Lanes		1	2	0		2	3	1	1	1	0	2
Peak Hour Factor		0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %		100	17	17		7	16	4	2	2	2	3
Cap, veh/h		26	1174	19		369	2088	721	107	85	19	612
Arrive On Green		0.02	0.38	0.38		0.11	0.47	0.47	0.06	0.06	0.06	0.17
Sat Flow, veh/h		1198	3115	49		3291	4472	1545	1774	1405	319	3514
Grp Volume(v), veh/h		11	313	327		163	1435	122	11	0	27	391
Grp Sat Flow(s),veh/h/ln		1198	1546	1619		1645	1491	1545	1774	0	1724	1757
Q Serve(g_s), s		0.6	10.7	10.7		3.1	17.1	3.1	0.4	0.0	1.0	7.0
Cycle Q Clear(g_c), s		0.6	10.7	10.7		3.1	17.1	3.1	0.4	0.0	1.0	7.0
Prop In Lane		1.00		0.03		1.00		1.00	1.00		0.19	1.00
Lane Grp Cap(c), veh/h		26	583	610		369	2088	721	107	0	104	612
V/C Ratio(X)		0.42	0.54	0.54		0.44	0.69	0.17	0.10	0.00	0.26	0.64
Avail Cap(c_a), veh/h		180	914	957		392	2505	865	415	0	403	1137
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		32.8	16.6	16.6		28.2	14.2	10.5	30.2	0.0	30.5	26.1
Incr Delay (d2), s/veh		6.2	1.1	1.0		0.5	0.8	0.2	0.3	0.0	0.8	2.2
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.3	4.7	4.9		1.5	7.1	1.4	0.2	0.0	0.5	3.6
LnGrp Delay(d),s/veh		39.1	17.6	17.6		28.7	15.0	10.6	30.5	0.0	31.3	28.3
LnGrp LOS		D	B	B		C	B	B	C		C	C
Approach Vol, veh/h			651				1720			38		
Approach Delay, s/veh			18.0				16.0			31.1		
Approach LOS			B				B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	12.5	31.5		15.8	6.4	37.7		8.1				
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0				
Max Green Setting (Gmax), s	8.1	40.2		22.0	10.2	38.1		15.9				
Max Q Clear Time (g_c+l1), s	5.1	12.7		9.0	2.6	19.1		3.0				
Green Ext Time (p_c), s	0.1	5.5		2.3	0.0	12.6		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			18.4									
HCM 2010 LOS			B									
Notes												

HCM 2010 Signalized Intersection Summary Cumulative Plus Scenario 10 Project Conditions

1: Dennis McCarthy Drive & Laval Road

PM Peak Hour













	↓	↙
Movement	SBT	SBR
Lane Configurations	↕	
Traffic Volume (veh/h)	20	20
Future Volume (veh/h)	20	20
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		1.00
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1900
Adj Flow Rate, veh/h	0	0
Adj No. of Lanes	1	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	2	2
Cap, veh/h	306	0
Arrive On Green	0.00	0.00
Sat Flow, veh/h	1759	0
Grp Volume(v), veh/h	0	0
Grp Sat Flow(s),veh/h/ln	1759	0
Q Serve(g_s), s	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0
Prop In Lane		0.00
Lane Grp Cap(c), veh/h	306	0
V/C Ratio(X)	0.00	0.00
Avail Cap(c_a), veh/h	569	0
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0
LnGrp LOS		
Approach Vol, veh/h	391	
Approach Delay, s/veh	28.3	
Approach LOS	C	
Timer		

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

HCM 2010 Signalized Intersection Summary Cumulative Plus Scenario 10 Project Conditions

2: I-5 Southbound Ramps & Laval Road

PM Peak Hour

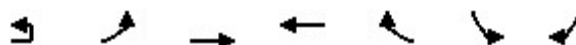
								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	770	300	10	790	562	0		
Future Volume (veh/h)	770	300	10	790	562	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1712	1681	1863	1652	1667	0		
Adj Flow Rate, veh/h	828	0	11	849	604	0		
Adj No. of Lanes	1	1	1	2	2	0		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	11	13	2	15	14	0		
Cap, veh/h	902	791	28	1124	980	0		
Arrive On Green	0.55	0.00	0.02	0.36	0.31	0.00		
Sat Flow, veh/h	1630	1429	1774	3222	3333	0		
Grp Volume(v), veh/h	828	0	11	849	604	0		
Grp Sat Flow(s),veh/h/ln	1630	1429	1774	1570	1583	0		
Q Serve(g_s), s	51.5	0.0	0.7	26.6	18.2	0.0		
Cycle Q Clear(g_c), s	51.5	0.0	0.7	26.6	18.2	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	902	791	28	1124	980	0		
V/C Ratio(X)	0.92	0.00	0.40	0.76	0.62	0.00		
Avail Cap(c_a), veh/h	1193	1046	95	1662	1382	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	22.6	0.0	54.4	31.5	32.9	0.0		
Incr Delay (d2), s/veh	11.3	0.0	9.1	2.2	1.7	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	25.8	0.0	0.4	11.8	8.2	0.0		
LnGrp Delay(d),s/veh	33.9	0.0	63.5	33.7	34.5	0.0		
LnGrp LOS	C		E	C	C			
Approach Vol, veh/h	828			860	604			
Approach Delay, s/veh	33.9			34.1	34.5			
Approach LOS	C			C	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		45.3		66.3	5.4	39.8		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 59		81.7	6.0	48.7		
Max Q Clear Time (g_c+I1), s		28.6		53.5	2.7	20.2		
Green Ext Time (p_c), s		11.4		8.3	0.0	8.4		
Intersection Summary								
HCM 2010 Ctrl Delay			34.1					
HCM 2010 LOS			C					
Notes								

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM Signalized Intersection Capacity Analysis Cumulative Plus Scenario 10 Project Conditions

3: S. Wheeler Ridge Road & I-5 Northbound Ramps

PM Peak Hour
























Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑↑	↑↑	↗		↗
Traffic Volume (vph)	30	320	1706	1022	540	0	110
Future Volume (vph)	30	320	1706	1022	540	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3125	4590	3312	1340		1208
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3125	4590	3312	1340		1208
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	340	1815	1087	574	0	117
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1815	1087	574	0	117
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	13%	13%	9%	19%	2%	36%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		11.5	51.1	29.9	51.1		51.1
Effective Green, g (s)		11.5	51.1	29.9	51.1		51.1
Actuated g/C Ratio		0.23	1.00	0.59	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		703	4590	1937	1340		1208
v/s Ratio Prot		0.12	0.40	c0.33			
v/s Ratio Perm					c0.43		0.10
v/c Ratio		0.53	0.40	0.56	0.43		0.10
Uniform Delay, d1		17.4	0.0	6.5	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.3	0.3	0.8	1.0		0.2
Delay (s)		17.8	0.3	7.3	1.0		0.2
Level of Service		B	A	A	A		A
Approach Delay (s)			3.2	5.2		0.2	
Approach LOS			A	A		A	
Intersection Summary							
HCM 2000 Control Delay			3.9		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.56				
Actuated Cycle Length (s)			51.1		Sum of lost time (s)		9.7
Intersection Capacity Utilization			46.6%		ICU Level of Service		A
Analysis Period (min)			15				
c Critical Lane Group							

HCM 2010 Signalized Intersection Summary Cumulative Plus Scenario 10 Project Conditions

4: S. Wheeler Ridge Road & Laval Road

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Traffic Volume (veh/h)	10	40	60	10	770	40	246	10	70	456	800	472
Future Volume (veh/h)	10	40	60	10	770	40	246	10	70	456	800	472
Number	5	2	12		1	6	16		3	8	18	7
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		1.00		1.00		0.99	1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863		1863	1691	1900		1863	1338	1863	1652
Adj Flow Rate, veh/h	11	43	0		837	43	84		76	496	282	513
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2		2	42	2	15
Cap, veh/h	28	104	88		943	160	313		98	916	394	359
Arrive On Green	0.02	0.06	0.00		0.27	0.31	0.31		0.06	0.25	0.25	0.23
Sat Flow, veh/h	1774	1863	1583		3442	511	998		1774	3653	1574	1573
Grp Volume(v), veh/h	11	43	0		837	0	127		76	496	282	513
Grp Sat Flow(s),veh/h/ln	1774	1863	1583		1721	0	1510		1774	1218	1574	1573
Q Serve(g_s), s	0.6	2.2	0.0		23.5	0.0	6.4		4.3	11.9	16.5	23.0
Cycle Q Clear(g_c), s	0.6	2.2	0.0		23.5	0.0	6.4		4.3	11.9	16.5	23.0
Prop In Lane	1.00		1.00		1.00		0.66		1.00		1.00	1.00
Lane Grp Cap(c), veh/h	28	104	88		943	0	474		98	916	394	359
V/C Ratio(X)	0.39	0.42	0.00		0.89	0.00	0.27		0.78	0.54	0.71	1.43
Avail Cap(c_a), veh/h	141	190	162		2094	0	953		208	1309	564	359
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.1	46.0	0.0		35.1	0.0	25.9		47.0	32.7	34.5	38.9
Incr Delay (d2), s/veh	5.4	4.5	0.0		1.9	0.0	0.2		7.9	1.0	4.7	208.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.3	0.0		11.4	0.0	2.7		2.3	4.1	7.7	30.7
LnGrp Delay(d),s/veh	54.5	50.5	0.0		37.0	0.0	26.1		54.9	33.7	39.1	247.1
LnGrp LOS	D	D			D		C		D	C	D	F
Approach Vol, veh/h		54				964				854		
Approach Delay, s/veh		51.3				35.6				37.4		
Approach LOS		D				D				D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	32.3	11.3	9.7	47.4	6.3	37.3	27.0	30.2				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 61	10.3	* 12	47.1	* 8	63.6	23.0	36.1				
Max Q Clear Time (g_c+I1), s	25.5	4.2	6.3	16.3	2.6	8.4	25.0	18.5				
Green Ext Time (p_c), s	2.1	0.1	0.0	9.8	0.0	0.6	0.0	6.8				
Intersection Summary												
HCM 2010 Ctrl Delay			67.0									
HCM 2010 LOS			E									
Notes												

HCM 2010 Signalized Intersection Summary Cumulative Plus Scenario 10 Project Conditions
 4: S. Wheeler Ridge Road & Laval Road PM Peak Hour

	↓	↙
Movement	SBT	SBR
Lane Configurations	↑↑↑	
Traffic Volume (veh/h)	722	10
Future Volume (veh/h)	722	10
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		0.99
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1433	1900
Adj Flow Rate, veh/h	785	10
Adj No. of Lanes	3	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	33	33
Cap, veh/h	1680	21
Arrive On Green	0.42	0.42
Sat Flow, veh/h	3982	51
Grp Volume(v), veh/h	514	281
Grp Sat Flow(s),veh/h/ln	1304	1424
Q Serve(g_s), s	14.3	14.3
Cycle Q Clear(g_c), s	14.3	14.3
Prop In Lane		0.04
Lane Grp Cap(c), veh/h	1100	601
V/C Ratio(X)	0.47	0.47
Avail Cap(c_a), veh/h	1219	666
HCM Platoon Ratio	1.00	1.00
Upstream Filter(l)	1.00	1.00
Uniform Delay (d), s/veh	21.0	21.0
Incr Delay (d2), s/veh	0.6	1.1
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	5.8
LnGrp Delay(d),s/veh	21.6	22.1
LnGrp LOS	C	C
Approach Vol, veh/h	1308	
Approach Delay, s/veh	110.1	
Approach LOS	F	
Timer		

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

5: Street A & Street C Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.7	0.2	0.2	4.9	2.1	0.0	8.1
Total Del/Veh (s)	15.6	6.7	25.0	67.2	45.3	6.1	38.7
Stop Delay (hr)	0.5	0.1	0.2	4.5	1.9	0.0	7.2
Stop Del/Veh (s)	11.3	3.3	21.0	62.5	39.4	4.0	34.1
Total Stops	83	64	23	276	156	4	606
Stop/Veh	0.53	0.51	0.79	1.06	0.92	0.29	0.80
Travel Dist (mi)	20.6	16.5	2.5	22.2	15.7	1.3	78.8
Travel Time (hr)	1.5	0.9	0.3	5.8	2.7	0.1	11.3
Avg Speed (mph)	14	18	9	4	6	20	7
Fuel Used (gal)	0.9	0.6	0.1	1.8	1.0	0.1	4.5
Fuel Eff. (mpg)	22.5	25.8	20.8	12.7	16.2	24.2	17.7
HC Emissions (g)	14	11	2	11	8	1	46
CO Emissions (g)	548	446	60	292	252	40	1638
NOx Emissions (g)	46	35	6	32	25	3	146
Vehicles Entered	154	124	27	239	156	13	713
Vehicles Exited	152	122	27	237	162	13	713
Hourly Exit Rate	608	488	108	948	648	52	2852
Input Volume	668	498	147	1431	634	53	3431
% of Volume	91	98	73	66	102	98	83
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							111
Occupancy (veh)	6	4	1	23	11	0	45

6: Street A & I-5 SB Off-Ramp Performance by movement

Movement	EBT	EBR	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	1.7	1.8	0.6
Total Delay (hr)	7.2	1.3	0.7	0.1	1.1	0.9	11.3
Total Del/Veh (s)	77.8	45.6	20.0	4.8	21.4	19.1	39.9
Stop Delay (hr)	5.5	1.0	0.5	0.0	0.5	0.3	7.9
Stop Del/Veh (s)	60.2	35.3	14.8	0.1	10.1	6.7	27.9
Total Stops	505	69	95	0	96	97	862
Stop/Veh	1.53	0.66	0.75	0.00	0.52	0.55	0.84
Travel Dist (mi)	41.7	12.5	23.2	17.5	177.3	168.4	440.7
Travel Time (hr)	8.6	1.8	1.4	0.7	5.3	5.0	22.9
Avg Speed (mph)	5	7	16	26	34	34	19
Fuel Used (gal)	3.1	0.7	1.0	0.5	4.0	3.6	12.9
Fuel Eff. (mpg)	13.6	17.0	23.9	35.5	44.3	46.6	34.2
HC Emissions (g)	21	9	14	6	63	51	163
CO Emissions (g)	588	243	568	221	1359	1020	3998
NOx Emissions (g)	73	27	44	23	249	211	627
Vehicles Entered	303	96	121	100	165	156	941
Vehicles Exited	297	96	122	99	165	157	936
Hourly Exit Rate	1188	384	488	396	660	628	3744
Input Volume	1567	498	546	702	655	622	4590
% of Volume	76	77	89	56	101	101	82
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							245
Occupancy (veh)	35	7	6	3	21	20	91

7: I-5 NB Off-Ramp & Street A Performance by movement

Movement	EBT	EBR	WBT	WBR	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.4	0.2	0.1
Total Delay (hr)	0.9	1.0	0.6	1.5	0.7	0.4	5.0
Total Del/Veh (s)	15.7	12.9	15.8	16.6	23.8	8.9	15.2
Stop Delay (hr)	0.5	0.0	0.2	0.2	0.5	0.2	1.6
Stop Del/Veh (s)	9.0	0.6	5.3	1.7	16.4	5.8	5.0
Total Stops	110	48	73	102	70	86	489
Stop/Veh	0.51	0.18	0.54	0.32	0.69	0.61	0.41
Travel Dist (mi)	40.8	46.6	28.6	64.6	65.0	91.1	336.7
Travel Time (hr)	2.3	2.4	1.5	3.6	2.2	2.6	14.5
Avg Speed (mph)	18	20	19	18	29	35	23
Fuel Used (gal)	1.7	1.7	1.2	2.3	1.6	2.1	10.6
Fuel Eff. (mpg)	23.7	27.5	23.7	27.9	41.2	43.3	31.7
HC Emissions (g)	28	19	17	31	20	37	152
CO Emissions (g)	972	637	709	960	556	1011	4843
NOx Emissions (g)	94	77	60	114	85	146	577
Vehicles Entered	210	252	127	301	94	132	1116
Vehicles Exited	208	256	127	300	94	132	1117
Hourly Exit Rate	832	1024	508	1200	376	528	4468
Input Volume	865	1356	874	1992	374	504	5965
% of Volume	96	76	58	60	101	105	75
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							298
Occupancy (veh)	9	10	6	14	9	10	58

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8: Street D & Street A Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.4	0.4	0.1	0.1	0.1	0.1	0.1	0.1
Total Delay (hr)	1.7	0.5	0.1	1.0	73.3	1.4	11.8	0.2	0.0	0.6	0.3	5.6
Total Del/Veh (s)	41.1	12.2	4.6	334.1	359.0	313.8	362.9	48.8	9.1	42.7	49.5	109.4
Stop Delay (hr)	1.5	0.4	0.0	1.0	71.9	1.4	11.7	0.2	0.0	0.5	0.3	4.7
Stop Del/Veh (s)	35.4	8.4	1.8	327.9	352.1	313.9	359.9	43.5	8.8	39.7	44.1	91.4
Total Stops	108	50	17	11	628	15	118	11	3	36	20	148
Stop/Veh	0.71	0.31	0.31	1.00	0.85	0.94	1.01	0.85	0.75	0.75	0.80	0.80
Travel Dist (mi)	29.4	33.0	11.3	11.7	771.9	17.0	39.9	6.6	1.8	29.3	15.5	103.2
Travel Time (hr)	2.7	1.6	0.4	1.4	95.6	1.9	13.0	0.4	0.1	1.4	0.8	8.8
Avg Speed (mph)	11	21	25	9	8	9	3	18	28	20	20	12
Fuel Used (gal)	1.4	1.2	0.4	0.5	33.4	0.7	3.6	0.2	0.0	0.8	0.4	3.6
Fuel Eff. (mpg)	21.7	26.7	29.5	24.9	23.1	24.5	11.1	34.6	42.1	36.0	35.2	28.6
HC Emissions (g)	17	21	8	4	270	5	17	3	0	9	6	33
CO Emissions (g)	612	698	254	86	6079	124	491	78	9	197	127	840
NOx Emissions (g)	56	69	24	10	746	14	42	11	1	29	19	103
Vehicles Entered	134	153	53	7	465	11	91	12	3	42	22	153
Vehicles Exited	135	153	52	3	245	4	44	12	3	42	21	139
Hourly Exit Rate	540	612	208	12	980	16	176	48	12	168	84	556
Input Volume	537	619	214	32	1888	47	349	52	16	158	95	626
% of Volume	101	99	97	38	52	34	50	92	75	106	88	89
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	11	6	2	5	382	8	52	1	0	6	3	35

8: Street D & Street A Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.2
Total Delay (hr)	96.6
Total Del/Veh (s)	228.9
Stop Delay (hr)	93.6
Stop Del/Veh (s)	221.8
Total Stops	1165
Stop/Veh	0.77
Travel Dist (mi)	1070.6
Travel Time (hr)	128.0
Avg Speed (mph)	8
Fuel Used (gal)	46.3
Fuel Eff. (mpg)	23.1
HC Emissions (g)	393
CO Emissions (g)	9595
NOx Emissions (g)	1125
Vehicles Entered	1146
Vehicles Exited	853
Hourly Exit Rate	3412
Input Volume	4633
% of Volume	74
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	146
Occupancy (veh)	512

9: Street C & Street G Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.9	0.2	0.0	0.0	0.1	0.1	0.1
Total Delay (hr)	0.1	0.1	0.7	0.1	0.4	0.0	1.3
Total Del/Veh (s)	64.5	3.7	53.7	2.3	10.8	3.0	13.6
Stop Delay (hr)	0.1	0.0	0.7	0.0	0.2	0.0	1.0
Stop Del/Veh (s)	62.6	3.2	49.5	1.2	6.9	1.8	11.0
Total Stops	3	37	39	7	37	0	123
Stop/Veh	1.00	0.71	0.81	0.07	0.29	0.00	0.36
Travel Dist (mi)	0.7	11.6	4.3	10.1	59.7	0.7	87.2
Travel Time (hr)	0.1	0.4	0.9	0.5	2.1	0.0	4.0
Avg Speed (mph)	9	26	5	22	28	32	22
Fuel Used (gal)	0.0	0.3	0.4	0.6	1.5	0.0	2.8
Fuel Eff. (mpg)	23.9	42.1	11.8	17.8	40.0	40.2	31.7
HC Emissions (g)	0	3	4	11	20	0	38
CO Emissions (g)	7	95	151	500	442	2	1196
NOx Emissions (g)	0	10	12	36	66	0	125
Vehicles Entered	3	50	45	105	120	1	324
Vehicles Exited	3	50	46	105	119	1	324
Hourly Exit Rate	12	200	184	420	476	4	1296
Input Volume	11	196	193	453	491	5	1349
% of Volume	109	102	95	93	97	80	96
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							570
Occupancy (veh)	0	2	4	2	8	0	16

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10: Street C & Street H Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.1	5.1	0.0	0.0	5.2
Denied Del/Veh (s)	0.4	3.8	76.4	56.7	0.0	0.0	33.2
Total Delay (hr)	1.5	0.0	0.3	20.6	0.1	0.0	22.5
Total Del/Veh (s)	75.1	21.1	193.8	239.6	2.0	1.8	143.3
Stop Delay (hr)	1.4	0.0	0.3	20.4	0.0	0.0	22.1
Stop Del/Veh (s)	69.0	16.5	189.6	237.2	1.2	0.5	140.9
Total Stops	74	4	8	337	9	2	434
Stop/Veh	1.00	1.00	1.60	1.09	0.06	0.07	0.77
Travel Dist (mi)	16.8	1.1	1.0	63.2	13.4	2.7	98.2
Travel Time (hr)	2.1	0.1	0.4	27.5	0.6	0.1	30.8
Avg Speed (mph)	8	18	3	3	21	18	4
Fuel Used (gal)	0.8	0.0	0.1	7.4	0.6	0.1	9.1
Fuel Eff. (mpg)	22.2	30.2	8.8	8.5	22.0	25.1	10.8
HC Emissions (g)	8	0	0	36	10	2	56
CO Emissions (g)	236	14	13	1154	359	59	1834
NOx Emissions (g)	23	1	1	93	33	6	157
Vehicles Entered	68	4	4	255	138	27	496
Vehicles Exited	64	4	3	202	139	29	441
Hourly Exit Rate	256	16	12	808	556	116	1764
Input Volume	284	16	21	1294	594	128	2337
% of Volume	90	100	57	62	94	91	75
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	2	68	0	0	70
Density (ft/veh)							84
Occupancy (veh)	8	0	1	90	3	1	102

Appendix X
Scenario 10 - AM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.75	1.00					0.40			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			834					694	140				2,726	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			6.8%					12.1%	14.3%				22.3%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _{WV}			0.967					0.943	0.933				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			937					800	163				3,293	
Off Flow (pcphpl)			469					800	163				1,647	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.22					0.38	0.09				0.70	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective v _P (pcph)					4,734	6,344					7,189			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{FM} (Eqn 13-3)					0.592	0.592					0.592			
P _{FM} (Eqn 13-4)														
P _{FM} (Eqn 13-5)														
P _{FM}					0.039	-0.044					0.113			
v ₁₂ (pcph)					185	-279					814			
v ₃ (pcph)														
v ₃₄ (pcph)					4,550	6,624					6,376			
v _{12s} (pcph)					1,894	2,538					2,876			
v _{812s} (pcph)					3,324	4,632					3,713			
Merge Speed Index					0.40	0.68					0.44			
Merge Area Speed					55.7	49.4					57.8			
Outer Lanes Volume					1,420	1,903					2,157			
Outer Lanes Speed					61.7	59.9					64.0			
Segment Speed					58.3	53.7					61.0			
Merge v/c ratio					0.72	1.01					0.81			
Merge Density					27.6	37.5					30.9			
Merge LOS					C	F					D			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_F (pcph)			5,519					8,133	7,329					
Up Ramp L_{EQ}														
Down Ramp L_{EQ}														
P_{FD} (Eqn 13-9)			0.579					0.520	0.569					
P_{FD} (Eqn 13-10)														
P_{FD} (Eqn 13-11)														
P_{FD}			0.260					0.436	0.436					
v_{12} (pcph)			2,129					3,997	3,287					
v_3 (pcph)														
v_{34} (pcph)			3,391					4,136	4,041					
v_{12a} (pcph)			2,208					3,997	3,287					
Diverge Speed Index			0.38					0.37	0.57					
Diverge Area Speed			56.2					59.6	54.0					
Outer Lanes Volume			1,656					2,068	2,021					
Outer Lanes Speed			68.7					72.6	72.8					
Segment Speed			63.1					65.6	62.9					
Diverge v/c ratio			0.50					0.91	0.75					
Diverge Density			18.7					34.1	30.9					
Diverge LOS			B					D	D					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	0.76	0.59	0.50	0.49	0.72	1.01	0.85	0.91	0.75	0.75	0.81	0.83	0.83	0.66
Segment Density	28.5	21.2	18.7	17.8	27.6	-	32.8	34.1	30.9	27.3	30.9	32.0	32.0	23.3
Segment LOS	D	C	B	B	C	F	D	D	D	D	D	D	D	C
Over Capacity						Merge								

Location	1

Key	
<-> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	2,726
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	2,726
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.3%
RV %	0.0%
E _T	1.5
E _R	1.2
f _{HV}	0.900
f _p	1.00
GP Flow (pcph)	3,223
GP Flow (pcphpl)	1,612
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.67
Speed (mph)	68.0
Density (pcphpl)	23.7
LOS	C
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes F	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.67
Segment Density	23.7
Segment LOS	C
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
↔ Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,760	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	2,831	2,831	2,501	2,331	2,331	4,439	4,609	5,269	5,269	4,909	4,629	4,629
On Ramp Volume					2,108	170	660					684
Off Ramp Volume		330	170						360	280		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	2,831	2,831	2,501	2,331	4,439	4,609	5,269	5,269	5,269	4,909	4,629	5,313
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	17.7%	17.7%	6.8%	0.0%	0.0%	3.6%	7.2%	18.0%	18.0%	18.0%	18.5%	18.5%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _B	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
t _W	0.919	0.919	0.967	1.000	1.000	0.982	0.965	0.917	0.917	0.917	0.915	0.915
t _P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,243	3,243	2,722	2,454	4,673	4,939	5,745	6,045	6,045	5,632	5,323	6,110
GP Flow (pcphpl)	1,081	1,081	907	1,227	1,168	988	1,149	1,209	1,209	1,408	1,331	1,527
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
t _W												
t _C												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.46	0.46	0.39	0.52	0.50	0.42	0.49	0.51	0.51	0.60	0.57	0.65
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.8
Density (pcphpl)	16.6	16.6	14.0	18.9	18.0	15.2	17.7	18.6	18.6	21.7	20.5	23.6
LOS	B	B	B	C	B	B	B	C	C	C	C	C
Calculate Operations for Entering GP Lanes												
GP _{IN} Vol (pcph)		3,243			2,294	4,662	4,669			5,632		5,288
GP _{IN} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{IN} v/c ratio		0.46			0.49	0.50	0.40			0.60		0.56
Calculate Operations for Exiting GP Lanes												
GP _{OUT} Vol (pcph)		2,705	2,445				5,745		5,632	5,301		6,110
GP _{OUT} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{OUT} v/c ratio		0.38	0.52				0.49		0.60	0.56		0.65
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,108	170	660					684
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					7.6%	100.0%	100.0%					21.1%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _B					1.2	1.2	1.2					1.2
t _W					0.963	0.667	0.667					0.905
t _P					1.00	1.00	1.00					1.00
On Flow (pcph)					2,378	277	1,076					822
On Flow (pcphpl)					1,189	277	1,076					822

Location	4	5	6	7	8	9	10	11	12	13	14	15
Key	↔ Express Lane (HOV) No Trucks											
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.50	0.13	0.49					0.39
Calculate Off Ramp Flow Rate												
Off Volume (vph)		330	170						360	280		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						11.1%	17.9%		
RV %		0.0%	0.0%						0.0%	0.0%		
E _T		1.5	1.5						1.5	1.5		
E _R		1.2	1.2						1.2	1.2		
f _{lv}		0.667	0.667						0.947	0.918		
f _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		538	277						413	332		
Off Flow (pcphpl)		538	277						413	332		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.26	0.13						0.20	0.17		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			538									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		277										
Calculate Merge Influence Area Operations												
Effective v ₀ (pcph)							3,642					5,288
Up Ramp L _{EQ}												
Down Ramp L _{EQ}												
P _{MU} (Eqn 13-3)							0.606					0.593
P _{MU} (Eqn 13-4)												
P _{MU} (Eqn 13-5)												
P _{MU}							0.286					0.115
v ₁₂ (pcph)							1,042					608
v ₂ (pcph)												
v ₃₄ (pcph)							2,600					4,680
v ₁₂₄ (pcph)							1,457					2,115
v ₁₁₂₄ (pcph)							2,533					2,937
Merge Speed Index							0.26					0.34
Merge Area Speed							59.0					57.1
Outer Lanes Volume							1,092					1,586
Outer Lanes Speed							62.9					61.1
Segment Speed							60.7					59.1
Merge v/c ratio							0.55					0.64
Merge Density							18.5					24.5
Merge LOS							B					C
Calculate Diverge Influence Area Operations												
Effective v ₀ (pcph)		3,243								5,632		
Up Ramp L _{EQ}												
Down Ramp L _{EQ}		327										
P _{TD} (Eqn 13-9)		0.654								0.604		
P _{TD} (Eqn 13-10)												
P _{TD} (Eqn 13-11)		0.582										
P _{TD}		0.654								0.436		
v ₁₂ (pcph)		2,308								2,643		
v ₂ (pcph)		936										
v ₃₄ (pcph)										2,990		
v ₁₂₄ (pcph)		2,308								2,643		
Diverge Speed Index		0.35								0.65		
Diverge Area Speed		57.0								50.0		
Outer Lanes Volume		936								1,495		
Outer Lanes Speed		71.3								69.4		
Segment Speed		60.5								58.7		
Diverge v/c ratio		0.52								0.60		
Diverge Density		22.7								25.4		
Diverge LOS		C								C		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segment												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.46	0.52	0.39	0.52	0.50	0.42	0.55	0.51	0.51	0.60	0.57	0.64
Segment Density	16.6	22.7	14.0	18.9	18.0	15.2	18.5	18.6	18.6	25.4	20.5	24.5
Segment LOS	B	C	B	C	B	B	B	C	C	C	C	C
Over Capacity												

Fehr & Peers

Fehr & Peers

Fehr & Peers

Appendix Y
Scenario 10 - PM Peak Hour
Northbound I-5 and Southbound I-5
HCS Freeway Mainline Analysis, On-Ramp Merge Analysis, and
Off-Ramp Diverge Analysis

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<- Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment														
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500	1,240	1,470	1,500	3,336	1,500	
Accel Length			500		500	500					500			
Decel Length								500	185					
Mainline Volume	6,927	6,927	6,927	5,560	5,560	6,530	7,607	7,607	7,111	7,001	7,001	7,861	7,861	4,510
On Ramp Volume					970	1,077					860			
Off Ramp Volume			1,367					496	110				3,351	
Express Lane Volume														
EL On Ramp Volume														
EL Off Ramp Volume														
Calculate Flow Rate in General Purpose Lanes (GP)														
GP Volume (vph)	6,927	6,927	6,927	5,560	6,530	7,607	7,607	7,607	7,111	7,001	7,861	7,861	7,861	4,510
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4	4	4	4	4	4	3
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.7%	20.7%	20.7%	24.1%	24.1%	24.1%	20.2%	20.2%	20.2%	20.2%	20.2%	19.7%	19.7%	17.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _B	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f _W	0.707	0.906	0.906	0.892	0.892	0.892	0.908	0.908	0.908	0.908	0.908	0.910	0.910	0.919
f _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	10,420	8,132	8,132	6,628	7,784	9,068	8,910	8,910	8,329	8,200	9,207	9,186	9,186	5,222
GP Flow (pcphpl)	2,605	2,033	2,033	1,657	1,946	2,267	2,227	2,227	2,082	2,050	2,302	2,297	2,297	1,741
Calculate Speed in General Purpose Lanes														
Lane Width (ft)														
Shoulder Width														
TRD														
f _W														
f _{LC}														
Calculated FFS	65.0	65.0	65.0	65.0	65.0									
Measured FFS	65	65	65	65	65	65	70	70	70	70	70	70	70	70
FFS Curve														
Calculate Operations in General Purpose Lanes														
v/c ratio	1.11	0.87	0.87	0.71	0.83	0.96	0.93	0.93	0.87	0.85	0.96	0.96	0.96	0.73
Speed (mph)	-	59.3	59.3	64.1	60.8	54.3	57.8	57.8	61.0	61.6	55.9	56.1	56.1	66.6
Density (pcphpl)	-	34.3	34.3	25.9	32.0	41.7	38.6	38.6	34.2	33.3	41.2	41.0	41.0	26.1
LOS	F	D	D	C	D	E	E	E	D	D	E	E	E	D
Calculate Operations for Entering GP Lanes														
GP _{IN} Vol (pcph)			8,132		6,706	7,858		8,910	8,329		8,196			
GP _{IN} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600			
GP _{IN} v/c ratio			0.87		0.71	0.84		0.93	0.87		0.85			
Calculate Operations for Exiting GP Lanes														
GP _{OUT} Vol (pcph)			6,592		7,784	9,068		8,325	8,188		9,207		5,140	
GP _{OUT} Cap (pcph)			9,400		9,400	9,400		9,600	9,600		9,600		7,200	
GP _{OUT} v/c ratio			0.70		0.83	0.96		0.87	0.85		0.96		0.71	
Calculate Flow Rate in Express Lanes (EL)														
Calculate Speed in Express Lanes														
Calculate Operations in Express Lanes														
Calculate On Ramp Flow Rate														
On Volume (vph)					970	1,077					860			
PHF					0.92	0.92					0.92			
Total Lanes					1	1					1			
Terrain					Level	Level					Level			
Grade %					0.0%	0.0%					0.0%			
Grade Length (mi)					0.00	0.00					0.00			
Truck & Bus %					4.4%	6.6%					16.3%			
RV %					0.0%	0.0%					0.0%			
E _T					1.5	1.5					1.5			
E _B					1.2	1.2					1.2			
f _W					0.978	0.968					0.925			
f _p					1.00	1.00					1.00			
On Flow (pcph)					1,078	1,209					1,011			
On Flow (pcphpl)					1,078	1,209					1,011			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
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Key														
<- Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate On Ramp Roadway Operations														
On Ramp Type					Right	Right					Right			
On Ramp Speed (mph)					25	45					45			
On Ramp Cap (pcph)					1,900	2,100					2,100			
On Ramp v/c ratio					0.57	0.58					0.48			
Calculate Off Ramp Flow Rate														
Off Volume (vph)			1,367					496	110				3,351	
PHF			0.92					0.92	0.92				0.92	
Total Lanes			2					1	1				2	
Terrain			Level					Level	Level				Level	
Grade %			0.0%					0.0%	0.0%				0.0%	
Grade Length (mi)			0.00					0.00	0.00				0.00	
Truck & Bus %			7.3%					17.0%	36.4%				22.2%	
RV %			0.0%					0.0%	0.0%				0.0%	
E _T			1.5					1.5	1.5				1.5	
E _R			1.2					1.2	1.2				1.2	
f _W			0.965					0.922	0.846				0.900	
f _p			1.00					1.00	1.00				1.00	
Off Flow (pcph)			1,540					585	141				4,047	
Off Flow (pcphpl)			770					585	141				2,023	
Calculate Off Ramp Roadway Operations														
Off Ramp Type			Right					Right	Right				Major	
Off Ramp Speed			45					45	25				65	
Off Ramp Cap (pcph)			4,200					2,100	1,900				4,700	
Off Ramp v/c ratio			0.37					0.28	0.07				0.86	
Determine Adjacent Ramp for Three-Lane Mainline Segments														
Calculate Merge Influence Area Operations														
Effective V _D (pcph)					6,706	7,858					8,196			
Up Ramp L _{EQ}														
Down Ramp L _{EQ}														
P _{HA} (Eqn 13-3)					0.592	0.592					0.592			
P _{HA} (Eqn 13-4)														
P _{HA} (Eqn 13-5)														
P _{HA}					0.083	0.067					0.091			
V _D (pcph)					557	524					749			
V _S (pcph)														
V _{SA} (pcph)					6,149	7,335					7,447			
V _{12A} (pcph)					2,683	3,143					3,279			
V _{12A} (pcph)					3,760	4,353					4,290			
Merge Speed Index					0.46	0.58					0.56			
Merge Area Speed					54.3	51.7					54.3			
Outer Lanes Volume					2,012	2,358					2,459			
Outer Lanes Speed					59.6	58.1					62.5			
Segment Speed					56.9	54.8					58.4			
Merge v/c ratio					0.82	0.95					0.93			
Merge Density					31.2	35.7					35.3			
Merge LOS					D	E					E			

Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Key														
<-> Express Lane (HOV)														
No Trucks														
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Diverge Influence Area Operations														
Effective v_0 (pcph)			8,132					8,910	8,329					
Up Ramp L_{EO}														
Down Ramp L_{EO}														
P_{FD} (Eqn 13-9)			0.486					0.510	0.545					
P_{ED} (Eqn 13-10)														
P_{ED} (Eqn 13-11)														
P_{ED}			0.260					0.436	0.436					
v_{12} (pcph)			3,254					4,215	3,711					
v_3 (pcph)														
v_{34} (pcph)			4,878					4,695	4,618					
v_{124} (pcph)			3,254					4,215	3,711					
Diverge Speed Index			0.44					0.35	0.57					
Diverge Area Speed			55.0					60.2	54.0					
Outer Lanes Volume			2,439					2,348	2,309					
Outer Lanes Speed			65.7					71.5	71.7					
Segment Speed			60.9					65.7	62.6					
Diverge v/c ratio			0.74					0.96	0.84					
Diverge Density			27.7					36.0	34.5					
Diverge LOS			C					E	D					
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment														
Calculate On Ramp to Mainline Flow Rate for Weave Segment														
Calculate Mainline to Off Ramp Flow Rate for Weave Segment														
Calculate General Purpose Lanes to General Purpose Lanes														
Calculate Weave Segment Operations														
Summarize Segment Operations														
Segment v/c ratio	1.11	0.87	0.74	0.71	0.82	0.95	0.93	0.96	0.84	0.85	0.93	0.96	0.96	0.73
Segment Density	-	34.3	27.7	25.9	31.2	35.7	38.6	36.0	34.5	33.3	35.3	41.0	41.0	26.1
Segment LOS	F	D	C	C	D	E	E	E	D	D	E	E	E	D
Over Capacity	Segment GP Lanes													

Location	1

Key	
<-> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	3,351
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	3,351
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	22.2%
RV %	0.0%
E _T	1.5
E _R	1.2
f _{HV}	0.900
f _p	1.00
GP Flow (pcph)	3,961
GP Flow (pcphpl)	1,980
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f _{LW}	
f _{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.83
Speed (mph)	62.9
Density (pcphpl)	31.5
LOS	D
Calculate Operations for Entering GP Lanes	
GP _{IN} Vol (pcph)	
GP _{IN} Cap (pcph)	
GP _{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP _{OUT} Vol (pcph)	
GP _{OUT} Cap (pcph)	
GP _{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	
Determine Adjacent Ramp for Three-Lane Mainline Segments	
Calculate Merge Influence Area Operations	
Calculate Diverge Influence Area Operations	
Calculate On Ramp to Off Ramp Flow Rate for Weave Segment	
Calculate On Ramp to Mainline Flow Rate for Weave Segments	
Calculate Mainline to Off Ramp Flow Rate for Weave Segments	
Calculate General Purpose Lanes to General Purpose Lanes F	
Calculate Weave Segment Operations	
Summarize Segment Operations	
Segment v/c ratio	0.83
Segment Density	31.5
Segment LOS	D
Over Capacity	

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
↔ Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Define Freeway Segment												
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic	Basic	Diverge	Basic	Merge
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310	1,500	1,250	1,780	1,500
Accel Length							1,000					560
Decel Length		150								170		
Mainline Volume	5,891	5,891	5,421	5,191	5,191	8,143	8,373	9,383	9,383	8,223	7,423	7,423
On Ramp Volume					2,952	230	1,010					862
Off Ramp Volume		470	230						1,160	800		
Express Lane Volume												
EL On Ramp Volume												
EL Off Ramp Volume												
Calculate Flow Rate in General Purpose Lanes (GP)												
GP Volume (vph)	5,891	5,891	5,421	5,191	8,143	8,373	9,383	9,383	9,383	8,223	7,423	8,285
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	11.9%	11.9%	4.2%	0.0%	0.0%	3.3%	6.0%	21.1%	21.1%	21.1%	22.7%	22.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E _T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E _B	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
t _{lv}	0.944	0.944	0.979	1.000	1.000	0.984	0.971	0.905	0.905	0.905	0.898	0.898
t _p	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	6,569	6,569	5,827	5,464	8,572	8,960	10,172	10,919	10,919	9,569	8,701	9,711
GP Flow (pcphpl)	2,190	2,190	1,942	2,732	2,143	1,792	2,034	2,184	2,184	2,392	2,175	2,428
Calculate Speed in General Purpose Lanes												
Lane Width (ft)												
Shoulder Width												
TRD												
t _{lv}												
t _c												
Calculated FFS												
Measured FFS												
FFS Curve	65	65	65	65	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes												
v/c ratio	0.93	0.93	0.83	1.16	0.91	0.76	0.87	0.93	0.93	1.02	0.93	1.03
Speed (mph)	56.2	56.2	60.8	-	57.2	62.8	59.3	56.3	56.3	-	56.5	-
Density (pcphpl)	39.0	39.0	31.9	-	37.5	28.5	34.3	38.8	38.8	-	38.5	-
LOS	E	E	D	F	E	D	D	E	E	F	E	F
Calculate Operations for Entering GP Lanes												
GP _{IN} Vol (pcph)		6,569			5,216	8,585	8,525			9,569		8,716
GP _{IN} Cap (pcph)		7,050			4,700	9,400	11,750			9,400		9,400
GP _{IN} v/c ratio		0.93			1.11	0.91	0.73			1.02		0.93
Calculate Operations for Exiting GP Lanes												
GP _{OUT} Vol (pcph)		5,803	5,452				10,172		9,578	8,637		9,711
GP _{OUT} Cap (pcph)		7,050	4,700				11,750		9,400	9,400		9,400
GP _{OUT} v/c ratio		0.82	1.16				0.87		1.02	0.92		1.03
Calculate Flow Rate in Express Lanes (EL)												
Calculate Speed in Express Lanes												
Calculate Operations in Express Lanes												
Calculate On Ramp Flow Rate												
On Volume (vph)					2,952	230	1,010					862
PHF					0.92	0.92	0.92					0.92
Total Lanes					2	1	1					1
Terrain					Level	Level	Level					Level
Grade %					0.0%	0.0%	0.0%					0.0%
Grade Length (mi)					0.00	0.00	0.00					0.00
Truck & Bus %					9.1%	100.0%	100.0%					12.3%
RV %					0.0%	0.0%	0.0%					0.0%
E _T					1.5	1.5	1.5					1.5
E _B					1.2	1.2	1.2					1.2
t _{lv}					0.956	0.667	0.667					0.942
t _p					1.00	1.00	1.00					1.00
On Flow (pcph)					3,355	375	1,647					995
On Flow (pcphpl)					1,678	375	1,647					995

Location	4	5	6	7	8	9	10	11	12	13	14	15
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Key												
↔ Express Lane (HOV)												
No Trucks												
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp
Calculate On Ramp Roadway Operations												
On Ramp Type					Major	Right	Right					Right
On Ramp Speed (mph)					70	55	55					45
On Ramp Cap (pcph)					4,800	2,200	2,200					2,100
On Ramp v/c ratio					0.70	0.17	0.75					0.47
Calculate Off Ramp Flow Rate												
Off Volume (vph)		470	230						1,160	800		
PHF		0.92	0.92						0.92	0.92		
Total Lanes		1	1						1	1		
Terrain		Level	Level						Level	Level		
Grade %		0.0%	0.0%						0.0%	0.0%		
Grade Length (mi)		0.00	0.00						0.00	0.00		
Truck & Bus %		100.0%	100.0%						12.7%	14.3%		
RV %		0.0%	0.0%						0.0%	0.0%		
E _T		1.5	1.5						1.5	1.5		
E _R		1.2	1.2						1.2	1.2		
t _{av}		0.667	0.667						0.940	0.933		
t _p		1.00	1.00						1.00	1.00		
Off Flow (pcph)		766	375						1,341	932		
Off Flow (pcphpl)		766	375						1,341	932		
Calculate Off Ramp Roadway Operations												
Off Ramp Type		Right	Right						Right	Right		
Off Ramp Speed		45	45						45	20		
Off Ramp Cap (pcph)		2,100	2,100						2,100	1,900		
Off Ramp v/c ratio		0.36	0.18						0.64	0.49		
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps												
Up Type		No	Off									
Up Distance			4,500									
Up Flow (pcph)			766									
Down Type		Off	No									
Down Distance		1,000										
Down Flow (pcph)		375										
Calculate Merge Influence Area Operations												
Effective v _p (pcph)							6,025					8,716
Up Ramp L _{EQ}												
Down Ramp L _{EQ}												
P _{MU} (Eqn 13-3)							0.606					0.593
P _{MU} (Eqn 13-4)												
P _{MU} (Eqn 13-5)												
P _{MU}							0.012					0.093
v _{U2} (pcph)							72					815
v _U (pcph)												
v _{MU} (pcph)							5,953					7,902
v _{MU} (pcph)							2,410					3,487
v _{MU2} (pcph)							4,057					4,481
Merge Speed Index							0.44					-
Merge Area Speed							55.0					-
Outer Lanes Volume							1,808					
Outer Lanes Speed							60.3					
Segment Speed							57.4					
Merge v/c ratio							0.88					0.97
Merge Density							30.1					-
Merge LOS							D					F
Calculate Diverge Influence Area Operations												
Effective v _p (pcph)		6,569								9,569		
Up Ramp L _{EQ}												
Down Ramp L _{EQ}		571										
P _{D2} (Eqn 13-9)		0.561								0.478		
P _{D2} (Eqn 13-10)												
P _{D2} (Eqn 13-11)		0.525										
P _{D2}		0.561								0.436		
v _{U2} (pcph)		4,019								4,698		
v _U (pcph)		2,550										
v _{MU} (pcph)										4,871		
v _{MU2} (pcph)		4,019								4,698		
Diverge Speed Index		0.37								-		
Diverge Area Speed		56.6								-		
Outer Lanes Volume		2,550										
Outer Lanes Speed		65.3										
Segment Speed		59.6										
Diverge v/c ratio		0.91								1.07		
Diverge Density		37.5								-		
Diverge LOS		E								F		
Calculate On Ramp to Off Ramp Flow Rate for Weave Segments												
Calculate On Ramp to Mainline Flow Rate for Weave Segments												
Calculate Mainline to Off Ramp Flow Rate for Weave Segments												
Calculate General Purpose Lanes to General Purpose Lanes Flow Rate for Weave Segment												
Calculate Weave Segment Operations												
Summarize Segment Operations												
Segment v/c ratio	0.93	0.91	0.83	1.16	0.91	0.76	0.88	0.93	0.93	1.07	0.93	0.97
Segment Density	39.0	37.5	-	-	-	28.5	30.1	38.8	-	-	38.5	-
Segment LOS	E	E	F	F	F	D	D	E	F	F	E	F
Over Capacity			Out GP Lanes	Segment GP Lanes	In GP Lanes				Out GP Lanes	Segment GP Lanes In GP Lanes Diverge		Segment GP Lanes Out GP Lanes

Fehr & Peers

Fehr & Peers

Fehr & Peers

Appendix Z – August 2018 AM and PM Peak Hour Traffic Counts

ALL TRAFFIC DATA

City of Lebec

All Vehicles on Unshifted

HT on Bank 1

RTOR on Bank 2

(916) 771-8700

orders@atdtraffic.com

File Name : 15-8074 Dennis McCarthy Dr-Laval Rd.ppd

Date : 8/16/2018

Unshifted Count = All Vehicles

	Dennis McCarthy Dr Southbound					Laval Rd Westbound					Dennis McCarthy Dr Northbound					Laval Rd Eastbound					Total	Ped Total
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	43	2	0	0	45	10	14	38	0	62	0	2	8	0	10	1	26	1	0	28	145	0
07:15	33	2	4	0	39	8	17	53	1	78	0	1	4	0	5	1	18	0	0	19	141	1
07:30	47	2	2	0	51	6	26	51	1	83	0	1	11	0	12	2	21	0	0	23	169	1
07:45	39	2	2	0	43	15	33	46	1	94	0	1	9	0	10	0	25	0	0	25	172	1
Total	162	8	8	0	178	39	90	188	3	317	0	5	32	0	37	4	90	1	0	95	627	3
08:00	40	1	0	0	41	7	14	52	0	73	0	0	7	1	7	0	27	0	0	27	148	1
08:15	51	6	1	0	58	7	16	60	0	83	0	4	5	0	9	0	29	1	0	30	180	0
08:30	50	3	0	0	53	15	15	33	0	63	0	2	5	0	7	1	25	2	0	28	151	0
08:45	43	3	1	0	47	18	19	59	2	96	0	3	11	0	14	2	26	0	0	28	185	2
Total	184	13	2	0	199	47	64	204	2	315	0	9	28	1	37	3	107	3	0	113	664	3
16:00	71	2	6	0	79	32	19	67	2	118	1	3	20	0	24	5	22	1	1	28	249	3
16:15	71	9	3	0	83	22	20	63	4	105	0	5	31	0	36	2	25	2	0	29	253	4
16:30	62	5	2	0	69	32	52	69	0	153	1	4	26	0	31	0	26	1	0	27	280	0
16:45	74	4	3	0	81	24	41	58	1	123	0	2	19	0	21	1	32	1	0	34	259	1
Total	278	20	14	0	312	110	132	257	7	499	2	14	96	0	112	8	105	5	1	118	1041	8
17:00	60	6	0	0	66	22	22	62	0	106	0	1	24	0	25	2	32	1	0	35	232	0
17:15	52	9	0	0	61	24	27	52	0	103	1	5	29	0	35	1	25	4	0	30	229	0
17:30	60	3	0	0	63	25	22	70	0	117	1	3	31	0	35	1	27	2	0	30	245	0
17:45	51	3	2	0	56	23	33	67	1	123	1	2	17	0	20	3	29	1	0	33	232	1
Total	223	21	2	0	246	94	104	251	1	449	3	11	101	0	115	7	113	8	0	128	938	1
Grand Total	847	62	26	0	935	290	390	900	13	1580	5	39	257	1	301	22	415	17	1	454	3270	15
Apprch %	90.6%	6.6%	2.8%			18.4%	24.7%	57.0%			1.7%	13.0%	85.4%			4.8%	91.4%	3.7%				
Total %	25.9%	1.9%	0.8%		28.6%	8.9%	11.9%	27.5%		48.3%	0.2%	1.2%	7.9%		9.2%	0.7%	12.7%	0.5%		13.9%	100.0%	

AM PEAK HOUR	Dennis McCarthy Dr Southbound					Laval Rd Westbound					Dennis McCarthy Dr Northbound					Laval Rd Eastbound					Total
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 07:30 to 08:30																					
Peak Hour For Entire Intersection Begins at 07:30																					
07:30	47	2	2		51	6	26	51		83	0	1	11		12	2	21	0		23	169
07:45	39	2	2		43	15	33	46		94	0	1	9		10	0	25	0		25	172
08:00	40	1	0		41	7	14	52		73	0	0	7		7	0	27	0		27	148
08:15	51	6	1		58	7	16	60		83	0	4	5		9	0	29	1		30	180
Total Volume	177	11	5		193	35	89	209		333	0	6	32		38	2	102	1		105	669
% App Total	91.7%	5.7%	2.6%			10.5%	26.7%	62.8%			0.0%	15.8%	84.2%			1.9%	97.1%	1.0%			
PHF	.868	.458	.625		.832	.583	.674	.871		.886	.000	.375	.727		.792	.250	.879	.250		.875	.929

PM PEAK HOUR	Dennis McCarthy Dr Southbound					Laval Rd Westbound					Dennis McCarthy Dr Northbound					Laval Rd Eastbound					Total
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																					
Peak Hour For Entire Intersection Begins at 16:00																					
16:00	71	2	6		79	32	19	67		118	1	3	20		24	5	22	1		28	249
16:15	71	9	3		83	22	20	63		105	0	5	31		36	2	25	2		29	253
16:30	62	5	2		69	32	52	69		153	1	4	26		31	0	26	1		27	280
16:45	74	4	3		81	24	41	58		123	0	2	19		21	1	32	1		34	259
Total Volume	278	20	14		312	110	132	257		499	2	14	96		112	8	105	5		118	1041
% App Total	89.1%	6.4%	4.5%			22.0%	26.5%	51.5%			1.8%	12.5%	85.7%			6.8%	89.0%	4.2%			
PHF	.939	.556	.583		.940	.859	.635	.931		.815	.500	.700	.774		.778	.400	.820	.625		.868	.929

ALL TRAFFIC DATA

City of Lebec

All Vehicles on Unshifted

HT on Bank 1

Nothing on Bank 2

(916) 771-8700

orders@atdtraffic.com

File Name : 15-8074 Wheeler Ridge Rd-I-5 NB Ramps.ppd

Date : 8/16/2018

Unshifted Count = All Vehicles

	Wheeler Ridge Rd Southbound					I-5 NB Ramps Westbound					Wheeler Ridge Rd Northbound					I-5 NB Ramps Eastbound					Total	Ped Total
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL		
07:00	0	13	35	0	48	0	0	0	0	0	31	61	0	4	92	0	0	14	0	14	154	4
07:15	0	19	36	0	55	0	0	0	0	0	22	48	0	7	70	0	0	15	0	15	140	7
07:30	0	22	29	0	51	0	0	0	0	0	25	66	0	4	91	0	0	25	0	25	167	4
07:45	0	27	31	0	58	0	0	0	0	0	28	64	0	3	92	0	0	12	0	12	162	3
Total	0	81	131	0	212	0	0	0	0	0	106	239	0	18	345	0	0	66	0	66	623	18
08:00	0	26	28	0	54	0	0	0	0	0	21	70	0	2	91	0	0	15	0	15	160	2
08:15	0	19	27	0	46	0	0	0	0	0	26	62	0	4	88	0	0	14	0	14	148	4
08:30	0	32	23	0	55	0	0	0	0	0	19	63	0	2	82	0	0	13	0	13	150	2
08:45	0	37	36	0	73	0	0	0	0	0	25	80	0	0	105	0	0	6	0	6	184	0
Total	0	114	114	0	228	0	0	0	0	0	91	275	0	8	366	0	0	48	0	48	642	8
16:00	0	30	90	0	120	0	0	0	0	0	35	99	0	9	134	0	0	11	0	11	265	9
16:15	0	36	51	0	87	0	0	0	0	0	40	106	0	5	146	0	0	23	0	23	256	5
16:30	0	45	65	0	110	0	0	0	0	0	41	102	0	5	143	0	0	22	0	22	275	5
16:45	0	42	73	0	115	0	0	0	0	0	45	85	0	9	130	0	0	19	0	19	264	9
Total	0	153	279	0	432	0	0	0	0	0	161	392	0	28	553	0	0	75	0	75	1060	28
17:00	0	31	60	0	91	0	0	0	0	0	46	87	0	6	133	0	0	20	0	20	244	6
17:15	0	20	64	0	84	0	0	0	0	0	35	84	0	5	119	0	0	9	0	9	212	5
17:30	0	33	53	0	86	0	0	0	0	0	40	64	0	2	104	0	0	11	0	11	201	2
17:45	0	23	45	0	68	0	0	0	0	0	32	88	0	7	120	0	0	18	0	18	206	7
Total	0	107	222	0	329	0	0	0	0	0	153	323	0	20	476	0	0	58	0	58	863	20
Grand Total	0	455	746	0	1201	0	0	0	0	0	511	1229	0	74	1740	0	0	247	0	247	3188	74
Apprch %	0.0%	37.9%	62.1%			0.0%	0.0%	0.0%			29.4%	70.6%	0.0%			0.0%	0.0%	100.0%				
Total %	0.0%	14.3%	23.4%		37.7%	0.0%	0.0%	0.0%		0.0%	16.0%	38.6%	0.0%		54.6%	0.0%	0.0%	7.7%		7.7%	100.0%	

AM PEAK HOUR	Wheeler Ridge Rd Southbound					I-5 NB Ramps Westbound					Wheeler Ridge Rd Northbound					I-5 NB Ramps Eastbound					Total
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	0	26	28		54	0	0	0		0	21	70	0		91	0	0	15		15	160
08:15	0	19	27		46	0	0	0		0	26	62	0		88	0	0	14		14	148
08:30	0	32	23		55	0	0	0		0	19	63	0		82	0	0	13		13	150
08:45	0	37	36		73	0	0	0		0	25	80	0		105	0	0	6		6	184
Total Volume	0	114	114		228	0	0	0		0	91	275	0		366	0	0	48		48	642
% App Total	0.0%	50.0%	50.0%			0.0%	0.0%	0.0%			24.9%	75.1%	0.0%			0.0%	0.0%	100.0%			
PHF	.000	.770	.792		.781	.000	.000	.000		.000	.875	.859	.000		.871	.000	.000	.800		.800	.872

PM PEAK HOUR	Wheeler Ridge Rd Southbound					I-5 NB Ramps Westbound					Wheeler Ridge Rd Northbound					I-5 NB Ramps Eastbound					Total
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	
Peak Hour Analysis From 16:00 to 17:00																					
Peak Hour For Entire Intersection Begins at 16:00																					
16:00	0	30	90		120	0	0	0		0	35	99	0		134	0	0	11		11	265
16:15	0	36	51		87	0	0	0		0	40	106	0		146	0	0	23		23	256
16:30	0	45	65		110	0	0	0		0	41	102	0		143	0	0	22		22	275
16:45	0	42	73		115	0	0	0		0	45	85	0		130	0	0	19		19	264
Total Volume	0	153	279		432	0	0	0		0	161	392	0		553	0	0	75		75	1060
% App Total	0.0%	35.4%	64.6%			0.0%	0.0%	0.0%			29.1%	70.9%	0.0%			0.0%	0.0%	100.0%			
PHF	.000	.850	.775		.900	.000	.000	.000		.000	.894	.925	.000		.947	.000	.000	.815		.815	.964

ALL TRAFFIC DATA

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
RTOR on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-8074 I-5 SB Ramp-Laval Rd.ppd
Date : 8/16/2018

Unshifted Count = All Vehicles

	I-5 SB Ramp Southbound					Laval Rd Westbound					I-5 SB Ramp Northbound					Laval Rd Eastbound					Total	Ped Total
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL		
07:00	0	0	41	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0
07:15	0	0	48	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0
07:30	0	0	44	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	0
07:45	0	0	67	0	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0
Total	0	0	200	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0
08:00	0	0	47	0	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0
08:15	0	0	53	0	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0
08:30	0	0	40	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0
08:45	0	0	76	0	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	0
Total	0	0	216	0	216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	216	0
16:00	0	0	75	0	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0
16:15	0	0	72	0	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72	0
16:30	0	0	103	0	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103	0
16:45	0	0	78	0	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	0
Total	0	0	328	0	328	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	328	0
17:00	0	0	61	0	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	0
17:15	0	0	84	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	0
17:30	0	0	80	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0
17:45	0	0	94	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	0
Total	0	0	319	0	319	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	319	0
Grand Total	0	0	1063	0	1063	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1063	0
Apprch %	0.0%	0.0%	100.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%				
Total %	0.0%	0.0%	100.0%		100.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	100.0%	

AM PEAK HOUR	I-5 SB Ramp Southbound					Laval Rd Westbound					I-5 SB Ramp Northbound					Laval Rd Eastbound					Total
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	0	0	47		47	0	0	0		0	0	0	0		0	0	0	0		0	47
08:15	0	0	53		53	0	0	0		0	0	0	0		0	0	0	0		0	53
08:30	0	0	40		40	0	0	0		0	0	0	0		0	0	0	0		0	40
08:45	0	0	76		76	0	0	0		0	0	0	0		0	0	0	0		0	76
Total Volume	0	0	216		216	0	0	0		0	0	0	0		0	0	0	0		0	216
% App Total	0.0%	0.0%	100.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			
PHF	.000	.000	.711		.711	.000	.000	.000		.000	.000	.000	.000		.000	.000	.000	.000		.000	.711

PM PEAK HOUR	I-5 SB Ramp Southbound					Laval Rd Westbound					I-5 SB Ramp Northbound					Laval Rd Eastbound					Total
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	
Peak Hour Analysis From 16:00 to 17:00																					
Peak Hour For Entire Intersection Begins at 16:00																					
16:00	0	0	75		75	0	0	0		0	0	0	0		0	0	0	0		0	75
16:15	0	0	72		72	0	0	0		0	0	0	0		0	0	0	0		0	72
16:30	0	0	103		103	0	0	0		0	0	0	0		0	0	0	0		0	103
16:45	0	0	78		78	0	0	0		0	0	0	0		0	0	0	0		0	78
Total Volume	0	0	328		328	0	0	0		0	0	0	0		0	0	0	0		0	328
% App Total	0.0%	0.0%	100.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			
PHF	.000	.000	.796		.796	.000	.000	.000		.000	.000	.000	.000		.000	.000	.000	.000		.000	.796

ALL TRAFFIC DATA

City of Lebec

All Vehicles on Unshifted

HT on Bank 1

Nothing on Bank 2

(916) 771-8700

orders@atdtraffic.com

File Name : 15-8074 Wheeler Ridge Rd-I-5 NB Ramp.ppd

Date : 8/16/2018

Unshifted Count = All Vehicles

	Wheeler Ridge Rd Southbound					I-5 NB Ramp Westbound					Wheeler Ridge Rd Northbound					I-5 NB Ramp Eastbound					Total	Ped Total
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	48	48	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0	47	47	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	0	44	44	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	28	28	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	167	167	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0	46	46	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	48	48	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0	37	37	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	35	35	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	166	0	166	166	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	0	73	73	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	0	69	69	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	0	59	59	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	0	57	57	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	258	0	258	258	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	48	48	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	0	54	54	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0	42	42	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	0	56	56	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	200	200	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	791	0	791	791	0
Apprch %	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	100.0%				
Total %	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	100.0%		100.0%	100.0%	

AM PEAK HOUR	Wheeler Ridge Rd Southbound					I-5 NB Ramp Westbound					Wheeler Ridge Rd Northbound					I-5 NB Ramp Eastbound					Total
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 07:00 to 08:00																					
Peak Hour For Entire Intersection Begins at 07:00																					
07:00	0	0	0		0	0	0	0		0	0	0	0		0	0	0	48		48	48
07:15	0	0	0		0	0	0	0		0	0	0	0		0	0	0	47		47	47
07:30	0	0	0		0	0	0	0		0	0	0	0		0	0	0	44		44	44
07:45	0	0	0		0	0	0	0		0	0	0	0		0	0	0	28		28	28
Total Volume	0	0	0		0	0	0	0		0	0	0	0		0	0	0	167		167	167
% App Total	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	100.0%			
PHF	.000	.000	.000		.000	.000	.000	.000		.000	.000	.000	.000		.000	.000	.000	.870		.870	.870

PM PEAK HOUR	Wheeler Ridge Rd Southbound					I-5 NB Ramp Westbound					Wheeler Ridge Rd Northbound					I-5 NB Ramp Eastbound					Total
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																					
Peak Hour For Entire Intersection Begins at 16:00																					
16:00	0	0	0		0	0	0	0		0	0	0	0		0	0	0	73		73	73
16:15	0	0	0		0	0	0	0		0	0	0	0		0	0	0	69		69	69
16:30	0	0	0		0	0	0	0		0	0	0	0		0	0	0	59		59	59
16:45	0	0	0		0	0	0	0		0	0	0	0		0	0	0	57		57	57
Total Volume	0	0	0		0	0	0	0		0	0	0	0		0	0	0	258		258	258
% App Total	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	100.0%			
PHF	.000	.000	.000		.000	.000	.000	.000		.000	.000	.000	.000		.000	.000	.000	.884		.884	.884